São Paulo Environmental Agreement

91 SUCCESSFUL CASES in the Climate Agenda

2nd edition - 2022

ACORDO AMBIENTAL SÃO PAULO

CETESB

SÃO PAULO
GOVERNO DO ESTADO
Secretaria de Infraestrutura e Meio Ambiente

São Paulo Environmental Agreement

91 SUCCESSFUL CASES in the Climate Agenda

2nd edition - 2022

ACORDO AMBIENTAL SÃO PAULO

CETESB

SÃO PAULO GOVERNO DO ESTADO

Secretaria de Infraestrutura e Meio Ambiente

São Paulo, November 2022

Internacional Cataloging Data

(CETESB – Library, SP, Brasil)

C418s CETESB (São Paulo)
São Paulo environmental agreement [eletronic resource] : 91 successful cases in the climate agenda / CETESB ; Organizers Patrícia Iglecias, Josilene Ticianelli Vanuzini Ferrer ; Technical team Ana Maria G. Schmid ... [et al.] ; Cases authors Admilson Barbosa ... [et al.]. – São Paulo : CETESB : SIMA, 2022.
1 test file (364 p.) : il. color., PDF ; 118 MB.

Also available in pen drive and paper.
Available at: <https://cetesb.sp.gov.br/acordo-ambiental-sao-paulo/>
ISBN 978-65-5577-042-1.

1. Climate change 2. Environmental agreement 3. Global warming 4. Grennhouse effect – gases 5. Low carbon 6. São Paulo (BR) I. Title.

CDD (21. ed. Esp.) 363.738 74
CDU (2. ed. Port.) 504.7:531.791

Cataloging at source: Margot Terada – CRB 8.4422

CETESB – Environmental Company of the State of São Paulo
Av. Professor Frederico Hermann Júnior, 345
Alto de Pinheiros -SP, ZIP code: 05459-900
CETESB's website: **www.cetesb.sp.gov.br**
Agreement website: **https://cetesb.sp.gov.br/acordo-ambiental-sao-paulo/**
Contact e-mail: acordo2030_cetesb@sp.gov.br

GOVERNO DO ESTADO
DE SÃO PAULO

GOVERNOR
Rodrigo Garcia

SECRETARY OF INFRASTRUCTURE AND ENVIRONMENT
Fernando Chucre

CETESB – ENVIRONMENTAL COMPANY OF THE STATE OF SÃO PAULO

CEO
Patrícia Iglecias

Director of Corporate Management
Aruntho Savastano Neto

Director of Control and Environmental Licensing
Gláucio Attorre Penna

Director of Evaluation and Environmental Impact
Domenico Tremaroli

Director of Engineering and Environmental Quality
Carlos Roberto dos Santos

CETESB – ENVIRONMENTAL COMPANY OF THE STATE OF SÃO PAULO

SÃO PAULO ENVIRONMENTAL AGREEMENT

CEO

Patrícia Iglecias

Department of Strategic and Institutional Development Department

Jorge Luiz Nobre Gouveia

Sectoral Coordination Division

Vivian Marrani de Azevedo Marques

Presidency of the Environmental Chamber of Climate Change

Evandro Gussi

Executive Secretariat of the Environmental Chamber of Climate

Josilene Ticianelli Vannuzini Ferrer

São Paulo Environmental Agreement

Technical data

Organizers

Patrícia Iglecias

Josilene Ticianelli Vanuzini Ferrer

Team

Ana Maria Gonçalves Schmid (CETESB)

Clarice Aico Muramoto (CETESB)

Daniel Soler Huet (CETESB)

Elizabeth Poletti Zani (CETESB)

Helena Barbosa (EcoSolar Energia Inteligente Ltda.)

Thiago Pietrobon (ABRAVA/APAS/Ecosuporte Assessoria Ambiental Ltda.)

Case authors (alphabetical order)

Admilson Clayton Barbosa (Empresa Metropolitana de Água e Energia S.A. – EMAE)
Adriana Castro de Andrade Mello (Braskem S.A.)
Alida Maria Fleury Bellandi (Guarany Indústria e Comércio Ltda)
Aline Lazzarotto (Associação Brasileira das Indústrias de Óleos Vegetais – ABIOVE)
Allan Oliveira Tácito (Allan Oliveira Tácito ME)
Amanda Izabel Dutra da Silva (Raízen Energia S.A.)
Ana Lucia Fonseca Rodrigues Szajubok (Companhia de Saneamento Básico do Estado de São Paulo – SABESP)
André Gulfier (Assaí Atacadista)
Anna Leticia Malagoli Silva (Instituto Nacional de Processamento de Embalagens Vazias – INPEV)
Annie Groth (Ambipar Participações e Empreendimentos S.A.)
Arthur Cortez Pires de Campos (Raízen Energia S.A.)
Arthur Dian Ting Ngai (The Chemours Company Indústria e Comércio de Produtos Químicos Ltda.)
Ayres Takashi Abe (Toyota do Brasil Ltda.)
Camila Almeida (Sylvamo do Brasil Ltda.)
Cinthia Bechelaine (Desenvolve SP)
Camila Canesi Morino (Savin, Paiva Advogados)
Claudio Ribeiro Ramalhoso (Araci Solar EIRELI)
Cristiane Lima Cortez (Federação do Comércio de Bens, Serviços e Turismo do Estado de São Paulo – Fecomercio SP)
David Canassa (Reservas Votorantim Ltda.)
Débora Soares Rocha (Desenvolve SP)
Diego Silva Siqueira (Quanticum Análises e Mapeamentos Ltda.)
Eduardo Humberto Campos Borges (Leroy Merlin Companhia Brasileira de Bricolagem)
Federico Augusto Hideo Correntino Miura (Braskem S.A.)
Fernanda dos Santos Rotta (Rotta e Moro Sociedade de Advogados)
Fernando Berteli (Newsun Energy Brazil S.A.)
Flavia Witkowski Frangetto Castanho (Ordem dos Advogados do Brasil (OAB) – Subseções de São Paulo)
Gabriel Andrade Ferreira de Moura (Tereos Açúcar e Energia Brasil S.A.)
Gabriel Novaes (Companhia Brasileira de Distribuição – GPA)
Gabriela Coral Manga (Aeroportos Brasil Viracopos S.A.)

Gabriela Ditt (Associação Técnica Brasileira das Indústrias de Vidro – ABIVIDRO)
Gabriela Ferrari (Tetra Pak Ltda.)
Giovana Bergamaschi (Companhia Brasileira de Distribuição – GPA)
Guilherme Susteras (Nova Sun – Sim Energias Renováveis Ltda.)
Gustavo Ribeiro de Carvalho (ArcelorMittal Brasil S.A.)
Helena Barbosa (EcoSolar Energia Inteligente Ltda.)
Henrique Kayo (Toyota do Brasil Ltda.)
Henrique Mendes (GM&C Soluções em Logística Reversa e Reciclagem)
Igor Belletti Mutt Urasaki (ENC Energy Brasil)
Ingrid Vieira de Oliveira (Pitangueiras Açúcar e Álcool Ltda.)
Isabela Basso (Braskem S.A.)
Isabela Lima Silva (Tetra Pak Ltda.)
João Paulo Andrade (Emiliano Empreendimentos e Participações Hoteleiras Sociedade Ltda).
Karina Derigo (BYD do Brasil Ltda.)
Karina Batista Figueiredo (ENC Energy Brasil)
Leonardo Almeida (Ambipar Participações e Empreendimentos S.A.)
Lívia Demier Mauri (ComBio Energia S.A.)
Luana Cardoso (Toyota do Brasil Ltda.)
Luciana Corrêa Magalhães (ArcelorMittal Brasil S.A.)
Luciana de Cassia Nunes Kamimimura (Toyota do Brasil Ltda.)
Luciana Leal Coelho (Desenvolve SP)
Lucio Vicente (Grupo Carrefour Brasil)
Luisa Cotrim (Ambipar Participações e Empreendimentos S.A.)
Marcelo Leopardi Zeferino (Logum Logística S.A.)
Marcio Rea (Empresa Metropolitana de Água e Energia S.A. – EMAE)
Marcos Vinícius Maceno (Toyota do Brasil Ltda.)
Mariana Claudio (Sylvamo do Brasil Ltda.)
Mariana Farah (Farah Service)
Mariana Gimenez Carollo Sarabia (União da Agroindústria Canavieira e de Bioenergia do Brasil – UNICA)
Marilene Iamauti (Instituto Nacional de Processamento de Embalagens Vazias – INPEV)
Marina Westrupp Alacon Rayis (Companhia Brasileira de Alumínio – CBA)
Moisés Alves de Araújo Junior (Aeroportos Brasil Viracopos S.A.)
Nicole Pervelli Gonçalves (Instituto Nacional de Processamento de Embalagens Vazias – INPEV)
Olivia Pinheiro Merlin (Lins Agroindustrial S.A.)
Paula Constanza Wilson Aguilera (Associação Brasileira de Energia Solar Fotovoltaica – ABSOLAR)
Raquel Martins Montagnoli (Companhia Brasileira de Alumínio – CBA)
Renata Castiglioni Amaral (Companhia Brasileira de Distribuição – GPA)
Renata Fernandes Vieira Camargo (União da Agroindústria Canavieira do Estado de São Paulo – UNICA)
Roberto Munhoz (Guarany Indústria e Comércio Ltda.)
Rodolfo Nardez Sirol (CPFL Energia)
Rosa Ramos (Ordem dos Advogados do Brasil (OAB) – Subseções de São Paulo)
Tais Mascia Cecchi (Companhia Brasileira de Alumínio – CBA)
Thais Messias Berto (Comercio Industria Canaã Açúcar e Álcool Ltda. – COCAL)
Sandra Nogueira (ArcelorMittal Brasil S.A.)
Shoei Kuratomi (Gressit Revestimentos Indústria e Comercio Ltda. – Gail)
Susane Rasera (Ambipar Participações e Empreendimentos S.A.)
Tamer Abdalla Hajel (Ecofunding Consultoria em Tecnologia Ltda.)
Thiago Duenha (Grupo Carrefour Brasil)
Thiago Pietrobon (Associação Brasileira de Refrigeração, Ar Condicionado, Ventilação e Aquecimento – ABRAVA; Associação Paulista de Supermercados – APAS; Ecosuporte Assessoria Ambiental Ltda.)
Vittoria Neves Picarelli (Braskem S.A.)
Victor Kenzo Horie (Sociedade Beneficente de Senhoras Hospital Sírio Libanês)
Vivian Martins de Souza (Companhia Brasileira de Alumínio – CBA)
Viviane Aversa Franco (Raízen Energia S.A.)

Technical Reviewers (alphabetical order)

Alexsandra Ricci
Aline Lazzaroto
André Gulfier
Antonio Luiz Lima de Queiroz
Arthur Dian T. Ngai
Ayres Takashi Abe
Camila Almeida
Clarice Muramoto
Carlos Ibsen Vianna Lacava
Daniel Soler Huet
David Canassa
Gabriel Andrade Ferreira De Moura
Helena Barbosa
José Contrera Lopes Neto
Josilene Ticianelli Vannuzini Ferrer
Lia Helena M. De Lima Demange
Luana Cardoso
Lucas Takeji Nakaima Fugita
Marcelo Mizutani
Marcos Vinicius Maceno
Maria Cristina Poli
Marina Westrupp Alacon Rayis
Thiago Pietrobon

Case Reviewers – first evaluation (alphabetical order)

Alexsandra Ricci
Aline Lazzarotto
Ana Lucia Fonseca Szajubok
André Tebaldi
Arthur Ngai-Dian Ting
Ayres Takashi Abe
Camila Abolafio
Camila Almeida
Carlos Ibsen Vianna Lacava
Clarice Aico Muramoto
Daniel Soler Huet
Débora Della Nina
Diego Silva Siqueira
Éder Fernando Luciano
Eduardo Humberto Campos Borges
Eliane Kaori Haga
Felipe da Rocha Teixeira Costa
Flavia Witkowski Frangetto
Gabriel Coimbra
Gabriel Andrade Ferreira de Moura
Gilzema Rodrigues
Gustavo Ribeiro de Carvalho
Helena Barbosa
Isabela Badur
Isabella Mendes
Janaína Araújo Borges
Jandelson Pereira
Jaqueline Izumi Ribeiro Toyoda
José Contrera Lopes Neto
Josilene Ticianelli Vannuzini Ferrer
Juliana de Castro Moreto
Karina Derigo

Karina Batista Figueiredo
Luana Cardoso
Lucas Takeji Nakaima Fugita
Luis Augusto Lancellotti Zapparolli Pupin
Marcelo Akira Mizutani
Marcos Vinicius Maceno
Maria Cristina Poli
Marina Rossi
Marina Westrupp Alacon Rayis
Mauricio de Oliveira Silva
Mayra Ferreira Moura
Mayra Hiraoka Catani
Milton Brovini
Natalia Torres
Olívia Conceição Pinheiro Merlin
Patrícia Mendanha Dias
Renata Fernandes Vieira Camargo
Roberto Munhoz
Rosimeire Lopes
Rossevelt de Paula Almado
Sabrina Feldman
Sandra Nogueira de Souza
Sergio Alex Constant de Almeida
Talita Esturba
Thais Messias Berto
Thiago Pietrobon
Victor Kenzo Horie
Victor Riboldi
Vitor Bastos Silva
Vivian Marrani de Azevedo Marques
Vivian Souza
William Takanori Ino

Standards revision ABNT

Setor de Biblioteca e Memória Institucional

Text revision

Ana Maria Gonçalves Schmid
Clarice Muramoto
Davi Francisco Strauss
Daniel Soler Huet
Elizabeth Poletti Zani
Helena Barbosa
Maria Cristina de Souza Leite
Josilene Ticianelli Vannuzini Ferrer
Ruth Cordido
Thiago Pietrobon

Collaborators

Aletea Cristina Avila Madacki (Magalu)
Andressa do Espírito Santo Borba (Leroy Merlin)
Andrey Brito (SERI)
Ayres Takashi Abe (Toyota)
Carlos Lacava Ibsen Vianna Lacava (CETESB)
Carolina Moro (Rotta & Moro)
Clarice Aico Muramoto (CETESB)
Cristiane Lima Cortez (Fecomercio SP)
Cristina Couto (CETESB)
Eduardo Humberto Campos Borges (Leroy Merlin)
Evandro Gussi (UNICA)
Fernanda Rotta (Rotta & Moro)
Helena Barbosa (EcoSolar)
Joana Bercht Canozzi (Chemours)
José Pedro Fittipaldi (InvestSP)
Julio Serson (SERI)
Luana Cardoso (Toyota)
Luiz Gonzaga Benjamin Calou (CETESB)
Marcelo Akira Mizutani (São Martinho)
Marcelo Terenzi Conceição (CETESB)
Marcos Vinicius Maceno (Toyota)
Maria Cristina Poli (CETESB)
Paulo Pompílio (APAS)
Renata Fernandes Vieira Camargo (Unica)
Ricardo Esparta (BlockC)
Roberto Ferreira Santana (Usina São Manoel)
Sergio Alex Constant de Almeida (CETESB)
Thaís Paggoto (CART)
Vivian Marrani de Azevedo Marques (CETESB)
Wilson Issao Shiguemoto (CETESB)

Graphic project

Phábrica de Produções

Layout and art

Phábrica de Produções:
Alecsander Coelho
Daniela Bissiguini
Érsio Ribeiro
Paulo Ciola

Printing of the book

CETESB own printing

Images portrayed in the Cases

All Images portrayed in the Cases belong to the authors and enterprises who have permitted their display.

Opinions and conclusions expressed in this publication are the responsibility of their authors and do not necessarily reflect the views of CETESB.

CETESB – Environmental Company of the State of São Paulo
Avenida Professor Frederico Hermann Jr., 345
Alto de Pinheiros CEP 05459-900 São Paulo SP
Tel.: (11) 3133 3000
http://www.cetesb.sp.gov.br
https://cetesb.sp.gov.br/acordo-ambiental-sao-paulo
acordo2030_cetesb@sp.gov.br

© CETESB 2022
Total or partial reproduction of this document is permitted, provided the source is cited.
Distribution rights reserved.

Acknowledgements

To the president of Câmara Ambiental de Mudanças Climáticas (Climate Change Environmental Chamber), Evandro Gussi, his deputy, Renata Camargo, and to the other members of CAMC for the constant support during the execution of this work.

To the members of the São Paulo Environmental Agreement that took part in the validation meetings of the successful cases sent by the adhering companies and organizations and to the professionals that took on the task of validating and revising the successful cases. These professionals respectively belong to the following organizations: Aeroporto Brasil Viracopos S.A., Associação Brasileira de Refrigeração, Ar Condicionado, Ventilação e Aquecimento – ABRAVA, ABIOVE – Associação Brasileira das Indústrias de Óleos Vegetais, Ambipar Participações e Empreendimentos S.A., Associação Paulista de Supermercados – APAS, ArcelorMittal Brasil S.A., ASSAÍ, BRASKEM S.A., Bichara Sociedade de Advogados, BYD do Brasil Ltda., Companhia Ambiental do Estado de São Paulo – CETESB, Companhia Brasileira de Alumínio – CBA, Companhia Brasileira de Distribuição – GPA, CPFL Energia, Desenvolve SP, Ecosolar Energia Inteligente Ltda., Ecosuporte Assessoria Ambiental Ltda., ENC Energy do Brasil, Federação do Comércio de Bens, Serviços e Turismo do Estado de São Paulo – Fecomercio SP, Guarany Indústria e Comércio Ltda., GM&C Soluções em Logística Reversa e Reciclagem, Sociedade Beneficente de Senhoras Hospital Sírio Libanês, Instituto Nacional de Processamento de Embalagens Vazias – INPEV, Leroy Merlin Companhia Brasileira de Bricolagem, Lins Agroindustrial S.A., MRS Logística S.A., Logum Logística S.A., Quanticum Análises e Mapeamentos Ltda., Raízen Energia S.A., Reservas Votorantim Ltda., Companhia de Saneamento Básico do Estado de São Paulo – SABESP, São Martinho S/A, Savin, Paiva Advogados, Sylvamo do Brasil Ltda., Tereos Açúcar e Energia Brasil S.A., The Chemours Company Indústria e Comércio de Produtos Químicos Ltda., Toyota do Brasil S.A, União da Agroindústria Canavieira e de Bioenergia do Brasil – ÚNICA, and Usina São Manoel.

To the autors of Technicla Note 01 — Quantification of the GHG Emission Report: Cristiane Lima Cortez, Joana Bercht Canozzi, José Pedro Fittipaldi, Josilene Ticianelli Vannuzini Ferrer, Ricardo Esparta and Thaís Pagotto e and Ruth Cordido for the revision and preparation of the second edition presented in this publication.

To Ana Maria Gonçalves Schmid and Elizabeth Poletti Zani (CETESB) for the support in the revision of texts of the successful cases.

To Thiago Pietrobon (Associação Brasileira de Refrigeração, Ar Condicionado, Ventilação e Aquecimento — ABRAVA / Associação Paulista de Supermercados - APAS /Ecosuporte Assessoria Ambiental Ltda.) Helena Barbosa (Ecosolar Energia Inteligente Ltda.), for the excellency in the participation of the entire development process of this publication.

To Helena Barbosa (Ecosolar Energia Inteligente Ltda) for the technical consultancy which she offered in several moments of this publication.

To Daniel Soler Huet, Carlos Ibsen Lacava, Maria Cristina Poli, Clarice Aico Muramoto, José Contrera Neto, colleagues at CETESB, for the support during the meetings at Câmara Ambiental de Mudanças Climáticas and during the entire process of the implementation of the agreement.

To Vivian Marrani de Azevedo Marques, for the support on the development of the works of Câmara Ambiental de Mudanças Climáticas, for the great supported provided for this publication to be finalized.

To Logum Logística S.A. and to Marcelo Leopardi Zeferino (Logum Logística S.A.) for their support in the translation of Technical Note 01.1 into English, which will expand the dissemination of this important document produced by Câmara Ambiental de Mudanças Climáticas.

ACORDO AMBIENTAL SÃO PAULO

Environment and State Infrastructure Secretariat's Presentation

The State of São Paulo has been demonstrating its commitment to the decarbonization of the economy of the State of São Paulo, as well as its contributions to the achievement of the national targets established in the NDC (National Determined Contributions), through the adhesion to UN Campaigns Race to Zero and Race to Resilience, and the following commitments: the conception of the Plano de Ação Climática Net Zero (Climate Action Plan Net Zero) — 2050 and Plano de Adaptação e Resilência Climática (Adaptation and Resilience Climate Plan). Our goal is to reach zero carbon emissions by 2050, besides guaranteeing a resilient state through feasible programs in renewable energy, forest restoration, sustainable transportation, low-carbon agriculture, bioeconomy, biodiversity protection, pollution control and prevention, hydric security, environmental sanitation, risks and disasters reduction program, municipal resilience programs in the State of São Paulo, among others.

We acknowledge the urgency of climate action, and defend, with an inclusive transition, not letting anyone fall behind, similarly, we acknowledge that biodiversity protection cannot be postponed.

São Paulo Environmental Agreement, which began in COP-25 in Madrid in 2019, shows that São Paulo is committed to sustainable development, incentivizing best practices, seeking partnerships with the public and private sectors to reach the objectives of the international agenda to reduce greenhouse gas emissions.

Public policies effectively function when they stem from the sum of actions among governments, businesses, and civil society. It is through initiatives like this one, that allow the implementation of new technologies and innovative solutions, that we believe it to be possible to put into practice actions in favor of the environment and quality of life of our population.

Fernando Chucre

State Secretary of Infrastructure and Environment

CETESB President-Director's Presentation

The world, annually, awaits the holding of the Climate Change Conference. In 2022, the spotlights are directed at the city of Sharm El Sheik, in Egypt, where COP27 takes place.

Increasingly the conference host city receives parallel events and demonstrations, aiming to draw attention to the urgency of quick and well-structured actions, that incentivize the interested parties to take part in the climate agenda.

São Paulo, as a subnational government, has taken the lead in this theme and through CETESB, in a parallel event to COP27, launches the second edition of the "São Paulo Environmental Agreement—56 Successful Cases".

The new book has reached the total of 91 reports related to the voluntary contributions of businesses located or acting in the State, of associations that represent productive sectors. The book is made up of two volumes, one in English and the other one in Portuguese and, besides the description of the new cases, it has been added to the experiences put forward in the first edition, presented in 2021, in COP26.

The São Paulo Environmental Agreement was launched in 2019, by the Government of the State, by the Secretariats of International Relations and Infrastructure and Environment, conceived and technically coordinated by CETESB. It aimed to incentivize the voluntary adherence of companies, associations that represent productive sectors and municipalities, allowing them to commit to reductions of emissions of greenhouse gases, as stipulated in the Paris Agreement. Initially, with 55 adherents, today it counts with 1,660 adherents from representatives of many productive segments, as well as municipalities, which are followed by the experiences put forward by this heterogenous group, having still, validation by highly regarded international observers.

The first part of the book is a sample of what has been done and planned towards the fulfilment of the voluntary environmental targets to halt global warming.

The second is composed by the Technical Note 01.1 — Quantification and Reporting of Greenhouse Gas Emissions, updated, with approaches and the presentations of references and methodologies to report greenhouse gas emissions.

The São Paulo Environmental Agreement is a program of the State, which must be made permanent and expanded over the next years, a definitive contribution for the State climate agenda, reflecting on Brazil and the world.

Patrícia Iglecias

CEO CETESB

Associate Professor School of Law University of São Paulo

Former State of São Paulo Secretary for Environment and Head of Environmental Affairs in the University of São Paulo

INTERNATIONAL OBSERVERS

British Consulate-General São Paulo

Cambra de Comerç Brasil - Catalunya

CONSULAT GÉNÉRAL DE FRANCE À SÃO PAULO
Liberté
Égalité
Fraternité

Consulado General de Chile en Sao Paulo
Gobierno de Chile

EARTHDAY.ORG

ONU programa para o meio ambiente

PNUD

ACORDO AMBIENTAL SÃO PAULO

PARTICIPATION - CASES

ABIOVE Associação Brasileira das Indústrias de Óleos Vegetais

Abividro Associação Brasileira das Indústrias de Vidro

ABRAVA Associação Brasileira de Refrigeração Ar Condicionado, Ventilação e Aquecimento

ambipar GROUP

APAS Associação Paulista de Supermercados

ARACI

ArcelorMittal

ASSAÍ Atacadista

Braskem

BYD

Carrefour

cba

Chemours

energia responsável cocal

combio

CPFL Energia

DESENVOLVE SP O Banco do Empreendedor

ecofunding the green new deal

ecosolar Energia Inteligente

ECO SUPORTE

emae

EMILIANO

ENC ENERGY

farahservice melhorias urbanas

FECOMERCIOSP
REPRESENTA MUITO PARA VOCÊ

GAIL

GM&C
SOLUÇÕES EM LOGÍSTICA REVERSA E RECICLAGEM

GPA

Guarany
tradição e inovação

inpEV
INSTITUTO NACIONAL DE PROCESSAMENTO DE EMBALAGENS VAZIAS

LEROY MERLIN
A casa da sua casa.

lōgum

NewSun
A Energia da Nova Era

OAB
SÃO PAULO

QUANTICUM
INTELIGÊNCIA EM SOLOS
Diagnóstico | Agro Data Science | Práticas de Manejo

raízen

LEGADO
DAS ÁGUAS
RESERVA VOTORANTIM

Rotta Moro
Assessoria jurídica ambiental

sabesp

Savin
Paiva
advogados

HOSPITAL
SÍRIO-LIBANÊS

SUN MOBI
A energia sem limites.

Sylvamo

TÁCITO
CONSULTORIA
AMBIENTAL E TURÍSTICA

Tereos

Tetra Pak®
PROTEGE O QUE É BOM

TOYOTA

UNICA
ALIMENTO E ENERGIA SUSTENTÁVEL
DO BRASIL PARA O MUNDO

Usina Lins

45
USINA PITANGUEIRAS

VIRACOPOS
Aeroportos Brasil

ACORDO AMBIENTAL SÃO PAULO

SUPPORTED BY

APAS
ASSOCIAÇÃO PAULISTA DE SUPERMERCADOS

LEROY MERLIN
A casa da sua casa.

UNICA
ALIMENTO E ENERGIA SUSTENTÁVEL DO BRASIL PARA O MUNDO

emae

INVESTSP
AGÊNCIA PAULISTA DE PROMOÇÃO DE INVESTIMENTOS E COMPETITIVIDADE

sabesp

ORGANIZED BY

Câmara Ambiental
MUDANÇAS CLIMÁTICAS

CETESB

SÃO PAULO
GOVERNO DO ESTADO
Secretaria de Infraestrutura e Meio Ambiente

ACORDO AMBIENTAL SÃO PAULO

ADHERING INSTITUTIONS

3A Mining
ABES São Paulo
abetre
ABiogás Associação Brasileira do Biogás
ABIOVE Associação Brasileira das Indústrias de Óleos Vegetais
Abividro
ABRAVA
abrelpe
ABSOLAR Associação Brasileira de Energia Solar Fotovoltaica
ABVE Associação Brasileira do Veículo Elétrico
AELO Associação das Empresas de Loteamento e Desenvolvimento Urbano
aes Brasil
AFPESP
Albert Einstein Sociedade Beneficente Israelita Brasileira
ambipar GROUP
amyris
ANFAVEA
ANVAZ Innovation by DNA
APAS Associação Paulista de Supermercados
ARACI
ArcelorMittal
ARKEMA Innovative Chemistry
arteris
ASSAÍ Atacadista
atvos
GO AUDAX OSASCO
Bandeirantes Refrigeração
Beng engenharia
Bichara 20 Advogados
BIOVERDE
BLOCKc
Braskem
BYD
CAETÉ florestal
Câmara de Comércio Italiana de São Paulo - ITALCAM
Camere di Commercio Italiane all'Estero
Centro Logístico CampoGrande
Carrefour
CART
cba
Chemours
Companhia Nacional de Álcool
energia responsável cocal
Colormaq
combio

COMPRE BEM
SUPERMERCADOS

CONCREMAT
engenharia e tecnologia

conforlab®

CORPUS
Saneamento e Obras Ltda

CPFL
ENERGIA

DESENVOLVE SP
O BANCO DO EMPREENDEDOR

Dexco

Distak
AR CONDICIONADO AUTOMOTIVO

Duratex
Soluções para melhor viver

ecofunding
the green new deal

ECONOM
SOLUÇÕES AMBIENTAIS

ecosolar
Energia Inteligente

ECOSUPORTE

EIXO [SP]

emae

EMILIANO

ENC ENERGY

entrevias

ESPECTRO
Soluções Ergonômicas
Sustentáveis

farahservice
melhorias urbanas

FECOMERCIOSP
REPRESENTA MUITO PARA VOCÊ

FERRARI
Agroindústria

FERRAZ DE CAMARGO
ADVOGADOS

FLSmidth

FREEPACKNET

FUNDAÇÃO
TOYOTA
DO BRASIL

GAIL

gás
eco

INSTITUTO
GEA
ética e meio ambiente

geoflorestas
Soluções Ambientais

GERDAU
O futuro se molda

GFB
Global Forest Bond

GM&C
SOLUÇÕES EM LOGÍSTICA REVERSA E RECICLAGEM

GPA

greenyellow
smart energy solutions

GRESOCOL
Equipamentos para Refrigeração

GRUPO
colorado
colorado

Guarany
tradição e inovação

Instituto i.S

INI
AUTOMOTIVE

inpEV
INSTITUTO NACIONAL DE PROCESSAMENTO DE EMBALAGENS VAZIAS

INVESTSP
AGÊNCIA PAULISTA DE PROMOÇÃO DE
INVESTIMENTOS E COMPETITIVIDADE

iTrack
BRASIL

Johnson
Controls

KAAN Architecten

LEROY MERLIN
A casa da sua casa.

lōgum

Magalu

Marfrig

Maringá Ferro-Liga

MERCADO extra

metalex

mini extra

minuto Pão de Açúcar

MRS Logística S.A.

MRV

National Freight International logistics

NELSER

NETSHOES

NewSun A Energia da Nova Era

Nitto Innovation for Customers

NOVABRICO ENERGIA SOLAR

NE

OAB SÃO PAULO

ORIZON VALORIZAÇÃO DE RESÍDUOS

PINHEIRO NETO ADVOGADOS

POMA

Prodesp Sua conexão com o futuro.

purcom.

QUANTICUM INTELIGÊNCIA EM SOLOS Diagnóstico | Agro Data Science | Práticas de Manejo

raízen

RECICLALOG

LEGADO DAS ÁGUAS

RLX fluidos refrigerantes

Rotta Moro Assessoria jurídica ambiental

sabesp

Santa Helena O MELHOR DO AMENDOIM

São Manoel

São Martinho

Savin Paiva advogados

SindTRR

SINDIPEÇAS ABIPEÇAS

HOSPITAL SÍRIO-LIBANÊS

STOCCHE FORBES ADVOGADOS

Strabjunqueira CONSTRUINDO VALORES

SUN MOBI A energia sem limites.

SunR

SUPER AR

Sylvamo

TÁCITO CONSULTORIA AMBIENTAL E TURÍSTICA

TECNOROAD RODAS E PNEUS PARA TRATORES

Tereos

Tetra Pak® PROTEGE O QUE É BOM

TOYOTA

TRENNEPOHL ADVOGADOS

UNICA ALIMENTO E ENERGIA SUSTENTÁVEL DO BRASIL PARA O MUNDO

Usina Lins

USINA PITANGUEIRAS

USL OURINHOS

Usina Vertente

Via Green institute

VINAGREEN

VIRACOPOS Aeroportos Brasil

ACORDO AMBIENTAL SÃO PAULO

PARTICIPATING MUNICIPALITIES

ASSEMBLEIA LEGISLATIVA DO ESTADO DE SÃO PAULO

PREFEITURA MUNICIPAL DE ÁGUAS DE SANTA BÁRBARA

PREFEITURA DE ÁGUAS DE ÁLVARO DE CARVALHO

GOVERNO MUNICIPAL AMÉRICO DE CAMPOS Construindo Juntos

PREFEITURA DE ANGATUBA

PREFEITURA DE ARAÇARIGUAMA cidade de oportunidades

PREFEITURA DE ARAÇOIABA DA SERRA

PREFEITURA DE ARANDU

PREFEITURA DE ARIRANHA

PREFEITURA DE ATIBAIA

PREFEITURA DE BARRA DO CHAPÉU

PREFEITURA DE BARUERI

Prefeitura de Bastos Realizando sonhos

PREFEITURA DE BILAC

PREFEITURA DE BOFETE

PREFEITURA DE BOITUVA boituva.sp.gov.br

PREFEITURA DE BROTAS

PREFEITURA DE CABRÁLIA PAULISTA

PREFEITURA DO MUNICÍPIO DE CAJOBI Amor por nossa gente!

Prefeitura Municipal CAJURU

Prefeitura Municipal de Cândido Rodrigues Estado de São Paulo

PREFEITURA DE CAPELA DO ALTO

PREFEITURA DE CATADUVA

GOVERNO MUNICIPAL Colômbia Gestão eficiente, transparente e inovadora. 2021 / 2024

ESTÂNCIA CLIMÁTICA DE CUNHA

PREFEITURA DE DESCALVADO

PREFEITURA DE DOIS CÓRREGOS

PREFEITURA DE ECHAPORÃ

PREFEITURA DE ELDORADO

PREFEITURA DE ELIAS FAUSTO

PREFEITURA MUNICIPAL DE ENGENHEIRO COELHO PREPARANDO UM NOVO FUTURO GESTÃO 2021-2024

PREFEITURA DE ESPÍRITO SANTO DO TURVO

PREFEITURA DE FERNANDO PRESTES

CIDADE DE FERRAZ DE VASCONCELOS

PREFEITURA DE GUAIÇARA Juntos Somos Mais

PREFEITURA MUNICIPAL DE GUAIMBÊ

PREFEITURA DE GUAPIARA

PREFEITURA DE GUARÁ

PREFEITURA DE GUARANI D'OESTE

Hortolândia
CONTINUAR A SONHAR E REALIZAR

IARAS

PREFEITURA DE IBIRAPEMA

PREFEITURA DE IGARAPAVA

INDAIATUBA
PENSANDO EM VOCÊ

PREFEITURA DE ITANHAÉM

PREFEITURA MUNICIPAL DE ITAPIRA

PREFEITURA DE ITAPIRAPUÃ PAULISTA

PREFEITURA DE ITAQUAQUECETUBA

PREFEITURA DE ITIRAPUÃ

Itu
TEMPO DE CRESCER

PREFEITURA DE ITUPEVA

PREFEITURA DE JABORANDI

PREFEITURA DE JABOTICABAL

Prefeitura de JACAREÍ

PREFEITURA DE JACUPIRANGA

PREFEITURA DE JAGUARIÚNA

PREFEITURA DE JANDIRA

PREFEITURA MUNICIPAL DE JARDINÓPOLIS-SP

PREFEITURA DE JOÃO RAMALHO

PREFEITURA DE JUQUIÁ
Município de Interesse Turístico

PREFEITURA MUNICIPAL DE JUQUITIBA

PREFEITURA DE LAVÍNIA

PREFEITURA
LINDOIA
Construindo uma nova história
ADM 2021/2024

PREFEITURA DE LOUVEIRA

PREFEITURA DE MAIRINQUE

Prefeitura de Mairiporã
mairipora.sp.gov.br

PREFEITURA MUNICIPAL DE MARABÁ PAULISTA

PREFEITURA DE MIGUELÓPOLIS

Município de Mirante do Paranapanema
Capital do Pontal e da Reforma Agrária
Secretaria do Meio Ambiente

MUNICÍPIO DE MOGI MIRIM

PREFEITURA DE MONÇÕES

PREFEITURA DE MONTE ALEGRE DO SUL

PREFEITURA DE MONTE AZUL PAULISTA

PREFEITURA DE MONTEIRO LOBATO

Natividade da Serra

PREFEITURA DE MONTEIRO LOBATO

PREFEITURA DE NOVA GRANADA

PREFEITURA DE ORINDIÚVA

PREFEITURA DE PALMITAL

PREFEITURA DE PARIQUERA-AÇU

PREFEITURA DE PEDERNEIRAS

PREFEITURA DE PINDORAMA

PREFEITURA DA CIDADE TURÍSTICA DE Piracaia TRABALHANDO PARA TODOS

PREFEITURA DE PIRANGI JUNTOS POR UM NOVO TEMPO

PREFEITURA DE PLATINA

PREFEITURA DE PRADÓPOLIS

PREFEITURA DE PRESIDENTE ALVES

PREFEITURA DE QUADRA

PREFEITURA DE REDENÇÃO DA SERRA

PREFEITURA DE Registro

PREFEITURA DE RIBEIRÃO BONITO

PREFEITURA DE RIBEIRÃO PRETO

PREFEITURA DE RIVERSUL

SAAP Associação dos Amigos de Alto dos Pinheiros

PREFEITURA DA ESTÂNCIA TURÍSTICA DE SALTO

PREFEITURA DE SANTA ERNESTINA Um novo tempo começou!

Município de Santa Isabel

PREFEITURA DE Santa Maria da Serra Um novo tempo chegou

PREFEITURA DE SANTO ANTONIO DA ALEGRIA

Juntos por SANTO ANTÔNIO DO PINHAL GESTÃO 2021 | 2024

PREFEITURA DE Santos

PREFEITURA MUNICIPAL SÃO JOSÉ DO RIO PRETO

MUNICÍPIO DE SÃO MANUEL

CIDADE DE SÃO PAULO

PREFEITURA DE SÃO PEDRO

PREFEITURA DE SÃO SEBASTIÃO

PREFEITURA DE SÃO SEBASTIÃO DA GRAMA

PREFEITURA DE SÃO SIMÃO MAIS PELA NOSSA GENTE

PREFEITURA DE SILVEIRAS

PREFEITURA DE Suzano

PREFEITURA DO MUNICÍPIO DE TACIBA

PREFEITURA DE TAQUARITUBA

TRÊS FRONTEIRAS MUNICÍPIO DE INTERESSE TURÍSTICO

PREFEITURA DE VALPARAÍSO

PREFEITURA DE VARGEM GRANDE PAULISTA

PREFEITURA DE VISTA ALEGRE DO ALTO

PREFEITURA DE ZACARIAS

ACORDO AMBIENTAL SÃO PAULO

SUMMARY

INTRODUCTION **29**

PERCEPTIONS ABOUT THE RELEVANCE OF THE SÃO PAULO ENVIRONMENTAL AGREEMENT **31**

SUCCESSFUL CASES **37**

ABIOVE

ABIOVE's Sustainable Oil Programme 39

ABIVIDRO

Carbon Trust Program 42

ABRAVA

Reverse logistic of refrigerant cylinders 45

AMBIPAR

Corridors for Life AR Grouped Project 48

APAS

GHG emissions avoided through banning single-use plastic bags in São Paulo city 52

ARACI SOLAR

Photovoltaic Generator System in Industry 39 kilowatt peak (kWp) 55

ARCELORMITTAL

Carpark case study 57

Steligence: the intelligent construction choice 60

ASSAI

Assaí Atacadista's renewable energy mix as a vector for combating climate change 63

BRASKEM

Green PE I'm Green™ (GREEN PE I'M GREEN™) 66

Vesta Project: modernization of the ABC petrochemical complex 69

BYD

Replacement of fluorescent lamps with Light Emitting Diode (LED) lamps 72

CARREFOUR

CarbonFree –Offsetting logistics emissions by Carrefour Brasil Group 75

CBA

Biomass Fired Boiler 78

Smelter Technology Update 81

CHEMOURS

Sustainable Commercial Refrigeration 84

COCAL
Expansion of Localized Vinasse Application 87
Limestone Application Using Precision Technology 90

COMBIO
Energy transition project: biomass boilers 93

CPFL ENERGIA
CPFL and RGE in Hospitals 96
Development of a Sustainable Campus model at UNICAMP - living laboratory for applications of mini renewable generation, energy efficiency, monitoring and management of energy consumption 100
Electrical mobility: the new path 104
Innovation for adaptation to climate changes 107
Multisource hybrid energy system management 110
Preserva 113
Sustainable Charging Station Integration, Comprehensive Monitoring, and Real-Time Connectivity 117
Urban Reforestation with Security 121

DESENVOLVE SP
Measuring the carbon consumption of Desenvolve SP and neutralization through "Integration Planting" 124

ECOFUNDING
PVU Golf Club Barra 128

ECOSOLAR
Container EcoSolar® 131

ECOSUPORTE
Determination of purity refrigerant as an indicator for energy efficiency of refrigeration 134
Refrigerant reclaimed as avoided GHG emissions strategy 137

EMAE
Projects to generate electricity from solar sources, Floating Photovoltaic Power Plants, to be installed in the water mirror of the Billings Reservoir (Metropolitan Region of São Paulo - Brazil) 140

EMILIANO
Implementation of Electric Charging Stations 143

ENC ENERGY
Energy from Landfill Gas (LFG) - Guatapará Energia S.A. e SPE Tremembé Energia Ltda. 145

FARAH SERVICE
Bike path, Social Impact and Carbon Reduction: the New Rio Pinheiros 148

FECOMERCIO SP
"Prêmio Fecomercio de Sustentabilidade"/ Fecomercio Sustainability Award 151

GAIL
Dual system: GN furnace and wood chip furnace 154

GM&C
Materials recovery from e-waste recycling 156

GPA
Sustainable Transport Modalities for GPA E-commerce Deliveries 160

GUARANY
Guarany Saving Water Sources 163

INPEV
Campo Limpo Environmental Educational Program (PEA) 166
Campo Limpo System Eco-efficiency Study 169
Improvement of the Campo Limpo System energy mix, with the implementation of photo-voltaic power generation system 172

LEROY MERLIN
Compensation of GHG Emissions Generated in the New Stores Constructions 174
Forest Week 176
HQE-AQUA Certification: Use and Operation 179
Postera Project 182
LOGUM
Using Pipeline system to transport Ethanol with a significant reduction in carbon emissions 185
NEW SUN
UFV NewSun Sapucai 188
OAB
Range of transformational actions of the class of lawyers regarding the climate change issue 191
QUANTICUM
Good Practices in Regenerative Agriculture 194
RAÍZEN
Biogas from Vinasse 198
Biomass Energy (Bagasse Pellets) 201
Cellulosic Ethanol 204
Raízen and the creation of the Bioenergy Park: full circularity 207
RESERVAS VOTORANTIM
The structure of the *Legado das Águas* Private Reserve 210
ROTTA MORO
Education and climate advocacy 215
Joining the Partnership Platform for the Amazon (PPA) 218
SABESP
Corporate Program of Sustainable Sewage Treatment Plants 221
Distributed Generation Program - Photovoltaic Energy 224
SAVIN, PAIVA
Low Carbon Advocacy 227
SÍRIO-LIBANÊS
100% renewable energy 230
Actions contributing to low carbon emissions 232
Compensation of emissions making investments in education 234
Hospital Sírio-Libanês: Strategies for management of Carbon Neutral and Zero Carbon in Energy 236
SUN MOBI
Community solar photovoltaic (PV) distributed generation 239
SYLVAMO
Raízes do Mogi Guaçu Program (Mogi Guaçu Roots) 242
São Marcelo Forest Park Natural Heritage Private Reserve 245
Sustainability practices in the supply chain 248
Sustainable supply chain 252
Verde Mel Project 255
TÁCITO CONSULTORIA
TÁCITO A2030 258
TEREOS
Replacement of Nitrogen Fertilizers 261
Restaurant Waste Composting Project 263
Vinasse Biodigestion Project 265

TETRAPAK
Tetra Pak's Journey to Zero Landfill 268

TOYOTA
Circular Economy in the Value Chain 271
CO_2 Reduction through Hybrid Vehicles 273
Energy efficiency – applying "just in time" concept in equipment 276
Engaging the Supply Chain 279
Project ReTornar - Reusage of uniforms and automotive fabrics for making sustainable gifts 283
Projeto ReTornar - Etios Aibo 286
Use of certified green energy 289

UNICA
Greener Ethanol ('Etanol Mais Verde') 291
RenovaBio 295

USINA LINS
"Preventing Fires Together" - Awareness, Prevention and Firefighting Campaign 299
Programa SEMEAR 302

USINA PITANGUEIRAS
Regular planting since 2016. 304

VIRACOPOS
Replacement of metal steam lamps with LED. 307
Valorization of solid waste to Waste Derived Fuel (CDR) generation. 310

APPENDICES 315
Technical Note. 317
Questions and answers 359

Introduction

The São Paulo Environmental Agreement is an initiative of the Government of the State of São Paulo, launched in 2019, with 55 adherents, in an effort to combat climate changes, with the promotion of the engagement of the main actors of the business sectors and public management, in a voluntary form, towards more adequate measures of mitigation and adaptation to global climate phenomena.

Today, the Agreement counts with 1,600 adherents of representatives of many productive segments and municipalities, and international observers that keep up with the experiences reported by this heterogenous group.

In 2022, attention is turned to Sharm El Sheik, in Egypt, where the 27th UN Conference on Climate Change takes place. Increasingly the city that hosts the Conference receives demonstrations and parallel events, aiming to alert to the urgency of quick and well-structured actions, that incentivize the interested parties to take on their roles in the climate agenda.

São Paulo, as a subnational government, has taken the lead in the theme, and through CETESB, in a parallel event to COP27, launches the second edition of the "São Paulo Environmental Agreement — 56 Successful Case". The new book has reached a total of 91 reports relative to the voluntary contributions of businesses locates or acting in the State, as well as associations that represent productive sectors.

The book is made up of two volumes, one in English and the other one in Portuguese, and besides the new cases, it has been added to the experiences put forward in the first edition, presented in 2021, at COP26.

Several productive segments of the private sector, institutions, public entities reported that their voluntary adherence to the São Paulo Environmental Agreement has allowed them to channel efforts, systematize results and identify the opportunities to contribute to the reduction of GHG emissions, facilitating the engagement in the climate agenda.

The second part of the new issue consists of the Technical Note 01.1 Quantification and Reporting of Greenhouse Gas Emissions, updated, with approaches and the presentation of references and methodologies about the emissions of gases.

The Technical Note is composed of four sections: the first addresses the main normative and organizational references for the São Paulo Environmental Agreement, which includes a brief view of the international climate agreements and the main regulatory references within the national and state spheres, to the present date.

The second section deals with climate change and market references, which includes a glance at green bonds, indices of Environmental, Social, and Governance (ESG), the corporate sustainability index in the stock market (ISE B3) and sectorial accreditations.

The third sector includes the presentation of calculations of greenhouse gas (GHG) emission and the publishing of inventories and tools, presenting the guidelines of the Intergovernmental Panel on Climate Change (IPCC), Norm Iso14064-1, GGH Protocol, Global Protocol for Community-Scale GHG Emissions inventories (GPC) and the main references which will encompass the organizational and operational limits, selection of methodologies of calculations and data collection of GHG activities and factors of emissions, base-year, emissions calculations, for inventorying best practices.

Lastly, the concluding considerations, which consolidate the set of information in the Technical Note. Throughout the entire document, the references for each theme are shown as footnotes, to facilitate the access to the sources of information.

Another important tool, that is available in the Technical Note presented to the reader, is a catalogue, glossary, in which the words used in the edition are defined, explained, or commented.

The new issue sediments the base for every entity, business, and city hall to begin their emission inventories and report them, identifying the relevant points and opportunities for mitigation, facilitating the consultation of successful cases.

Certainly, this is an initiative under construction: new cases and new editions will follow!

ACORDO AMBIENTAL SÃO PAULO

PERCEPTIONS ABOUT THE RELEVANCE OF THE SÃO PAULO ENVIRONMENTAL AGREEMENT...

Climate change have definitely entered the agenda of all businesses, especially with regard to food safety, which is at the core of the supermarket sector. Through Agreement of the State São Paulo, similarly to how we have worked in terms of our commitment to reverse logistics together with CETESB, for circular economy, we seek to advance in the universalization of knowledge, in order to permit all, regardless of size, to contribute as a sector to the agenda against climate change.

Paulo Pompílio, Director of Sustainability - APAS

It is an honor for us at ComBio to be present in this book of positive environmental impact cases, along with so many other important initiatives aligned with the climate agenda. Providing a solution that enables industries to make their energy transitions has been at the heart of our activities since 2008, and each year we deliver a large-scale decarbonization solution to more companies. The São Paulo Environmental Agreement is therefore not only something we can contribute to, but we are also part of the solution to the CO_2 emission reduction targets.

Roberto Véras, Sustainability Director - ComBio Energia

Adhering to the São Paulo Environmental Agreement allows FecomercioSP to perform in the promotion of a low carbon economy in the State, as it disseminates the Agreement to the unions and businesses with whom it is related. Thus, it incentivizes new memberships, the realization of greenhouse gas inventories, the report of emissions and the establishment of voluntary emission reduction targets.

José Goldemberg, President of Sustainability - Federação do Comércio de Bens, Serviços e Turismo do Estado de São Paulo - FecomercioSP

The São Paulo Environmental Agreement, launched in November 2019, was a pioneer since it incentivized companies from the state to make voluntary compromises of greenhouse gas emissions, in order to limit global warming, maintaining the State Government's commitment and the established targets in the Paris Agreement. In this context, the Sugar and Energy sector, through the participation of UNICA and their associates, has made many contributions to combating climate change and global warming. Sustainable development is part of our DNA and, with RenovaBio, we will be one of the greatest service providers in the decarbonization of Brazil, and, consequently, the world. It is becoming ever more clear that development can only be comprehended in its most complete understanding on the condition that it presupposes sustainable aspects. The São Paulo Environmental Agreement is, without a doubt, a great response that Brazil, from the State of São Paulo, offers to its society and to the international society.

Evandro Gussi, President - Unica

It has been a great satisfaction for Toyota to take part in the São Paulo Environmental Agreement. It is an opportunity to learn from other businesses, to make our compromises public and to challenge even more. It is part of Toyota's global mission to produce happiness in large scale and this path is only possible making decisions that benefit business, while they protect people and the environment. We are together on this journey.

Viviane Mansi, Communication and Sustainability Diretor - Toyota

Desenvolve SP works on future agendas, always in line with the Sustainable Development Goals (SDGs) and the fight against climate change. Our goal is to boost financing for sustainable projects in areas such as renewable energy, energy efficiency, solid waste management, water and sanitation, as well as financing with positive social impacts, aiming at a just transition. In this context, the São Paulo Environmental Agreement is essential to increase private investment and contribute to the economic, social and sustainable development of the 645 municipalities in the state of São Paulo. We are doing our part to build a better world for generations to come.

Gabriela Redona Chiste, CEO - Desenvolve SP

The photovoltaic solar source, both in large solar power plants and in own solar energy generations in building, residences, businesses, public venues and rural areas is a strategic tool to contribute with the reduction of greenhouse gas emissions, combat global warming and for the sustainably economic development of Brazil, which has one of the greatest solar potentials of the world and still is not well harnessed. That's why, ABSOLAR considers it extremely important to take part in the São Paulo Environmental Agreement, a state-run initiative that is connected to the theme of the environment and its sustainability, which has contributed for sustainable development of our country through photovoltaic solar energy.

Dr. Rodrigo Lopes Sauaia, CEO - ABSOLAR

CBA believes in a better future and more sustainable and more collaborative. Taking part of The São Paulo Environmental Agreement reaffirms our commitment to guarantee positive contributions to the environment and society, through an ESG agenda, which expects a supply of low carbon aluminum, social development and performance in the whole chain of value.

Leandro Campos de Faria - CBA

In order to drastically reduce GHG emissions globally and combat climate change, immediate actions must be taken by the society, companies and governments. Thus, Raísen, as one of the largest businesses in Brasil, acknowledges its responsibility and potential do catalyze the decarbonification and highlights its support to the São Paulo Environmental Agreement. This is everyone's journey and, initiatives such as this one collaborate for businesses to be in the same wavelength in the transition to a low-carbon economy.

Claudio Borges T Gaspar Oliveira, Vice President of Institutional Relations and Sustainability - Raízen

The care with the environment, within ESG metrics, is one of the most important pillars of the management of our business and we notice that even with all the guidelines, as well as the current law number 12,305/10, which addresses the correct disposal of Solid Residue in Brazil, the problem persists, worsening even more the global warming potential. In the face of that, within the several actions planned by our internal Environment team to change this scenario, we adhere and are totally aligned with the São Paulo Environmental Agreement of CETESB.

Ramon Lumertz, CEO - RLX Fluidos Refrigerantes

The São Paulo Environmental Agreement is a great opportunity for companies to reflect their efforts to reduce greenhouse gas emissions and respond, in an assertive manner, to society's expectations for the improvement of the quality of the air and the preservation of the environment, in contrast to the increasing global temperature and its harmful consequences to all living beings who live on our planet. Thus, EMAE has been developing non-polluting electricity generations projects, through its small central hydroelectric plants, aiming to contribute to the economic and environmental sustainability of São Paulo.

Márcio Rea, CEO - EMAE

The adherence to the São Paulo Environmental Agreement is an important opportunity to exchange experiences among the sectors, ratifying SABESP's compromise to enhance its Environmental and Climatic Agenda to mitigate the greenhouse gas emissions, aligned with the challenges of the universalization of sanitation. Our investments in sustainable technologies, clean energy, and the implementation of sewage treatment itself have contributed for the reduction of emissions, as well as the initiatives for greater resilience and hydric safety, in the face of extreme events.

Benedito Pinto Ferreira Braga,
Presidente - Sabesp

For Farah Service, the Environmental Agreement of São Paulo means the opportunity to reaffirm our values and become a part of an initiative committed to socio-environmental changes that will create significant impacts on society while following the goals of the 2030 agenda.

Michel Farah, CEO - Farah Service

For Leroy Merlin the adhesion to the São Paulo Environmental Agreement is strategic, since it represents the intersectoral alignment for the prioritization of the climate agenda, the adoption of compromises and collective targets, which seek the transition to a low carbon and resilient economy. This ambition transcends the borders of our country and, therefore, is part of culture, philosophy, and world-wide entrepreneurial purposes.

Renato Augusto Coltro, Leader of
Desafio de Desenvolvimento, Expansão
& Relações Institucionais (Development
of Challenge, Expansion and
Institutional Relations) - Leroy Merlin

GM&C's Adherence to the Environmental Agreement consolidates an important step in the company's strategy to improve the management of greenhouse gas emissions. Because we are in the recycling business, naturally there was a perception of the positive impacts that the company already provided. Now, with the preparation of GHG inventories and the internal definition of goals, we reinforce our commitment to always improve and maintain the transparency of our operations.

Marcelo Oliveira, CEO - GM&C

The adhesion to the São Paulo Environmental Agreement will be very significant for Guarany. Firstly, for the privildge of being present, on November 29 2019, at Palácio dos Bandeirantes with our president Mrs. Alida Bellandi, with the Governor João Doria and with the president of CETESB, Phd Patrícia Inglecias, in the launch of this important Agreement. Secondly, for taking part of this select group who has worked hard over the last 2 years, in which we had the priviledge of learning from specialists from various businesses who have singed the Agreement. Lastly, we congratulate this initiave that allowed our company to carry out the survey of the most relevant GHG, identify strategies to face the challenges present and future that will come from climate changes, acting in a proactive way to establish plans and actions to mitigate both in relation to the company, as well as the community of Itu, where we are located, especially, adding improvements to our company's quality and competitivity advantages.

Roberto Munhoz Gonçalves, Gerente de Gestão da Qualidade e Meio Ambiente - Guarany

As important as the legislations that foster sustainable development, are the initiatives related to best practices of executing, in practice, actions that significantly decrease greenhouse gasses. The São Paulo Environmental Agreement has proven itself a capable platform in this sense, and Reservas Votarantim has taken part actively of the synergy process that takes place between companies and CETESB, which seeks to enhance processes, implement practices and promote ideas. Our proposal to foster a new economy at Legado das Águas through maintaining the forest stock and sequestration through plantings, s has showed itself complimentary to other initiatives of the platform. It is the sum of good ideas and actions that will lead to real results in the climate change, with the excellent example of coordination given by São Paulo.

David Canassa, Director - Reservas Votorantim Ltda. / Manager - Legado das Águas

The São Paulo Environmental Agreement is an initiative that stimulates businesses to commit and publish their greenhouse gas emissions reductions targets, aligned to society's expectations. Braskem sees it as a great opportunity to take part in this initiative and reaffirms its target to reduce 15% of GHG emissions until 2030 and to become a neutral carbon business until 2050, aligning with sustainable development.

Marina Rossi, Corporative Manager of Sustainable Development - Braskem

This partnership with the government, more than representing an impulse for environmental protection, places Concessionária in a community that involves other corporative segments. This reflects on the sharing of experiences and good practices that lead to a common goal: to reduce the amount of pollutants released in the atmosphere, reducing the environmental impact .

Thaís Pagotto, Environment Coordinator at Concessionária Auto Raposo Tavares - CART

GPA works in favor of a low carbon economy to combat climate change, prioritizing actions to reduce atmospheric emissions and increasing energy efficiency in its operations. As a food retailer, the distribution of products to supply millions of customers is one of the focuses of the business and, therefore, among several other fronts of action, we constantly invest in innovation and technology to improve our logistics operation in line with more sustainable mobility. The São Paulo Environmental Agreement makes a strong contribution to the evolution of this agenda, expanding conversations and presenting different initiatives in search of a common agreement, in addition to the opportunity for companies and society to work together for the same objective.

Renata Castiglioni Amaral, Sustainability Manager - GPA

It is a great honor to participate in the São Paulo Environmental Agreement and to contribute for the reductions of greenhouse gas emissions in our planet. The International Airport of Viracopos is renowned for being one of the best and most relevant components of the transport of cargo and passengers of the country and Concessionária Aeroportos Brasil Viracopos S.A. has an entrepreneurial philosophy and internal policies that strive for sustainable and socially responsible actions, always seeking the rational use of natural resources and environmental preservation.

Marco Antonio Beme, Manager Advisor Aeroportuária - Viracopos

The law firm adhered to the São Paulo Environmental Agreement aiming to neutralize its greenhouse gas emissions. It was not a business decision, but a moral imperative facing the future.

Glaucia Savin - Savin, Paiva Advogados

For Centro Logístico Campo Grande participating of the São Paulo Environmental Agreement means reaffirming our values and objectives through this important initiative, which is aligned with the 17 ESG programs already contained in the project.

Jael Rawet, Diretor - Centro Logístico Campo Grande.

CPFL Energia's mission is to provide sustainable, affordable, and reliable energy at all times, making people's lives safer, healthier and more prosperous in the regions where we operate. To fulfill this mission, we believe in the collaboration and interaction with organizations that are protagonists of the sustainable development agenda, reinforcing our commitments to the energy transition and to the value generation for society.

Rodolfo Nardez Sirol, Environment and Sustainability Director - CPFL Energia

For us at EcoSolar, participating of the Environmental Agreement represents an opportunity to commit with the society in the construction of a sustainable economy — being present at the meetings grants access to us to important initiatives that serve as references for us to define our values as a company. As a professional, I feel privileged to have access to qualified people who have a well-defined purpose — there is a constant and lively exchange of ideas and of projects and all are open to listening, giving and getting inputs.

Helena Barbosa - EcoSolar Energia Inteligente

For Rotta e Moro Advogados being part of The São Paulo Agreement represents being connected to a valuable network, capable of bringing into reality the climate ambitions in our State, for which the future generations will have the opportunity to enjoy a life of quality, because this is a challenge that will only be reached collectively.

Fernanda Rotta - Rotta e Moro Advogados

The São Paulo Environmental Agreement allowed us to build bridges between institutions, actions and actors, potentializing results, in a way to make it ever more viable, the change the world needs.

Jorge Luiz Mantovani Jr, Director - ECOSUPORTE

It is a great honor for NewSun to participate of the São Paulo environmental Agreement, a program that has a lot of synergy with the noble mission of NewSun and its team, focused on long-term sustainability. We welcome the initiative, which has proven to be proactive in its actions, favoring the creation of a 'greener' business environment in a unique format, so far in Brazil. Stemming from the public sector of the State of São Paulo, the Agreement incentivizes sustainable businesses and can give the due visibility to many low-carbon businesses. What will transform Brazil and the world, regarding mitigation and adapting to climate change is not the mere use of the term ESG, which is trending, but the solid development of a sustainable business environment, as is the most important agenda of the São Paulo Environmental Agreement.

Fernando Berteli - New Sun

BYD do Brasil is a company that breathes and inspires the environment, for this reason, it is very gratifying for us to participate in the Environmental Agreement of the State of São Paulo and thus be able to contribute to the reduction of greenhouse gases (GHG), an issue that is very polemic and worrying nowadays.

Karina Derigo - HSE/BYD

The pioneering of the São Paulo Environmental Agreement in encouraging companies to assume commitments to reduce greenhouse gas emissions is fully aligned with the commitment of the ArcelorMittal Group, which was the first to establish the global commitment to be carbon neutral by 2050, with the intermediate goal to reduce emissions by 25% by 2030. The decarbonization is part of a larger agenda that ArcelorMittal maintains focused on ESG (Environmental, Social, and Governance) objectives. The attitudes such as those of the São Paulo Environmental Agreement should encourage other states and companies to seek effective actions to face the impacts of global warming.

Luciana Magalhães, Environment & By-products Manager - ArcelorMittal Aços Longos Brasil

The São Paulo Environmental Agreement is aligned with the compromise of FLSmidth to Sustainability and our program "MissionZero" which seeks to contribute significantly to the reduction of emissions from the cement and mining until 2030.

Diogo Lima, Head HSE&QA Brasil - FLSmidth

Refrigeration, Air Conditioning, Ventilation, and Heating has shown to be strategic for the mitigation and adaptation against climate change. The adhesion to the São Paulo Environmental Agreement has allowed us to channel efforts, systematize results and identify opportunities to contribute as a sector, facilitating our engagement.

Arnaldo Basile, CEO - ABRAVA

After hearing about São Paulo Environmental Agreement, we got excited to be part of this promising initiative that brings together companies that are truly committed to GHG reduction goals. ENC Energy Brasil's thermoelectric plants contribute to the goals by using methane gas (28 times more pollutant than carbon dioxide) for energy generation. Not only our operation but also our strategic values are aligned with climate change cause and that's why we set decarbonization goals.

Igor Urasaki, Business Development Director ENC Energy Brasil

The chance for Conforlab to take part in the Environmetal Agreeemet is aligned with our Environmental, Social and Governance commitment. This move by the State of São Paulo is fundamental for sustainably economical growth. It brings great satisfaction to support this plan, certain that the future generations will have a healthier and more balanced environment.

Leonardo Cozac - Conforlab

Usina Lins believes that to achieve the sustainable world we want, cooperation and the involvement of all is essential, so together we can be protagonists of development, transforming challenges into opportunities. São Paulo Environmental Agreement is aligned with what we believe, as it promotes the reduction of GHG emissions through the union and partnership of companies and institutions from different segments, all together with a common objective: the mitigation of climate change. Our responsibility to society and the environment is part of Our Commitment, and being part of São Paulo Environmental Agreement is reaffirming our sustainability value, helping to contain global warming and its harmful effects on life on Earth.

Olivia Pinheiro Merlin, Sustainability Manager - Usina Lins

Our brand promise is to protect people, food and the planet. Thus, investing in innovative solutions that contribute to the environment is part of the company's strategy along the ESG agenda. Therefore, it is with great satisfaction that Tetra Pak participates in the São Paulo Environmental Agreement, as it reinforces the company's commitment to contribute to a low carbon society, seeking to build a better planet for all!",

Karen Vasconcelos, Head of Government Relations & Public Affairs Brazil and Southern Cone - Tetra Pak

Hospital Sírio-Libanês adheres to the São Paulo Environmental Agreement, as it understands that it is in line with our commitment to being a Carbon Neutral institution, valuing ESG practices and ratifying the actions realized with the validation of shared cases. Therefore, we understand that we are contributing, in fact, to the minimization of the environmental impacts of an activity that always will exist, which is caring for people's health."

Anderson Cremasco, Director of Logistics, Infrastructure and Facilities - Hospital Sírio-Libanês

ACORDO AMBIENTAL SÃO PAULO

SUCCESSFUL CASES

ACORDO AMBIENTAL SÃO PAULO

ABIOVE Associação Brasileira das Indústrias de Óleos Vegetais

óleo sustentável

Corporate Name

Brazilian Association of Vegetable Oil Industries

Name of the case

ABIOVE's Sustainable Oil Programme

Campaign "Sustainable Oil in Summer" held in February 2022.

Collector installed at one of the Program's Voluntary Delivery Points (VDP).

Front cover of the IV Edition of Capitã Recicla: environmental education booklet for children published annually by the Program.

VDP design with step-by-step instructions on how to properly dispose of used cooking oil

Site

https://abiove.org.br

www.oleosustentavel.org.br

Corporate Email Address

abiove@abiove.org.br

Type of Organization

Association.

Economic activities (based on CNAE - National classification of economic activities)

Activities of business and employers membership organisations.

Theme

Reduction of indirect emissions, scope 3 (according to the Greenhouse Gases Program (GHG Protocol) – acquired goods and services, capital goods, fuel, transport and distribution, waste, business travel, etc.), Avoided emissions (substitution of fuels and modes of transportation, innovations in products and services, etc.).

Case description

The Brazilian Association of Vegetable Oil Industries (ABIOVE) coordinates sectorial actions in reverse logistics for Residual Edible Vegetable Oils through the "Sustainable Oil" initiative.

Created in 2012 for educational purposes, one of the programme's main functions is as a communications channel with consumers wishing to learn more about the importance of recycling and to improve their understanding of the correct storage and destination for used vegetable oils at the Voluntary Delivery Points (VDP), as well as informing consumers of the benefits recycling brings to the environment and the population's well-being.

ABIOVE's member companies have their own collection systems in partnerships with wholesale and retail chains, schools, churches, public entities, commercial establishments, and condominiums. There are over 2,000 VDPs in more than 100 municipalities in the state of São Paulo.

The biggest contribution to climate change from recycling residual edible oils is their use in the production of biodiesel, replacing virgin vegetable oil. As the current share of virgin soy oil in the raw material mix used for biodiesel production is 68%, and as just 2% of the mix comes from residual vegetable oils, it is evident that there is a big potential for expanding the use of residual oils, obviating the need to clear new areas to grow soy for energetic purposes.

In addition, the potential for generating residual edible oils from the vegetable oils used for food purposes is estimated at 25%. In other words, each litre of oil used generates 250 ml of residual oil that could be used in the production of biofuel.

The programme has, since its inception, collected over ten million litres of residual edible vegetable oils. In 2021 alone, over 764,000 litres were correctly disposed of.

The theme of the Sustainable Oil initiative has great social appeal because the programme's focus is on the residential consumers of cooking oil, who are mainly consumers in Classes C and D, as these families consume, on average, one litre of edible oil per person per month.

As mentioned above, all the programme's communication and awareness actions are directed towards the correct disposal of oil and its recycling in order to promote the biodiesel production chain, generating income and employment for thousands of people. The focus is to inform consumers that used oil is a high-value residue and that its reuse can benefit the environment since its main destination is the production of biofuel.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it is ongoing.

What is the forecast of continuity of the Case?

Over 10 years.

Is the Case likely to expand?

Very likely.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Correctly disposing of used cooking oil already represents an important reduction in the methane emissions occurring in the sewage system. In addition to this benefit, further GHG emissions are avoided as virgin oils are replaced by residual oils in the production of biofuel, as well as by increasing the biodiesel content in fossil diesel, currently at 10%.

Impacts/results

The programme has an educational nature with a high social impact as it promotes a change in the oil consumer's behaviour and encourages people to adopt habits that help preserve the environment, such as recycling other residues. Furthermore, with the correct disposal of used vegetable oils at delivery points, the recycling chain is strengthened by increasing the validation of collectors and the generation of jobs. The increased collection and recycling of oils also strengthens biodiesel production using used oils, increasing demand for biofuels from renewable sources and improving the quality of people's lives.

The goals set by the São Paulo state government (700,000 litres collected in 86 municipalities in the state and 1,550 Voluntary Delivery Points in 2021) were met by collecting used residual oils and by recycling 100% of the volume collected.

Since 2006, ABIOVE's member companies have collected over ten million litres of used oil in 16 states and the Federal District, in supermarket chains, schools, condominiums, commercial establishments, parks, hospitals, churches, and other locations easily accessed by the population.

This initiative also aims to raise awareness among children and adolescents through projects such as the Environmental Programme in Schools, which instructs teachers and students on the correct disposal of oil for conversion into biodiesel and for other uses. Since the Programme's inception, 3.8 million students have been positively impacted throughout Brazil. Educational pamphlets were created, using the personality "Recycle Captain" and simple, educational language to present the various topics related to recycling. These pamphlets are available to the public on the Programme's website. All editions can be downloaded.

Invested resources

BRL 14 million just in São Paulo state.

Main challenges faced

To extend to all Brazilian states, by 2030, a used oil collection system based on the VDP model in schools as the main strategy to increase environmental awareness and the community's engagement on this topic.

Next steps

To make all government schools in the state of São Paulo Voluntary Delivery Points for residual oils under the Sustainable Oil Programme. Extend installation to other locations easily accessed by the population.

To create a distance environmental learning platform for enhancing the knowledge of government schoolteachers about recycling of residues, training them to deal with this topic in a modern and current way. The platform will also be used for approval of collection companies who will collect the residual oil stored in the schools on behalf of the Sustainable Oil Programme, thus increasing the validation of this worker category and improving the quality of the service through tracking and transparency.

Relations with the SDG (Sustainable Development Goals)

1 – Eradication of poverty:

In all places and in all forms.

6 – Potable water and sanitation:

For all.

7 – Clean and affordable energy:

Ensure access to affordable, reliable, sustainable, and modern energy for all.

8 – Decent work and economic growth:

Promote steady economic growth, inclusive and sustainable, full and productive employment, and decent work for all.

9 – Industry, innovation, and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialisation, and foster innovation.

12 – Responsible consumption and production:

Ensure sustainable standards of consumption and production.

14 – Life in water:

Conserve and use sustainably the oceans, seas, and marine resources for sustainable development.

Does the Case contribute to technological development and/or to the business model?

This case contributes by using this used edible oil in biodiesel production, without needing to clear new areas to grow soy for energetic purposes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Brazilian Association of Glass Industries

Name of the case

Carbon Trust Program

Illustrative imagery of glass jars and bottles.

Site

https://abividro.org.br/

Corporate Email Address

contato@abividro.org.br

Type of Organization

Association.

Economic activities (based on CNAE - National classification of economic activities)

Business representation.

Theme

Organizational innovations and business models;

Other axis directly or indirectly related to the climate agenda.

Case description

The glass industry participated in the creation of a "Brazilian carbon footprint certification system", under the tutelage of the Brazilian Association of Technical Standards (ABNT) and the Ministry of Science, Technology and Innovation (MCTI). The glass sector collaborated on the project by selecting two products, flat glass and container, and each Abividro member calculated the carbon footprint according to the methodology implemented by the system, which was then audited by ABNT.

In other words, the project allowed the creation of an environmental certification system to measure the carbon footprint of Brazilian products, which is simple, highlighting Brazil's competitive advantages and allowing the new sustainability demands that are beginning to emerge to be met. The project's objective was to develop a tool for carbon footprint management to be used within companies.

Expected benefits:

1. To generate knowledge and a solid technical base for communication and market strategies, seeking to increase sales and meet new customer and consumer demands.

2. To understand and mitigate risk by antecipating future legal demands.

3. To identify and prioritize measures through knowledge of the companies' production chains, allowing for reduction of impacts and costs on several fronts.

4. Relationship with investors, demonstrating a sustainable business proposal.

The project basically consists of establishing the Product Category Rule (RCP), which establishes the technical characteristics that each product needs to fulfill to fit into category in which it supposedly fits. This is important to be able to compare similar products produced by different manufacturers, who state the technical specifications that their products should have to meet market needs.

Based on the calculation tool established by the Carbon Trust and approved by ABNT, companies calculated the carbon footprint of their products, classified according to the RCP in which they fit.

This methodology allows for an unbiased and equal comparison of the carbon footprint of national versus imported products, or of several national products, without possible interpretations as to what is offered or promised by the product, since ABNT validates whether the product to be compared does or does not fit the stated CPR.

In fact, it avoids misleading advertising and lets you know if Brazilian products are competitive in their carbon footprint.

Does the Case show GHG emission level reduction?

The case did not apply any measure to actually reduce GHG emissions, the project consisted of carbon footprint management, so that companies could identify the need, or not, for implementing a tool of GHG reduction.

The program is structured within ABNT and each member of Abividro has already implemented the tool internally.

The tool itself does not reduce gas emissions, it serves as a management tool. Abividro does not have the data on the associates after the implementation of this tool, nor the approaches adopted by each one to reduce GHG (when this was the case), after managing the tool.

How is the Case classified?

Carbon Footprint Management.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

The case has already been implemented.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

The institutional impact of creating a management culture will prepare Brazilian products for possible regulatory pressures. The results impact all the ends of the chain, with good carbon management companies are able to better assess suppliers, results, costs, among others. Customers and stakeholders are positively impacted, as they receive a product better suited for new market demands.

In addition, the company that implements carbon management has a better relationship with investors, demonstrating a sustainable business proposal. It also manages to mitigate risks, anticipating future legal demands.

If implemented nationally, this program avoids misleading advertising, as in order to disclose the carbon footprint of a product, within a company's sustainability strategy, it is necessary to have the "Carbon Trust" seal, certified by the Brazilian Association of Technical Standards (ABNT).

Invested resources

A team of ten people traveled to London to do the carbon management training and another year of work on the project. From this training, the tool was developed and implemented.

Six companies involved in the development of the Carbon Trust Project.

The training consisted of getting to know the Carbon Trust methodology implemented in Europe, discussing the criteria together with ABNT, Carbon Trust and MCTI for the implementation of this tool in Brazil.

Its great merit is to compare the competitiveness of the same product manufactured by different companies, to avoid green washing and misleading advertising, in addition to generating a solid comparative basis regarding the importing of carbon embedded in products that come from abroad.

Main challenges faced

Need for training and capturing information from participating companies.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Preparation for standardization of comparative methods to assess the carbon footprint of products.

Relations with the SDG (Sustainable Development Goals)

7 – Accessible and Clean Energy:

Ensuring reliable, sustainable, modern and affordable access to energy for all;

8 – Decent Work and Economic Growth:

Promoting sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;

9 – Industry, Innovation and Infrastructure:

Building resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

Does the Case contribute to technological development and/or to the business model?

It defines the specifications of higher quality products, stimulating the market to produce equivalent products.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

ABRAVA -Brazilian Association of Refrigeration, Air Conditioning, Ventilation and Heating

Name of the case

Reverse logistic of refrigerant cylinders

Disposable refrigerant cylinders needs specific destination for GHG neutralization.

Site

https://abrava.com.br/

Corporate Email Address

abrava@abrava.com.br

Type of Organization

Class association.

Economic activities (based on CNAE - National classification of economic activities)

Employers' membership organizations and business.

Theme

Scope 3 emissions - Reduction of indirect emissions (GHG Protocol).

Case description

The Refrigeration and Air-Conditioning segment is represented by ABRAVA -Brazilian associations of Refrigeration, Air Conditioning, Heating and Ventilation which was founded in 1962, with 400 companies members, and more than 60 national and international agreements.

The present case shows the results of the correct disposal of post-consumption of refrigerant cylinders at the Recycling and Reclaimed Refrigerant Centers, and its GHG emissions avoided.

In Brazil, the refrigerants are commercialized in non-rechargeable cylinders. This cylinders retain gas waste and need to be recovered.

The GWP of each common cylinder may represent 1,3 ton of CO_2e avoided, when it was decontaminated in a refrigerant reclamation center.

Brazilian law requires the disposal of cylinders at the refrigerant reclamation center (IBAMA's Normative Instruction 05/2018), however it is necessary to strengthen the reverse logistics to improve the results.

Thus, ABRAVA, through the National Department of the Environment, structured the Working Group on Reverse Logistics and strengthened the sector's participation in the Refrigeration Environmental Chamber of the CETESB, where the sectorial term of commitment for São Paulo is being discussed.

In the Reclaimed Refrigerant Centers, the refrigerant was analyze and identified. It was collect through vacuum collectors, by type, and analyzed to verify the degree of purity and potential return to market as recycled gas or neutralized by incineration. The empty packages are recycled according to their composition. The volume was converted in CO_2 equivalents (GHG Protocol) avoided.

In 2019, 1.7 thousand tons of CO_2e were avoided through decontaminated cylinders at the Ecosuporte's Reclaimed Refrigerant Center (ABRAVA member of São Paulo State) despite its processing potential being 17.7 thousand tons.

Estimating the full potential based just on HCFC R22 imports (data from CTF-IBAMA 2013), would be 208.7 thousand tons of CO_2e avoided if all cylinders had been decontaminated before their final destination.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

Over 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

In 2020, Ecosuporte decontaminated 7,200 cylinders, preventing the release of 1,267 t CO_2e, only in São Paulo State. In 2019, the volume was even greater, reaching 1.7 t CO_2e.

Impacts/results

If 15,682 tons of HCFC R22 arrived in Brazil in 2013 (according to CTF-IBAMA data), there are about 1.1 million cylinders annually discarded.

With only 100 g of gas waste in each cylinder, we reached 208.7 thousand tons of CO_2e avoided, if the correct destination is reached.

The number is even higher when we consider the gases like HFC R400 families, whose GWP is up to 4 times higher.

Invested resources

Equipment, storage and disposal of waste, ensuring the no emission by neutralization (destruction) or reclaiming (re-entering into the market) of the collected fluids.

Total BRL 1.3 million.

Main challenges faced

The collection chain is the most expensive step in the process.

The informal practice of reusing non-rechageable cylinders creates a parallel destination chain, which result in release of these refrigerant gas residues into the atmosphere.

Suggestions to improve the business environment (regulations, licensing, access to credit)

The regulation of reverse logistics for refrigerant cylinders would be a way to facilitate the return and disposal of post-consumer cylinders.

Next steps

To consolidate the reverse logistic.

Relations with the SDG (Sustainable Development Goals)

12 – Responsible Consumption and Production:

To ensure sustainable production and consumption patterns;

13 – Climate Action:

To take urgent action to combat change and its impacts.

Does the Case contribute to technological development and/or to the business model?

It's not an innovation, but it is about technology that is still not widespread.

Disposable cylinders.

ACORDO AMBIENTAL SÃO PAULO

ambipar GROUP

Corporate Name

Ambipar Participações e Empreendimentos S.A

Name of the case

Corridors for Life AR Grouped Project

2.4 million trees make up the 1,200-hectare corridor restored by IPÊ at the Rosanela Farm, the largest in Brazil. This corridor connects the two main protected areas: the Ecological Station of Mico-Leão-Preto and the State Park of Morro do Diabo.

Mata Nativa nursery, implemented with support by IPÊ and managed by women.

Site

https://ambipar.com

Corporate Email Address

rafael.tello@ambipar.com

Type of Organization

Listed company.

Economic activities (based on CNAE - National classification of economic activities)

Scientific and technical activities, environmental services company.

Theme

Reduction of direct emissions, scope 1 (cf. Greenhouse Gases Protocol (GHG Protocol) – the organization's own facilities, own transportation), Biodiversity, conservation, forest asset management, land use, Carbon capture and storage, emission compensation.

Case description

The Corridors for Life AR Grouped Project was founded by the Institute of Ecological Research (IPÊ) in partnership with Biofílica Ambipar Environment, a company that since 2021 has been part of the Ambipar Group. The objective of the project is to enhance reforestation efforts in the state of São Paulo.

The project counts on the pioneering work of IPÊ, which has been operating in the Pontal do Paranapanema region for more than 35 years, and Biofílica Ambipar's innovative business model, which aims to finance forest conservation and restoration projects through the commercialization of carbon credits.

The project aims to promote connectivity between protected areas and forest fragments remaining from ecological restoration in large areas of private land in the Pontal do Paranapanema region. In addition, it aims to promote the occupation by local fauna of the restored and connected areas and generate employment, income, training and support in the development of new businesses associated with forest restoration for the local population.

The Project has the potential to reforest 30,000 hectares of forest in 10 years and 75,000 hectares in 20 years. The planting of seedlings began less than a year ago, in November 2021, and already reached the milestone of 786,500 trees planted of at least 120 native species.

Thus, simultaneously, the project addresses aspects related to climate change, support to local communities, and biodiversity conservation.

In order to leverage, enable and accelerate the Corridors for Life AR Grouped Project and acknowledging that:

i. there is an urgent need to conserve forest remnants and restore the areas of environmental liabilities of the properties for the maintenance of fauna and flora species;

ii. the success of planting and quality of restoration depend on knowledge and skilled labor;

iii. the restoration approach should consider the entire territory, including not only aspects of biodiversity (such as ecology of populations of fauna and flora), but also community populations (identifying who the key stakeholders occupying the area are and how we can make them partners in the implementation of the project);

iv. the cost of the implementation and maintenance of ecological restoration areas is one of the biggest challenges and obstacles to the environmental adequacy of rural properties.

The project contributes to a low carbon economy, with the potential total impact of the removal of 28,408,500 tons of CO_2 equivalent in 50 years. This impact is calculated from the estimated growth of Semidecidual Seasonal Forest in the project region, according to scientific studies and following the methodological guidelines of the *Verified Carbon Standard* (VCS). These tons will be marketed as carbon credits, which are the main source of revenue for the project and will allow the objective of forest connectivity through the formation of ecological corridors to be achieved.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Removal.

Has the Case been implemented?

Yes, it is currently implemented.

What is the forecast of continuity of the Case?

More than 10 years.

Is the case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The project started in November 2021 and will remove 28,408,500 tons of CO_2e over 50 years.

Impacts/results

The project is the result of partnerships between all sectors: public, private, and civil society. In addition to the environmental impact, the social benefits to local communities are one of its greatest achievements and objectives, generating employment, income, capacity building and support in the development of new businesses in the forest restoration chain. The main businesses concern is the construction and expansion of nurseries and the foundation of small companies providing services in the field, with rural settlers and small farmers as the main stakeholders involved. Another fundamental point is the stimulus to the training, employability and leadership of women and young people in the project.

In addition to local communities, the project directly benefits the owners of the land to be restored: it will be carried out in areas with environmental liabilities of Legal Reserve and Permanent Protection Area that, according to the Brazilian Forest Code, must be reforested.

The landowners, therefore, have the area reforested free of charge and with high quality in exchange for the rights to the carbon generated. The costs of reforestation (ranging from soil preparation to maintenance over the years of the project) in the region are estimated at around BRL 30,000 to BRL 40,000 per hectare, values that the owner would have to invest with their own resources to comply with the law in the absence of the Project.

To show the interconnected impact of different stakeholders, we estimate that, with reforestation, it is possible to generate USD 10 million in the region's economy and USD 1.2 million in community nurseries by 2025. It is something promising, which benefits companies, government sectors, biodiversity, and, of course, society.

Invested resources

The Project is a partnership between the Institute of Ecological Research (IPÊ) and Biofílica Ambipar Environment. In addition to the development and coordination teams, IPÊ has the Technical Assistance and Rural Extension team, which operates daily in the field in the monitoring of forest restoration activities and with service providers and living people. Biofílica Ambipar Environment, on the other, has the main role of structuring the project with the appropriate methodologies for the certification of a carbon project. It is also responsible for the commercialization of credits, including prospecting customers who wish to invest in forest restoration and benefit from carbon removal credits.

In more operational terms, the purchase of native seedlings is made in 8 community nurseries and the provision of service is carried out by local companies or that employ residents of the region, mainly rural settlers and small farmers of family farming. Other bases used in forest restoration activities, such as fertilizers, wire, hydrogel and other field equipment, are also purchased from local companies. In this way, financial resources are used locally and help develop the region's economy.

Main challenges faced

The main challenges are associated with the techniques of forest restoration themselves. With the expansion of the project, new service providers and supplies are needed, in addition to the adaptation of machinery for scale gain. The challenge, in this sense, is to gain scale without losing the quality of forest restoration plantations and without increasing the cost, which is already high. Thus, the role of the Technical Assistance and Rural Extension team is fundamental, both to accompany, learn and teach established teams and new teams that will work on the project.

When it comes to 50 years of obligations and responsibilities for the development and recovery of a native forest other challenges emerge, such as climatic and natural risks and the non-permanence of the forest. Thus, it is necessary to think about strategies and actions mitigating these risks so that we can operate safely for the delivery of carbon credits.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Overall, the project depends on the effective implementation of the Brazilian Forestry Code. It is of paramount importance that landowners must comply with the Code, which means, in this case, having in their properties areas legally determined to be a Legal Reserve and Permanent Preservation Area. As for the state of São Paulo, it is very important that the agencies advance in the analysis and validation of data from the Rural Environmental Registry (CAR), since the declaration of the owner's registration is one of the main tools used for planning restoration plantations within the property and connectivity with other fragments or nearby APPs.

Next steps

The Corridors for Life AR Grouped Project aims to reforest 30,000ha of Atlantic Forest in 10 years and 75,000ha in 20 years.

Over the total 50 years of the project, in addition to planting and monitoring forest growth and biomass and carbon accumulation, several actions aimed at the community, research and biodiversity monitoring will be carried out. Among these activities, training is cited, mainly in the collection and production of seedlings and in the implementation and maintenance of forest plantations; encouraging the hiring of rural settlers and small producers; and the stimulus and support in the creation of new companies providing forest service, providing legal, financial and management support to new entrepreneurs. It is important to mention that all actions involve the inclusion, participation and empowerment of young people and women. As a result of these actions, the number of jobs generated, and training will be monitored throughout the project. Regarding biodiversity, trap cameras, and audio recorders will be installed in restored areas to monitor the presence of bird and mammal species throughout the forest formation. Such cameras take photos and videos when animals are detected, while recorders record one minute of audio every 10 minutes, and it is from these recordings and images that the species are identified and monitored.

The detailed Monitoring Plan is presented in our Project Description Document, to be inserted into the Verra Certification Platform in the coming months. This platform serves as a form of public record, where detailed project information can be accessed in a transparent manner for all stakeholders.

Relations with the SDG (Sustainable Development Goals)

1 - Poverty eradication:

End poverty in all its forms, everywhere.

5 - Gender equality:

Achieve gender equality and empow all women and girls.

8 - Decent work and economic growth:

Sustainable, inclusive and sustainable economic growth, full and productive employment and decent work for all.

13 - Action against global climate change:

Urgent measures to combat climate change and its impacts.

15 – Life on Earth:

Protect, restore, and promote the sustainable use of terrestrial ecosystems, manage forests in a sustainable way, combat desertification, disrupt and reverse land degradation and stop biodiversity loss.

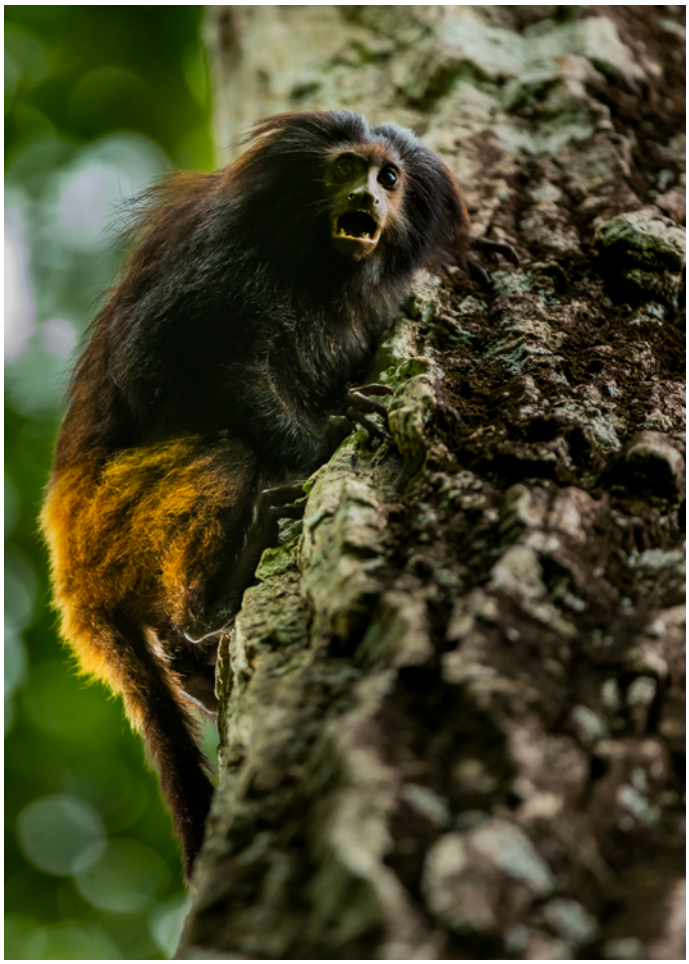
Does the Case contribute to technological development and/or to the business model?

No.

Other information regarded as relevant

It is important to note that the project follows rigorous monitoring, reporting, and verification (MRV) processes. Through extensive tracking (including area visits, measurement of tree growth and forest development in the field, and satellite imagery and monitoring of community actions and biodiversity) we can ensure the environmental and social benefits of the project. Thess MRV processes follow Verra's Verified Carbon Standard (VCS) scientific methodology and is audited by third parties, effectively ensuring the benefits of the project.

https://www.biofilica.com.br/en/corridors-for-life-ar-project/



Black lion tamarin (*Leontopithecus chrysopygus*), one of the rarest monkeys in the New World and in danger of extinction.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

APAS - São Paulo association of supermarkets

Name of the case

GHG emissions avoided through banning single-use plastic bags in São Paulo city

Non-gratuity distribution, reduced 84.4% of plastic made into shopping bags, representing 21.1 thousand tons of CO_2e per year. The reduction potential will reach 75.6 thousand tons when applied in all cities of São Paulo State.

Site

www.apas.com.br

Corporate Email Address

imprensa@apas.com.br

Type of Organization

Class association.

Economic activities (based on CNAE - National classification of economic activities)

Employers' membership organizations and business.

Theme

Scope 3 emissions - Reduction of indirect emissions (GHG Protocol).

Case description

The Municipal Law of São Paulo No. 15.374/2011, banned single-use plastic bags, and, only in 2015, it was regulated by Decree No. 55.827/15, always accompanied by the APAS Sustainability Committee.

Through APAS, the supermarket sector signing the Protocol of Intent APAS-PROCON (defense of consumer rights), aiming to encourage consumers to use reusable bags.

The change resulted in a reduction of 84.4% of plastic, compared to the volume of plastic that was used to produce single-use plastic bags, since 2016, totaling 27.4 thousand tons/year of HDPE (high density polyethylene) plastic.

Applying the conversion index of 0.77 tCO_2e/t of HDPE, we arrived 21.1 thousand tons of CO_2 avoided per year (conversion rate based on lifecycle analysis of SIMA PRO products, database ecoinvent v3).

We hope that a state law can expand this result to the 645 municipalities of São Paulo State, when the supermarket contributions is expected to reach 1.8% of the target of CO_2e waste emissions reductions.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

Over 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

94.25 thousand tons of CO_2 avoided per year.

Impacts/results

Reduction of 84.4% in volume of plastic made into bags, totaling 10.2 thousand tons/month of HDPE plastic. Applying the index conversion rate of 0.77 tCO_2e/t of HDPE, we reach 94.25 thousand tons of CO_2 avoided per year (conversion rate based on product lifecycle study software SIMA PRO, ecoinvent database v3).

We hope that a state law can expand this result to the 645 municipalities of São Paulo State, when the supermarket contributions is expected to reach 1.8% of the target of CO_2e waste emissions reductions.

Invested resources

Technical advice, communication advice, advertising campaign.

Main challenges faced

Every behavior change brings us challenges.

To reach a balance of consumer rights with environmental protection.

Suggestions to improve the business environment (regulations, licensing, access to credit)

State laws standardizing the banning of single-use plastic bags in São Paulo.

Next steps

To expand the analysis of avoided impacts, considering Biopolymer aspects of reusable packaging (case presented in this book too) and the recent discoveries of plastic photodegradation into methane and ethylene.

To support the Government in the implementation of the São Paulo State law banning the single-use plastic bags.

Relations with the SDG (Sustainable Development Goals)

12 – Responsible Consumption and Production:

To ensure sustainable production and consumption patterns;

13 – Climate Action:

To take urgent action to combat change and its impacts;

14 – Life below water:

To conserve and sustainably use the oceans, seas and marine resources for sustainable development;

15 – Life on land:

To protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage the forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

Does the Case contribute to technological development and/or to the business model?

No.

Other information regarded as relevant

Non-gratuity distribution, reduced 84.4% of the plastic made into shopping bags, representing 94.25 thousand tons of CO_2e per year. The reduction potential will reach 18,552.4 thousand tons when applied in all cities of São Paulo State.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Araci Solar EIRELI

Name of the case

Photovoltaic Generator System in Industry
39 kilowatt peak (kWp)

A 39 kWp system installed in an industry in the east side of São Paulo , this 120 solar panel system saves the company approximately 3.5 thousand reais per month.

Site

http://aracisolar.com.br/

Corporate Email Address

contato@aracisolar.com.br

Type of Organization

Limited Society.

Economic activities (based on CNAE - National classification of economic activities)

Commerce, installation and projection of photovoltaics systems and courses for those who want to enter the sector.

Theme

Reduction of indirect emissions, scope 2 (according to the Greenhouse Gases Protocol (GHG Protocol), which includes electric power , steam, heating/cooling purchased for own use); avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.); adaptation actions to climate change; other axis directly or indirectly related to the climate agenda.

Case description

The implementation of a 39.6 kWp Solar Photovoltaic system with 120 solar panels which meets the company's fixed energy supply, besides to preserving the environment and the reducing the consumption of electricity from the grid.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Compensation and Socioenvironmental responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

The continuity prevision is 25 years or more, as the change of panels will be offered within the warranty period.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

In Carbon Dioxide (CO_2) reduction, it has it has not yet been applicable.

The impact of the system represents a reduction of 34.07 tons of carbon emitted - 1,703 trees and 140 thousand light bulbs.

In less than two years, the system has generated more than 45 megawatts hours (mWh), with almost 60,000 kWh/month which is not being consumed from fossil sources. Industry energy bills show the reduction in kilowatt hours (kWh) and reals.

Impacts/results

Cost reduction, energy consumption reduction, less heat produced, environment protection, and increased environmental awareness.

Invested resources

BRL160,000.00 invested for a monthly return of approximately BRL4,000.00. The return will take for at least 25 years, but the values may change depending on the law that is to be approved by the National Congress.

Main challenges faced

Showing the the client that the result is real, developing a project that meets the client's needs, technical and financial feasibility.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Publishing the system widely, providing more information and knowledge to the population about solar energy.

Next steps

To develop more similar cases. There are more cases to present.

Relations with the SDG (Sustainable Development Goals)

7 – Accessible and Clean Energy:

To ensure reliable, sustainable, modern and affordable access to energy for all;

8 – Decent Work and Economic Growth:

To promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;

9 – Industry, Innovation and Infrastructure:

To build resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation;

11 – Sustainable Cities and Communities:

To make cities and human settlements inclusive, safe, resilient and sustainable;

12 – Responsible Consumption and Production:

To ensure sustainable production and consumption patterns;

13 – Action Against Global Climate Change;

To take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Clean energy in Brazil's largest metropolis. The system is on the east side of São Paulo.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

ArcelorMittal Brasil S/A

Name of the case

Carpark case study

Internal view of the garage building model with prefabricated structure.

Model of the garage building used in the case.

Site

http://brasil.arcelormittal.com.br/

Corporate Email Address

luciana.magalhaes@arcelormittal.com.br

Type of Organization

Open Society / open capital.

Economic activities (based on CNAE - National classification of economic activities)

Transformation Industries.

Theme

Organizational innovations and business models, communication, stakeholder engagement, and diffusion of good practises.

Actions to minimize the climate change, hydric resources and efficiency, other areas directly or indirectly related to the climate agenda.

Case description

The carpark case study, considering the application of ArcelorMittal products and solutions, was carried out through Steligence® methodology.

The reference carpark for the study is in São Paulo, has seven floors and a total area of 6,900m². The original project (baseline) was designed in reinforced concrete, with prefabricated elements for the beams and pillars and prestressed elements for the slabs.

Steligence® is a global initiative from ArcelorMittal with the purpose of demonstrating the benefits of the use of steel in buildings. It is a complete methodology, with a holistic approach to meet the current requirements to support developers, architects, engineers, and builders.

The methodology is offered to clients that execute large civil works or solutions with high repeatability.

To investigate the best solution in terms of economics, environmental and social impacts, different scenarios were considered for the original carpark project.

Among all the proposed solutions, products with higher mechanical resistance (such as steel cords for prestressed concrete) and solutions with higher levels of industrialization and productivity were considered. Always with a focus on reducing the environmental impacts.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, adaptation, social-environmental responsibility.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand?

Likely.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The Steligence® methodology develops standardized construction systems to be used by ArcelorMittal clients.

In 2021, using the methodology, a carpark building was developed with the proposal to reduce up to 46 tons of CO_2, which represents 12% of the total building emission when compared to a traditional project.

Until now, the study was applied in three carparks and has been considered for different Brazilian regions.

Impacts/results

For the case study different carpark typologies were considered (to be compared with a market usual solution), such as on-site made solutions and bubbledeck system. With the results it was possible to:

- Reduce the total costs (up to 35%) for the on-site made solutions.
- Reduce the GHG emissions (46 tons, or 12%) and water consumption (13%, or 1,155m²) for the bubbledeck system.
- Increase the architectural freedom, by the reduction of the columns number (from 44 to 24), and a consequent increase of the total car spots, for the on-site made solutions.
- Shorten the deadline up to 70% (70 to 21 days) considering more industrialized solutions.

Invested resources

In this new Steligence® cycle, ArcelorMittal kept a team of 10 project engineers with the objective to select the best steel solutions for each construction. The cycle even counted with the support of the R&D team and with a consultancy company related with sustainability.

Main challenges faced

There is still a big challenge in Brazil to implement solutions (in construction area) where the cost is not the main chosen factor. Environmental criteria or even social aren't widely discussed yet, whether by economic factors, regulatory, or the market's culture.

Due to the fact that constructions depend on many stakeholders in the decision-making process, the application of more complete solutions (like Steligence® proposition) is still a complex approach that needs a maturation time until its scale application.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Steligence® was developed based on European standards and regulations. There are still few criteria for environmental performance in the construction area in Brazil.

Discussion about the Environmental, Social and Governance (ESG) and life cycle methodologies has been exponentially increasing, but there is still a necessity to standardize the dialog.

An improvement suggestion could be the regulation of the Environmental Product Declarations (EPDs) use for buildings Life Cycle Assessments (LCAs) and the expansion of the environmental certifications such as Leadership in Energy and Environmental Design (LEED), Green Building Council (GBC) and High Ambiental Quality (AQUA).

Next steps

ESG actions for construction are a trend in Brazil and in the world, therefore, an approach through the Steligence® methodology is strategic when thinking on a plan to reduce GHG emissions, social well-being, and economic impacts.

ArcelorMittal assumed the commitment, in line with the Sustainable Development Goals (SDG), to reduce 10% of the GHG emission in its plants until 2030 and to be carbon neutral until 2050.

Relations with the SDG (Sustainable Development Goals)

9 - Industry, innovation and infrastructure:

Building resilient infrastructure, to promote sustainable industrialization and innovation.

11 - Sustainable cities and communities:

To make cities and human settlements inclusive, safe, resilient, and sustainable.

12 - Consumption and responsible production:

To guarantee consumption standards and sustainable production.

Does the Case contribute to technological development and/or to the business model?

New business models, new civil construction approaches and new constructive systems.

Other information regarded as relevant

One of the first Brazilian companies to sign the United Nations (UN) Global Pact, ArcelorMittal has been committed (since 2021) to follow the 10 UN principles and continue to advance in this field.

An example is the announcement of the Group to become carbon neutral until 2050, an effort that places the company at the forefront of reducing greenhouse gas (GHG) emissions in the steel industry. In Brazil, ArcelorMittal also stablished a goal to reduce its emissions in 10% until 2030.

Another sustainability initiative is the company effort to certify its units with the ResponsibleSteel label and with the Iniciative for Responsible Mining Assurance (IRMA), with the aim of ensuring sustainable steel production and mining productive chain.

This case is published on the enterprise's site: **brasil.arcelormittal.com.br/steligence**

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

ArcelorMittal Brasil

Name of the case

Steligence: the intelligent construction choice

Parafix's Industrial Warehouse in Vinedo/SP with Steligence solution application.

Site

https://brasil.arcelormittal.com.br/

Corporate Email Address

comunicacao.corporativa@arcelormittal.com.br

Type of Organization

Corporation / Privately Held.

Economic activities (based on CNAE - National classification of economic activities)

Production of Long Steel.

Theme

Organizational innovations and business models.

Communication, engagement of specific parties and dissemination of good practices.

Adaptation actions to climate change.

Other axes directly or indirectly related to the climate agenda.

Case description

Steligence is a life cycle analysis methodology developed in Europe by the research and development team and has been, since 2019, being nationalized for the Brazilian reality.

The company provides customers with a comparison between a standard construction and an intelligent construction, enabling better decision making.

It is based on the definition of a constructive model and on the assessment regarding environmental, economic and social aspects. In this way, the philosophy and knowledge acquired are applied in the clients' projects, comparing the model project with each case, adapting solutions (job by job).

The environmental pillar considers energy efficiency indicators, consumption of natural resources, emissions and potential for reduction and recycling as metrics.

The economic pillar, on the other hand, considers the global cost of the project (construction and operation), construction speed and construction quality as indicators, thus measuring its efficiency.

The social pillar, whose objective is to measure acceptance and human well-being regarding construction, defines as its indicators thermal and acoustic comfort, design flexibility, and the safety and inconvenience of the construction process

Thus, ArcelorMittal works on the development of solutions for types of industrial, residential, walkways, garage buildings and also on expanding the scope of work over the years.

In short, Steligence enables buildings to be more sustainable, cleaner and cheaper, but it's up to the customer to decide.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Adaptation, Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it was implemented.

What is the forecast of continuity of the Case?

More than ten years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The methodology develops standardized construction systems serving as an application model for ArcelorMittal's customers. In 2020, an industrial shed model was developed using this methodology, with a proposal to reduce 100t of CO_2, up to a 3% reduction in energy consumption and the generation of up to 37 points in the LEED certification, when compared to a traditional project.

Impacts/results

For the industrial shed typology developed by Steligence, the following results were born:

- Up to 11% reduction in construction costs
- Up to 3% energy consumption reduction
- Up to 100 t of CO_2 saved
- Up to 11% reduction in environmental impacts
- Up to 37 points generated in LEED certification
- Possibility to increase the gap by 40%, with up to 2% savings.

Invested resources

In Brazil, there is a team of more than 10 project engineers working on real projects with the objective of selecting the best steel solutions for each project.

Main challenges faced

Despite the methodology listing all the benefits of a specific solution, there is still a great cultural difficulty to implement solutions whose cost criterion is not the main factor of choice. Environmental or even social criteria are not widely discussed, whether due to economic, regulatory or even market culture factors.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Steligence was developed based on European standards and regulations. There are still few regulated environmental performance criteria in the construction business environment. Discussion on Environmental, Social and Governance (ESG) criteria has been bringing the topic to the fore and life cycle analysis methodologies are increasingly common, but it is still necessary to standardize the dialogue on this topic.

Next steps

Steligence is seen at ArcelorMittal as not just a project, but a program. There is a constant concern to make it a reality to more and more customers and construction systems. For 2021, there is an expectation of expanding the application of the methodology by up to 10% of sales.

Relations with the SDG (Sustainable Development Goals)

9 – Industry, Innovation and Infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

11 – Sustainable Cities and Communities:

Make cities and human settlements inclusive, safe, resilient and sustainable.

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption patterns.

Does the Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Sendas Distribuidora S/A

Name of the case

Assaí Atacadista's renewable energy mix as a vector for combating climate change

Vista panorâmica, com a usina solar em destaque no telhado da loja Independência, em Goiânia – GO.

Site

https://www.assai.com.br/quem-somos

Corporate Email Address

sustentabilidade@assai.com.br

Type of Organization

Corporation / Publicly Traded Company.

Economic activities (based on CNAE - National classification of economic activities)

Wholesale trade of goods in general, with predominance of food products.

Theme

Reduction of indirect emissions, scope 2 [cf. Greenhouse Gases Protocol (GHG Protocol) – purchased electrical energy, steam, heating/cooling purchased for own use].

Case description

Among the commitments established by Assaí to mitigate the impacts of its business model is the reduction in its direct and indirect emissions of Greenhouse Gases (GHG), in scopes 1 and 2, of 30% by 2025, and of 38% by 2030, based on the year 2015. This is the organization's business goal and is linked to the variable compensation of medium and top management positions.

To achieve this goal, the path to reduce the impacts of the business has been mainly to reduce the use of non-renewable resources, such as electricity from the burning of fossil fuels, for example. Therefore, Assaí has improved the energy efficiency of its operations and the supply chain by adopting the use of clean-source and self-generating energies.

Unlike the traditional electric energy acquisition model, which does not have a choice and includes non-renewable sources, such as thermoelectric power plants, Assaí carried out the migration of its entire stores park to the free energy market, in which it chooses to use only renewable generation sources, such as photovoltaic solar plants, wind farms, biomass and Small Hydroelectric Plants (SHPs).

The migration process to the free energy market began in 2019 and, by the end of 2021, it had already reached 92% of the total stores throughout the domestic territory. The units located in the state of São Paulo are examples of this process: in 2021, out of the 212 Assaí stores in the country, 80 were located in the State, in addition to the three important distribution centers of the Company. Out of this total, 79 stores, that is, 99% of the operation in São Paulo had already completed the migration to the new energy model; and 2 of its distribution centers, that is, 67%, and the company's headquarters, also completed their migration.

The result of this work is the achievement of the mark of 9,090 tons of equivalent carbon dioxide (CO_2e) that ceased to be emitted annually to the environment only in the state of São Paulo, contributing to 31.6% to the reduction obtained by the country referring to the Company's total annual emissions of scope 2. In the domestic context, the amount of purchased renewable energy is higher, resulting in a reduction of 27,432 tons of CO_2e/year, from 69,557 to 42,124 tons of CO_2e/year.

It is also worth mentioning that 100% of the reductions in CO_2 emissions by stores in the State of São Paulo in scope 2 were certified by the acquisition of international renewable energy certificates (I-REC), which ensures the traceability of the environmental attributes of the energy purchased. Considering nationwide stores, only in 2020, 116 migrated to the new contract model. In December 2021, the number continued to grow and reached 194 stores, which represents 92% out of the 212 stores in total. In addition to reducing greenhouse gases, migration to the free energy market contributes to the establishment of a new management model, in which complementing with the use of diesel power generators at peak consumption times is no longer necessary, aiming at reducing costs.

In 2021 alone, compared to the previous year, there was a 50% reduction in total diesel emissions.

In addition, Assaí has invested in the installation of solar power plants in the store's roofs, promoting the use of unusable areas and increasing the independence of the local distributor's supply. Currently, the company has 7 photovoltaic power plants in operation, which together generated, in 2021, about 4.3 GWh of electricity, equivalent to the consumption of some Brazilian cities, such as Alvinlândia, Arapeí, Arco-Íris and Balbinos, all in the State of São Paulo. The structure has 11,720 panels installed on the roofs in a total of 22,184m² area, with 3,720 kWp installed capacity, reducing by 540 tons CO_2e in the period from January to December 2021. It is noteworthy the GHG Protocol emission accounting methodology was used, which incorporates the emission factors of the Brazilian Integrated System (SIN), published throughout 2021 by the Ministry of Science, Technology and Innovations (MCTI).

Actions such as the expansion of the stores park in the free energy market, the production of photovoltaic solar energy and the acquisition of international renewable energy certificates rendered possible, in 2021, to substantially reduce the Company's scope 2 emissions by 41% and positioned Assaí Atacadista on the path towards the achievement of medium and long-term climate goals. For the coming years, the company plans to expand these initiatives in alignment with its expansion process throughout the country.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it is in progress.

What is the forecast of continuity of the Case?

More than 10 years.

Is the case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

27,973.53 tons of CO_2e.

Impacts/results

- Total avoided emissions: 27,973.53 ton. CO_2e/year.
- Emissions avoided the State of São Paulo: 9,090.12 ton. CO_2e/year.
- Reductions due to migration to the free energy market: 27,432.81 tons of CO_2e/year.
- Reductions due to photovoltaic power plants: 540.72 ton. CO_2e.

Other figures of program:

- SP stores: 100% of renewable energy certified by I-REC (ref. 2021).
- Stores in Brazil 92% of stores migrated to the free energy market by December 2021.
- Scope 2 emission reductions in 2021: 40% (base year: 2020) – 100% certified by I-REC.
- Reductions in diesel oil consumption in generators in 2021: 50% (base year: 2020).
- Photovoltaic solar power generation: 4.3 GWh in 22,184 m2 of area (store roofs), in 2021.

Invested resources

The invested resources constitute internal, strategic information for the Company.

Main challenges faced

The rapid pace of expansion of Assaí represents the biggest challenge for the renewable energy project as a whole. The deadlines for technical adjustments represented challenges that were overcome through the engagement of the operations teams, which internalized systems specifically aimed at the implementation of renewable energy systems.

Next steps

Expansion of the migration project from the store park to the free energy market, which follows the schedule of the Company's organic expansion plan, in order to achieve the migration of all stores.

Relations with the SDG (Sustainable Development Goals)

7 - Clean and affordable energy:

Ensure access to affordable, reliable, sustainable and modern energy for all.

12 - Responsible consumption and production:

Ensure sustainable consumption and production patterns.

13 - Action against global climate change:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

No. However, the company contributes to the modernization of the sector with the acquisition of energy from encouraged sources linked to the Alternative Sources Incentive Program * (PROINFA), which aims to increase the participation of renewable sources, such as Small Hydroelectric, wind farms and thermal biomass plants in the production of electricity. The Program was created and is maintained by the Electric Energy Trading Chamber (CCEE). In addition, there is investment in the purchase of refrigeration and air conditioning equipment with superior technology combined with the installation of insulating panels and nanotechnological paints that promote high thermal protection, generating savings in the energy consumption of Assaí stores.* Available at: **https://www.mercadolivredeenergia.com.br/proinfa/**, Access in 2022.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Braskem S.A.

Name of the case

Green PE I'm Green™ (GREEN PE I'M GREEN™)

Green ethylene production at Triunfo, Rio Grande do Sul.

Site

https://www.braskem.com.br/

Corporate Email Address

responsabilidade.social@braskem.com

Type of Organization

Publicly held corporation.

Economic activities (based on CNAE - National classification of economic activities)

Processing industry.

Theme

Indirect emission reduction, scope 3 (as per Greenhouse Gases Protocol (GHG Protocol) which includes purchased goods and services, capital goods, fuel, transportation and distribution, waste, business travel, etc.).

Case description

I'm green™ polyethylene is a plastic produced from sugarcane, a renewable raw material, while traditional polyethylene uses fossil raw materials such as oil or natural gas. Instead of naphtha or natural gas, the technology employed by Braskem uses ethanol from sugarcane in Crackers units to produce ethylene. Which is subsequently used in its second-generation plants to produce polyethylene called I'm green™ PE because it is produced from renewable sources, which captures carbon dioxide (CO_2) collaborating to reduce the greenhouse gases emission.

Furthermore, the care for sustainability is present in Braskem's relationship with ethanol suppliers. From the planting of sugarcane to the production of ethanol, suppliers must meet the principles of sustainable development present in the "Responsible Ethanol Purchasing" prepared and implemented by Braskem, which covers aspects such as respect for biodiversity and good environmental practices.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Compensation, sequestration.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

Case implemented

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

I'm green™ captures up to 3.09 tons of carbon dioxide for each ton produced. With the current production capacity of 200,000, this means a capture of up to 600,000 tons of CO_2 per year. Braskem is currently expanding this production capacity to 260,000 so that from 2022 this capture will potentially reach up to 800,000 tons of CO_2 annually.

The impact was calculated by Life Cycle Assessment (LCA), a scientific methodology for assessing the environmental aspects and potential impacts associated with a product, understanding the stages from the extraction of raw materials from nature that enter the production system to the final product. This analysis allows Braskem and its customers to increasingly understand the environmental impact throughout all stages of the life cycle of its products.

In the case of I'm green™, the LCA was conducted by British consultants E4tech and LCAworks specialized in studies focused on the bioenergy and biomaterials sectors. The research also had the cooperation of suppliers and process engineers in the collection of primary data following the guidelines of the ABNT ISO14040 standard including the review of the results by a third party with the participation of three experts.

Impacts/results

I'm green™ captures up to 3.09 tons of carbon dioxide for each ton produced. With the current production capacity of 200,000, this means a capture of up to 600,000 tons of CO_2 per year. Braskem is currently expanding this production capacity to 260,000 so from 2022 this capture will have the potential to reach up to 800,000 tons of CO_2 annually.

Over its 10 years of existence, I'm green™ has avoided the emission of at least 5.54 million tons of CO_2, the equivalent to more than a year of automotive emissions in the city of São Paulo.

Invested resources

The industrial unit received investments of USD 290 million and has the capacity to produce 200 thousand tons of green polyethylene per year. To meet the growing demand from society and partners for sustainable products, the investment of USD 61 million was announced for the expansion of the I'm green™ biopolymer production which will go from a production capacity of 200 thousand to up to 260 thousand tons per year. The project will start in 2021 and should be completed in the fourth quarter of 2022.

Main challenges faced

The launch of an innovative product 10 years ago, when the market still did not value sustainability to the point of paying the premium for a product that captures carbon.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Approval of the methodology that confirms the capture of biogenic carbon inserted in the product.

Next steps

To meet the growing demand from society and partners for sustainable products, the investment of USD 61 million was announced for the expansion of the I'm green™ biopolymer production which will go from a production capacity of 200 thousand to up to 260 thousand tons per year. The project will start in 2021 and should be completed in the fourth quarter of 2022.

Relations with the SDG (Sustainable Development Goals)

8 – Decent Work and Economic Growth:

To promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;

9 – Industry, Innovation and Infrastructure:

To build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

12 – Responsible Consumption and Production:

To ensure sustainable production and consumption patterns;

13 – Climate Action:

To take urgent action to combat climate change and its impacts;

17 – Partnerships for the goals:

To strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes.

Green ethylene production at Triunfo, Rio Grande do Sul.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Braskem SA

Name of the case

Vesta Project: modernization of the ABC petrochemical complex

ABC Petrochemical Complex (Q3 and PE7 units).

Site

https://www.braskem.com.br/detalhe-noticia/braskem-e-siemens-estabelecem-parceria-para-melhorar-eficiencia-energetica-no-abc-paulista

Corporate Email Address

sustainabledevelopment@braskem.com

Type of Organization

Publicly traded corporation.

Economic activities (based on CNAE - National classification of economic activities)

Transformation industry.

Theme

Reduction of direct emissions, scope 1 (according to Greenhouse Gases Protocol (GHG Protocol) – organization's own facilities, own transportation), Water resources and water efficiency.

Case description

In 2019, Braskem began modernizing the electrical system in the industrial unit of its petrochemical complex in the ABC Region of São Paulo, in partnership with Siemens. The investment of BRL 600 million, which includes the contributions made by the two companies, covers technological updates to the energy system that handles the *cracker* for Q3 (Chemicals 3). *Cracking* is a pyrolysis process, where several basic petrochemicals are produced. It represents about 97.5% of Braskem's scope 1 Greenhouse Gas (GHG) emissions in the state of São Paulo. The project includes replacing steam-based turbines with high-efficiency electric motors, supported by a new cogeneration power plant fueled by residual gas that has high hydrogen content from the petrochemical production process. Braskem's resources are in partnership with Siemens, responsible for building and operating the high-efficiency cogeneration system through a long-term contract.

This project, which reduces GHG emissions from the ABC unit, is aligned with Braskem's Industrial Decarbonization Program, which aims to structure the company's business plan and advance initiatives that promote a 15% reduction in absolute CO_2 emissions (scopes 1 and 2) by 2030.

Does the Case show GHG emission level reduction?

Yes

How is the Case classified?

Mitigation

Has the Case been implemented?

It is in the implementation and commissioning phase.

What is the forecast of continuity of the Case?

The case will maintain the estimated emissions reduction over the life of the project.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

Yes, indirectly by the site's greenhouse gas emissions inventory, which is done annually by an independent third party.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

It is estimated that once the project has been fully implemented, there will be an absolute reduction of around 100 thousand tons of CO_2 that year. This reduction occurs in the year of implementation and continues throughout the life of the project.

Impacts/results

The first phase of the project was implemented in 2021, during the cracker's General Shutdown, by installing some of the electric motors, resulting in a reduction of more than 30 thousand tons of CO_2 that year. Throughout 2022, the cogeneration and evaluation of other electrification projects is projected to enter operation. Upon completion of the Vesta Project, there has been an estimated 11.4% reduction in water consumption and 6.3% reduction in total GHG emissions from the unit's scope 1 (stationary combustion) and scope 2 (acquired electricity), equivalent to about 100 thousand tons of CO_2. With this upgrade, Braskem estimates a reduction in energy consumption equivalent to that of a city with one million inhabitants.

The case benefits several stakeholders, especially society in general, given that it is contributing positively to the fight against climate change, investing in technologies to reduce global GHG emissions, and mitigating other environmental impacts, by reducing water consumption and reducing regulated pollutant emissions (e.g., particulate matter and NOx).

Invested resources

The total investment was BRL 600 million, including contributions from Braskem and Siemens.

Main challenges faced

The project's main challenge has been to implement it fully according to the expected schedule, with an initial estimated start date for the second half of 2021. Due to the maintenance shutdowns of the industrial unit, the COVID-19 pandemic, the learning process with the new technology adopted and the business model, in which Siemens is responsible for the operation and maintenance of cogeneration assets, the project schedule has changed.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Accessing financial resources for the project modality, which relies on the participation of the operating partner, Siemens.

Next steps

Finalize implementation of the second project phase and calculate the reduction of GHG emissions. It is expected that the project's benefits will be recorded in the 2024 inventory, considering the 2023 operating year.

Relations with the SDG (Sustainable Development Goals)

6 – Drinking water and sanitation:

For everyone.

7 – Clean, affordable energy:

Ensure access to affordable, reliable, sustainable, and modern energy for all.

12 – Responsible consumption and production:

Ensure sustainable consumption and production standards.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Modernization of the energy system using state-of-the-art technologies, for both engines and power generation using high hydrogen fuel.

Other information regarded as relevant

This case is posted on the company website: **https://www.braskem.com.br/detalhe-noticia/braskem-e-siemens-estabelecem-parceria-para-melhorar-eficiencia-energetica-no-abc-paulista**

ABC Petrochemical Complex (Q3 unit).

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

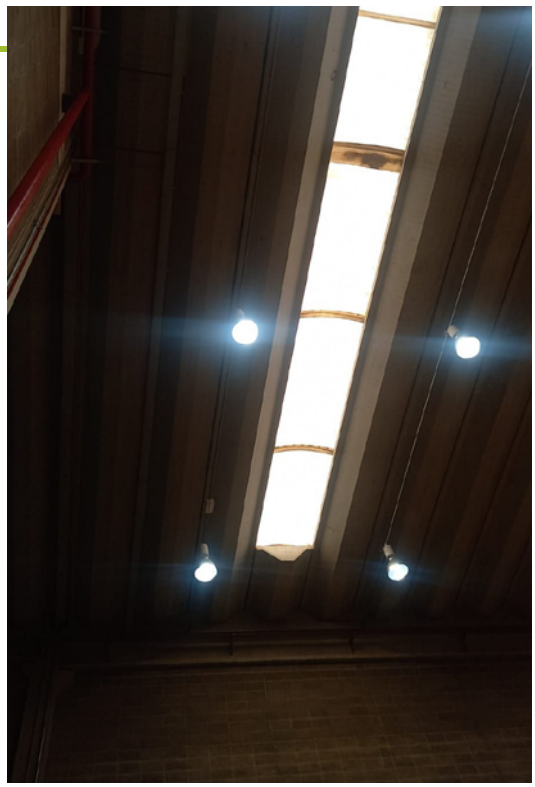
BYD do Brasil LTDA

Name of the case

Replacement of fluorescent lamps with Light Emitting Diode (LED) lamps

Sodium vapor lamps – 400W.

Light-emitting diode (LED) lamps – 50W.



Site

https://www.byd.com.br

Corporate Email Address

karina.derigo@byd.com

Type of Organization

Limited society.

Economic activities (based on CNAE - National classification of economic activities)

Manufacture of direct and alternating current generators, parts, and accessories.

Theme

Reduction of indirect emissions, scope 2 (cf. Greenhouse Gases Protocol (GHG Protocol) – purchased electricity, steam, heating/cooling purchased for own use).

Case description

The project under implementation to replace 230 fluorescent lamps of 400 W with 50 W LED lamps, in the production line of the new BYD do Brasil Ltda. subsidiary, located in Campinas/SP, in the Technopark district. With the project, it will be possible to minimize environmental impacts caused by the use of fluorescent lamps, such as reducing greenhouse gas emissions, in addition to reducing electricity costs.

After replacing the lamps, they will be disposed in an environmentally correct way for decontamination and recycling, through a specialized and approved previously contracted company.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

In progress.

What is the forecast of continuity of the Case?

6 months in total.

Initially, 3 sheds will be part of these modifications.

Is the Case likely to expand?

Yes, expanding to shed 4 and the administrative sector

Information about GHG emissions.

Is there any emission reduction?

Yes. There is a significant reduction, around 70%. Generation will drop from 0.103 tCO_2/month to 0.031 tCO_2/month until the end of the project.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

With the total replacement of fluorescent lamps, around 70% in energy consumption will be reduced and consequently the same reduction in GHG emissions resulting from this consumption. Based on the average energy consumption in the first four months of 2022, even with fluorescent lamps, the emission was 0.103 tCO_2/month or 1.240 tCO_2/year. After this project is concluded, it is estimated that the emission will drop to 0.031 tCO_2/month or 0.372 tCO_2/year. The CO_2 emission from electricity consumption can be directly calculated directly using the calculator available at https://idesam.org/calculadora/.

Impacts/results

The impacts will be environmental, on energy, economy, and occupational safety. In addition to consuming less energy, and consequently, emitting less GHG. LED lamps don't have contaminants in their composition (mercury, for example). LED lamp life is longer, generating less waste in the long run. Another point to be taken into account is the fact that the LED lamp does not heat up the environment as much as fluorescent lamps, providing a more pleasant work place and reducing the need for cooling the environment. A fluorescent lamp heats up approximately 7ºC more when compared to an LED lamp.

Invested resources

Human resources: Health, Safety and Environment (HSE) sector, maintenance, branch supervisor. Project costs will be low as they only involve purchasing new light bulbs, preparing environmental legal documents and shipping so that old light bulbs can be disposed of properly.

Financial resources: BRL 4,000/shed (using national light bulbs: Galaxy LED).

Main challenges faced

Choosing a national supplier in order to reduce environmental impacts, mainly due to CO_2 emissions during the transport of these products. Another challenge is the destination of fluorescent lamps, as they need to be disposed of differently, as they are classified as Class I. They will be sent to the company already approved and contracted, with all the necessary environmental documentation.

Next steps

Implementation of LED lamps in shed 4 and in the administrative sector.

Relations with the SDG (Sustainable Development Goals)

7 – Clean and affordable energy.

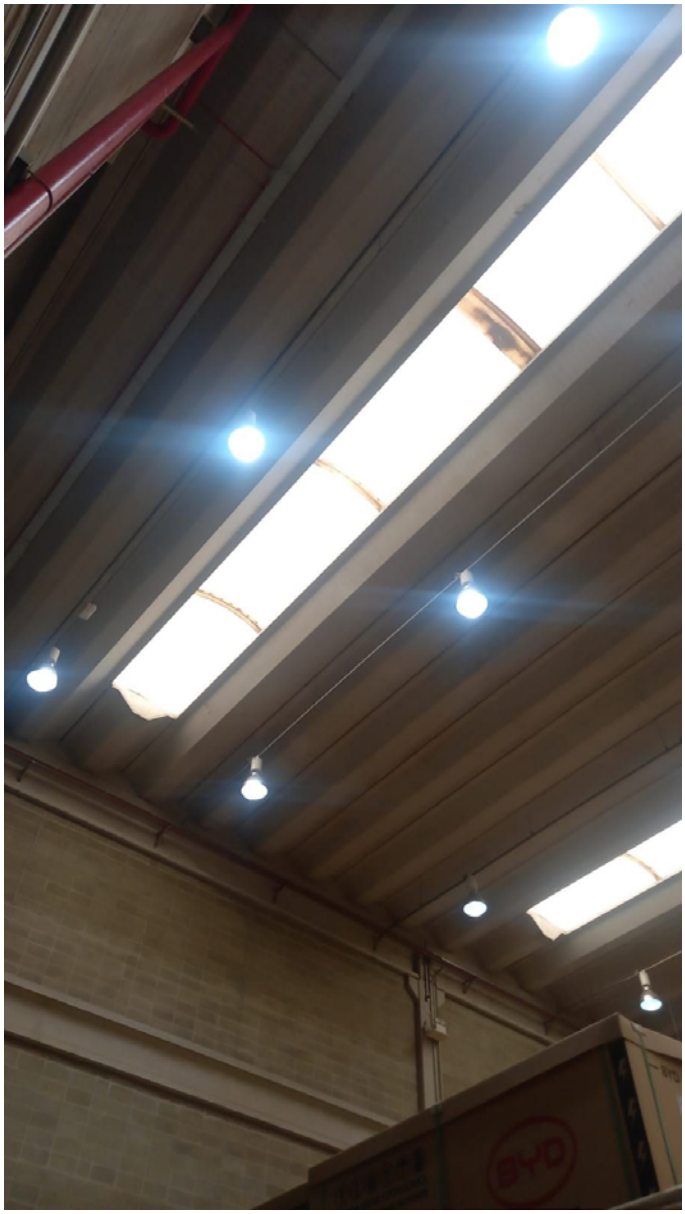
Ensure access to affordable, reliable, sustainable, and modern energy for all.

13 – Action against global climate change:

Take urgent measures to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

No.



Light-emitting diode (LED) lamps – 50W.

ACORDO AMBIENTAL SÃO PAULO

GRUPO CARREFOUR BRASIL

Corporate Name

Carrefour Brasil Group

Name of the case

CarbonFree –Offsetting logistics emissions by Carrefour Brasil Group

To reduce dependence on fossil energy, the company adopted Liquefied Natural Gas (LNG). Two ecological trucks – which emit 15% less CO_2 than the diesel version – have been in circulation since July 2020 and serve stores in the capital of São Paulo and in the interior of State.

Site

https://www.grupocarrefourbrasil.com.br/

Corporate Email Address

lucio_vicente_silva@carrefour.com

Type of Organization

Publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Retail.

Theme

Reduction of direct emissions, scope 1 (cf. Greenhouse Gases Protocol (GHG Protocol) – the organization's facilities, its transport) and scope 3 (cf. GHG Protocol – acquired goods and services, capital goods, fuel, transportation and distribution, waste, business trips, and so on).

Emissions eliminated (replacement of fuel and means of transport, innovations in products and services, and so on).

Carbon capture and storage, emission offsetting.

Case description

Continuing its efforts aligned with the international goal for the Carrefour Brasil Group to decarbonize its business and reduce CO_2 emissions to neutral in 2040, the company continues to invest in projects and initiatives to increase logistics efficiency, in changing the energy mix for its fleet, participating in the carbon offset program in Brazil. As a result of these measures, from 2020 to 2021 transport emissions in supplying Carrefour Brasil stores (retail) were reduced by 16.7%, from 16,374 tons of carbon equivalent (tCO_2e) in 2020 to 13,641 tCO_2e in 2021. These calculations were performed using the Brazilian GHG Protocol Program methodology.

Emissions in the first half of 2022 were down by 237 tCO_2e year on year, equivalent to -3%. Again, a review of processes to increase transport efficiency reduced distance covered, increases the volume dispatched per vehicle and, consequently, reduced the number of trips.

To reduce fossil fuel emissions, the company continued to adopt Liquefied Natural Gas (LNG). Ecological trucks, which emit 15% less CO_2 than diesel vehicles, continue to serve stores in Sao Paulo state. Two 100% electric vehicles, equipped with a 97kWh capacity battery with a range of 250 km and zero pollution, continue to operate under the Carrefour brand. In addition to not emitting CO_2, they also reduce noise pollution. Electric vehicles produce 53% fewer greenhouse gas emissions than gasoline equivalent vehicles from fabrication to operation. A medium-sized electric vehicle produces about 29 tCO_2e less than a similar gasoline-powered vehicle, according to the Union of Concerned Scientists, in 2015.

The Carrefour Brasil Group is also investing in offsetting 100% of the emissions from its supply logistics through the Green Farm CO_2Free project, at Fazenda Porto Bonito I and II, in Itaquiraí, Mato Grosso do Sul (MS). Green Farm CO_2Free has an area of 46,540,666 m^2 and more than 30km of rivers in the confluence region of three very important biomes: Atlantic Forest, Cerrado, and Pantanal. It is considered the only buffer area in the Ilha Grande National Park biome, with a total area of 4,654 hectares dedicated to specific investments in the implementation of seven Ecosystem Services management activities, allowing the company to reach its social and environmental responsibility targets, transparently and comprehensively, using reports in accordance with the recommendations of ISO 26,000 Corporate Social Responsibility for Companies.

In addition, the company's transportation sector is using the southeastern rail network, reducing the current cost of road transport, getting trucks off major highways connecting São Paulo to Rio de Janeiro, and mitigating GHG emissions. In 2022, the group invested in rail to service and supply seven stores in Rio de Janeiro, with its main Distribution Center (DC) for goods in São Paulo. Previously, we had 60 road trips a month to serve Rio de Janeiro. Through rail, we are reducing emissions by more than 316 tCO_2e per year, 62% less than road transport, according to the transport company. Using rail has reduced transport emissions by1.7% (from 2020 to 2021 – emission factors from the LAS-TROP tool). So, we have achieved economic and environmental results and benefits, increasing efficiency in operations for the Carrefour Brasil Group.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Compensation.

Has the Case been implemented?

Yes

What is the forecast of continuity of the Case?

It has been implemented.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Action for the transport sector - Estimate of 3,000 tCO_2e per year.

The actions taken included increased cargo occupancy in vehicles and the use of vehicles that carry more cargo, to reduce the number of trips and, consequently, emissions; the implementation of other means - such as rail – with an estimated 316 tCO_2e per year - calculation based on average number of trips in the period and the 62% reduction reported by the transport company, and cabotage, with a reduction of 25% of emissions compared to road transport, as reported by the transporter.

Impacts/results

Rail – In the first four months of using rail, 38 tCO_2e were reduced on road transport on the São Paulo - Rio de Janeiro route. The estimate is 114 tCO_2e saved in 12 months.

Invested resources

Financial and human. For the execution and implementation of transport projects, the only investment was in CO_2 offsetting with the purchase of carbon credits. The other results are obtained through operational optimization, route reviews, and negotiation processes with partners.

Main challenges faced

The lack of multimodal carriers with access to rail networks since they are under concession; the cost of electric vehicles, which is still high compared to diesel vehicles; the need for greater availability of ships to improve delivery times; little competition in the segment.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Provide subsidies and access to credit for companies that want to invest through financing or purchasing vehicles or equipment that are sustainable; establish effective public and social policies to facilitate licensing and regulations of sustainable activities.

Next steps

The transport area of the Carrefour Group aims to increase the number of electric vehicles in its fleet in 2022, and optimize return trips, contributing more to the reduction of the group's emissions.

Relations with the SDG (Sustainable Development Goals)

11 -Sustainable cities and communities:

To make cities and human settlements inclusive, safe, resilient, and sustainable.

12 - Responsible consumption and production:

Guarantee sustainable consumption and production standards.

13 - Action against global climate change:

Take urgent measures to combat climate change and its impacts.

17 - Partnerships and means of implementation:

Strengthen the means of implementation and revitalize global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes, for the sector. Technology is a tool used by the Carrefour Brasil Group to reduce greenhouse gases in its operations. We use technologies available in the market to reduce our dependence on fossil energy, and so adopted Liquefied Natural Gas to power two ecological trucks serving stores in the state of Sao Paulo, which emit 15% less CO_2 than diesel vehicles, and electric vehicles.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Companhia Brasileira de Alumínio

Name of the case

Biomass Fired Boiler

Biomass Boiler at the Alumina Refinery (municipality of Alumínio/SP).

Site

https://www.cba.com.br/en/

Corporate Email Address

sustentabilidade@cba.com.br

Type of Organization

Publicly traded company.

Economic activities (based on CNAE - National classification of economic activities)

Manufacturing industry.

Theme

Reduction of direct emissions, scope 1 (according GHG Protocol), which includes the organization's own facilities and own transportation; Avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.).

Case description

The first industrial stage of aluminum production takes place at the Alumina Refinery (municipality of Alumínio/SP), where the aluminum oxide (alumina) is extracted from bauxite. This occurs through chemical reactions with alkaline solutions associated with high pressures and temperatures, according to the Bayer process. For this process it is necessary to produce steam, which at Companhia Brasileira de Alumínio (CBA) was done by boilers powered by fuel oil and natural gas. In search of more sustainable alternatives to compose its energy mix, in 2020, CBA started to acquire steam from wood chip biomass. It was possible through the construction of a new boiler in partnership with the company ComBio Energias Renováveis, which also operates the boiler and is responsible for supplying the steam acquired by CBA. The operation of this structure began in March 2020 in a test phase and since July 2020 it has been operating regularly and has the capacity to produce all the steam necessary for the operation of the plant.

By replacing fossil fuels with biomass, CBA had, as its main results, the reduction of gross emissions from the Alumina Refinery by 46.2% compared to 2019 and the reduction of specific emissions (emissions per ton of product) from 0.55 to 0.31 tCO_2e/t aluminum oxide, considering scopes 1 and 2 compared to 2019.

These results are expected to be even more significant in 2021, since in 2020 the boiler operated on a regular basis for only 6 months.

The project was also the basis for obtaining the first Export Credit Notes (NCEs) for sustainable projects issued in Brazil.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

Already Implemented.

Is the Case likely to expand??

It's not possible.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The project represented a reduction of more than 163,000 tCO_2e in 2020 compared to 2019. The number is expected to be even more significant in 2021, with regular boiler operation throughout the year.

Impacts/results

CBA produces low carbon aluminum, being among the companies in the aluminum industry that has the lowest rate of greenhouse gas emissions (GHG) per ton of product in the world. Still, it is committed to the reduction of GHG emissions by establishing reduction goals until 2030 and investing in projects such as the biomass boiler, which contributes significantly to the reduction of emissions in the production process and to the reduction of the carbon footprint of final products. All CBA clients benefit from the purchase of low carbon products.

Invested resources

Up to the present BRL 63 million have been invested.

Main challenges faced

The main challenges were the implementation and interconnection of the boiler structures at the CBA industrial plant

Next steps

The boiler is deployed and operates regularly. CBA constantly monitors steam consumption and atmospheric emissions from the boiler, according to legal requirements and applicable licenses.

Does the Case contribute to technological development and/or to the business model?

The use of renewable fuel sources to replace fossil sources.

Other information regarded as relevant

The boiler is in compliance with the environmental legislation applicable to the State of São Paulo, it is licensed and complies with the requirements established by the environmental agency. Periodic monitoring of atmospheric emissions is performed, in accordance with methodologies for monitoring emissions from stationary sources recommended in the applicable legislation.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Companhia Brasileira de Alumínio

Name of the case

Smelter Technology Update

Smelters with cells upgraded with the new technology.

Site

https://relatorioanual2021.cba.com.br/

Corporate Email Address

sustentabilidade@cba.com.br

Type of Organization

Public limited company/public (Open capital).

Economic activities (based on CNAE - National classification of economic activities)

Transformation industry.

Theme

Reduction in scope 1, direct emissions (as per Greenhouse Gases Protocol (GHG Protocol) from the organization's own facilities, own transportation); Reduction in scope 2 indirect emissions (as per GHG Protocol – electricity acquired, steam, heating/cooling acquired for internal use), emissions avoided (replacement of fuels and means of transportation, product and service innovation etc.), organizational innovations and business models; water resources and water efficiency.

Case description

The production of primary aluminum is an electrochemical process which entails the electrolysis of alumina (aluminum oxide) dissolved in the electrolyte bath Na_3AlF_4) by conducting an electric current. This process occurs in an electrolysis cell in which alumina (Al_2O_3) is reduced into metallic aluminum (Al) and oxygen is released, which in accordance with the process conditions oxidizes the anodic paste (formed of coke and coal-tar pitch), issuing CO_2.

Alumina forms a crust on the outside of the cell, which is completely broken off every 4 hours to allow each cell to be filled with standard volumes. The upgrade switches the cell feeding process to an automatic intermittent feed system tailored to the needs of each cell, thereby eliminating the need to break the crust and improving process efficiency. This results in better current efficiency and the cell's productivity rises whilst using the same resources.

CBA has installed the new system in 72 cells and has shown that it reduces the consumption of anodic paste and minimizes the anodic effects (sharp increase in voltage in the cell), which are the main sources of greenhouse gas emissions in aluminum production.

The consumption of anodic paste by CBA generates carbon emissions of 600 thousand tons CO_2 a year, due to the cooking that takes place within the cell. While conventional cells consumed 517 kg of paste for each metric ton of aluminum in 2021, the converted cells consumed just 496 kg, i.e., the losses generating carbon emissions diminished.

The anodic effects triggered the emission of perfluorocarbons (CF_4 and C_2F_6), as these events trigger a reaction between the electrolyte bath and the carbon in the anodic paste, accounting for some 200 thousand tons CO_2e issued annually. While the frequency of anodic effects in 2021 was 0.59 effects per cell per day in the conventional process, this figure dropped to 0.23 in converted cells.

Using actual process data to compare the former cells with the converted cells found greenhouse gas emissions dropped by 20% during the electrolysis stage. The project also enhances energy efficiency and productivity, reduces the consumption of alumina in electrolyte baths and also reduces the consumption of water need for gas scrubbing. We expect to complete this project by 2025 for a total of 1,040 active cells, and 236 will begin operating with this new technology.

This project was one of those comprising CBA's flotation and is one of CBA's overarching targets to reduce greenhouse gas emissions in its 2030 ESG (Environmental, Social, and, Governance) Strategy, also contemplating the targets approved by Science Based Targets.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it is running.

What is the forecast of continuity of the Case?

3 to 5 years.

Is the Case likely to expand?

No.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

When all cells have been converted, including those that are yet to enter operation, more than 200 thousand tons CO_2e can be avoided annually. To date the upgraded cells have avoided the emission of 17,994 tons CO_2e, with 2,641 in 2018, 2,520 in 2019, 6,216 in 2020 and 6,618 in 2021.

Impacts/results

In addition to lower greenhouse gas emissions, upon completion, the project will avoid 27 million cubic meters of water withdrawals, and reduce electricity consumption by 17 megawatts (MW) enough to supply power to 30,000 homes. This positive impact is also felt in the CDP's climate change rating, in which the Company has secured an excellent rating.

Invested resources

The complete project will receive total investment of BRL 620 million. An organizational structure has also been created to instruct employees only to monitor the conversion of the cells and their performance.

Main challenges faced

CBA has been producing aluminum using Soderberg technology in its Smelters since 1955. The efficient upgrading of this technology required in-depth studies and analyses to ensure the project was feasible. The financial investment to implement it is also sizable. In 2018 the company initiated a project to validate whether the results were effective so it could continue converting all cells.

It was also necessary to acquire funding to implement the project and this was possible thanks to green bonds, enabled by substantial sustainability gains.

Next steps

All cells in CBA's smelters will be upgraded with the new technology by 2025. All gains will be measured, validated and disclosed by the company annually.

Relations with the SDG (Sustainable Development Goals)

9 – Industry, innovation & infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

13 – Climate action:

Take urgent action to combat climate change and its impacts.

17 – Partnerships for the goals:

Strengthen the means of implementation and revitalize the global partnership for sustainable development..

Does the Case contribute to technological development and/or to the business model?

Yes it does. The project consists of upgrading CBA's existing technology for producing primary aluminum.

ACORDO AMBIENTAL SÃO PAULO

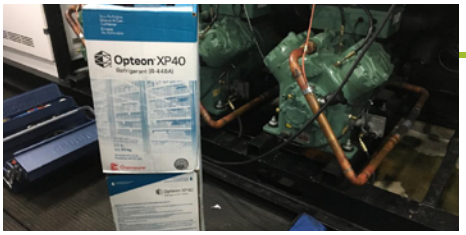
Corporate Name

The Chemours Company Indústria e Comércio de Produtos Químicos Ltda.

Name of the case

Sustainable Commercial Refrigeration

Sustentability for Commercial Refrigeration Systems in Supermarket.



Commercial Refrigeration Retrofit is simple and allows the continuity of system operation with improved energy consumption.

The Replacement of high global warming potential refrigerant reduces climate impact and improves system energy efficiency..

Site

https://www.chemours.com/en

Corporate Email Address

infobrasil@chemours.com

Type of Organization

LLC Limited Liability Company.

Economic activities (based on CNAE - National classification of economic activities)

Manufacturing and sales of chemical products.

Theme

Avoided emissions (replacement of fuels and modes of transport, innovations in products and services, etc.);

Communication, stakeholder engagement, and dissemination of good practices.

Actions to adapt to climate change;

Other axes directly or indirectly related to the climate schedule.

Case description

Most commercial refrigeration systems in supermarkets use as one of the components the refrigerant fluid that promotes the thermal exchange of the system. The main refrigerant currently being used, R-404A , is a hydrofluorocarbon mixture (HFC) and has high Global Warming Potential (GWP) of 3,922 CO_2e/kg. A new technology of refrigerants fluids based on Hydrofluoroolefin (HFO), such as the R-449A (trademark Opteon XP40) with GWP three times lower, allowed the replacement of these refrigerants without the need to change equipment bringing the benefit in several cases of reduced energy consumption.

The company has developed in several major supermarket and food industries in Brazil the conversion of more than 100 supermarket stores and refrigerated facilities, where very high GWP refrigerants fluids were replaced by more sustainable fluids, without the need of big investments in new systems and in most cases with better energy efficiency, which also reduces the indirect environmental impact. It is estimated that only in the conversion of these 100 stores about 63 thousand tons CO_2e ceased to be emitted into the atmosphere due to possible leaks of refrigerant fluids from refrigeration systems.

In addition to the avoided emission of high GWP refrigerants adopted in the converted systems, the refrigerant fluid taken from existing systems can be recycled and reused in systems that do not allow conversion for technical reasons. Training and guidance on the proper disposal and handling of refrigerants are part of the seminar program that the company promotes throughout the region, educating hundreds of refrigeration and air conditioning technicians every year, in order to raise awareness about the responsible use of fluids.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, adaption, social and environmental responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

It is estimated that only in the conversion of these 100 stores about 63 thousand tons CO_2e emissions were avoided due to possible leaks of refrigerant fluids from the refrigeration systems. The expectation is that with the increase in conversions each year these avoided emissions increase exponentially, since refrigeration systems in Brazil have relatively high rates of leaks. In addition to direct emission, there is also the reduction of indirect emissions due to the reduction in energy consumption that also brings reduction of emissions, which can vary from system to system depending on the energy efficiency obtained.

Impacts/results

In more than 10 projects already implemented with the monitoring of energy consumption done by the company, there were reductions of up to 11% of the energy consumption of refrigerators and 6% of the energy consumption of the freezer systems. In addition, the conversions reduced the refrigerant fluid GWP by 67%, directly reflecting the reduction of the environmental impact related to fugitive emissions. The easy conversion allowed business and store operations to be disrupted minimally, which also brings economic benefits. The low initial investment required due to the possibility of converting of installed systems also brings benefits for a faster return on investment and less indirect environmental impact when taking advantage of existing assets.

In Brazil, about 2.000 t of R-404A refrigerant fluids are consumed every year and corresponds to about 7.9 million ton CO_2e which if converted to more sustainable solutions, such as R-449A, could bring a reduction of 5.3 million ton of CO_2e. This reduction would be equivalent of the same as 2.3 billion liters of gasoline less consumed or 1.1 million fewer light vehicles circulating on the streets in the period of 1 year (source: **https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator**).

Invested resources

Technical manpower to perform the conversion of the system, being the same qualification required for traditional technologies. The additional investment required was basically the acquisition of the new refrigerant fluid and the quantity can vary from system to system. Converting the system using a more efficient component brought energy savings which paid for the cost difference and labor for conversion in a short time. The pay-back of the conversion of some stores in which the company monitored energy consumption was between 6 to 18 months.

Main challenges faced

Economic and financial challenges that end up prioritizing short-term solutions over solutions of greater efficiency, productivity, and lower environmental impact (sustainability). In addition, lack of skilled labor, which results in lack of preventive maintenance and high rate of refrigerant fluid leak that accelerate the global warming impact, specially when using high GWP refrigerant fluids.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Policies and business environment that could facilitate access to credit and financial support to promote the conversion of refrigeration systems with less environmental impact and legislation that encourages and accelerates the adoption of technologies and refrigerants of lesser environmental impact, aligned with international protocols for climate change (Montreal Protocol, Kigali Amendment and Paris Agreeement).

Next steps

Increasingly expand the conversion of refrigeration and air conditioning systems to more sustainable components to reduce high potential greenhouse gas emissions and contribute to better energy efficiency of the systems. At the same time, defend public policies to encourage the adoption of technologies with less climate impact and a program to recognize companies that have proactively adopted environmentally sustainable solutions.

Relations with the SDG (Sustainable Development Goals)

9 – Industry, Innovation and Infrastructure:

To build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

12 - Responsible Consumption and Production:

To ensure sustainable production and consumption patterns;

13 – Action Against Global Climate Change:

To take urgent action to combat climate change and its impacts;

17 – Partnerships and Means of Implementation:

To strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Hydrofluoroolefin based substances with lower environmental impact and greater energy efficiency.

Other information regarded as relevant

The case is connected to the SDO 9 in which the conversion of the systems (retrofit) allows the extension of the life of the equipment. The initiative is connected to SDG 12, as it contributes to sustainable management and the efficient use of natural resources, such as energy, besides enabling the use of the same equipment for retrofit reducing the need for exchange and, therefore, more sustainable consumption of resources and less waste generated with the use of equipment. It is also aligned with SDG 13 as it contributes to the UN's sustainable d-involvement goals by using refrigerant fluids that provide greater efficiency to customers while significantly reducing the GWP of refrigeration systems and equipment and r-conditioning. These products enable the development of politics and national legislation so that refrigerants are regulated and contribute directly and indirectly to the reduction of global warming. And it is connected to SDG 17, as it strengthens partnerships by sharing knowledge, expertise, technology, and financial resources to support the achievement of sustainable development goals. With regard to the Principles of the Global Compact, the initiative is fully connected to the three principles of the environment (7 Companies should support a preventive approach to environmental challenges; 8 Develop initiatives to promote greater environmental responsibility; and 9 Encourage the development and dissemination of environmentally friendly technologies).

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

COCAL Comércio Indústria Cana de Acucar E Alcool Ltda

Name of the case

Expansion of Localized Vinasse Application

Agricultural machine carrying out the application of localized stillage.

Site

http://www.cocal.com.br/

Corporate Email Address

meioambiente@cocal.com.br

Type of Organization

Limited Society.

Economic activities (based on CNAE - National classification of economic activities)

Transformation industry.

Theme

Reduction of direct emissions, scope 1 (according GHG Protocol), which includes the organization's own facilities and own transportation; avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.).

Case description

The use of vinasse, a by-product of ethanol distillation as a fertilizer, is an ally for obtaining more productive sugarcane fields. The localized vinasse is applied directly to the sugarcane line, and it is possible to add other nutrients that guarantee complete fertilization, greater agricultural use and control of the dose to be used.

To guarantee the fertility of agricultural areas and the expected productivity, the Plant depends on the acquisition of mineral fertilizers; however, the application of localized stillage supplies the source of mineral potassium that the plant needs.

The calculations for the quantification of CO_2 from the expansion of the localized vinasse are performed by the RenovaCalc calculator from RenovaBio. For this, Cocal has an agricultural record that counts how much inputs and fuels were consumed in the year, in addition to agricultural productivity. Based on this factor, we use RenovaCalc to generate an Energy Efficiency Score for ethanol production, i.e., with the reduction of these inputs, the efficiency score increases and, consequently, a greater amount of Decarbonization Credits (CBIO) is generated. Each CBIO is equivalent to 1 ton of CO_2 equivalent emissions avoided.

Therefore, for this case, the increase in the use of vinasse in the field, the reduction in the consumption of potassium chloride and the increase in productivity were taken into account.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

More than ten years, and for the year 2022 we are already carrying out a new expansion in Narandiba.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Based on 2021 data, 628 tons of CO_2 equivalent were avoided as a result of the expansion of localized vinasse application.

Impacts/results

Localized vinasse application increased from 18,000 hectares (ha) in 2019 to 52,000 ha in 2021, and in 2022 we will apply it to 66,745 ha. This practice increases the efficiency of nitrogen utilization by the plant, due to the reduction in the volatilization of this element. In addition, it contributes to raising agricultural productivity, soil quality and decreasing dependence on mineral fertilizers.

Invested resources

In 2021, BRL 18 million was invested in the Localized Fertigation Expansion Project.

Main challenges faced

The main challenges encountered for expanding the application of localized stillage were the planning, discipline, and execution of the project.

Suggestions to improve the business environment (regulations, licensing, access to credit)

So far into this project, there are no suggestions for improvements in the business environment.

Next steps

The continuous search for alternatives to reduce consumption of mineral fertilizers.

Relations with the SDG (Sustainable Development Goals)

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

13 – Action Against Global Climate Change: Take urgent steps to combat climate change and its impacts.

15 – Terrestrial Life:

Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, fight desertification, halt and reverse land degradation and halt the loss of biodiversity.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

energia responsável cocal

Corporate Name

COCAL Comércio Indústria Cana de Acucar E Alcool Ltda

Name of the case

Limestone Application Using Precision Technology

Cocal invests in technologies that allow for more productive sugarcane plantations and lower environmental impacts.

Transformation industry

http://www.cocal.com.br/

Corporate Email Address

meioambiente@cocal.com.br

Type of Organization

Limited Society.

Economic activities (based on CNAE - National classification of economic activities)

Transformation industry.

Theme

Reduction of direct emissions, scope 1 (according GHG Protocol), which includes the organization's own facilities and own transportation; Avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.).

Case description

Precision agriculture (PA) is a way of managing the production system, considering that the crop is not uniform, i.e., there is variability in productivity, physical and chemical attributes of the soil.

Previously, the rate of limestone application to soils was fixed and determined by amplified sampling. This technique can lead to underdosing or overdosing. Therefore, Cocal invested in the sampling of georeferenced soils carried out by dividing the crop into grids, which are small plots. In this methodology, the points are predetermined and georeferenced within the cultivation area, using equipment for the elaboration of maps, which allows for an increase in representativeness and a more assertive recommendation for the application of this agricultural corrective in the region of the municipalities of Narandiba and Paraguaçu Paulista. In this way, the collection of samples in grids allows obtaining a greater level of detail about the cultivation area, allowing the application of limestone at variable rates.

The calculations for the quantification of CO_2 from the reduction of limestone consumption at Cocal are performed by the RenovaCalc calculator from RenovaBio. For this, Cocal has an agricultural record that counts how much inputs and fuels were consumed in the year, in addition to agricultural productivity. Based on this factor, we use RenovaCalc to generate an Energy Efficiency Score for ethanol production, that is, with the reduction of these inputs, the efficiency score increases and, consequently, a greater amount of Decarbonization Credits (CBIO) is generated. Each CBIO is equivalent to 1 ton of CO_2 equivalent emissons avoided.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

More than ten years. Today it is our standard within the guidelines and technical premises, and we have no intention of changing the practice.

Is the Case likely to expand?

Maybe. If new areas are expanded, they will be included in this work model.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Based on 2021 data, 854 tons of CO_2 equivalent were avoided, as a result of reduced limestone consumption.

Impacts/results

The use of PA rationalizes the use of correctors with gains in productivity and cost reduction.

In 2020, 17,808 hectares (ha) of limestone application were carried out in soil preparation areas, with an average dosage of 5,881 kg/ha. In 2021, 21,282 ha were carried out with an average dosage of 4,040 kg/ha. The adoption of this technology provided a reduction of about 31% in the average dose of limestone in the last two years, resulting in a reduction of more than 39,000 tons of limestone, considering the area volume of 2021.

Invested resources

In 2021, approximately BRL 2 million was invested in the application of limestone made by third-party equipment and BRL 1 million in soil analysis, totaling BRL 3 million invested.

Main challenges faced

The main challenges encountered in consolidating the grid sampling were project planning, discipline and execution.

Suggestions to improve the business environment (regulations, licensing, access to credit)

So far into this project, there are no suggestions for improvements in the business environment.

Next steps

To continue grid consumption and seek new technologies to reduce limestone consumption

Relations with the SDG (Sustainable Development Goals)

9 – Industry, innovation, and infrastructure: Build resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

15 – Terrestrial Life:

Protect, restore, and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, fight desertification, halt and reverse land degradation and halt the loss of biodiversity.

Does the Case contribute to technological development and/or to the business model?

The case is a process improvement, because previously the limestone application rate in the soils was fixed and after the introduction of grid sampling it was possible to apply this agricultural corrective at variable rates, according to the soil needs.

Limestone storage in the mining operation site.

ACORDO AMBIENTAL SÃO PAULO

com bio

Corporate Name

ComBio Energia S.A.

Name of the case

Energy transition project: biomass boilers.

Biomass to be used in the process.

Biomass boiler operated by ComBio.

Site

https://combioenergia.com.br/

Corporate Email Address

sustentabilidade@combioenergia.com.br

Type of Organization

Public limited company / closed capital.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and Gas.

Theme

Avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.).

Case description

As a way of implementing a solution that is environmentally efficient in generating steam, a partnership was signed between Ingredion and ComBio. ComBio develops projects for steam generation and cogeneration of electricity with biomass, which promote environmental improvements and significant cost reductions for clients in the industrial segment. Ingredion, on the other hand, operates in the field of processing and refining food, additives, and corn-based sugars. With this partnership, the Ingredion Mogi Guaçu unit will have biomass as the main fuel for generating thermal energy, replacing natural gas, which is a fossil fuel and, therefore, non-renewable. The project is in the implementation phase and the operation of the new boilers will start in 2023. With the switch to renewable fuel, it will be possible to achieve a significant reduction in the emission of CO_2 and other greenhouse gases (GHG), contributing to the sustainability global goals. The project includes the installation of two new biomass boilers, with a total installed capacity of 200 tons of steam/hour and it is expected to consume 564 thousand tons of biomass/year to generate thermal energy exclusively for the unit. The steam will be used in different production processes at Ingredion, such as cooking and drying corn grains, among other purposes. With this, the current boilers, powered by natural gas, can be turned off.

With the full operation of the biomass boilers, it is expected to reduce 25% of emissions in the municipality of Mogi Guaçu. In addition, the project will contribute to the region's circular economy by reusing byproducts from other agricultural and forestry activities to generate energy, such as sugarcane bagasse, wood chips from the eradication of orange groves and eucalyptus residues; and also, with the destination of the ashes generated in the process for the production of organic fertilizers and compost.

The operation of a biomass boiler is more complex than boilers powered by fossil fuels, demanding a greater number of employees. In addition, our operation has biomass generation fronts, whether in forestry operations or agricultural residue operations, which, in turn, also generate jobs linked to the project. Thus, one of the positive impacts of the project will be the generation of 150 jobs, including industrial, biomass generation and road jobs.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

No, the project is in the implementation phase and the operation will start in 2023.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

With the implementation of the project, it is expected that the emission of approximately 200 thousand tons of CO_2 per year will be avoided.

Estimates were made using internal production data from ComBio and data from the IPCC, from which it was concluded that 0.16 tCO_2 is avoided for each ton of steam produced, from the switching from natural gas to biomass. Multiplying the steam generation estimate by the avoided emissions rate, we have the presented estimate of 200 thousand tons of CO_2.

Impacts/results

With the implementation of the project, in addition to reducing emissions, the following impacts are expected to be observed:

- generation of 150 jobs.
- reuse of byproducts from other activities, contributing to circular economy.

Invested resources

Approximately BRL 210 million will be invested by ComBio. Research and Development initiatives, employee training and consultations with the local community will also be carried out.

Main challenges faced

The main challenge faced in implementing the project was the proximity of the Ingredion unit to the local community, unlike most locations where ComBio operates, which required more assertive actions of engagement and consultation with stakeholders. Regarding the operation, the main challenges will occur when the operation starts, since they are linked to the logistics and supply of biomass to the unit.

Next steps

After the implementation of the project, periodic monitoring of biomass consumption, steam generation, ash generation, and boiler emissions will be carried out, in accordance with legal requirements.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and clean energy:

Ensure access to affordable, reliable, sustainable, and modern energy for all.

8 – Decent work and economic growth:

Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.

9 – Industry, Innovation, and Infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

13 – Climate Action:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

With the implementation of the new boiler, there is a change in the energy mix, making it cleaner, which represents an innovation for the sectors in which the ComBio operates. The case also contributes to innovation as boilers are adapted to burn different types of biomasses, reusing by-products from other activities.

Other information regarded as relevant

With the operation of the biomass boiler, an annual emissions reduction is expected, which represents neutralizing 85 days of annual emissions in the municipality of Mogi Guaçu. The municipality's emissions in 2019 were 774,002 tCO_2 (https://plataforma.seeg.eco.br/cities/statistics) according to the System of Estimates of Greenhouse Gas Emissions and Removals (SEEG, 2020). In addition, ComBio will take over the management of the public square in front of the unit and will plant 450 seedlings to form a Permanent Preservation Area.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

CPFL Energia

Name of the case

CPFL and RGE in Hospitals

Hospital in Jaguariúna (SP).

Emergency Care in Botucatu (SP).

Hospital In Guaraci (SP).

Medical Specialities Center in Itu (SP).

Site

https://cpfl.riweb.com.br/default.aspx?linguagem=en

Corporate Email Address

issu-sustentabilidade@cpfl.com.br

Type of Organization

Joint-stock company/ publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Avoided emissions (substitution of fuels and transportation modals, innovations in products and services, etc.), communication, stakeholder engagement, and dissemination of best practices. Other themes directly or indirectly related to the climate agenda.

Case description

The CPFL and RGE in Hospitals program was created in 2019 with the commitment to collaborate with the improvement of public health in the cities of the areas where the group's distributors operate, enabling the reduction in consumption and the efficient use of energy of public and philanthropic health institutions. Through energy efficiency projects, the Program helps to reduce energy bills by installing photovoltaic panels in hospitals and by changing light bulbs with obsolete technology for more efficient ones. In this way, the money saved can be invested in other sectors, to improve the service, benefiting the community and the region where they are installed. This initiative of the CPFL group uses resources from the Energy Efficiency Program (PEE) of the National Electricity Regulatory Agency (ANEEL).

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Social-Environmental Responsibility.

Has the Case been implemented?

Yes, it is running.

What is the forecast of continuity of the Case?

3 to 5 years.

Is the Case likely to expand?

Likely.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Following the efficiency actions at the Hospitals, 2,287 tons of CO_2 equivalent were avoided, since its inception in 2019 until December 2021.

Impacts/results

From its inception in 2019 until December 2021, the project has already achieved the following results:

- BRL 155 million invested in energy efficiency actions.
- 204 hospitals, located in the state of São Paulo and Rio Grande do Sul, benefited with finished construction works and 121 projects in execution, totaling 325 hospitals that will benefit from the project, being 182 in the state of São Paulo.
- 2,287 tons of CO_2 equivalent ceased to be emitted, with the efficiency actions in the hospitals, an amount related to the solar energy generation of the project, compared to the emissions of the National Interconnected System (SIN).
- 463 thousand people benefited by the humanization actions and projects for improvements in hospital infrastructure through the CPFL Institute in 14 hospitals.
- More than 105 thousand light bulbs replaced by more efficient LED models.
- 30 GWh of energy saved.

After the energy efficiency actions implemented, the annual economy forecast for the benefited hospitals already represents around BRL 12 million.

The project "CPFL and RGE in Hospitals" reinforces the strategy of the CPFL Group and of the CPFL Institute to act together with society in favor of public health and the well-being of the population, driving the transition to a more sustainable model of production and consumption of energy, potentiating the positive impacts of our business model in the community and value chain.

Invested resources

The resources used for energy efficiency actions come from the Energy Efficiency Program (PEE) of the National Agency of Electrical Energy (ANEEL), a regulatory obligation for energy distributors to invest a percentage of their net operating revenue (ROL) in energy efficiency projects. Having this resource in hand, the CPFL Group has innovated by creating the largest program with investments in energy efficiency projects in public and philanthropic hospitals in Brazil. Since its creation in 2019 until December 2021, the project has already had BRL 155 million invested in energy efficiency actions and customer donations made through energy bills.

The initiative acts on three major fronts, always aiming at the support and development of health institutions.

- The first pillar of the program is energy efficiency, where through the resources of the Energy Efficiency Program, regulated by ANEEL, photovoltaic panels were installed, less efficient lighting was replaced by LED technology models, and more efficient equipment was installed to generate savings in the energy consumption of the benefited institutions.
- Our second pillar of action are the social actions, where the CPFL Institute conducts initiatives aimed at the humanization of patient care, through performing arts, games, and recreational activities. Actions are also developed to improve the infrastructure (repairs to facilities, acquisition of equipment, and expansion of spaces) and support for clinical research in oncology. The social humanization front counts on the support of the Griots Association, which through "storytelling", the association's volunteers work on the patients' feelings and creativity, contributing to humanize the hospital environment and speed up the medical treatments. Another supporting institution is the "Doctors of Smile", which through art, professional musicians and scenic artists bring lightness to the hospital environment and work on the physical and mental health of patients in public hospitals.
- Finally, we have the third pillar of the program, which consists of financial collections. Through the initiative "Hospitals with + Health", the CPFL group has opened the opportunity for customers to make donations to hospitals through their energy bills.

Main challenges faced

One of the worst social problems in Brazil is the difficult condition in which the Health System and Hospitals are found, we easily find institutions with infrastructure problems, precarious hygiene conditions, lack of basic equipment and support in cases of intercurrences. The situation of Brazilian hospitals is far from what is necessary to ensure quality care to the population (VENTURA, 2019)[1]. This situation was further aggravated with the crisis triggered by the new coronavirus pandemic, further evidencing structural problems and lack of resources.

In this scenario, energy efficiency projects carried out in hospitals act in two ways directly related to society and the environment, providing cost reduction with electricity without affecting the needs of hospitals and also contributing to sustainability, generating energy from a renewable source.

[1] VENTURA, Luiz Alexandre Souza. A Situação dos Hospitais no Brasil. Disponível em: <https://cdd.org.br/saude-publica/a-situacao-dos--hospitais-no-brasil/>. Accessed in: Dec. 2019.

Next steps

The CPFL group has already approved a new stage of this project, to continue investing in hospitals and has collaborated with Aneel, for the then Priority Call for energy efficiency projects for hospitals.

Relations with the SDG (Sustainable Development Goals)

In 2021, the CPFL and RGE in Hospitals program was recognized by the United Nations (UN) as an example of good practice linked to the Sustainable Development Goals. The recognition is due to the integration of environmental, social, and economic indicators generated by CPFL and RGE in Hospitals, which contribute directly to the SDGs, such as ensuring accessible, sustainable, and modern energy distribution and promoting well-being and healthy living for all. CPFL Energia's president, Gustavo Estrella, is an ambassador of the UN's Leadership with the the Impact program.

3 – Health and Well-being:

(Ensure a healthy life and promote well-being for all, at all ages), with investments of more than BRL 150 million in public and philanthropic hospitals, the CPFL Group is through its service provision, promoting access to quality essential health services at all levels of care and access to safe, effective, and quality essential medicines and vaccines that are incorporated into the list of products offered by the Single Health System (SUS).

7 – Clean and affordable energy:

(Ensure access to affordable, reliable, sustainable, and modern energy for all), CPFL in Hospitals helps public and philanthropic health institutions to have a sustainable and more efficient energy system; in addition, the hospitals that benefit from the program are able to reduce the cost of their energy bills.

9 – Industry, innovation, and infrastructure:

(Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation), through CPFL and RGE in hospitals we are modernizing the infrastructure of hospitals, making them more sustainable, more efficient in energyconsumption, and bringing more technology to the buildings of these institutions.

12 – Responsible consumption and production:

(Ensuring sustainable consumption and production patterns), by installing photovoltaic panels and energy efficiency actions we are using the EEP resources and promoting the efficient use of electricity and energy production through solar energy.

13 – Action against global climate change:

(Take urgent action to combat climate change and its impacts). The burning of fossil fuels in the energy sector is one of the main sources of Greenhouse Gas (GHG) emissions, and for this reason, the use of resources for the implementation of clean energy generation (less GHG emitting) in health institutions makes the program so significant for the country.

Does the Case contribute to technological development and/or to the business model?

By installing photovoltaic panels and exchanging light bulbs with obsolete technology for more efficient ones, such as LEDs.

Other information regarded as relevant

The CPFL Group is an energy company committed to society. Thus, we have acted using the company's specialty and expertise in the sector, to support hospitals in its concession area and open replicable opportunities for other companies in the electricity sector, either through photovoltaic projects for similar institutions or by the vision of applying the resources resulting from Selic, as was the case.

The Project presents already measurable results and demonstrates the goal of collaborating with the improvement of public health in the cities of the concession area, through energy efficiency actions, investments, and support in the collection of donations to hospitals through energy bills. These are aids that are not directly measurable in the energy efficiency project, but that feed a virtuous circle in benefit of the hospitals.

Facing this unprecedented crisis, caused by the new coronavirus, shows that CPFL and RGE are reinforcing their actions so that health institutions have better conditions to serve the infected population.

Hospital of Charity Association in Três Passos (RS).

Emergency Care in Botucatu (SP).

Health Care Unit in Jataí (SP).

Hospital in Nova Granada (SP).

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

CPFL Energia

Name of the case

Development of a Sustainable Campus model at UNICAMP - living laboratory for applications of mini renewable generation, energy efficiency, monitoring and management of energy consumption

Photovoltaic System of the UNICAMP Gymnasium.

Operations Center (COS) Implemented.

Site

https://cpfl.riweb.com.br/default.aspx?linguagem=en

Corporate Email Address

issu-sustentabilidade@cpfl.com.br

Type of Organization

Joint-stock company/ publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Avoided emissions (fuel and transport modal substitution, product and service innovations, etc.).

Case description

The project's main goal was to create an Energetically Sustainable Campus model at the State University of Campinas (UNICAMP) in partnership with CPFL Energia through the implementation of a "Living Lab", which is a collaborative user-centered research method. Several areas of knowledge were involved, aiming to improve the campus infrastructure and, through the study and development of new technologies, to improve teaching and research. Ten subprojects were implemented to disseminate concepts and actions of energy efficiency and sustainability on campus, in order to promote the resolution of complex problems present in the emerging agenda of energy transition to sustainability, these being: management of electricity supply; distributed generation; energy efficiency and teaching and research. Such subprojects range from retrofitting electronic appliances and lighting fixtures in campus buildings to installing photovoltaic power plants.

This case began in August 2017 with a public call for a priority and strategic project in energy efficiency and distributed mini generation from the National Agency for Electrical Energy (ANEEL). Five departments of the University participated in the project, being: Interdisciplinary Center for Energy Planning (NIPE), Faculty of Electrical and Computer Engineering (FEEC), Faculty of Mechanical Engineering (FEM), Faculty of Civil Engineering and Architecture and Urbanism (FECFAU) and Faculty of Applied Sciences (FCA), with the participation of 65 researchers, including teachers, doctors, masters and undergraduates.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Socio-Environmental Responsibility.

Has the Case been implemented?

Yes, it was implemented, and its benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

One of the results achieved with this initiative was the substantial reduction in electricity consumption, directly impacting the reduction of greenhouse gas emissions (GHG) on campus. These avoided emissions have not yet been quantified, but it is possible to measure the impact of the case and its wide scope, with the replacement of inefficient equipment, and subsequent reduction in energy consumption Photovoltaic plants were installed on campus in order to supply part of the energy demand. Thus, a positive impact was obtained with the decrease in the use of energy generated by non-renewable sources, which usually have a high GHG emission rate.

Impacts/results

The project was divided into 10 subprojects that started together in 2017, and had a duration of 52 months, except for subproject 8 that started in 2020 and ended together with the project in 2022, among these:

Subproject 1: creation of an Operations and Monitoring Center for the UNICAMP electrical system, to reduce the University's vulnerability in the face of natural factors and unforeseen events. The infrastructure deployed in the campus allows the application of tools for analysis and optimization of electrical networks, aiming at efficiency gains, besides implementing the precise monitoring of the units and the capacity for physical action with the System Operation Center (COS). It contributes to the reduction of greenhouse gas emissions (GHG), with the reduction of electric power consumption, technical losses, and waste, among others.

The real-time monitoring allows quantitative results of the energy efficiency actions, through the information available at the COS. The data collected will support the definition of consumption reduction and monitoring goals. The project returns to the University the efficiency and savings gains.

Subproject 2: Installation of photovoltaic panels, to create an auxiliary generation to the electrical grid, allowing the injection of photovoltaic energy, with a potential of about 534 kWp, directly into the University's distribution grid as a focal mini generation.

In addition, the "Living Lab" will allow the evaluation of the use of different photovoltaic modules, solarimetry studies, solar radiation modeling, and methodologies for energy simulation and performance evaluation of photovoltaic systems. In addition, workshops were held, conferences and training (extension courses) in favor of the qualification of the internal and external population of the University.

Subproject 3: The subproject, due to its high potential, became UNICAMP's electric bus project.

Subproject 4: efficiency of the air-conditioning and illumination systems in the campus, aiming at the reduction of electric energy waste. The equipment was retrofitted with more efficient models, replacing 41 air-conditioning units and 15,380 fluorescent lamps with LED lamps. Thus, it brought as benefits the reduction of electric energy waste, consumption and peak demand, and the optimization of the electrical system.

Subproject 5: Intelligent energy management based on IoT (Internet of Things) or GENIIOT.

This subproject corroborates in the standardization, systematization and rationalization of the energy efficiency projects, giving more effectiveness to the continuous process of all campuses of UNICAMP, and the market in general.

Subproject 6: Capacity building in energy efficiency (CAPE), mainly with training and knowledge sharing. Courses offered at the Faculty of Electrical and Computer Engineering (FEEC) were formatted, as well as extension courses, lectures and events held on the subject of Energy Transition.

Subproject 7: Creation of a model for energy efficiency analysis in buildings to be replicated in other institutions through labeling of the buildings. Thus, 6 entities with their buildings were analyzed with the label evaluation, based on the Brazilian Labeling Program (PBE) provided by the National Institute of Metrology, Quality and Technology (INMETRO). The metrics for evaluating the energy efficiency level of the buildings by the prescriptive method and/or simulation, and the evaluations are focused on the performance of the envelope, lighting, and air-conditioning systems.

By evaluating the buildings, it is possible to understand the points of improvement to be applied according to the evaluated items, which allowed the planning of new buildings, not only considering the evaluation points but also the architectural design of the building. These actions are configured mainly in the retrofit of the School of Civil Engineering and the School of Architecture and Urbanism, in which the lamps were substituted by LED technology, contributing to a reduction of 9,416W of installed power for lighting in just one building, and the installation of photovoltaic panels, which allowed savings of about 26% of the annual consumption of the buildings surveyed. Another action carried out was in the Multidisciplinary Gymnasium (GMU), where there was a retrofit of the lamps, reducing the installed power by 178,660W, meaning an approximate saving of almost 50% in the installed power and the installation of 336.8 kWp of photovoltaic panel, which generate about 496.69 MWh/year.

Subproject 8: UNICAMP's energy contracting in the free market. Through the evaluation of the demand contracted in the last years it was possible to adjust the contracted demand and the reactive surplus in all the university's units. This way, it was possible to adjust the amount of energy to be purchased in the Free Energy Market with better planning in the energy purchase auctions. The socio-environmental impacts of this subproject occur indirectly through the reduction of costs with payment of contracted demand, reactive surplus and energy contracting in the Free Energy Market, mainly coming from photovoltaic sources.

The UNICAMP Sustainable Campus project has promoted deep transformations in the university's energy management throughout 52 months of execution.

The university instituted the special project office "Sustainable Campus" as the center of the energy policy and new projects, such as the robust energy measurement and management system; software registered in the National Institute of Intellectual Property (INPI) for generation simulation in photovoltaic systems; specific hardware for analysis of degradation of photovoltaic modules; IoT (Internet of Things) software and hardware for thermal comfort, expressive numbers of training and qualification of personnel; among others.

Invested resources

A total of 3,4 MM (PEE) was invested in the "Sustainable Campus" project, through ANEEL's Energy Efficiency Program (PEE) project and 6,3 MM of R&D. (e 6,3 MM no P&D).

Main challenges faced

The main challenges encountered during the project were scientific, methodological, technological, management, and, mainly, to implement an interdisciplinary project.

Next steps

As next steps, there is the commitment to continue the project by the institutions that composed it, to expand and strengthen it, aiming to make UNICAMP the most sustainable higher education institution in Latin America.

Relations with the SDG (Sustainable Development Goals)

4 – Quality Education:

Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.

7 – Clean and affordable energy:

Ensure access to affordable, reliable, sustainable, and modern energy for all.

9 – Industry, innovation, and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient and sustainable.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development).

Does the Case contribute to technological development and/or to the business model?

Yes, it is an R&D project, with the ambition of establishing an energy management and efficiency model that can be replicated in other higher education institutions in Brazil and Latin America.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

CPFL Energia

Name of the case

Electrical mobility: the new path

Vehicles are already being used in Indaiatuba and are fully customized.

Site

https://www.cpfl.com.br/institucional/quem- so-mos/Paginas/default.aspx

Corporate Email Address

sustentabilidade@cpfl.com.br

Type of Organization

Joint-stock company/ publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Avoided emissions (replacement of fuels and transport modals, product innovations and services, etc.).

Case description

One of the largest windows for innovation in the electricity sector is electrical mobility. The advancement of technology for engines electrification in commercial and passenger vehicles, in addition to other types of transportations, will lead to the creation of a more robust, digital and connected energy infrastructure. This vision guided the creation of the Emotive Program, a R&D initiative that evaluated, for five years, possible business models for battery recharging and customer service. In 2021, the theme continued to be addressed within the company's strategic vision. More details of this case can be found in the field: "Impacts/results".

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it is in execution.

What is the forecast of continuity of the Case?

3 to 5 years.

Is the Case likely to expand??

Maybe.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

~2.900 tCO_2e by the use of electric vehicles.

Impacts/results

- Creation of a real lab comprising up to 117 electrical vehicles and 57 points of recharge, distributed between Campinas and Caxias do Sul;
- Use of the vehicles with three drivers profiles: application drivers; business to business rental (service provided for other companies) and logistics;
- Installation of electro posts with batteries and solar generation in cities located in the main highways of São Paulo and Rio Grande do Sul States.
- Electrification of Indaiatuba own fleet, in order to teste the different vehicle models adherence to the field operation, evaluating the critical adherence scenario and internalizing knowledge for eventual expansion.
- Reapplication of used batteries in electrical vehicles to study how to decrease the risks related to the electric vehicles resale market, increase of the adhesion potential to the technology; mitigate environmental impacts related to the early disposal and maximize the capitalization of the battery (the most expensive component of the electrical vehicle). The objective is to develop the methodology of used batteries cell recombination to form new cells that can be applied in different scenarios.
- Studies of energy storage, smart consumption and Smart Campus (Unicamp);
- Estimative of reduction of emissions around ~2.900 tCO_2e by the use of electrical vehicles.

Invested resources

The sustainability plan projects the investment of BRL 45 million in the development of technologies for electrical mobility until 2024.

For further information, consult the annual report of CPFL:

https://cpfl.riweb.com.br/Download.aspx?Arquivo=MKb3okZ/6WZ16A9MHhip1g==

Main challenges faced

The main challenges for the project were and still are for the present projects: test, in real time, new technologies; accelerate the insertion of emergent technologies; prepare the energy sector for the future; gather support of the population of a region for the real tests, among others.

Suggestions to improve the business environment (regulations, licensing, access to credit)

The theme of electric mobility is still in very early stage in the country. Nonetheless, there is potential for the community to benefit from an innovation ecosystem focused on environmental preservation, electricity sustainable generation and consumption and the smart cities development for the next generations.

One of the main conclusions of the Project Emotive is that the Brazilian electrical sector is ready to absorb the growth in energy demand with the expansion of electrical vehicles numbers in operation around the country. The tests realized show that, considering a 5% of penetration rate of electrical vehicles in the total fleet, 80% of the distribution network would not require adequations or extra investments to meet the new demand.

Next steps

Continue current projects, creating a solid link between the end user and the infrastructure for electric mobility, providing new knowledge on the subject.

Relations with the SDG (Sustainable Development Goals)

9 – Industry, Innovation and Infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

11 – Sustainable Cities and Communities:

Make cities and human settlements inclusive, safe, resilient and sustainable;

13 – Climate Action:

Take urgent action to combat climate change and its impacts.

Fleet of electric vehicles to perform services.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

CPFL Energia

Name of the case

Innovation for adaptation to climate changes

We are the 3rd largest private company in power generation and a leader in renewable energy, with an installed capacity of 4.3 gigawatts (GW).

Site

https://www.cpfl.com.br/institucional/quem- so-mos/Paginas/default.aspx

Corporate Email Address

sustentabilidade@cpfl.com.br

Type of Organization

Joint-stock company / publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Action of adaptation to the climate changes.

Case description

Projects that incorporate innovation to management solutions ensure a better level of readiness to deal with the impacts of climate change.

The company has invested in mitigation and adaptation actions that minimize the exposition to risks and ensure a better level of readiness to deal with the irreversible impacts of climate change. In the context of energy distributors, projects that incorporate innovation into management solutions stand out. It is the case of Weather Translator System (WeTS) that crosses data of the weather forecast criticality and operational impact levels, proportional to the number of interrupted customers. The system uses advanced artificial intelligence techniques to establish 24-hour and 72-hour scenarios for the entire CPFL concession area. Implemented in October 2019 at the distributors' Operations Centers, the initiative has contributed to the planning and allocation of teams in case of storms. The project was also awarded in December 2019 by the Project Design Management magazine in the Innovative Project category.

PixForce, another startup participating in the CPFL Inova program, will develop a project that aims to implement an automated vegetation inspection system in urban networks, reducing the risk of tree contact with the electricity network in case of storms. This initiative should bring synergistic gains to the project "Arborização + Segura", aimed at replacing trees in cities with species better adapted to the urban environment, as the development of an algorithm to identify tree types is planned.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Adaptation.

Has the Case been implemented?

Yes, it is in execution.

What is the forecast of continuity of the Case?

3 to 5 years.

Is the Case likely to expand??

Maybe.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

- Improved dispatch of field teams during stormy periods;
- Decrease in costs directed for tree pruning maintenance programs on the electricity grid;
- Improvement in the rates of energy supply.

Invested resources

- Resources for para R&D, regulated by ANEEL;
- CPFL Inova, program to develop Startups;
- Articulation with stakeholders (city halls, population, civil society, etc.);
- Training of operation teams.

Main challenges faced

One of the main consequences of climate changes is the increase of incidence of storms, lightning and Wind intensity. More frequent and intense storms and lightning affect the distribution networks, which can interrupt the energy supply, in addition to generating increased costs with network maintenance and reimbursement to customers in case of damages to their electronic devices.

Therefore, the projects aim to improve urban afforestation to avoid power supply interruptions while preparing the operation teams for action during storms. Some difficulties encountered were:

- Development of an algorithm to recognize the types of trees that are in contact with the electrical network;
- Building the correlation between major power outages during heavy storms and weather conditions;

Suggestions to improve the business environment (regulations, licensing, access to credit)

- The tool has helped in decision making processes during storms, optimizing the teams' allocation to attend power outages, promoting a faster service restoration for the customer. Predictability also allows us to replant the dispatch of other services, mitigating the risk of missing commercial service deadlines or reducing the execution of the cut;
- Investment Optimization for network maintenance and better quality of energy supply and faster compliance with legal requirements.

Next steps

Keep programs active and expand the projects' performance in cities most impacted by climate issues.

Relations with the SDG (Sustainable Development Goals)

9 – Industry, Innovation and Infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

11 – Sustainable Cities and Communities:

Make cities and human settlements inclusive, safe, resilient and sustainable;

13 – Climate Action:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes.

In the distribution segment, we seek to build a more resistant, reliable and safer network to inclement weather through investments in modernization.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

CPFL Energia

Name of the case

Multisource hybrid energy system management

Implementation of pilot unit with energy storage at the final customer.

Lithium Ion Battery Energy Storage System.

Site

https://cpfl.riweb.com.br/default.aspx?linguagem=en

Corporate Email Address

issu-sustentabilidade@cpfl.com.br

Type of Organization

Joint-stock company / publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Avoided emissions (fuel and transport modal substitution, product and service innovations, etc.). Organizational innovations and business models.

Case description

Following the global trend of energy transition, the National Electricity Regulatory Agency (ANEEL) launched a strategic Research and Development (R&D) call, in 2016, aiming to study, in a national context, the insertion of Energy Storage System (ESS) in the electricity sector. In this context, CPFL Energia has three R&D projects that aim to study and implement battery energy storage systems, with applications from generation to the final consumer.

There are several projects and each one presents a different focus, being: (i) generation/transmission level, with an ESS installed in a wind farm, (ii) a distribution level project, with ESSs installed in a distribution substation (medium voltage) and common area of a residential condominium; and, iii) finally, the object of the present case, a lithium ion Battery Energy Storage Systema (BESS) installed in a medium voltage commercial client, belonging to A4 green subgroup, with a monitoring system aiming to substitute or complement the use of a diesel generator to supply its demands at peak hours, operating regularly between 6 pm and 9 pm.

The project also sought to measure the benefits of the ESS on the reduction of greenhouse gas emissions (CO_2e), power quality, equipment life cycle, and to technically evaluate the multi-source system.

A theoretical measurement of the amount of pollutant gas produced from the diesel generator operation to supply electricity to the final consumer was carried out by applying a simplified Life Cycle Analysis (LCA) and the Brazilian Greenhouse Gas (GHG) Protocol-PBGHG 202 Program Tool. For this, scenarios were established: Scenario 1, equivalent to the Reference System (SR), since this was the pre-project context; followed by Scenario 2, which corresponds to the Pilot System (PS) deployed with the execution of the project developed by CPFL and, finally, Scenario 3, which corresponds to the Future Projection (FP) expectation.

From the calculations with two methodologies, it was shown that, with the use of BESS, there was an average reduction of 75.2% of CO_2e emissions. Thus, ESS becomes attractive for maintaining the standards established in the Procedures for Distribution of Electrical Energy in the National Electric System (PRODIST) regarding energy quality and for minimizing the use of dispatchable diesel generators in peak hours.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

3 to 5 years.

Is the Case likely to expand?

Maybe.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

For the Life Cycle Analysis, considering the scenarios presented in the description of this case, it is observed that there is a considerable reduction from Scenarios 1 to 2, as well as from 1 to 3, of 3.259 tCO_2e/year and 3.528 tCO_2e/year, respectively. This demonstrates that the greater the diversification of sources used, the greater gains in terms of annual CO_2e reductions are observed. The reduction of emissions from Scenario 2 to Scenario 3, around 0.269 tCO_2e/year, was smaller, due to the BESS recharge coming from the utility's power grid, which corroborates the increase of the emission factor.

Concomitantly to this, it is emphasized that the BESS insertion does not provide the complete replacement of the grid for the case studied. Thus, comparing only the emissions of the diesel generator with those of the BESS, from the first to the second scenario, there is a reduction of 66.8% of CO_2e/year. In relation to Scenario 1 to 3, there is an emission reduction of 72.4%, and from Scenario 2 to 3, an emission reduction of approximately 16.6% of CO_2e/year.

As for the PBGHG tool, it is observed that there is a higher emission of CO_2e in Scenario 1 compared to the other scenarios, justified by a higher operating action of the Diesel generator. For this calculation, the CO_2e emissions for the production of the generator fuel, as well as the battery components, were not considered; for example, as it is verified in the simplified LCA, the values obtained are lower according to the PBGHG methodology, when compared to the LCA ones. In addition, in the PBGHG the emissions considered from the BESS correspond to the recharging of the batteries by the utility grid. It can be seen that in the scenarios in which the BESS is included, there are reductions in global emissions of CO_2e in the order of 92% from Scenario 1 to 2, and 99.9% from Scenario 1 to 3, as well as from Scenario 2 to 3. Thus, based on the results and taking the environmental impacts obtained as a starting point, we can conclude that the implementation of BESS brings significant reductions in CO_2e emissions, actively collaborating to the decarbonization of the Brazilian electricity sector.

Impacts/results

The implementation of the Energy Storage System, based on CO_2e emissions assessments, actively contributes to the decarbonization of the Brazilian electricity sector. Since the energy sector is responsible for 25% of total greenhouse gas emissions.

Invested resources

R&D resources, regulated by ANEEL, were used.

Main challenges faced

For a massive insertion of this technology in our electrical system, besides the price curve, we see other necessary actions, such as:

- Cultural change: which considers an effective communication to customers, showing benefits, efficiency and economy.
- Incentive plan: develop a tax and financing incentive plan to stimulate the battery and inverter segment, both from the customer's and manufacturer or supplier point of view.
- Regulation: is necessary to develop, in a clear and safe way, specific regulation that will encourage the applications for energy storage systems.
- Technology: improvement of battery technology so that they are able to operate with longer autonomy times and can replace diesel generators for a longer time.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Due to the stage of development of battery type energy storage systems, in this case electrochemical batteries, the technology would enable the energy transition scenario and allow the reduction of impacts related to carbon emission by the electric sector.

It is essential to enable the Brazilian regulation of the distributed generation sector (generate one's own energy) so that it also contemplates (broadly and efficiently) the option of storing electrical energy in batteries.

Next steps

Continue the projects in effect, creating a solid link between the end user and the electric grid infrastructures, as well as improving the current regulation so that the entry of this type of technology is more consistent, providing new knowledge on the subject, new business models, higher quality in the supply of energy and reducing CO_2e emissions in the production of electricity, contributing to the diversification of the energy mix and making it cleaner.

Relations with the SDG (Sustainable Development Goals)

7 – Clean and affordable energy:

Ensure access to affordable, reliable, sustainable, and modern energy for all.

9 – Industry, Innovation, and Infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes, the case is an R&D project that aims to study and implementation of battery energy storage systems.

The innovation consists in the inexistence of a similar product in the market to the developed business model of the solution, through the qualification of manpower, from the basic project, to the implementation with the respective technical-economic analyses.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

CPFL Energia

Name of the case

Preserva

CPFL performs environmental compensation with reforestation, promoting the planting of native trees in the area.

Site

https://www.cpfl.com.br/institucional/quem-somos/Paginas/default.aspx

Corporate Email Address

sustentabilidade@cpfl.com.br

Type of Organization

Joint-stock company / publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Biodiversity, conservation, management of forest assets, land use.

Case description

We manage our natural capital with a focus on minimizing environmental impacts, maximizing efficiency in the use of natural resources and conserving biodiversity. We continuously improve environmental management, updating the processes and technologies used in our operations.

At CPFL, biodiversity management embraces several programs and actions aimed at minimizing and offsetting the negative impacts of our operations, such as the reduction of vegetation cover, loss of habitats for fauna, interference in third-party properties and changes in the use of the soil, in addition to maximizing positive impacts on the environment and the surrounding community development. All investment initiatives and decisions are aligned with three main objectives: shared value protection, optimization, and generation. The Preserva Program aims to bring greater environmental relevance to the mandatory forest replacements carried out by CPFL, through the unification of the terms of commitment to environmental recovery (TCRA's). These are directed to sites of ecological interest defined in common agreement with CETESB.

In order to expand the electrical system, vegetation removal is often unavoidable: on average 4% of an under construction new transmission line , has tree-sized vegetation that needs to be cut. One of CPFL's major concerns, in this sense, is to adopt a standard technique that guides projects' preparation to avoid stretches with vegetation.

CPFL adopts the good practice of elevating the towers' structures. The result is that in many cases, the vegetation cut is no longer necessary. When it is not possible to prevent cutting trees, CPFL, through the Environment and Sustainability Department, requests environmental agencies authorizations to remove the vegetation. These authorizations are issued upon a commitment to carry out mandatory forest replacements.

In order to carry out environmental compensation, CPFL reforests carefully chosen protected areas to serve the most diverse biomes through the Preserva program. Previously, these initiatives were conducted in a decentralized and punctual manner.

With CETESB, CPFL approved a methodology that enables the unification of reforesting efforts in areas of great ecological interest: the Preserva program.

By planting in large areas, it is possible to enhance the reforestation relevance with greater species diversity. In addition, the project's implementation and maintenance are facilitated.

When the project has smaller social and environmental impacts, it is economically more viable, as it reduces expenses associated with mitigation actions and compensation for negative impacts.

Innovative forms of forest compensation and biodiversity conservation reduce company's risks. More efforts are directed towards the initiatives by establishing partnerships with public or private entities that share the objective of improving the environmental conditions of the determined places. Most of these actions are accounted for as investments by CPFL Group companies, which translates as a reduction in expenses associated with forest compensations.

In addition, the case proposes the articulation with stakeholders to indicate improvements in forest compensation processes and assists in the original projects' analysis and redesign to optimize and reduce environmental impacts, generating greater shared value.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Compensation.

Has the Case been implemented?

Yes, it is currently being executed.

What is the forecast of continuity of the Case?

3 to 5 years.

Is the Case likely to expand??

Maybe.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Due to the many variables inherent to the project, some assumptions were adopted, considering the most conservative scenarios for carbon removal through individual biomass fixation:

1. It was considered that for the 1100 hectares of forest compensation, the space between individuals is 3m x 2m - 1667 trees/hectare - (**https://www.embrapa.br/codigo-florestal/plantio-por-mudas**).

2. The removal of carbon per individual is 163 Kg CO_2e in a total period of 20 years (**https://www.sosma.org.br/noticias/cada-arvore-da-mata-atlantica-chega-a-retirar-163-kg-de-gas-carbonico-da-atmosfera/**).

The removal of carbon per individual is 163 Kg CO_2e in a total period of 20 years.

Impacts/results

With the integrated implementation of shared value protection, optimization and generation of pillars, constant positive impacts are observed in the social, environmental, and economic spheres.

CPFL already has more than 1,100 hectares of Forest Compensation areas, in the modalities of reforestation and management of exotic species in Conservation Units and acquisition of surplus Legal Reserve areas on private properties. In this initiative, CPFL is already helping to preserve 143 hectares of the Cerrado biome and 994 hectares of the Atlantic Forest biome.

CPFL's initiatives generate environmental and social benefits, both in public areas (Conservation Units) and private ones, promoting gains that go beyond the conservation of biodiversity.

In addition to preserving areas of great ecological interest, which currently include 761 hectares of native forest, the methodology developed by CPFL reduces compensation costs by an average of 68%, proving to be financially attractive.

The Preserva project only complies with mandatory TCRA compensation, it does not include voluntary planting.

The process is audited through compliance reports that are sent to CETESB, that comprise photographic evidence and the methodology used for the purpose of discharge from the TCRA.

Invested resources

The effective and integrated management of the impacts on biodiversity caused by the company's operations helps in the processes of anticipating future demands and solutions at a lower cost for the company, as well as the possibility of identifying opportunities to expand environmental gains for society and economic dynamism at the project sites, through the generation of jobs and the flow of financial resources.

Project's anticipation and environmental improvements, added to the optimization of compensation activities, brought a substantial reduction in regulatory costs. In addition, the processes previously presented avoid and reduce expenses such as: the social costs that would be used to relocate the families; the costs of clearing vegetation that would be removed to open paths for the implementation of transmission towers. These costs are no longer necessary due to the use of technologies and mechanisms that allow for coexistence with local communities and vegetation.

Main challenges faced

- Stakeholder awareness regarding process improvements related to forest compensation.
- Original projects update for better structuring and reduction of environmental impacts.

By reducing the social and environmental impacts, CPFL also makes its projects more economically viable.

Suggestions to improve the business environment (regulations, licensing, access to credit)

The main environmental gains are:

- Greater ecological relevance in terms of biodiversity conservation through mixed reforestation of native tree species in large areas (unified obligatory replacements), when compared to initiatives carried out on a smaller scale and distant from each other.
- The reduction of planting implementation and maintenance costs, with the formation of areas with greater potential for sustainability and resilience over time.
- The environmental recovery of areas initially occupied by reforestation with exotic species (pine and eucalyptus), as in the case of the Santa Maria Ecological Station and Luiz Antônio Experimental Station.
- Efficient compliance with environmental laws, in addition to providing financial compensation to those rural landowners who already protect natural vegetation, ensuring the protection of forests, the preservation of biodiversity and water resources.
- Local economic development through financial resources arising from the purchase of environmental easement institution rights and the generation of jobs for these easements maintenance and inspection, planting and control of exotic species in areas of interest to environmental agencies (conservation units).
- Acting as an efficient instrument for the execution of public environmental and sustainable development policies.
- Maintenance of forest remnants and their biodiversity, including the conservation of a large volume of carbon stored in forests, with vegetation in medium and advanced stages.

Next steps

Continue the biodiversity management in order to expand the business, ensuring safe and quality operations for energy generation, transmission and distribution and electric solutions, with the minimization of social and environmental impacts.

Relations with the SDG (Sustainable Development Goals)

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts;

15 – Life on land:

Protect, restore, and promote the sustainable use of terrestrial ecosystems, manage forests sustainably, combat desertification and halt and reverse land degradation and halt the loss of biodiversity;

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

CPFL Energia

Name of the case

Sustainable Charging Station Integration, Comprehensive Monitoring, and Real-Time Connectivity

Electric Bus supported by the project.

Completion of carport construction.

Electric Bus supported by the project.

Site

https://cpfl.riweb.com.br/default.aspx?linguagem=en

Corporate Email Address

issu-sustentabilidade@cpfl.com.br

Type of Organization

Joint-stock company/ publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Avoided emissions (substitution of fuels and transportation modals, innovations in products and services, etc.), Organizational innovations and business models. Other themes directly or indirectly related to the climate agenda.

Case description

The project entitled "Living laboratory of electric mobility for public transport at UNICAMP: integration of a sustainable charge satiation, wide monitoring and real-time connectivity", called "'Ônibus Elétrico', has as its main objective to study the technical, economic and environmental impacts of the insertion of electric buses in the University of Campinas (UNICAMP). The 'Electric Bus' is inserted in the context of the Unicamp's Sustainable Campus project, financed by the Research and Development Program of the Electric Sector (R&D) of the National Electricity Regulatory Agency (ANEEL in Portuguese), through the CPFL Energia group.

The increase in the use of electric vehicles (EVs) for private and public transportation purposes is a global trend motivated mainly by the benefits related to the reduction of environmental impacts, especially regarding local air pollution in large urban centers. However, there are uncertainties about the potential global environmental impacts associated with climate change, since in many countries the production of electricity occurs from the use of fossil fuels. Added to operational aspects, such as the possible adverse effects on the power grids with the connection of EVs, we can see the need to develop studies that allow investigating the real benefits of electric mobility, especially in public transport by bus and in the Brazilian context.

We also highlight, as motivating and facilitating aspects of the execution of this project:

- The need to study the technical, economic, and environmental impacts of the insertion of electric buses as an alternative to transportation on university campuses, turning UNICAMP into a living laboratory for the intended studies.
- The existence of a transportation system with conventional buses on campus, which allows a wide comparison of performance.
- The presence and partnership of an electric bus assembler in the region of Campinas.
- The inexistence of a project with a similar purpose in Brazil.
- The indication by ANEEL as a strategic theme for the country.
- The potential for generating new technologies and new business.

In addition to the operation of the electric bus, strictly in itineraries of the UNICAMP Campus, the project includes the construction of a sustainable electric charge station on the Campus itself, containing its own photovoltaic generation and energy storage system.

Beyond that, one of the main objectives of this project will be achieved, that of promoting the broad monitoring and real-time connectivity of electric buses, deploying charging stations and the electric power grid, in order to enable the creation of solutions for the intelligent management of charging stations and refills of such buses, reducing the impacts on the network.

The monitored data will enable the design of solutions for: (i) public transportation management; (ii) roadway maintenance management; (iii) continuous assessment and improvement of drivers; (iv) traffic management; (v) assessment of public transportation users' comfort; (vi) monitoring pollution inside and outside the buses; and (vii) assessment of other potential environmental impacts, in the context of the life cycle, from changes in the technological route and demand for energy and natural resources.

Finally, applications containing facilities for public transport users will be developed, as well as signs to encourage shifting the hours of use of the public transport system, in order to reduce demand at peak times.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, social-environmental responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

5 to 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The monitoring of a conventional bus, with diesel combustion engine, occurred in 2021, on the university campus of Campinas, and the results indicated an annual emission of 35 tCO_2. This emission refers only to the use phase of the bus and can be considered a part of the emissions avoided with the replacement by electric buses. The estimation of the potential for CO_2 emission reduction, within the context of Life Cycle Assessment, is in progress and corresponds to one of the results of the project. However, specific methodologies have been developed to measure the impact on emissions reduction.

Based on seven different internal routes to the Unicamp Campus, it was found that the use of electric buses reduced, on average, 78.6% of CO_2 emissions. To estimate the reduction we used literature references, these being: 1st National Inventory of Atmospheric Emissions by Road Motor Vehicles, published by the Ministry of Environment of Brazil, for data on emissions from combustion buses, and CO_2 emission factors from the generation of electricity in the Brazilian National Interconnected System (Base Year 2022), published by the Ministry of Science, Technology and Innovation of Brazil (MCTI). It is worth mentioning that, with the use of distributed and renewable generation sources, such as solar photovoltaics present on the campus itself, the reduction of emissions from the use of the electric bus would be even larger.

Impacts/results

The electric motorization is an alternative for the mitigation of local and global impacts of automotive vehicles, such as buses. The expectation is that there will be an improvement in air quality in large urban centers, with the reduction of regulated emissions (pollutant gases) by using electric buses. From a broader perspective, there are other aspects to consider, such as potential risks of soil and water contamination, due to the production and disposal of batteries. From the point of view of global impacts, associated with GHG emissions, studies already conducted indicate that the benefits of electric motorization depend on the profile of electricity generation and the recharging operation of the batteries, such as time, frequency, duration, etc. With the project it will be possible to analyze these potential impacts in an adequate and organized way through the Life Cycle Assessment tool, considering from the extraction of raw materials to the use and final disposal, or as it is called from cradle to grave.

From the macroeconomic point of view, the project foresaw the implementation of a Computable General Equilibrium Model (CGEM) for the Brazilian economy to evaluate the economic effects of the full adoption of electric buses in the city of São Paulo in the 2035 scenario. The results obtained indicated, from the assumptions adopted, an increase in the Gross Domestic Product (GDP) of 0.0156%. However, there would be a small reduction in the use of buses in public transport of passengers (about 1.4%), essentially because of the higher price of EV in relation to conventional diesel buses that was admitted, which would bring a small increase in the price of this type of transport service.

Among the studies carried out, specific mathematical methods were developed to evaluate the energy efficiency of electric and conventional buses. The models enable, for example, to characterize the benefits of electric buses compared to diesel buses, depending on the conditions of use, particularities of the route, altitude, speed, acceleration, and braking.

Based on the analysis of seven different routes internal to the UNICAMP Campus, it was found that the electric bus has 79% higher energy efficiency compared to the conventional bus, leading to a cost reduction of 73% in energy expenditure (diesel consumption versus electricity - kWh). Therefore, this data allows a preliminary reference for the economic feasibility of implementation, comparing the costs with energy consumption and investment in the acquisition of electric vehicles. Sample measurements revealed a 95% accuracy of the results of this model, which can be extended to other scenarios of use and feasibility analysis. Such models also allow the evaluation of the best strategy for a fleet electrification plan, as it can assess which routes are most cost-effective, allowing to prioritize investments.

In 2021, the project was reported in the publication "Sustainable Campus:

An Innovation Model in Energy Management for Latin America and the Caribbean", where it was possible to describe all the indicators and examples of studies carried out in the program.

For more information, the publication can be accessed at: **https://campus-sustentavel.unicamp.br/livro/**, accessed in: Oct. 2022.

Invested resources

Resources were used for R&D regulated by ANEEL. The project has an estimated investment value of BRL 6.47 million, including human capital for scientific research, development of new technologies, and acquisition of the bus and recharging infrastructure.

Main challenges faced

The main challenges faced, so far, in the execution of this project 2, associated with the specification, purchase, and installation of the necessary infrastructure. The first major challenge was the purchase of the electric bus. Furthermore, due to the significant increase in the dollar exchange rate soon after the beginning of the project, the cost of the bus has increased significantly in relation to the quotes made at the conception of the project. Because of the increase in the dollar rate, after an arduous specification and price quotation work, it was decided not to purchase the energy storage system that was planned to be placed in the chargin station, opting to use storage systems called second life reused from other R&D projects. Another major challenge was the development of the monitoring systems for the electric and diesel buses. The desired specifications could not be met due to limitations in the capabilities of the available hardware and, therefore, a great effort was required in data treatment to allow the performance of all the proposed studies. It should be noted that there are no devices with the minimum necessary specifications on the market, and, therefore, prototypes with the minimum necessary characteristics were developed.

In the field of environmental impact analysis, one of the main challenges was to carry out the measurement of pollutants and particulates. This is a measurement with specific high-cost equipment that is performed by only a few companies in Brazil. These measurements were performed with a diesel bus circulating on campus and, due to the pandemic, it was necessary to simulate the presence of people on the bus with the use of specific weights added to the bus.

Next steps

This project will be executed until December 2022, due to delays in the installation of the infrastructure and problems in data collection due to the pandemic. All infrastructure is in place, all monitoring devices have been developed and are operating in data collection. In addition, the pollutant measurements were performed by a third-party company.

This is a project with potential for continuity and expansion, with results that will benefit the insertion of electric mobility in urban public transport.

Considering the development chain, the next steps are the transformation of the devices, with prototypes developed into commercial equipment. Monitoring equipment of this nature will be essential in the transition to electric mobility, as they provide the necessary data for the management of refills, the impacts on the network and the electric vehicle fleet, and transport improvement for users.

Relations with the SDG (Sustainable Development Goals)

3 – Health and well-being:

Ensure healthy lives and promote well-being for all, at all ages.

7 – Clean and affordable energy:

Ensure access to affordable, reliable, sustainable, and modern energy for all.

9 – Industry, innovation, and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes, this is an R&D project to study the technical, economic and environmental impacts of the insertion of electric buses.

ACORDO AMBIENTAL SÃO PAULO

CPFL Energia

Name of the case

Urban Reforestation with Security

Seedling planting conducted in Itatiba (SP).

Environmental education activity/ planting with children in the city of Morungaba (SP).

Seedling planting conducted in Passo Fundo (RS).

Site

https://cpfl.riweb.com.br/default.aspx?linguagem=en

Corporate Email Address

issu-sustentabilidade@cpfl.com.br

Type of Organization

Joint-stock company/publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Biodiversity, conservation, forest assets management, soil use; carbon capture, and mitigation initiatives, offsetting strategy.

Case description

CPFL Energia began the Urban Reforestation with Security in 2015, with the goal of enabling, in partnership with the public authorities, the revitalization of urban tree planting. The project consists of the gradual replacement of trees of inadequate size, species, or phytosanitary status by species more suitable for interaction and coexistence with power grids and other structures of the current urban context, preventing damage and power supply interruptions in case of extreme weather events, such as summer storms. Since its creation in 2015, CPFL has served 87 cities, of which 58 are in the State of São Paulo, served by the initiatives of the Urban Reforestation with Security program. In seven years of the project, more than 6,000 inadequate trees have already been replaced with the donation and planting of more than 25,000 seedlings. In some of the municipalities that benefit from the program, the residues of the trees removed are destined for purposes such as the structure of benches in squares, substrate, and other means of reusing the organic matter of the vegetation removed.

As one of the main causes of power supply interruptions in some cities, collisions between the power grid and trees are far from making them villains: it reflects in many cases only the lack of public resources to maintain them, prune them, and select them according to local needs. It is up to the municipalities to manage green areas. However, financial difficulties and the lack of specialized professionals can hinder their proper conservation.

Through this initiative, CPFL and the partnering City Halls work together to identify trees that are incompatible with urban equipment (such as power grids, telephone, internet, water, sidewalks, public lighting), and that could bring risks of accidents to the population by electric shock or falling trees.

These trees are gradually replaced by trees of species suitable for urban afforestation, and the number of seedlings planted is always higher than the number of trees removed, respecting the legal regulations in force in the municipalities. CPFL pays for the entire replacement process of the tree identified as inadequate and for the logistics of handling the new seedlings. The planting is done by the City Halls in partnership with CPFL, while the monitoring of the development of the seedlings is done only by the City Halls associated to the program through the management of municipal arborization.

The program aims to establish a new culture of risk prevention and environmental preservation, providing a more planned and orderly growth, with reduced interference of vegetation in our electrical system. Urban Reforestation with Security also ensures greater safety and quality of life for the population, ensuring the maintenance of local biodiversity, aware of the importance of arborization in the urban context.

In addition to the commitment of replacing trees and planting new seedlings, CPFL and the partnering City Halls also develop environmental education actions in the municipal schools. The project, besides contributing directly to the increase of the vegetation cover in urban tree replacing the environmental compensation with the planting of new seedlings always in a larger quantity, can also be related to the carbon capture by the growth of seedlings.

Does the Case show GHG emission level reduction?

Yes. Trees in the urban environment are responsible for several environmental benefits. Besides the landscape function and carbon sequestration, trees provide other benefits such as: air purification by fixing dust and toxic gases, and recycling of gases through photosynthetic mechanisms; improvement of the microclimate of the city, by retaining soil moisture and air, as well as by generating shade, avoiding that the sun rays falling directly on people. The planting of vegetation suitable for the urban environment also results in the reduction of wind velocity, influences the water balance by enabling the infiltration of water into the soil, causing slower evapotranspiration, as well as providing shelter for local fauna.

How is the Case classified?

Sequestration.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

There is carbon sequestration according to the growth of the seedlings planted, but we have not estimated this capture.

Impacts/results

In seven years of the project, more than 6,000 inappropriate trees have been replaced, and more than 25,000 seedlings have been donated and planted.

The selection of the species planted reduced the interference of the vegetation in the supply of electric power, internet, water, and also offered improved accessibility to the sidewalks with the unblocking of the emerging roots, conciliating the supply of energy with the improvement of the population's quality of life.

The adequate coexistence of urban forestation with different public equipment, especially power grids, is a challenge faced throughout the country. The performance model, through the construction of partnerships between energy distribution concessionaires and municipalities, can be easily replicated, bringing the benefits of urban forestation to more cities, and thus expanding benefits such as improvement in microclimate, moisture retention, and shade generation.

The Urban Reforestation with Security project won the recognition of the United Nations (UN) for its performance in environment and was chosen to be presented during the Sustainable Development Goals (SDGs) in Brazil – The role of the private sector, in New York (USA), an event held in October 2018.

The SDG in Brazil – The role of the private sector aims to bring visibility to successful stories in the implementation of the Sustainable Development Goals (SDGs) in Brazil. The event was held one day after the start of the general debate of the 73rd meeting of the United Nations General Assembly (UNGA), which brings together heads of state and government of the 193 member countries of the organization.

Another benefit of the initiative is related to carbon capture by the seedlings, planted with a minimum size to have a greater possibility of rooting and avoid losses due to vandalism. In addition, there are financial gains related to the avoided cost of maintenance and equipment replacement. Since its creation in 2015 until December 2021, CPFL has served 87 municipalities, 58 of which are in São Paulo, with the initiatives of theUrban Reforestation with Security program.

Invested resources

In the seven years that the program has been in operation, more than BRL 10 million has been invested. The resources are invested in the process of tree replacement, hiring suppliers, acquiring and planting seedlings, and in media materials for the program.

Main challenges faced

The main objective of the Program is the gradual replacement of trees of inadequate size, species or phytosanitary status, for species more suitable for interaction and coexistence with the electrical networks and other structures of the urban context, preserving the urban arborization. It is understood that the greatest challenge is the comprehension by society of the program's objectives.

Next steps

To continue the projects in effect and expand the program to more municipalities in CPFL's concession area.

Relations with the SDG (Sustainable Development Goals)

7 - Clean and affordable energy:

Ensure access to affordable, reliable, sustainable, and modern energy for all.

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient, and sustainable.

13 - Action against global climate change:

Take urgent action to combat climate change and its impacts.

15 – Terrestrial life:

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation, and halt biodiversity loss.

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes, it is understood as an innovation, since CPFL is the pioneer in a program of this amplitude and the first company in the electric sector to make feasible the organization and management of urban arborization together with the partner Municipalities. All actions are developed by professionals with technical responsibility and trained for the activities.

Other information regarded as relevant

With operations in 679 Brazilian municipalities, CPFL Energia's distributors deal daily with a series of events that can affect the quality of their services, one of which is the direct contact of trees with the overhead power distribution network, a reflection of storms, windstorms, on urban tree planting.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Desenvolve SP - Agência de Fomento do Estado de São Paulo S.A.

DESENVOLVE SP
O BANCO DO EMPREENDEDOR

Name of the case

Measuring the carbon consumption of Desenvolve SP and neutralization through "Integration Planting"

Employee engagement with the planting project.

Site

https://www.desenvolvesp.com.br/

Corporate Email Address

sustentabilidade@desenvolvesp.com.br

Type of Organization

Joint stock company / mixed economy, privately held.

Economic activities (based on CNAE - National classification of economic activities)

Financial, Insurance Activities and Related Services.

Theme

Direct emissions reduction, scope 1 (cf. Greenhouse Gas Protocol (GHG Protocol) – organization's own facilities, own transport), reduction of indirect emissions, scope 2 (cf. GHG Protocol – purchased electricity, steam, heating/cooling purchased for own use), reduction of indirect emissions, scope 3 (cf. GHG Protocol – purchased goods and services, capital goods, fuel, transport and distribution, waste, business travel, etc.), biodiversity, conservation, forest asset management, land use, communication, stakeholder engagement and dissemination of good practices, carbon capture and storage, emissions offsetting.

Case description

Considering the environmental agenda as one of the pillars of its operations, Desenvolve SP prepared its first Inventory of Greenhouse Gases (GHG) for the year 2021, the content follows the parameters of the GHG Protocol and ISO 14,064.

The project took place in three phases: (i) GHG inventory; (ii) GHG reduction project and (iii) GHG neutralization.

In the inventory phase, the result was 123 tons of CO_2 emitted by the institution in 2021. Emissions are divided between CO_2 equivalent, which concerns the mass in terms of CO_2 molecules of all GHGs emitted by non-biological sources, and biogenic CO_2, which concerns the same mass, but emitted by biological sources. From the inventoried activities, the largest source of emissions came from the generation of waste, followed by business trips, employee travel and, finally, those related to energy consumption.

After the inventory of Greenhouse Gas (GHG) emissions, the project put forward a proposal to reduce the institution's emissions, which, in short, would be: installing alternative energy sources, such as solar panels, or renting renewable energy, opting for transports that use other renewable fuels (such as electric cars) and favored public transport or the use of a carpool program among employees.

The last phase of the project involves an action plan to offset the institution's carbon emissions, calculated in the year 2021. To this end, Carbon Free Brasil, the company contracted to execute the project, brought up the proposal to combine an environmental benefit with a social one. In February 2022, Desenvolve SP brought together a group of employees to carry out the planting of 380 seedlings, together with the Carbon Free Brasil team, of 17 species of trees native to the Atlantic Forest, namely: Grumixama, Cherry from RS, Uvaia, Pitangueira, Pau d'alho, Pink Ipê, Purple Ipê, Ingá Bean, Jacaranda, Red Angico, Canafístula, Embiruçu, Araça, Aroeira, Guarapuvu, Jerivá and White Ipê. The planting was carried out on the premises of one of the units of the Nossa Senhora Rainha da Paz Association (ANSPAZ), a partner entity of Carbon Free Brasil, located in the city of Itapetininga, state of São Paulo. On site, ANSPAZ carries out a work of inclusion and re-inclusion with children, young people and adults at risk. For more information about the institution and its social work, visit: www.anspaz.net .

The maintenance of the area is to be carried out by Carbon Free Brasil during the first four years of the project and aims to ensure the initial development of the seedlings and the subsequent sequestration of CO_2eq from the activities of Desenvolve SP, for the year 2021. Also, every six months, Carbon Free Brasil sends a Planting Monitoring Report, with photos of the area, the evolution of the seedlings and informs the actions taken to maintain the species. After the four-year period, ANSPAZ itself and its students will continue to monitor the growth of trees, under the guidance of environmental education teacher(s). Desenvolve SP will carry out a follow-up/monitoring of the planted area with ANSPAZ, periodically, in order to guarantee the continuity and permanence of the vegetation. With this, the objective of environmental compensation of the CO_2eq emitted in 2021, after the full development of the trees, will be reached. As a result, when the trees reach maturity, the 114 tons of CO_2eq emitted by the institution in 2021 will be compensated.

The planting of native species of the Atlantic Forest will fix, throughout its growth, the same amount of carbon emitted by business activities in 2021 and will represent the regeneration of 2,278 m² of native trees.

It is important to emphasize that Desenvolve SP is aware that its GHG emissions will only be compensated after the trees grow and, to ensure this, it monitors the growth of trees every six months in the first four years, in partnership with Carbon Free Brasil and with longer periodicity in the coming years, directly with ANSPAZ, when the vegetation itself is stronger.

The analysis of the developed inventory proposes changes in the operations of the institution's activities, so that future emissions are generated in smaller and smaller volumes, always in search of an emission-neutral activity. Such changes have been progressively implemented, providing for improvements for future emission calculations. As a complement, the compensation of annual GHG emissions was adopted as a practice, starting in 2021, in line with the 2030 Agenda and with the regulatory framework issued by the Central Bank of Brazil in 2021, which provides for the inclusion of the climate component in regulations aimed at institutions financial institutions of all sizes.

Desenvolve SP is a financial institution of the Government of the State of São Paulo, which has a workforce of 219 employees. It offers credit options that aim to finance investment and innovation projects, acquisition of machinery and equipment, working capital and sustainable environmental initiatives. Since the beginning of the pandemic, the bank has injected more than BRL 1.7 billion into the São Paulo economy.

Does the Case show GHG emission level reduction?

Compensation of GHG emissions.

How is the Case classified?

Compensation, Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it has been implemented, and its benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

114 tons of CO_2eq emitted by Desenvolve SP will be compensated in 2021, from the planting of 380 seedlings of 17 species of trees native to the Atlantic Forest, in a degraded area, which will represent the regeneration of 2,278 m² of forest, considering the growth of the seedlings.

Impacts/results

In addition to the environmental gains in compensation, the populations surrounding the originally degraded area, children, adolescents and adults at risk served by the Association where the seedlings were planted (ANSPAZ) and the Desenvolve SP employees those who participated in the action.

Invested resources

A specialized company was hired to carry out the GHG inventory, with proven technical knowledge for this activity. In addition to financial resources, Desenvolve SP employees participated in the planting of seedlings to offset emissions, thus contributing to an environmentally correct action in line with the Institution's Socio-environmental Responsibility Policy.

Main challenges faced

The first challenge was the difficulty of measuring the institution's issuance. As it is a digital bank, the quantification of carbon expenditure is not simple to measure, since there is no manufactured product, for example, whose production stages allow such measurement. Another obstacle was taking into account a new hybrid work regime, an unusual model until recently, which presents non-obvious forms of consumption. However, the great challenge for Desenvolve is to ensure that these planted seedlings become a large forest massif. As it is a long-term project, it was decided that the planted area will be monitored after the four years stipulated in the contract with Carbon Free Brasil.

Next steps

The growth of the seedlings will contribute to carbon sequestration, after the entire tree development process, and to the regeneration of 2,278 m² of forest, in addition to indirectly collaborating with the work developed by an association focused on social work, which will accompany the growth of trees, in partnership with Carbon Free Brasil and Desenvolve SP, and promoting environmental education with its students. As next steps, it is intended to maintain the process of inventorying GHG emissions annually, with the consequent compensation measures, as well as seeking to achieve continuous reduction targets. Involve more and more employees, multiplying their experience, fulfilling the commitments of the Sustainable Development Goals (SDGs) and actions against global climate change. It is also considered to expand the scope of the project, including clients and an inventory of emissions from the financing portfolio.

Relations with the SDG (Sustainable Development Goals)

13 – Action against global climate change:

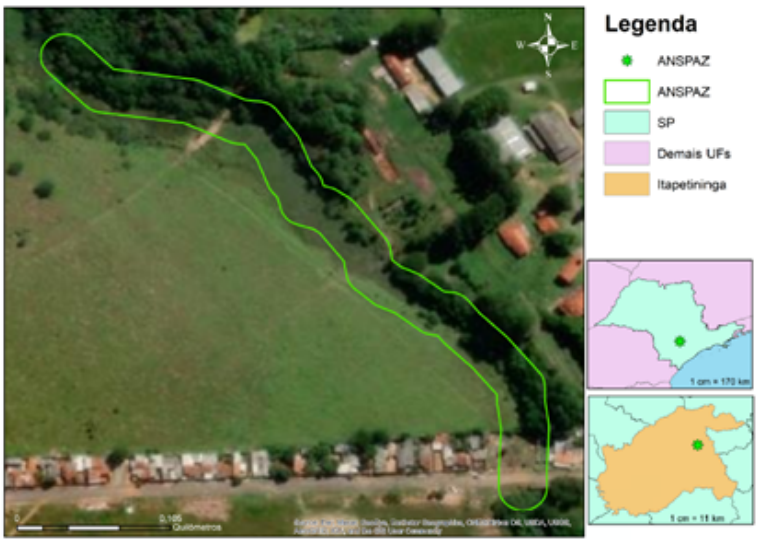
Take urgent action to combat climate change and its impacts.

15 – Terrestrial life:

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss.

Does the Case contribute to technological development and/or to the business model?

No.



Planting region.

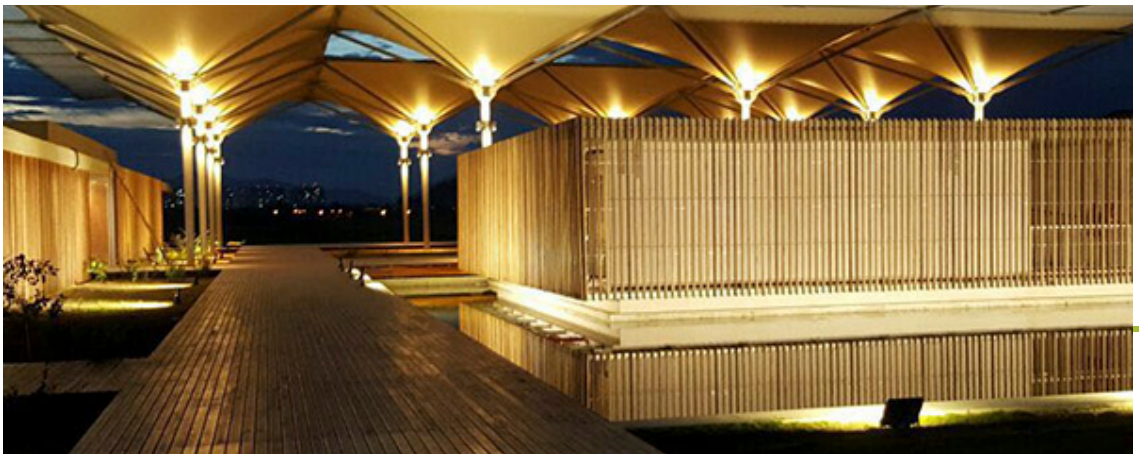
"Integration Planting".

Corporate Name

Ecofunding Consultoria em tecnologia Ltda.

Name of the case

PVU Golf Club Barra



Golf Olimpic Course Club Image.

Site

ecofunding.com.br

Corporate Email Address

contato@ecofunding.com.br

Type of Organization

Limited Society.

Economic activities (based on CNAE - National classification of economic activities)

D. Electricity and gas, E. Water, sewage, waste management activities, K. Financial, insurance and related services activities.

Theme

Reduction of indirect emissions, scope 2 (cf. GHG Protocol - purchased electricity, steam, heating/cooling purchased for own use), Reduction of indirect emissions, scope 3 (cf. GHG Protocol - purchased goods and services, capital goods, fuel, transport and distribution, waste, business trips etc.), Emissions avoided (substitution of fuels and modes of transport, innovations in products and services etc.).

Case description

Fundraising for the construction of a solar power plant in Rio de Janeiro. The eCOfunding has been doing fundraising operations privately for some time, with physical or institutional investors in the company's networking. In this fundraising and in the next ones, beginning the experience of carrying out these fundraising under the legislation ICVM 588, of the securities commission, which regulates the investment crowdfunding market in Brazil. This modality allows us to be an "online investment platform", launching these fundraising online to individual investors, enabling access to this profitable market with smaller contributions.

The long-term strategy is to be a sustainable investment platform, focusing only on green projects that have a proven environmental footprint for mitigating climate change, bringing the possibility for the common investor to contribute to these projects.

Finally, Golf Club Barra has benefited both from consuming cheaper energy than the rates in effect at the local concessionaire (less expense) and from leveraging its image before the public by opting for clean energy, as it is a internationally renowned Olympic field.

The plant was leased and, as in other operations of the solar company, the Golf Club customer pays monthly rents for the generated energy (within the scope of distributed generation) and at the end of the contract, the plant is owned by the Club.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it is running.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Estimated reduction of 200 tons of carbon dioxide per year, if the client (Golf Club Barra) remained in the captive market, consuming energy from the common electrical grid.

Impacts/results

We will bring social and environmental impacts with this case and others on the radar, generating financial returns for our investors and an impact investment. In practice, investors in the round could Invest a minimum amount of BRL 20,000, with an expected return of 15% p.a. after completion of the construction of the plant and at the end of the period, having its principal invested returned.

Invested resources

1.5 million CAPEX of the project (invested directly and exclusively in the project, the platform only gets a commission for funding).

Main challenges faced

The biggest challenges faced were finding a fit of individual investors with project tickets, something considered natural and to be overcome in the short term.

Suggestions to improve the business environment (regulations, licensing, access to credit)

For Ecofunding's business model, it would be access to credit and a high quality networking base.

Next steps

The project is expected to run for 25 years, which would be its useful life, and we hope to fund many others like this one or larger.

Relations with the SDG (Sustainable Development Goals)

7 – Clean and affordable energy:

Ensure access to affordable, reliable, sustainable and modern energy for all;

8 – Decent work and economic growth:

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;

9 – Industry, innovation and infrastructure:

Build resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation);

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient and sustainable;

13 – Action against global climate change:

Take urgent measures to combat climate change and its impacts;

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

A practical and scalable means of enabling the financing of green projects.

Other information regarded as relevant

None.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

EcoSolar Energia Inteligente Ltda.

ecosolar Energia Inteligente

Name of the case

Container EcoSolar®

3D drawing.

Site

http://www.ecosolar.com.br/

Corporate Email Address

contato@ecosolar.com.br

Type of Organization

Limited Company.

Economic activities (based on CNAE - National classification of economic activities)

Engineering.

Theme

Emission avoidance (substitution of fuel and transportation modes, innovation in products and services, etc.).

Case description

EcoSolar developed a portable autonomous solar generator capable to produce electricity from photovoltaic solar generation, with no need to connect to the public utility. Container EcoSolar® is an innovative product in its form: it combines existing equipment to meet a latent demand. It has several applicabilities, such as construction sites, health care settings in remote locations (Amazon communities), mobile police stations, mobile vaccination stations, fire camps during dense forest fires.

Its main applicability – which can prevent higher carbon emissions, ≅ 800 kg of CO_2/year/hectare – is the replacement of the diesel generators used for irrigation on small and medium-sized rural properties (from 1 to 15 hectares). In this configuration, EcoSolar's project was supported by the Low Carbon Brazil initiative and the company ranked among the world's one hundred most innovative startups in the field of energy (2019) by the Start Up Energy Transition (SET) initiative (EcoSolar was the only Brazilian company to win the SET award in 2019).

The main impact of the Container EcoSolar® is to avoid GHG emissions by replacing diesel generators, but it also:

- reduces noise pollution in rural areas;
- reduces air pollution in rural areas, contributing to improve farmers' health;
- reduces the expenditure on diesel and its transportation, which, in the long run, contributes to increase the farmers' income.

However, the product has not been commercialized yet, because EcoSolar redirected its business focus. A prototype was produced and remained in operation for more than one year, when it was possible to determine its technical applicability. That is, it generates the expected amount of electrical energy and effectively reduces the expected emission of CO_2.

Does the Case show GHG emission level reduction?

Yes. The Container EcoSolar® can show different power configurations to suit clients' needs. The 8-kWp prototype is composed of 32 photovoltaic modules of 250 W each. The Container EcoSolar® emits zero CO_2/year/irrigated hectare, whereas a diesel generator emits 741.2 kg of CO_2/year/irrigated hectare*. For this reason, we say that the substitution of diesel generators with solar generators reduces emissions in ≅ 800 kg of CO_2/year/hectare. Today, in a configuration using 500-W panels, the Container EcoSolar® can potentially reduce emissions by 1.6 ton of CO_2/year/hectare.

Moreover, the solar generator, besides not emitting CO_2 during the generation of energy, has an average energy payback of only two years, in a useful life of up to 30 years, with an efficiency of 80%. Emissions related to the life cycle of a diesel generator are, on average, at least 8 times higher.

* Three cycles per year, corn plantation, Teresina/PI.

How is the Case classified?

Mitigation, socio-environmental responsibility.

Has the Case been implemented?

A prototype validated its performance, but the product has never been commercialized.

What is the forecast of continuity of the Case?

The product will be developed for commercialization only when (and if) capital for the initiative is available, either from equity or public/private financing.

Is the Case likely to expand??

At EcoSolar, it is likely; howerver, in some configurations, the product cannot be manufactured by other Brazilian companies, because EcoSolar owns its patent in the country. In any case, other photovoltaic generation solutions can be considered to be used in irrigation.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

According to a study conducted by Link Inovação for EcoSolar, the Container EcoSolar®, in its 8-kWp configuration, is capable of preventing the emission of about 742 kg/year/irrigated hectare after the substitution of the diesel generator.

Impacts/results

The Container EcoSolar® has not been commercialized yet. Therefore, there is no concrete and large-scale result to be presented.

Invested resources

Financial: an investment of about BRL 150 thousand.

Human: the company's engineers and employees (the hours worked have not been documented, but the project lasted at least three years).

Main challenges faced

The main challenge was to secure financial resources to set the project in motion and be able to commercialize the product. EcoSolar obtained international recognition, but it did not have support to develop the product in Brazil. A prototype was produced and its capacity to generate electrical energy was verified. There are clients interested in our generator, but so far it has not been possible to produce it on a commercial scale. At a certain point, the company could no longer invest its own equity in the product.

The main technical challenge is the storage of electrical energy, for which better solutions are to be developed.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Especially, improving access to loan financing for both small companies (such as EcoSolar) to produce the first models of an innovative product (when there is no guarantee for the private investor) and potential clients (small and medium-sized farmers) who could be partially subsidized in their access to initiatives focused on sustainability.

Next steps

The product will be developed for commercialization only when (and if) capital for the initiative is available, either from equity or public/private financing.

Relations with the SDG (Sustainable Development Goals)

1 – No Poverty:

End poverty in all its forms everywhere;

2 – Zero Hunger and Sustainable Agriculture :

End hunger, achieve food security and improved nutrition and promote sustainable agriculture;

7 – Affordable and Clean Energy:

Ensure universal access to affordable, reliable and modern energy services;

13 – Climate Action:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

There is no technological innovation in the components of Container EcoSolar®, but rather in its applicability: to configure the existing technology to be used in a new way – as a portable autonomous solar generator.

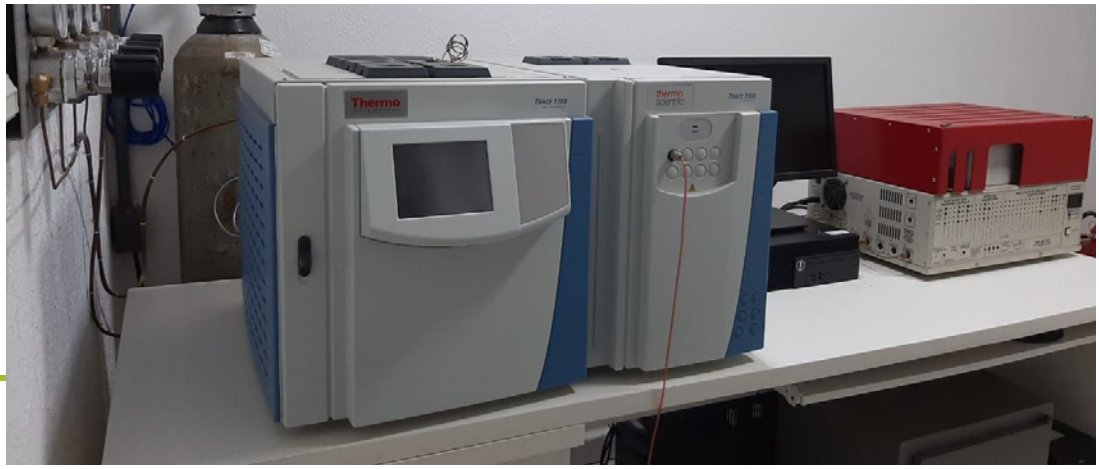
ACORDO AMBIENTAL SÃO PAULO

Corporate Name

ECOSUPORTE - MP2 Gerenciamento e Comércio de Resíduos

Name of the case

Determination of purity refrigerant as an indicator for energy efficiency of refrigeration



Gas chromatography used in analysis.

Ecosuporte gas chromatography laboratory.

Site

ecosuporte.com.br

Corporate Email Address

ecosuporte@ecosuporte.com.br

Type of Organization

Limited society.

Economic activities (based on CNAE - National classification of economic activities)

Water, sewage and waste management.

Theme

Scope 2 emissions - consumption of purchased electricity, steam, heat and cooling (GHG Protocol).

Case description

The analytical procedures for determination of refrigerant purity by Gas Chromatography Laboratory of the Ecosuporte's Refrigerant Reclamation Centers, showed good results when applied in the analysis of gas systems in operation, becoming an important indicator of energy efficiency.

Through refrigerant purity analysis it was possible to diagnose the impacts of contaminants on the energy performance of the refrigeration system. Working by heat exchange with the environment, the refrigerant purity is essential to that process. The increase of refrigerant contaminants, decreases the overall system efficiency.

Our analysis identifies contaminants and their percentages, while refrigerant reclamation promotes the contaminants elimination, returning the full heat exchange potential to the refrigeration system.

The contaminants in refrigerant – especially moisture and air (non-condensable gases) - promotes increased pressure and temperature of condensation, and just one more degree in condensation, will represents 3% to 4% of global increase of energy consumption.

The Organization for Cooperation and Economic Development / International Agency of Energy (OECO/IEA) forecasts the growth of refrigerate areas in Brazil from the current 20 million cubic meters (mi m3) to 100 mi m3 in 2050, when the sector will be responsible for the greatest energy demanding national electric power. Energy efficiency actions on the refrigeration sector will be of great importance in reducing national emissions.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The measurements started in 2021 and it hasn't been closed yet.

Impacts/results

Emissions avoided by reduction of energy consumption.

Invested resources

Gas Chromatography laboratory (Supported by the Brazilian Program of Ozone Layer Protection, Ministry of the Environment (MMA), through the United Nations Program for Development (UNDP).

Investment BRL 1,300,000.00 (70% supported, 30% own investment).

Main challenges faced

Scaling up, to reduce unit cost, enabling also for smaller systems of refrigeration.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Opportunity for standardization and technical guidance highlighting the solutions and alternatives.

Next steps

The project is meant to continue, with the growth potential and replication to overcome the challenges of range.

Furthermore, there is a current study taking place about feasibility of a mobile analysis unit. It is also part of the goals to expand research to the quality indicators of the whole system (testing also the lubricant, seeking indicators of the system wear).

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy:

Ensure access to affordable, reliable, sustainable and modern energy for all;

13 – Climate Action:

Take urgent action to combat change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes, innovation in the use of the analytical procedures, in the control of impurities and performance of the refrigeration systems.

Ecosuporte refrigerante analysis laboratory.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

ECOSUPORTE - MP2 Gerenciamento e Comércio de Resíduos

Name of the case

Refrigerant reclaimed as avoided GHG emissions strategy

Refrigerant reclaim equipment.

Equipment detail view.

Site

ecosuporte.com.br

Corporate Email Address

ecosuporte@ecosuporte.com.br

Type of Organization

Limited society.

Economic activities (based on CNAE - National classification of economic activities)

Water, sewage and waste management.

Theme

Scope 3 emissions - Reduction of indirect emissions (GHG Protocol).

Case description

Reclaiming of refrigerant in Brazil began in 2006, and the most recent Refrigerant Recovery Center (CRA, Central de regeneração e análise de fluidos refrigerantes, in Portuguese) installed in 2018.

Today, São Paulo State concentrates half of the CRAs installed in Brazil, becoming strategic for the whole country in the management of global warming potential and the potential of depletion of the ozone layer that many refrigerants can cause.

The data of the new CRA-ECOSUPORTE is presented in this case, as strategic activity for reduction of greenhouse gas (GHG) emissions.

The regeneration of refrigerant fluids is characterized as a solution to reduce GHG in two moments: in the disposal of waste gas (gas recovered from systems under maintenance or discard) and after the determining of the contaminants, reclaiming them.

As an alternative to final disposal, reclaiming brings environmental and economic advantages, compared to incineration.

In 2020, 2400 kg of R134a and 800 kg of R22 were reclaimed, totaling 4,528 tons of CO_2e avoided. Still, this is a market in early development. It is estimated that only 2% of all refrigerant with potential to reclaimed is processed by Brazilian CRAs, evidencing the need to expand knowledge about this solution.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Likely.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

In 2020, 2,400 kg of R134a and 800 kg of R22 were reclaimed, representing 4,528 tons of CO_2e.

Impacts/results

Reclaiming refrigerant is a safe and attested alternative which can reduce more than 70% of the consumption of these materials in an ecosystem. Avoiding emissions depends on the refrigerant gas type. In a charge of 100 kg of R22, the reclaiming of refrigerant guarantees 17.6 tons of avoided CO_2e.

Howerver, at 100 kg of R404, the GWP avoided increased to 39.4 t CO_2e avoided. Currently, if only 2% of all refrigerant with conditions for reclaiming come to the CRA, the potential for expansion needs to be harnessed.

Invested resources

Financial and human resources in the CRA operation, totaling BRL 1,300,000.00 (70% of funds raised in projects and 30% from own investments).

Main challenges faced

Only 2% of all refrigerant recovered in maintenance in Brazil comes to CRA due to bad practices by technicians and difficulty in gas recovering technique. Even with the environmental law, there is the practice of launching directly into the atmosphere the refrigerant residue directly into the atmosphere, which must be curbed.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Gas consumption data for maintenance and volumes recovered and destined, can be compared to the identified releases into the atmosphere.

Next steps

Dissemination about technical knowledge.

To strengthen technical participation in the refrigeration segment, ensuring broad knowledge of the legal requirements and economically viable alternative for the reuse of the waste, by reclamation.

Relations with the SDG (Sustainable Development Goals)

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption patterns;

13 – Climate Action:

Take urgent action to combat change and its impacts.

Does the Case contribute to technological development and/or to the business model?

It is a known technology, but in the beginning of its operation in Brazil, carried out by only five local companies.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Empresa Metropolitana de Águas e Energia S/A

Name of the case

Projects to generate electricity from solar sources, Floating Photovoltaic Power Plants, to be installed in the water mirror of the Billings Reservoir (Metropolitan Region of São Paulo - Brazil)

Floating solar power plant in Billings reservoir - aerial view.

Site

http://www.emae.com.br

Corporate Email Address

presidencia@emae.com.br

Type of Organization

Corporation / mixed economy, publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

D. Electricity and gas.

Theme

Avoided emissions (fuel substitution, product and service innovations).

Case description

With the purpose of contributing to the diversification of the Brazilian electric grid, with a focus on the generation of electric energy with low emission of greenhouse gases (GHGs), EMAE proposed a Public Call (CP nº 02/2020) to seek partners interested in developing energy projects. generation of electricity (power plants) from solar sources. In this first phase, two companies were selected, which will install the photovoltaic modules in the space provided by EMAE and will manage the energy credits generated by these plants.

The floating modules will be installed in the water mirror of the Billings Reservoir (Metropolitan Region of São Paulo).

The project will provide financial benefits to EMAE, which will receive for the lease of the asset, and to society, enabling National Interconnected System (NIS) consumers to start generating clean energy for part of their consumption instead of accessing the Brazilian electricity grid. In addition, the floating photovoltaic power plant avoids the use of ground cover and/or deforestation to install new plants.

In this first phase, it is estimated to install 90 megawatts (MW) in the water mirror of the Billings Reservoir, an area corresponding to 0.91% of the total area of the water mirror, which has about 109km².

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it is running. The Public Call (CP n. 02/2020) is in its final stage. The process is still in the stage of environmental licensing and requesting access to the local electricity distributor for the deployment of 30MW. The remaining 60 MW are about to formalize a contract between EMAE and another partner.

What is the forecast of continuity of the Case?

This Public Call is in its final stage, the installation of which is scheduled for the beginning of 2022, and should operate until 2042.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

After the implementation of the Photovoltaic Power Plants in the water mirror of the Billings Reservoir (90MW), it can be inferred that 149,559 tCO_2e/year will be avoided. This takes into account the CH_4 and N_2O emissions, expressed in CO_2 equivalent (CO_2e) for the respective global warming potential ("GWP") in relation to a fuel oil thermoelectric power plant, which is no longer activated in the National Interconnected System (NIS) and, therefore, avoids the use of energy from the most polluting sources in the Brazilian electricity grid.

Impacts/results

Energy availability in the largest consumption center in Brazil, being generated from low carbon technology. In this first phase, the project, after its implementation, will be able to benefit the equivalent of approximately 67.5 thousand homes, considering the average monthly consumption of electricity of 195 kWh per home, which corresponds to 149,559 tCO_2e/year mentioned above.

Invested resources

An investment of around USD 73.4 million is estimated.

Main challenges faced

Make the generation of photovoltaic electricity compatible with new projects in multiple-use reservoirs, as well as the availability of electricity substations close to the projects for connecting photovoltaic power plants.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Search for partners and new technologies to improve the carbon footprint of the electricity sector. As a competitive advantage is the use of existing reservoirs for the implementation of the project, and this environment avoids the construction of plants on the ground, with the consequent emission of biogenic CO_2, considering the scarcity of free spaces for the implementation of power plants in the Metropolitan Region of São Paulo.

Next steps

In this first phase (CP n. 02/2020), the intention is to complete the stages of licensing and request for access (connection) and, subsequently, start the construction of the photovoltaic plants. As for the second phase (CP No. 01.2021), we await the submission of proposals which should take place by 11.22.2021.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy: Ensure access to affordable, reliable, sustainable and modern energy for all;

9 – Industry, innovation and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient and sustainable;

13 – Climate Action:

Take urgent action to combat climate change and its impacts;

17 – Partnerships for the goals:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does *the* Case contribute to technological development and/or to the business model?

Yes. The technique used to generate electricity for commercial exploration purposes, through photovoltaic modules installed over the water mirror of a reservoir, is unprecedented in Brazil.

Technological innovation is in the use of floating devices to support the photovoltaic modules on the surface of the reservoir and keep them stable in order to provide maximum capture of solar radiation, against the incidence of wind and water level variation.

Other information regarded as relevant

Bibliography

DANTAS, O. L.; APOLÔNIO, R.; JUNIO, A. A. 2019. Potencial da geração distribuída e seu impacto na redução de emissões de CO_2: Estudo de uma micro usina fotovoltaica conectada à rede de energia elétrica. ENGEVISTA, V. 21, n.2, p. 329-340, Maio 2019. Disponível em: **https://periodicos.uff.br/engevista/article/view/27299**. Acesso em 14 out. 2021.

EPE – EMPRESA DE PESQUISA ENERGÉTICA. Anuário Estatístico de Energia Elétrica. Acesso em: **https://www.epe.gov.br/pt/publicacoes-dados-abertos/publicacoes/anuario-estatistico-de-energia-eletrica**. Acesso em 14.10.2021.

EPE – EMPRESA DE PESQUISA ENERGÉTICA. Balanço Energético Nacional 2021, Base 2020. Disponível em: **https://www.epe.gov.br/pt/abcdenergia/matriz-energetica-e-eletrica**. Acesso em: 14 out. 2021.

FREDIGO, N. S.; GONÇALVES G.; LUCAS, P. F. Usos Finais de Energia Elétrica no Setor Residencial Brasileiro. 94p. Relatório de Iniciação Científica – Universidade Federal de Santa Catarina, Florianópolis, 2009.

MIRANDA, M. M. 2012. Fator de emissão de gases de efeito estufa da geração de energia elétrica no Brasil: implicações da aplicação da Avaliação do Ciclo de Vida. 162p. Dissertação (Mestrado em Engenharia Ambiental) – Universidade de São Paulo, São Carlos. Disponível em: **https://teses.usp.br/teses/disponiveis/18/18139/tde-22012013-112737/pt-br.php.** Acesso em: 14 out. 2021.

Floating solar power plant near Billings reservoir banks.

ACORDO AMBIENTAL SÃO PAULO

EMILIANO

Corporate Name

Emiliano Empreendimentos e Participacoes Hoteleiras Sociedade Ltda.

Name of the case

Implementation of Electric Charging Stations

Charging station.

Site

https://emiliano.com.br/

Corporate Email Address

marketing@emiliano.com.br

Type of Organization

Limited company.

Economic activities (based on CNAE - National classification of economic activities)

Food and Lodging.

Theme

Avoid emissions – (replacement of fuels and transportations modals, innovation of products and services, etc.).

Case description

Implementation of two battery chargers for electric cars in two hotels in São Paulo and Rio de Janeiro

The transportation industry is accountable for a major contribution to the Greenhouse Gases emissions, and electric vehicles are an alternative to this scenario. However, one of the main challenges is to provide for an infrastructure that will support technology changes in the industry. It was with this purpose that charging units for electric cars were built in the parking lots of two hotels (in São Paulo and in Rio de Janeiro) and are made available free of cost to hotel guests and restaurant customers. Thus, contributing to the expansion and acceptance of the technology and to the reduction of greenhouse gases emissions in the cities.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Social and environmental responsibility.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

Case implemented.

Is the Case likely to expand??

Maybe.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

It is not possible yet to affirm the levels of reduction, as this will be calculated based on the frequency of use. However, generally speaking, a medium size family car, on gasoline, will generate 24 tons of CO_2 during its life cycle, whereas an electric car will produce 18 Tons, being 46% of this impact caused in the manufacturing period. Considering that making charging units available ensures that no fossil fuels will be used, in the future it will be possible to calculate the contribution of each electric charging unit.

Comparison source: **https//quatrorodas.abril.com.br/noticias/pros e contras do carro elétrico/**

Impacts/results

The initiative of increasing the number of charging stations for electric and hybrid cars is expected to guarantee that infrastructure for recharging will not become a bottleneck in the growth of car fleets of lesser environmental impact and will encourage consumers to adopt this modality of sustainable transportation.

Invested resources

Parking spaces for two cars, and electric power.

Main challenges faced

Training of drivers and teams.

Next steps

To enhance dissemination and promote the use of this type of car.

Relations with the SDG (Sustainable Development Goals)

7 – Accessible and clean energy;

9 – Industry, innovation and infrastructure:

To build resilient infrastructures and promote inclusive industrialization;

11 – Sustainable cities and communities:

To make cities and human settlements inclusive, safe, resilient and sustainable;

12 – Accountable consumption and production:

To ensure sustainable production and consumption standards.

Does *the* Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

ENC Energy Brasil

Name of the case

Energy from Landfill Gas (LFG) - Guatapará Energia S.A. e SPE Tremembé Energia Ltda.

Tremembé power plant.

Guatapará engines.

Guatapará aerial view.

Site

https://www.encenergy.com

Corporate Email Address

infobr@encenergy.com

Type of Organization

Public limited company / closed capital.

Economic activities (based on CNAE - National classification of economic activities)

Electricity and gas.

Theme

Reduction of indirect emissions of Greenhouse gases, scope 2. (cf. Greenhouse Gases (GHG Protocol - purchased electric energy, steam, heating/cooling, acquired for own use), avoided emissions (fuel and transport modal substitutions, innovations in products and services etc.).

Case description

As Brazil is a country with a predominantly hydroelectric power grid (62.5%, according to data from Empresa de Pesquisa Energética (EPE), 2020), the diversification of the grid contributes to the environmental commitment to reduce CO_2 and follow the global investment movement in alternative and clean energy.

Aligned with this commitment, ENC Energy owns renewable power plants (UTEs) that produce energy from biogas generated of decomposition in landfills, an environmental liability that becomes energy source in this process.

Biogas is the gas of decomposition of organic waste, composed of approximately 55% methane. Methane is a greenhouse gas (GHG), considered 28 times more pollutant than carbon dioxide, based on the Global Warming Standard (GWP), determined by the Intergovernmental Panel on Climate Change (IPCC). In addition to being a pollutant, methane causes an impact on the local population where the gas is emitted due to its bad smell, also attracting unpleasant animals such as vultures and rats.

Unlike dumping ground, only regulated landfills allow Landfill-gas-to-energy projects. That is because the regulated landfill is characterized by an engineering infrastructure that makes it possible to capture biogas and capture leachate, protecting the environment from contamination.

Data from the Brazilian Association of Public Cleaning and Special Waste Companies (Abrelpe) reveals that in 2021 only 39.8% of urban solid waste collected in Brazil was not sent to a regulated landfill, ending up in dumping ground or similar.

Dumps ground are areas without any protection where waste is deposited without any control. These are places where usually marginalized families look for recyclable materials to generate income. Controlled landfills are a recent definition applied to dumps that have undergone improvements that now include control, disposal planning, protection, and contamination monitoring. They are built without technology and therefore do not have a gas network and geomembrane protection like regulated landfills.

In legal terms, only sanitary landfills are regulated. The adequacy of the municipalities was extended from 2014 to 2024 as provided for in the new basic sanitation framework (Law No. 14,026/2020). Municipalities that have not yet complied with the new law and do not have a waste management plan (PGR) claim that they have investment difficulties. The energy recovery of biogas contributes to the financial viability of the sanitary landfill, with the fulfillment of the law 14,026/2020 and economic development of the localities.

ENC Energy owns nine biogas power plants in Brazil. Two of them are in the state of São Paulo: the Thermoelectric Power Plants (UTE) "Guatapará Energia S.A." and "SPE Tremembé Energia LTDA", which are located inside the "Estre Ambiental" and "Orizon VR" landfills, respectively, through partnerships between ENC and the landfills. In this way, access to the biogas generated in the decomposition of organic waste in the sanitary landfill is facilitated and the methane from the biogas is used in the UTEs as biofuel, resulting in the generation of electricity.

In this way, in addition to being a clean, alternative, and renewable energy, contributing to the development of sustainable cities, it is also a source of electrical energy that mitigates the emission of methane into the atmosphere.

Consuming an average of 2,600m³/h of biogas, the 4 engines that make up the Guatapará plant have a total power of 5.7MW. In 2021, 39,693 MWh of energy was injected into the distribution network. In Tremembé, there are 2 motor generators totaling 2.8MW of power that generated a total of 17,729 MWh of energy available for sale in 2021, consuming an average of 1,300m³/h of biogas

The energy is verified by the Renewable Energy Certificates (RECs) in Brazil represented by Totum Institute. This system allows companies that generate clean energy to sell the certificate (1 "I-REC" corresponding to 1 MWh), participating in a global system of certification of renewable energy.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Alternative renewable energy generation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

Over 10 years.

Is the Case likely to expand?

There is a possibility of expansion. There is another plant under construction in the state of São Paulo. The company always analyzes and seeks regulated landfills for new partnerships. In addition, we are evaluating the possibility of expanding with more engines in the existing units if there is greater production/availability of biogas.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

In 2021, the consumption of biogas by the Guatapará Energia plant mitigated 8,506 tCH_4. A total mitigation estimate from 2022 to 2030 is 80,820 tCH_4. The Tremembé plant, also in 2021, through the consumption of biogas by the plant, mitigated 4,607 tCH_4 and the total mitigation estimate for 2022-2030 is up to 40,410 tCH_4. Considering the conversion ratio, the GWP of 28, as mitigations in CO_2 are tCO_2e and 1,443 tCO_2e, respectively.

Impacts/results

One of the main positive environmental impacts generated by the operation of UTEs Guatapará Energia S.A. and SPE Tremembé Energia LTDA is the capture of methane gas, generated by the decomposition of organic waste from the landfill, preventing it from being emitted into the atmosphere. Locally, this mitigation favors the health and well-being of the local community. Globally, we contributed to the actions signed at the 26th United Nations Conference on Climate Change (COP26) within the scope of the Methane Agreement, to reduce climate change, in addition to increasing the diversification of the country's renewable electricity grid. Economically, the introduction of new power generation engines makes it possible to increase the supply of electricity, contributing to the movement of the national economy, in addition to generating jobs locally.

Invested resources

Each power plant has a different investment as the installation works vary according to the location. In the case of Guatapará Energia S.A. and SPE Tremembé Energia LTDA the initial investment was BRL20MM and BRL15MM, respectively. This amount includes civil works facilities as well as machinery and transmission network.

In addition, for the operation there is a cost linked to the supply of biogas, this value is confidential in the contract signed between the parties.

Main challenges faced

Currently, Brazilian legislation, both at the federal and state levels, has few instruments to encourage and recognize biogas energy recovery technology as a renewable and clean source. A better framework for this energy sector is needed.

Suggestions to improve the business environment (regulations, licensing, access to credit)

It is essential to recognize the difference between renewable biogas energy and energy from fossil sources so that they have the proper structure and regulations. Biogas is a sustainable source that generates green, clean and constant (non-intermittent) energy.

Next steps

Our operation will take place on a continuous basis, meeting the availability of biogas in accordance with the capacity of solid waste in the sanitary landfill, with the possibility of expansion, when appropriate.

Relations with the SDG (Sustainable Development Goals)

3 – Good Health and well-being

Ensure healthy lives and promote well-being for all at all ages.

7 – Affordable and Clean Energy

Ensure access to affordable, reliable, sustainable and modern energy for all.

11 – Sustainable Cities and Communities

Make cities and human settlements inclusive, safe, resilient and sustainable.

13 – Climate Action

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Generation of energy with biogas.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Farah Service

Name of the case

Bike path, Social Impact and Carbon Reduction: the New Rio Pinheiros

Access to the bike path from the city.

Floating bridge.

Site

https://farahservice.com.br

Corporate Email Address

michel@farahservice.com.br

Type of Organization

Private limited company.

Economic activities (based on CNAE - National classification of economic activities)

Marketing of social responsibility.

Theme

Emission avoidance (through the change in energy sources and means of transportation, as well as products and service innovation), biodiversity, management and conservation of green areas, correct use of soil, organizational innovation and new business models, communication, social engagement of vulnerable communities, and other themes which are directly or indirectly related to the climate agenda.

Case description

The case is characterized by the revitalization of the bike path Franco Montoro, a 22.2 km stretch on the right bank of the Pinheiros River, in the city of São Paulo. The bike path is part of the Novo Rio Pinheiros project, a partnership between the São Paulo State Government and the São Paulo State Basic Sanitation Company (SABESP), which aims to clean up the river. It is the largest urban regeneration project in Latin America, and it is based on the redefinition of this space with the purpose of encouraging alternative and intermodal mobility, sports and leisure, through the provision of quality infrastructure, lighting, security, service operations, food, and cultural activities.

Since 2020, when Farah Service took over the management of the bike path, the number of users has grown by 1000%. In the beginning, there were 20 thousand people per month and now there are 200 thousand. This growth does not only affect sports practitioners, but also people who have started to use the bike path as the means for urban mobility, since it allows access to the city's train and subway lines.

Partnerships with strategic companies that currently sponsor beach tennis courts, lounges, a radio studio (Studiociclo), and a schedule of annual events that include exhibitions and installations of art pieces created a new interest for the population towards the bike path.

The success in the management model drew the attention of private and public sector entrepreneurs who came together to form the Parque Novo Rio Pinheiros Consortium. The consortium is responsible for managing the Bruno Covas Linear Park, with 17.1 km on the left bank of the Pinheiros River and an 8.2 km long bike path.

Farah Service, as the managing party of both banks, connected the Franco Montoro and the Bruno Covas bike paths through the creation of new accesses and a floating bridge over the river, thus increasing its length and enhancing the incentive for alternative and intermodal mobility.

This initiative impacts approximately three million people, dozens of neighborhoods, and a diverse scope of socioeconomic and cultural realities. Therefore, three pillars of action were chosen: guaranteeing the non-gentrification of the space, women's safety, and equity between all visitors. The initiative focuses on urban mobility, plurality of the access to all equipment and services available, the preservation of all the local fauna and flora, encouraging the practice of sports, and on the search for more health and well-being for the population.

Amongst the actions described above, the following stand out:

The creation and development of Lab Rio Pinheiros, a hub for studies on the surroundings that aim to map the crucial needs to facilitate access, walkability, and the communication with the surrounding communities.

The creation and development of the Animal Support and Protection Center (CAPA), a Non-Governmental Organization (NGO) that maps, rescues, and cares for all the fauna that lives around the river.

The creation of partnerships with responsibility and incentives to micro entrepreneurship, through free space and infrastructure, and contracts that provide nutritious and accessible food in cafes and restaurants.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Socioenvironmental responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits to society are present today and are increasing.

What is the forecast of continuity of the Case?

5 to 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes, but the number has yet to be calculated.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes. Estimates on GHG reductions have not been made, but an estimate will be done on the second stage of the project by USP specialists. As additional information, a car uses 250g of CO_2 for each km driven (250gCO_2/km), thus every person who exchanges their car for a bicycle, will avoid the emission of GHGs.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The estimate of how many tons will be reduced will be done in a next step.

Impacts/results

Today, people enjoy cycling along the riverbank. With bike lanes scattered throughout the city and the easy access to train and subway lines, citizens can easily access the complex Rio Pinheiros, where they are able to walk, practice sports, visit exhibitions and even attend lectures and classes. All this for free and with safety, increasing the quality of life.

The repair of the Franco Montoro Cycle Path, the implementation of new accesses, and the junction with Parque Bruno Covas increased the city's bike path area, promoting more sport, leisure, and mobility. Moreover, it increased the number of users and, consequently, less CO_2 emission and less pollution.

The environmental restoration of the area, together with the depollution of the river and restoration of the fauna and flora through the planting of trees and care for the animals, is another important point.

Finally, the social inclusion project in hiring employees and encouraging local micro-entrepreneurship that promotes economic improvement.

Invested resources

The human resources invested includes 360 people, who are employed by both Farah Service and the government of São Paulo for the maintenance and improvement of the banks of the Pinheiros River. These actions facilitated the implementation and maintenance of the cycle path and the Bruno Covas Park. Among these workers are the 200 employees in the Operation Work Program (POT), initiative created by the Government of São Paulo, 86 people directly hired by Farah Service, and 74 third-party employees. The financial resources invested includes BRL 68 million (BRL 30 million in the bike path and BRL 38 million for the Rio Pinheiros Foundation).

Main challenges faced

The revitalization of the bike path complex project, which was developed on the banks of a river that has been rectified, with its back towards the city and separated by six high-speed lanes from the avenues around. Moreover, grounded on its banks are essential service infrastructures, such as fiber optic cabling, energy, and sewage and rainwater pipes, creating a major operational and logistical challenge to enable the installation of new equipment in the space.

Another challenge was the creation of an internal communication channel that would enable a healthy dialogue between all the agents working in the project and companies working on the site, allowing for a more collaborative and value-generating dynamic where the different users of the space have an active voice in decision-making.

Next steps

Continuous projects to restore the quality of life around the Pinheiros River and the construction of new interconnection accesses to attain more visitors, thus increasing the modal of urban transport with safety and infrastructure.

Relations with the SDG (Sustainable Development Goals)

3 – Good health and well-being:

Ensure healthy lives and promote well-being for all at all ages.

11 – Sustainable Cities and Communities:

Make cities and human settlements inclusive, safe, resilient and sustainable.

13 – Climate Action:

Take urgent action to combat climate change and its impacts.

17 – Partnerships for the goals:

To strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

New architectural and urban interventions embrace the concept of energy efficiency and zero waste, using renewable, reuse, and related materials. The project relies on the wesafer app, which monitors the safety levels through online security cameras scattered along the bike path, and a member's club for registered cyclists called Ciclo.amigos.

Other information regarded as relevant

The creation of the Novo Rio Pinheiros Foundation was an important point in this process as its purpose is to promote the revitalization and preservation of the river, its banks, and the surroundings, thus further promoting the depollution of the river, environmental and social research, and the development of new technologies.

The SOLO project, part of an initiative by the Novo Rio Pinheiros Foundation, carries out a first study so that the removed plastic waste from the river could eventually be transformed into plastic bricks that can be used in the construction of houses, containers, or urban furniture. This plastic waste is removed from the Pinheiros River, then it goes through an extensive recycling process until it becomes a brick that can replace the conventional brick, thus developing a new recycling chain.

Corporate Name

Trade Federation of Goods, Services and Tourism

Name of the case

"Prêmio Fecomercio de Sustentabilidade"/ Fecomercio Sustainability Award

6th edition, Fecomercio Sustainability Award.

Site

https://www.fecomercio.com.br/

Corporate Email Address

representacao@fecomercio.com.br

Type of Organization

Other.

Economic activities (based on CNAE - National classification of economic activities)

Business representation.

Theme

Communication, stakeholder engagement and dissemination of good practices.

Case description

Since 2008, Fecomercio SP's Sustainability Council has organized the "Prêmio Fecomercio de Sustentabilidade" / Fecomercio Sustainability Award. In the last edition, the award had six categories: company (commerce, services and tourism), business entity, industry, public agency, academia (professors and undergraduate and graduate students) and journalism. In its six editions, nearly two thousand projects were registered, from all Brazilian states, and there were around fifty winners and more than one hundred finalists recognized. More information at **https://www.fecomercio.com.br/premio/sustentabilidade**.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Communication, stakeholder engagement and dissemination of good practices.

Has the Case been implemented?

Yes. The Award has had six editions.

What is the forecast of continuity of the Case?

Fecomercio SP is evaluating the best time and format to launch the new edition of the "Prêmio Fecomercio de Sustentabilidade" / Fecomercio Sustainability Award.

Is the Case likely to expand??

Maybe.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

The Award has been encouraging the creation of sustainability management and/or departments in companies, and also disseminating good practices in the management of water, energy and waste to companies and society in general.

The themes of the projects that were registered involve conscientious use of water, energy and natural resources; sustainable consumption, cities and communities; gender diversity, among others.

In its 6th edition, based on the Sustainable Development Goals (SDGs) of the United Nations (UN), it was sought, since the opening stage of registration, to disclose what the SDGs are and the importance of the productive sector in appropriating the proposed goals by the UN, as such objectives are not exclusive to municipal, state or federal governments. The award opening event featured lectures by Mr. Haroldo de Oliveira Machado Filho - senior advisor to the United Nations Program (UNDP) Brazil and Ms. Mohlago Flora Mokgohloa - Urban Sustainability Advisor from Johannesburg, South Africa.

Invested resources

In all editions, winners and finalists were given certificates, trophies, cash prizes and intense media coverage.

In its 6th edition, all finalists received a certificate and the winners in each category received prizes in the amount of BRL 15 thousand in capitalization or pension titles.

Main challenges faced

In the registration phase, the prospecting of partnerships for publicizing the event stands out, due to the wide range of categories and the need for national coverage.

The evaluation phase for choosing the finalists is challenging as the criteria designated in the regulation has to be fairly applied, such as innovation, stages that were reached, breadth and level of compliance with the SDGs; in addition to also ensuring the veracity, applicability and level of quality excellence of the awarded projects.

Now, in the disclosure phase of the finalist and winning socio-environmental projects, the challenge is to reach varied actors (commerce, services and tourism companies, industries, business entities, public agencies, universities, press) and impact them to truly adopt these actions and contribute to achieving the varied SDGs.

It is still required that the finalist projects and Award winners impact the direct stakeholders of Fecomercio SP, its affiliated business organizations, the companies of the representation bases, the trade federations of other states, the National Confederation of Commerce, the units of SESC and SENAC, and the entire network of the award supporters.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Fecomercio SP disseminates the social and environmental practices that won the Award, in order to be adopted by companies.

It encourages the viability of the winning projects through the given financial awards; it gives visibility in its communication channels, as well as of the publicity and supporting partners. For example, the project that won the 3rd edition in the small and medium business category, which consisted of collecting stations for expired or out-of-use medications, equipped with bar code readers to ensure the traceability and safety, so that the collected medications reach their environment-friendly disposal. Based on this project, Fecomercio SP asked ABNT to prepare a technical standard, which resulted in ABNT NBR 16457: 2016 - Reverse Logistics of expired and/or disused medicines for human use - Procedure.

Next steps

Fecomercio SP is evaluating the best time and format to launch the new edition of the "Prêmio Fecomercio de Sustentabilidade" / Fecomercio Sustainability Award.

Relations with the SDG (Sustainable Development Goals)

12 – Responsible Consumption and Production:

To ensure sustainable production and consumption patterns;

17 – Partnerships and Means of Implementation:

To strengthen the means of implementation and revitalize the global partnership for sustainable development.

However, due to the themes that the projects aim to solve in the company, industry, business entity and public agency categories, and the themes addressed in the 'academy' and 'journalism' categories, the "Prêmio Fecomercio de Sustentabilidade"/Fecomercio Sustainability Award is indirectly related to all other SDGs throughout its six editions, highlighted below:

1 – Eradication of Poverty:

Ending poverty in all its forms, everywhere;

2 – Zero Hunger and Sustainable Agriculture:

Ending hunger, achieving food security, improving nutrition and promoting sustainable agriculture;

6 – Drinking Water and Sanitation:

Ensuring the availability and sustainable management of water and sanitation for all;

7 – Affordable and Clean Energy:

Ensuring reliable, sustainable, modern and affordable access to energy for all;

9 – Industry, Innovation and Infrastructure:

Building resilient infrastructure, promote inclusive and sustainable industrialization and promote innovation;

11 – Sustainable Cities and Communities:

Making cities and human settlements inclusive, safe, resilient and sustainable;

13 – Action Against Global Climate Change:

Taking urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

It promotes technological and business model innovation, as seen in the finalist projects available at **https://www.fecomercio.com.br/premio/sustentabilidade.**

Other information regarded as relevant

In its 6th edition, the Award encouraged society to achieve the Sustainable Development Goals (SDGs) of the United Nations (UN). The diversity of subjects and themes dealt with in the projects is presented in the list of winners below, which shows the main SDG portrayed by the project:

- Company category: REVIVA project, Via Varejo's recycling program (SDG 12).
- Business Entity category: Arisp Integrated Environmental Management System, which develops actions to benefit the environment in real estate registry offices throughout the state of São Paulo (SDG 12).
- Industry category: Eco Panplas project, which uses an ecological solvent and guarantees clean plastic for recycling (SDG 9).
- Public Agency category: Integrated Water Program - Environmental Education Project in Rural Areas of Itabirito, Minas Gerais (SDG 6).
- Academy category: Sustainable Girls Program, a scientific education project aimed at sustainable development, female empowerment and social equality, by Mr. Márcio Andrade, a professor from the Federal University of Mato Grosso (UFMT) (SDG 5).
- Journalism category: "Invisible Violence", an online special content, by Ms. Jéssica Gonçalves, a journalist from Tribuna do Ceará, which shows the reality of a precarious settlement in Arraial Moura Brasil, a neighborhood of Fortaleza/CE. The location has an HDI similar to that of African countries (SDG 1).

Details of the projects mentioned, as well as other editions of the Award, are available at **https://www.fecomercio.com.br/premio/sustentabilidade.**

ACORDO AMBIENTAL SÃO PAULO

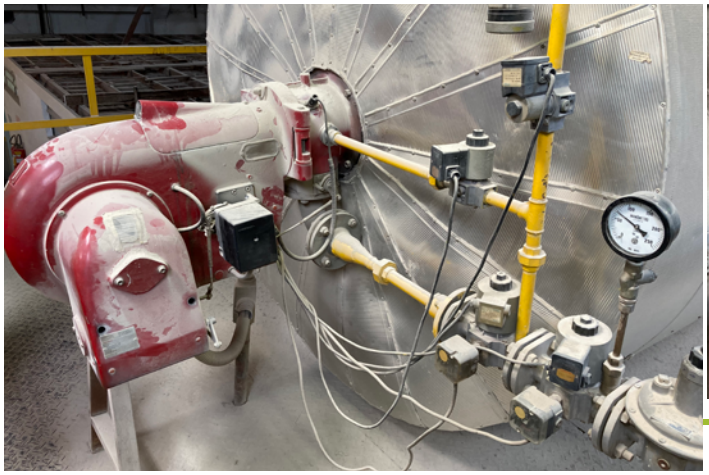
Corporate Name

Gressit Revestimentos IND e Comercio Ltda.

Name of the case

Dual system: GN furnace and wood chip furnace

Furnace.



Hot air Generator.

Site

http://gail.com.br/

Corporate Email Address

shoei.kuratomi@gail.com.br

Type of Organization

Limited society.

Economic activities (based on CNAE - National classification of economic activities)

Transformation industry.

Theme

Reduction of direct emissions, scope 1 (cf. GHG Protocol – organization's own facilities, own transport), Reduction of indirect emissions, scope 2 (cf. GHG Protocol – purchased electricity, steam, heating/cooling purchased for own use).

Case description

With the implementation of the wood chip hot air furnace, we will drastically reduce CO_2 emissions (approximately 7%). See attached photos of the systems.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Social and Environmental Responsibility, Greater flexibility and safety in the operation with the dual system.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

Case implemented, More than 10 years.

Is the Case likely to expand??

Yes! Because we have 2 sets of greenhouses and only one is working.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Considering the 2019 data: CO_2 Emission=4529.75t and with the implementation of the wood chip furnace, the CO_2 emission will be approx.. = 4212.00t (reduction of approx. 7%).

Impacts/results

The community for the consumption of renewable energy, savings in fuel consumption and reduction of GHG emissions (approx. 317t CO_2/year or (-7% of total emissions).

Main challenges faced

Lack of knowledge of the chip firing system and its environmental impact and consequences. The perception of lack of environmental impact, because the company's system of drying for evaporation of 16% water moisture of the products, favors the elimination of soot and smoke of diverse greenhouse gasses.

Difficulties in logistics: such as storage, chip feeding, adaptation of the location to provide operational safety (prevention against fire, hot air duct insulation, etc.).

Next steps

Continuity, expansion, goals, quantifying expected results in the next phases.

Ongoing monitoring, quantifying and confirming savings in consumption of fuel and reducing CO_2 emissions.

Relations with the SDG (Sustainable Development Goals)

Clean and Affordable Energy (ensuring access to affordable, reliable, sustainable and modern energy for all); Industry, innovation and infrastructure (building resilient infrastructure, promoting inclusively sustainable industrialization and fostering innovation);

Responsible consumption and production (ensure sustainable consumption and production patterns);

Terrestrial life (protecting and promoting the sustainable use of terrestrial ecosystems, managing forests sustainably, combating desertification, and halting and reversing land degradation and halting biodiversity loss).

Does the Case contribute to technological development and/or to the business model?

Yes.

Other information regarded as relevant

Equipment licensed by the manufacturer.

The GN furnace was not deactivated to be used in the eventual lack of wood chips.

According to the manufacturer, the furnace complies with the pollutant emission legislation.

No sampling was done to confirm.

GAIL buys the raw material (chips) from suppliers that reuse materials, from waste generated in carpentry, joinery and we are recycling our wood waste from broken, non-standard pallets and wood from pruning as well.

ACORDO AMBIENTAL SÃO PAULO

GM&C
SOLUÇÕES EM LOGÍSTICA REVERSA E RECICLAGEM

Corporate Name

GM&C soluções em Logística Reversa e Reciclagem

Name of the case

Materials recovery from e-waste recycling

Small electronics recycling line.

Examples of SIMCards recycled in the project.

Site

www.gmclog.com.br

Corporate Email Address

henrique.mendes@gmclog.com.br

Type of Organization

Limited society.

Economic activities (based on CNAE - National classification of economic activities)

Commerce. H. Transport, storage and shipping, Waste treatment, 9-31-99 - Recovery of metallic materials, except aluminum 38.31-9-01 – Recovery of scrap aluminum.

Theme

Avoided emissions (fuel substitution and transport modes, innovations in products and services etc.).

Case description

This project was developed by GM&C in partnership with recycling electronics machinery and equipment suppliers from Germany .

It is a solution initially designed for recycling credit cards and mobile phone chips (SIMcard) which was later improved with new modules enabled the recycling line to recycle small electronics, such as smartphones, chargers, plugs, sockets, among others.

GM&C serves the main telephone operators inThe country, executing the reverse logistics of these customers' products of, with the collection of discarded materials by consumers in stores, or the collection of obsolete equipment anditems to be discarded by the company.

Among the equipment to be used by these operators, the demand arose for a solution for the proper disposal of SIMcards, including the cards, made from a mixture of plastics and envelopes of plastic and paper, which wrapped these cards with the chip.

Until then, companies had sent these products to the sanitary landfill, representing an negative environmental impact, both in terms of wasted relevant raw material, present in the metals that cover chips, plastic from cards and paper from envelopes, as well as in the area occupied in the landfill with the shipment of this waste.

The initial demand was for the destination of approximately 25 million of these products, envelopes, and cards with SIMcard chip, amount that had been accumulated by GM&C, forwarded by the telephone service provider while the project was being developed.

Initially, the operation started manually, seeking to separate the chips (SIMcard) from the card and the envelopes, paper, and plastic.

GM&C sought partners in the machinery market, to jointly develop a new recycling line specific to this type of product. The result was excellent, making it possible to obtain the automated process separation of the three materials, forwarding all for recycling, reinserting these materials into the productive cycle as recovered raw material.

Throughout the project, it is estimated that more than 100 million units SIMcards, which resulted in the recovery of approximately 350 tons of materials, including paper, plastics and metals.

To estimate the number of avoided emissions that the project can provide, the following topics were considered:

- difference in emissions generated in extraction/ production of metals from mining, in comparison with the emissions generated in the recovery process of metals in the recycling line developed in this project.
- emissions that would be generated in the decomposition of the paper envelopes in landfill.
- difference in emissions generated in the production of virgin plastic compared to recycled plastic .

Considering the amount of noble metals recycled in this project, it is estimated that it was possible to avoid the emission of approximately 4,465 tons of CO_2e. This calculation was made considering the footprint of CO_2e required for the extraction of virgin metal, reported in an emissions inventory of large mining companies, compared to the emissions generated in the metal recovery from the recycling process.

Regarding the plastic part of the card and envelopes of cellophane, approximately 270 tons have been recycled over the last seven years. To compare with the emissions generated in the production of virgin plastic, it is estimated that approximately 160 tons of CO_2e have been avoided, considering the carbon footprint of recycled plastic compared with virgin plastic, using as a basis the emissions reported in the inventories of leading companies in plastic manufacturing.

Finally, a total of approximately 83 tons of paper, coming from the envelopes, was recycled throughout this project, which could have generated approximately 135 tons of CO_2e, if they had continued to be sent to the sanitary landfill, resulting in emissions from paper decomposition.

The paper and plastic recovered in this project were forwarded to recycling companies in the country, and the mixture of noble metals was exported to be refined in Belgium, where the leading company in this technology is located.

Does the Case show GHG emission level reduction?

The project does not directly reduce emissions, however, it does indirectly, by preventing emissions from being generated in the extraction of virgin metals and plastic.

In addition to avoided emissions, it also reduces the environmental impact of the extraction of materials and substances necessary for the production of virgin raw material.

To estimate the emissions that would have been generated by the decomposition of paper in landfill, the tool used was the GHG Protocol.

The amount of paper (coming from the envelopes) was entered in the tool, representing the waste that would have been sent to the landfill over the years if they had not been recycled by the project. The GHG protocol tool calculates what would be the emissions generated by these wastes, considering its decomposition along the time. This number was used as the emissions avoided by the fact that all this paper has not been sent to landfills, as had been done before the project.

The project considered the emissions generated in the extraction of gold, published by a large mining company on its GHG inventory, as a basis for comparison.

The same was done to obtain the emission data from the production of virgin plastic and recycled plastic.

To arrive at the net balance of avoided emissions in the project, the emissions generated by the recycling process (such as energy consumption) were discounted.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, the case was implemented and is still in operation.

The data shown here are the actual result of the project implementation.

What is the forecast of continuity of the Case?

More than 10 years.

The project will continue indefinitely.

This machine has been updated and enhanced with new separation lines, allowing it to also be used for processing smartphones and other small electronics.

With the obligation imposed on companies to implement reverse logistics of electronics in the

country, with increasing targets established in the Decree Federal no. 10,240/2020, this project will have to be expanded and replicated, so that it is possible to meet the demand of the market and the targets imposed by the decree mentioned.

Is the Case likely to expand?

The initial design of this machine has already been expanded so that it was possible to recycle other electronic equipment.

Therefore, the original case has already been expanded, obtaining very positive results with this new function of the GM&C´s metal separation plant.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

This case is more related to avoided emissions than emission reductions in processes.

It is estimated that since the beginning (in 2018), the project has avoided the emission of approximately 4,739 tons of CO_2e.

Impacts/results

- The project resulted in an innovative solution, with better results for processing large-scale SIMcards;
- Greater efficiency in the process, with effectiveness superior to previous practice Adopted.
- Reduction in the volume of waste destined for the land fill.
- Use of resources (paper, plastic and metals) transforming them into raw material and, thereby reducing the resulting environmental impact from the extraction of virgin raw material from the environment.

Invested resources

Resources were invested in hiring the German consultancy, which helped in the design of the solution, in addition to working hours of the company's own technicians.

And, also, the investment in the acquisition of the machines, installation and configuration of the new recycling line.

The total financial investment was in the order of millions of Reals.

Main challenges faced

The need to correct and adapt the equipment to the reality of the country's local climate. Despite having done tests in Germany, the machine did not operate as expected in Brazil. One of the shredders' knife, used for crushing equipment, did not correspond well and woudl wear out very often, which would make the project unfeasible.

After further studies and adjustments, this part was replaced, and it was possible to make the machine 100% functional and suitable for the original purpose.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Need for greater formalization of the actors involved.

Electronics recycling is still relatively new in Brazil.

It is necessary to establish criteria to define what the requirements would be to enable a company to carry out the recycling of electronic equipment.

Due to the lack of a formal description of this activity, the sector is still characterized by a lot of informality.

It is necessary:

- To establish a National Classification of Activities (CNAE) specific to the reverse manufacturing activity, to support the identification of these companies and the formalization of this sector.
- To develop a specific licensing process for the reverse manufacturing activity, in which companies that process electronics will have to demonstrate specific attributes and controls to deal with some types of waste that will be classified as hazardous, such as lithium batteries.

The creation of a specific CNAE, combined with a specific environmental licensing process, would already greatly improve the business environment in this segment.

- The Creation of incentives (or deductions in the amounts of taxes charged in this activity), such as the reduction in the tax on imports of machines, which end up delaying new investments in new technologies for the sector.

The recycling sector represents an activity that results in significant gains for society (such as generating jobs, reducing the environmental impact by recovering materials/resources, reducing GHG emissions and reducing costs for municipalities - by removing waste from landfills), therefore, such incentives are justified.

Next steps

Next steps involve:

- Enhance the measurement of the impacts and results in reducing emissions from this project.
- Test the solution for new types of electronic equipment, to optimize the recycling of this segment in the country.
- Seek new solutions, with greater processing capacity and adaptable to larger electronics.

Relations with the SDG (Sustainable Development Goals)

8 – Decent work and economic growth:

Promote sustained economic growth,

inclusive and sustainable, full and productive employment and decent work for everyone.

9 – Industry, innovation and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and fosteri innovation.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

The recycling line project was developed by the GM&C team, with consultants from Germany, but the machines (sold separately for other purposes) already existed.

Although it was an innovative solution, a patent has not been registered for this project, but there was an agreement of a period of exclusivity, in which these suppliers could not implement a project similar to this one within five years.

Therefore, the development of this recycling line, actually, represented an innovation in the recycling process of SIM cards and small electronics, in Brazil and in the world.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Companhia Brasileira de Distribuição

Name of the case

Sustainable Transport Modalities for GPA E-commerce Deliveries

Clube Extra electric tricycle.

Pão de Açúcar electric van and tricycles.

Order delivery by electric vehicles.

Site

https://www.gpabr.com/

Corporate Email Address

sustentabilidade@gpabr.com

Type of Organization

Public limited company / publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Commerce. (Retail).

Theme

Reduction of indirect emissions, scope 3 (according to Greenhouse Gases Protocol – GHG Protocol).

Case description

GPA's sustainability strategy is committed to a circular economy agenda and actions in favor of a low carbon economy. To this end, we seek several ways to make our operation increasingly efficient, reducing the waste of resources.

To face this challenge, we have prioritized, over the last three years, the definition of goals and the adoption of systems, programs, and processes that make us advance in our commitments to combat climate change and contribute to the reduction of greenhouse gas emissions. GPA is publicly committed to reducing Scope 1 and 2 greenhouse gas emissions by 38% by 2030 (base year 2015).

In line with this commitment, one of our areas of focus is our logistics operation. As a food retailer, the distribution of products to supply millions of customers is the focus of our business. We constantly invest in innovation and technology to improve the service for delivering purchases to customers and the supply of our units. In this sense, as a way of contributing to the reduction of greenhouse gas emissions, initiatives have already been adopted to optimize delivery routes, with greater efficiency in the planning of routes and loads, to reduce the need for vehicle circulation and to use a more eco-efficient fleet of trucks.

In line with more sustainable mobility and with a view to reducing carbon emissions and pollutants in the delivery of orders purchased through the Pão de Açúcar e-commerce, GPA invested in the diversification of the delivery transport modes. In 2021, a project began to include sustainable modalities in orders purchased through the websites, loyalty programs apps (Pão de Açúcar Mais and Clube Extra) and Pão de Açúcar and Pão de Açúcar Fresh WhatsApp, with deliveries made by electric vans and tricycles, bicycles and on foot.

Thus, since July 2021, in the cities of São Paulo and Rio de Janeiro, some of these orders are delivered by electric vans and tricycles with a capacity of 15 to 30 deliveries per day. Initially, the neighborhoods of Jardins and surrounding areas, in São Paulo, and Leblon, in Rio de Janeiro, were served. But soon the measure was also integrated into Pão de Açúcar Fresh in the city of São Caetano do Sul.

The electric van, with a range of 300 km per recharge, replaces a conventional utility vehicle (diesel or gasoline), meeting e-commerce orders that leave the distribution center. The electric tricycles, with a range of 40km per recharge, meet the more nearby orders, made by WhatsApp and leaving the stores. Also, similar to tricycles, the bicycles and deliveries on foot serve smaller orders in the last mile modality made through websites, apps or WhatsApp, originating in stores and with routes of up to 30 minutes.

At the end of 2021, 1 electric van and 14 electric tricycles were in use, and the expectation is to expand the radius of operation and the number of vehicles throughout 2022, taking this service to other cities.

Does the Case show GHG emission level reduction?

Yes.

Has the Case been implemented?

Mitigation.

Has the Case been implemented?

Yes, it is underway.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Estimated reduction of approximately 3.2 tCO_2e in 5,026 orders delivered by the electric van and the 14 electric tricycles in part of 2021.

Impacts/results

The goal was to conclude 2021 with 10 electric vehicles in activity, but, by the end of 2021, 1 electric van and 14 electric tricycles were in use. Some results can already be seen:

- The first electric van started operating in August 2021 with the same capacity as a common utility vehicle to transport the purchases to e-commerce customers. Between August and December 2021, 4,985 km were traveled, in 89 trips for the delivery of 1,255 orders.

- Electric tricycles: The operation of the first electric tricycle began at the Pão de Açúcar Leblon store, in Rio de Janeiro, in July 2021, reaching three units by the end of the year. Pão de Açúcar Fresh, in São Caetano do Sul (SP), also adopted tricycles for the delivery of orders made by WhatsApp. In total, between July and December 2021, we fulfilled 3,771 requests in 731 trips with 14 tricycles.
- The electric van and the 14 electric tricycles, in operation for part of 2021, met 5,026 orders from GPA's e-commerce and, for these orders, the use of electric vehicles provided an estimated reduction of 89% in CO_2 equivalent emissions, corresponding to approximately 3.2 tCO_2e, when compared to conventional vehicles (diesel or gasoline) for these same deliveries. A possible expansion of this initiative is being studied, given the good results of this pilot program, contributing to our goal of reducing emissions for 2030.

In addition to facilitating access to roads and urban mobility, these sustainable modes contribute to reducing the emission of greenhouse gases and pollutants. Therefore, the initiative contributes to the pillar of combating climate change, GPA's business guideline and part of the Company's sustainability strategy.

Invested resources

The main resources invested are intended for the replacement and adaptation of vehicles for the electric mode (e.g., rental of electric vans and tricycles).

Main challenges faced

The main challenges focus on the high costs still found for electric vehicles in Brazil.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Eco-efficiency of mobility and incorporation of innovations in logistics and product distribution

Next steps

Regarding electric vehicles, the expectation is to expand the radius of operation and the number of vehicles throughout 2022 and take this service to other cities, reaching 5% of e-commerce deliveries. Logistical monitoring of deliveries makes it possible to quantify the savings and reductions in carbon emissions generated by the substitution of the modal.

Relations with the SDG (Sustainable Development Goals)

7 – Clean and affordable energy:

Ensure access to affordable, reliable, sustainable and modern energy for all.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes. The use of more sustainable modes (electric vans and tricycles, bicycles and on foot) constitutes an innovation in the business model and a technological development that, in order to carry out e-commerce deliveries, contributes to the reduction of greenhouse gas emissions and pollutants and for an improvement in urban mobility.

Other information regarded as relevant

The case is mentioned on the GPA Website and in the GPA Annual and Sustainability Report 2021, in addition to being the subject of news sites such as Exame (07/21/2021) and Yahoo (07/22/2021), and other sites and blogs, such as the Akatu site (20/07/201) and others.

Pão de Açúcar electric van.

ACORDO AMBIENTAL SÃO PAULO

tradition and innovation

Corporate Name

Guarany Indústria e Comércio Ltda

Name of the case

Guarany Saving Water Sources

Arboretum Guarany , where we have planted 49 native species threatened with extinction in Brazil.

"Guarany Saving Springs Project" Event.

Site

www.guaranyind.com.br

Corporate Email Address

roberto.munhoz@guaranyind.com.br

Type of Organization

Limited Liability Company.

Economic activities (based on CNAE - National classification of economic activities)

Plastic injection and blow moulding.

Theme

Reduction of direct emissions, scope 1 (cf. Greenhouse Gases Protocol (GHG Protocol) organization's own facilities, own transport), Biodiversity, conservation, forest asset management, land use, Carbon capture and storage, emissions offset.

Case description

Background: Arboretum Project: In 1999, the company carried out a reforestation project with endangered native species on the land adjacent to its factory. In an area of approximately 9,500 m², more than 5,400 trees of 49 different species were planted.

Guarany Saving Springs Project: In 2019, Guarany established a partnership with the city of Itu and its Municipal Department of Environment and Water Resources through the "Guarany Saving Springs Sources" project. The project provided for the reforestation of permanent preservation areas (PPA), aiming at the recovery of some of the 157 sources of the Itaim river basin, responsible for 20% of the city's water supply. The initiative resulted from the serious water supply problems in previous years.

The main objective of the project is the restoration of the vegetation cover of the springs, since 68% of these springs are without forest protection, in an area where a semi-deciduous seasonal forest predominates, constituting a vegetation belonging to the Atlantic Forest biome (Inland Atlantic Forest). The secondary objective is to reduce soil silting and the maintenance of the springs, in order to preserve groundwater.

Currently, the project has four reforestations, which together with the other vegetation capture a total of 2,246.3t of CO_2e, a value achieved through non-destructible measurements and specific biomass calculations, based on the relative density of the trees.

Reforestations are periodically monitored to ensure the establishment of vegetation over the years and to enable their ecosystems functionality. Eight more reforestations are planned, with 1 planting per year until 2030, with an average of 800 trees per planting.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Mitigation, Sequestration, Social and Environmental Responsibility

Has the Case been implemented?

Yes, it has been implemented and its benefits remain.

What is the forecast of continuity of the Case?

5 to 10 years.

Is the case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The project does not reduce emissions, however, with the plantings, 2,246.3t of CO_2e was sequestered, with an estimate of 2,654.3 tons in terms of CO_2e by 2030.

Impacts/results

The project has had a positive impact on the environment, with the capture of GHGs and the consequent reduction of atmospheric pollution.

The industrial CO_2e emissions, considering the current scenario in which there are no changes in the volume of these emissions, will on balance be reduced according to projections for the year 2030. However, a set of guidelines is proposed by the company, with the aim of further reducing emissions while remaining a model company of "Low Carbon for Industry".

Invested resources

Qualified professionals have been hired to prepare the company's GHG inventory, and train Guarany employees to carry out future updates on the inventory and implementation of actions.

Implementation and maintenance of reforestation, with a cost of approximately BRL 25,000.00 per group planting.

Main challenges faced

Theme studies/methods of calculation; implementation and verification; and infrastructure for project management.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Access to carbon credits.

Bank Financing.

Access to bids and tenders.

Next steps

To carry out a group planting per year; periodic monitoring; continuation of reforestation projects.

Relations with the SDG (Sustainable Development Goals)

6 – Drinking water and sanitation (for all).

13 – Action against global climate change:

Take urgent measures to combat climate change and its impacts.

15 – Terrestrial life:

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and halt and reverse land degradation and halt biodiversity loss.

Does the Case contribute to technological development and/or to the business model?

No.

Other information regarded as relevant

Guarany is a Brazilian Family-owned company founded in 1923. Located in Itu, State of São Paulo. It has a subsidiary in Jalapa, Veracruz, Mexico. It exports on regular basis to more than 85 countries in 5 continents, being established in the international market as one of the most renowned manufacturers of agricultural machinery for plant protection and plant nutrition. It also has two highly specialised divisions: Environmental Health producing WHO certified equipment for vector control; Forest Fires: producing a full package of fire-fighting equipment. Guarany is a member of two international committees: FAO-ISO and GDCPP of WHO, both created to define application guidelines and products specification, aiming at the safety of operators and the environment.

In the eighties,engaged in an environmental agenda for many years, an environmental policy for Guarany was designed, based upon 3 principles: to create awareness, to educate and provide good examples. Since then, many actions/projects have been implemented regularly, involving our collaborators.

As a result, Guarany has developed a solid culture in this respect. Two main projects are worth mentioning:

Arboretum - The reforestation of an area of 9,500 m2 with 49 native species in 1999, to maintain "in situ" genetic bank of endangered species.

Saving springs Project - designed jointly with the municipality of Itu, with the purpose of reforesting the adjacent areas to springs.

Guarany industrial facility in Itu.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

National Institute Of Empty Packaging Processing – (INPEV)

Name of the case

Campo Limpo Environmental Educational Program (PEA)

Students using the material from the PEA kit: The Planet's Guardians Game – 2017 Edition The School at the Waste Challenge.

Site

https://inpev.org.br/index

Corporate Email Address

informativo@inpev.org.br

Type of Organization

Association.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forest production, fishing and aquaculture;

Activities of employer and employee associative organizations.

Theme

Communication, engagement of interested parties and dissemination of good practices.

Case description

Objective

The PEA System was created in 2010 for the purpose of supporting educational institutions by complementing their syllabus contents concerning the environment. Its overall purposes are to develop awareness among 4th and 5th grade elementary school teachers and students regarding the shared responsibilities of the various players in society involving the sustainable management of empty packaging and other solid residue, and sponsor behavioral changes and a protagonist role of these students with respect to the adoption of mindful consumption practices that contribute towards the non-generation, reduction, reuse, recycling and treatment of solid residue, as well as the environmentally friendly final disposal of waste.

Background Information:

Since its creation, more than 1.9 million students have already concluded this program, and every year more than 2,500 schools (400 in the state of São Paulo) implement these kits, which consist of a teacher's manual, interactive posters, games and individual materials.

Pilot Project in the city of São Paulo:

In 2019, a pilot project was started to implement PEA in municipal schools in the São Paulo capital by means of 13 Regional Boards of Education, with over 600 teachers of the network trained, which allowed the program to be implemented in 500 municipal schools.

PEA 2021

In the 2021 edition, amongst the challenges imposed by the Covid-19 pandemic, the proposal was to offer a series of contents to teachers and students that would meet in-class and remote learning needs. The Circular Economy concept continues to be addressed in the material, which is now hybrid: physical kits are made available, besides on-line activities and games, plus the distance learning (EAD) for teacher training.

Learn more about this program and its materials:

https://www.youtube.com/watch?v=_roQg3rSO1k

http://inpevcampolimpo.org.br/

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Social-Environmental Responsibility.

Has the Case been implemented?

Yes. It has been implemented and its benefits are ongoing.

What is the forecast of continuity of the Case?

The Program is carried out every year, without any expected termination date.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

The PEA kits are distributed annually to public (municipal and state-level) and private schools that are part of the relationship network of the Campo Limpo System central stations across the country, and since its establishment more than 1 million students have already been benefited by the program. More than 400 schools participate in this program in the state of São Paulo.

Invested resources

- 10,000 kits are distributed annually across Brazil.
- 2,400 kits are distributed annually in the state of São Paulo.

Main challenges faced

Financial resources to print the PEA kits.

Partnership with the boards of education to promote PEA.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Partnerships with institutions such as the São Paulo Secretary of Education and companies participating in the SP Agreement to disseminate the PEA, as well as activities to expand the program throughout the state (state and municipal network).

Next steps

PEA implementation in 60% of the São Paulo municipal network in 2021.

Relations with the SDG (Sustainable Development Goals)

4 – Quality Education:

Ensure inclusive and equal quality education, and promote learning opportunities throughout life for all;

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption standards;

17 – Partnerships and Means of Implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes.

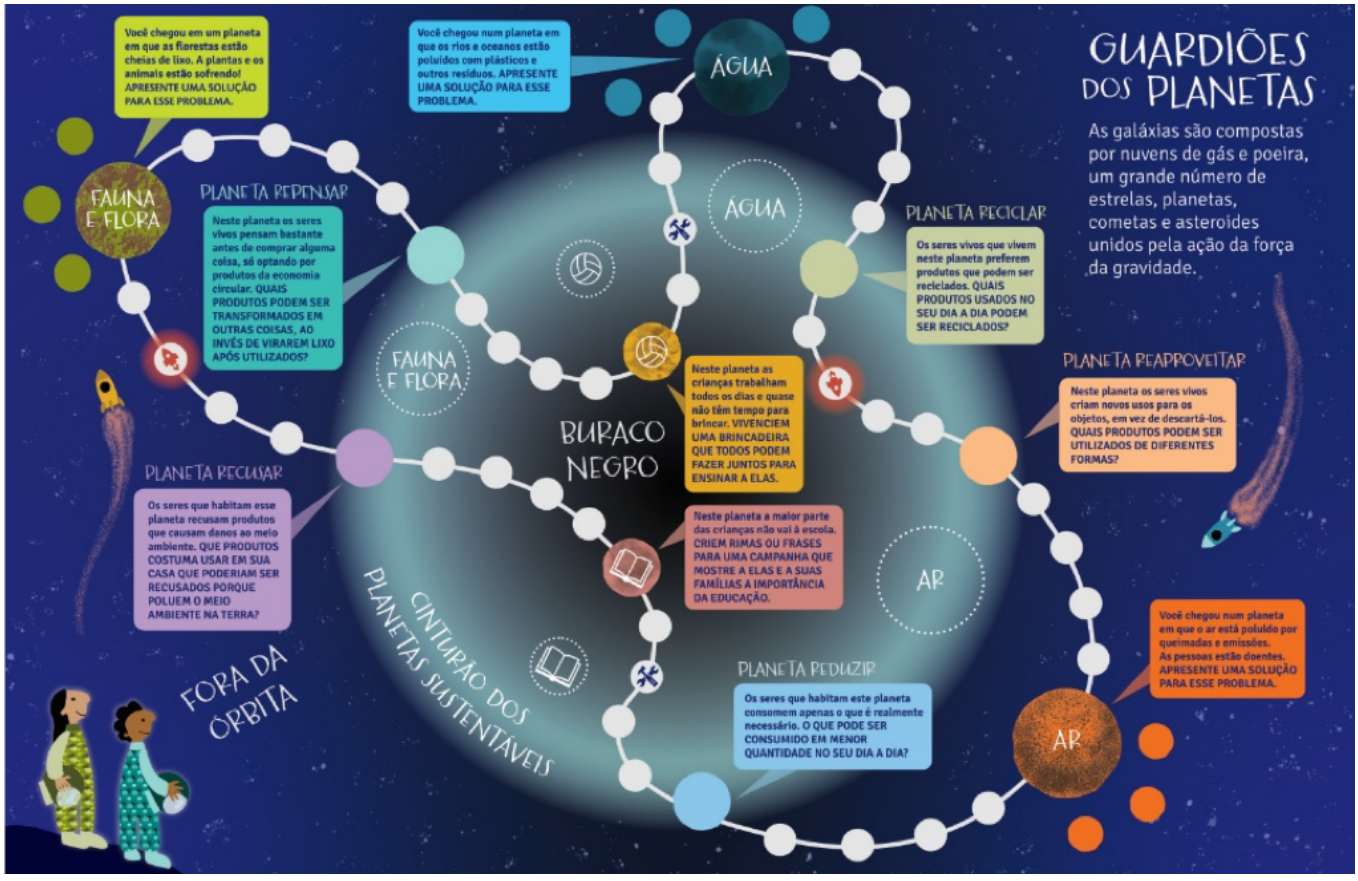
Other information regarded as relevant

More information about the program:

PEA 2021: **https://youtu.be/_roQg3rSO1k**

PEA archives and activities site: **http://inpevcampolimpo.org.br/**

2021 PEA Webinar: **https://youtu.be/ryh7a6pYglk**



The Guardians of the Planets Game Board – 2020 Edition On the way to the Circular Economy.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

National Institute of Empty Packaging Processing (INPEV)

Name of the case

Campo Limpo System Eco-efficiency Study

Picture of the Campo Limpo System.

Site

https://inpev.org.br/indexMarilene Iamauti

Corporate Email Address

informativo@inpev.org.br

Type of Organization

Association.

Economic activities (based on CNAE - National classification of economic activities)

Activities of employer and employee associative organizations.

Theme

Avoided emissions (substitution of fuels and transportation modals, innovations in products and services, etc.).

Case description

In conjunction with the Espaço Eco Foundation, since 2002 inpEV has conducted a study to assess the environmental and economic impacts (AEE®) of the Campo Limpo System. This study compares a hypothetical situation of a non-existent Brazilian receiving and disposal system for crop protection chemicals.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Avoided Emissions.

Has the Case been implemented?

Yes, It has been implemented and its benefits are ongoing.

What is the forecast of continuity of the Case?

Continuous.

Is the Case likely to expand??

Not likely.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

For the case of the Campo Limpo System (SCL), the study makes a hypothetical comparison between the existence and absence of the system. In this situation, the existence of the SCL avoided 70,505 tons of CO_2e from being emitted during the year of 2020.

The avoided emissions value depends on the amount of packaging that is returned by farmers.

Impacts/results

Between 2002 and 2020: (accumulated data referring to and considering the volume of packaging received by the Campo Limpo System).

- Savings of 36 billion mega Joules, enough to supply 5.2 million homes for a whole year;
- 823,000 tons of avoided CO_2e or 1.8 million barrels of crude oil avoided or the equivalent to that captured by 6.0 million planted trees.

This study is revised every four years. In 2018, its methodology was revised, and the water category was added. Only the savings for 2019 (55,290,000 liters) and 2020 (79,950,000 liters) have been reported.

Invested resources

inpEV's actions are funded by member companies. Costs include items such as the Institute's infrastructure and some receiving units, activities include logistics, final disposal, communication and education, legal counseling, technological development and sustainability projects.

In the Campo Limpo System, the largest costs inpEV faces are directly related to the logistic operation of transportation and packaging disposal. Under the governance of shared responsibilities established by law, the other stakeholders involved in the system - such as farmers, distribution channels and the public power - bear the costs of the phases for which they are responsible.

More than BRL 1.4 billion invested by the manufacturing industry since inpEV's foundation.

To learn more, please visit: https://inpev.org.br/sistema-campo-limpo/financiamento-sistema/

Main challenges faced

There are no challenges specifically concerning this study. The challenges of the Campo Limpo System are to reduce the material sent to incineration. Currently 93% of the packaging is recycled and 7% incinerated, e.g. flexible packaging that is incinerated.

Suggestions to improve the business environment (regulations, licensing, access to credit)

In the realm of business, since the study has been conducted for the past 19 years, all the processes are already aligned so that the data is collected and the study is done on an annual basis.

Next steps

Every year, the eco-efficiency study is carried out considering the post-consumption crop protection packaging received by the Campo Limpo System. The Espaço Eco Foundation determines the energy, CO_2 and water savings that are made possible due to the existence of the Campo Limpo System

Relations with the SDG (Sustainable Development Goals)

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption standards.

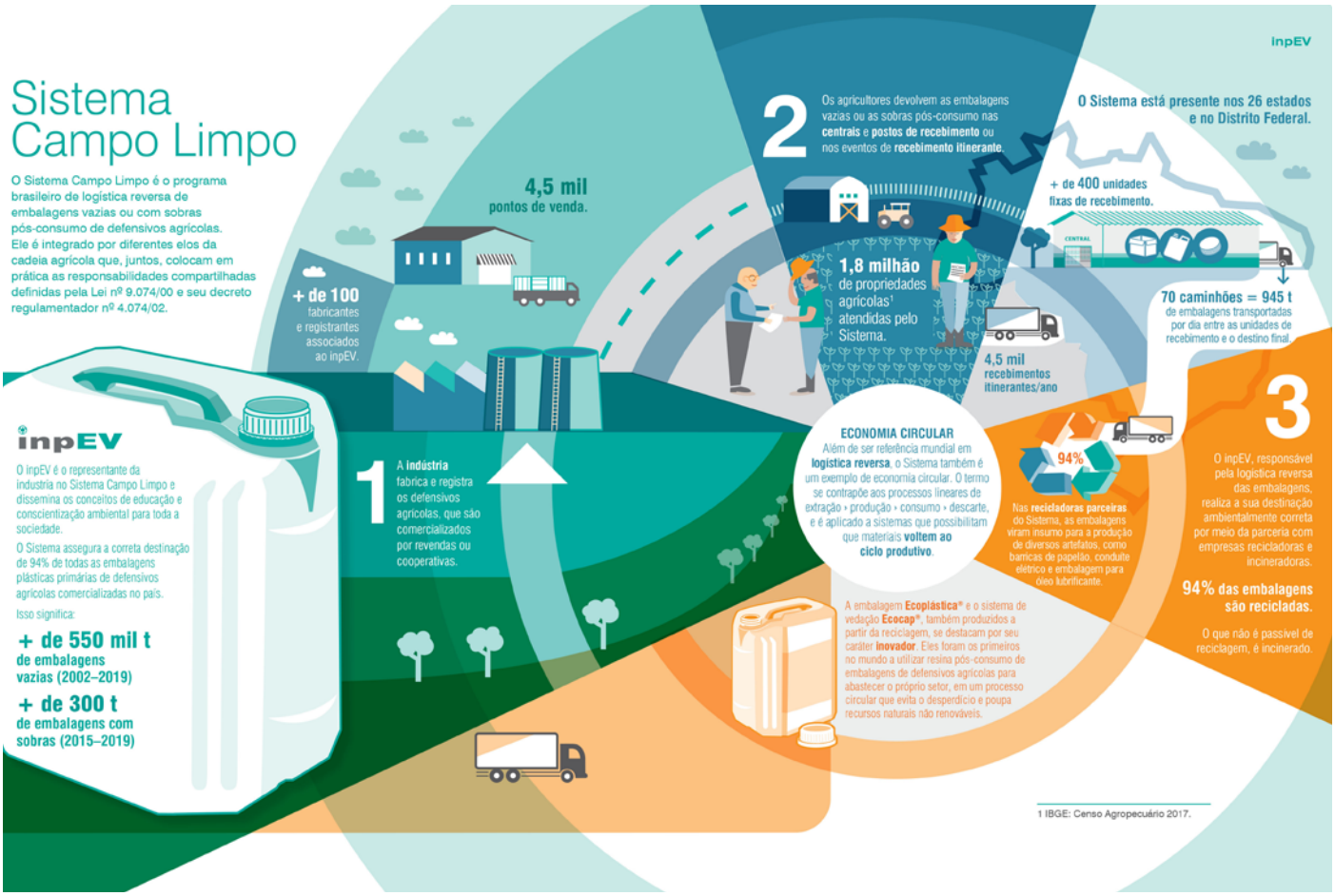
Does the Case contribute to technological development and/or to the business model?

This case is an example of Reverse logistics and Circular Economy.

Other information regarded as relevant

Further information on the 2020 Eco-Efficiency Study at:

https://inpev.org.br/saiba-mais/informativo-in-pev-virtual/91/em-movimento.html



Infographic explaining the Campo Limpo System.

ACORDO AMBIENTAL SÃO PAULO

inpEV

Corporate Name

National Institute for Processing Empty Packages (INPEV)

Name of the case

Improvement of the Campo Limpo System energy mix, with the implementation of photovoltaic power generation system

Empty Packaging Receiving Station in Guariba - SP with the installation of the photovoltaic solar power system on the roof.

Site

www.inpev.org.br

Corporate Email Address

informativo@inpev.org.br

Type of Organization

Association.

Economic activities (based on CNAE - National classification of economic activities)

Activities of employer and employee associative organizations.

Theme

Reduction of indirect emissions, scope 2 (according to Greenhouse Gases Protocol (GHG Protocol) acquired electric energy, steam, heating/cooling acquired for self-use).

Case description

The Campo Limpo System is the Brazilian reverse logistics program of empty crop protection packaging in which the National Institute for Processing Empty Packages (INPEV) acts as its managing entity. This System covers the entire country and has as its basis the concept of shared responsibilities: farmers, industry, distribution channels, and government have specific roles and responsibilities in the workflow of the program, defined by law.

The System counts on more than 400 empty packaging receiving stations, located in 26 States and in the Federal District. The state of São Paulo has 65 units.

In November of 2021, with the purpose of self- sustainability of the Campo Limpo System and of reducing greenhouse gas emissions by means of renewable energy generation and clean energy use, INPEV installed a photovoltaic power generation system on the roof of one of its empty crop protection packaging central stations, located in the city of Guariba, in São Paulo. This plant operates under the shared distributed generation mode, counts on an installed capacity of 25,93 kilowatts peak (kWp) and supplies the Guariba central station and four other receiving stations located in the state (Araçatuba, Araraquara, Ituverava, and São José do Rio Preto).

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Social-environmental responsibility.

Has the Case been implemented?

Yes, it has been implemented.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The photovoltaic system started operating in March of 2022. Until September of 2022 the solar system generated 9,245 kWh, which is equivalent to 768 kg of avoided CO_2.

Impacts/results

Contribution to mindful consumption of natural resources, generation and consumption of energy and generates energy shared with receiving stations located along the same energy concessionaire.

Invested resources

Human resources from the Projects and Operational area of INPEV, which developed the project, and investments in equipment of the photovoltaic solar generation system, approximately amounting to BRL 78,000.00.

Main challenges faced

Finding a balance between technological, financial, and operational parameters.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Regulatory improvement to create fiscal benefits that encourage the implementation of distributed generation.

Next steps

Expand the initiative to other receiving stations of the Campo Limpo System in other states and monitor energy generation to account for carbon reductions.

Relations with the SDG (Sustainable Development Goals)

7 – Clean and accessible energy:

Ensure access to accessible, reliable, sustainable and modern energy for all.

13 – Action against global climate change:

Take urgent measures to fight climate changes and their impacts.

Does the Case contribute to technological development and/or to the business model?

No

Other information regarded as relevant

With the installation of the photovoltaic solar power system, the Guariba-SP unit significantly reduces its dependence on the consumption of electric energy supplied by the concessionaire.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Leroy Merlin Companhia Brasileira de Bricolagem

Name of the case

Compensation of GHG Emissions Generated in the New Stores Constructions

Carbon Free: Compensation of GHG emissions generated during the construction of our 11 stores.

Site

https://www.leroymerlin.com.br/

Corporate Email Address

sustentabilidade@leroymerlin.com.br

Type of Organization

Public limited company / privately held.

Economic activities (based on CNAE - National classification of economic activities)

Retail.

Theme

GHG Emissions Compensation.

Case description

In order to compensate the greenhouse gas (GHG) emissions generated by the construction of 11 stores, Leroy Merlin Brazil voluntarily planted more than 100 thousand trees in partnership with the Iniciativa Verde, a non-profit organization focused on forest landscape restoration.

The tree planting programme was implemented between 2011 and 2015 and compensates GHG emissions generated by the construction of Leroy Merlin stores in Taguatinga, Campinas Dom Pedro, Sorocaba, São Leopoldo, Londrina, Curitiba Atuba, São José do Rio Preto, Fortaleza, Jaguaré, Tamboré and São Bernardo do Campo. In total, 19,019 tCO_2e were neutralized.

In addition to carbon compensation, planting these trees generated several other benefits. More than 96% of the planting was implemented in areas of the Atlantic Forest, generating the restoration of 600,000 m² of this biome, which was the most affected by the occupation of the Brazilian territory - currently only 17% of its original area remains.

Furthermore, most of the plantings were implemented in watershed areas that supply the city of São Paulo, which has been deeply affected by the water crisis in recent years - São Paulo and the Metropolitan Region concentrate 12 of the 44 Leroy Merlin stores distributed throughout Brazil.

The carbon stock potential of the areas was defined according to the information provided by the "Third Brazilian Inventory of Anthropogenic Greenhouse Gas Emissions and Removals". The methodologies adopted by the National Inventory are in line with those presented in the "Good Practice Guidance for Land Use, Land-Use Change and Forestry" of the Intergovernmental Panel on Climate Change (IPCC).

For each restoration area, a diagnosis and an executive project were prepared, based on the specificities of each project and rural property involved. Appropriate techniques for local conditions were used, including the planting of native species of regional occurrence, nucleation, conduction and/or induction of natural regeneration, enrichment planting and agroforestry systems, aiming to maximize environmental and social gains.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Compensation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

LIkely.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

Yes.

Impacts/results

In addition to carbon compensation, more than 96% of the planting was implemented in areas of the Atlantic Forest, generating the restoration of 600,000 m² of this biome, which was the most affected by the occupation of the Brazilian territory - currently only 17% of its original area remains.

Invested resources

BRL 1.48 million.

Next steps

In addition to the emissions generated in the construction of new stores since 2021, Leroy Merlin Brazil will compensate the retroactive emissions generated in the construction of another 33 Stores and 2 Distribution Centers until 2030.

Relations with the SDG (Sustainable Development Goals)

13 – Climate Action:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Leroy Merlin Companhia Brasileira de Bricolagem

Name of the case

Forest Week

Forest Week: For each customer who purchased a product with an FSC label, we planted 1 tree.

Site

https://www.leroymerlin.com.br/

Corporate Email Address

sustentabilidade@leroymerlin.com.br

Type of Organization

Public limited company / privately held.

Economic activities (based on CNAE - National classification of economic activities)

Retail.

Theme

Neutralization of GHG Emissions and Social and Environmental Responsibility.

Case description

From September 21 to 27, 2019, we held the Forest Week, in partnership with the FSC, the Forest Stewardship Council, a non-governmental organization (NGO) created to promote responsible forest management around the world, and Iniciativa Verde, a non-profit organization focused on forest landscape restoration, to talk about conscious consumption and how we can help combat illegal deforestation of our forests. During these 7 days, in addition to promoting all products with the FSC labels at the 42 Leroy Merlin Stores in Brazil, for each Customer who purchased a FSC's product, we planted 1 tree in the Amazon forest. In total, more than 4,000 trees were planted in a protected area, corresponding to 2.8 hectares (28,000 m²). With this action we neutralize 800 tCO_2eq. With our support and other partners, 36 hectares of agroforestry systems have already been implemented in three municipalities in the state of Pará – Pacajá, Anapu and Senador José Porfírio – which appeared in the list of the ten Brazilian cities with the highest number of deforestation alerts in July 2019. Data is from the National Institute for Space Research (Inpe).The initiative also benefited 29 families, who received technical assistance, inputs and equipment for the implementation of agroforestry systems (SAFs), such as: seedlings, limestone, fertilizer, according to the species/stage of the specimens, and mowers to help with cleaning and maintenance of SAFs.The technical visits carried out were also intended for planning irrigation systems, which will be implemented in these areas, with financial support from the farmer, and for monitoring the operational practices carried out by the farmers involved.

The project was implemented in a partnership between Iniciativa Verde and Ipam - Amazon Environmental Research Institute with resources from several private companies, through the voluntary programs of the Iniciativa Verde and Carbon Free.

The carbon stock potential of the areas was defined according to the information provided by the "Third Brazilian Inventory of Anthropogenic Greenhouse Gas Emissions and Removals". The methodologies adopted by the National Inventory are in line with those presented in the "Good Practice Guidance for Land Use, Land-Use Change and Forestry" of the Intergovernmental Panel on Climate Change (IPCC).

For each restoration area, a diagnosis and an executive project were prepared, based on the specificities of each project and rural property involved. Appropriate techniques for local conditions were used, including the planting of native species of regional occurrence, nucleation, conduction and/or induction of natural regeneration, enrichment planting and agroforestry systems, aiming to maximize environmental and social gains.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

GHG Emissions Neutralization.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

Yes.

Impacts/results

In total, more than 4,000 trees were planted in a protected area, corresponding to 2.8 hectares (28,000 m²). With this action we neutralize 800 tCO_2e. With our support and other partners, 36 hectares of agroforestry systems have already been implemented in three municipalities in the state of Pará – Pacajá, Anapu and Senador José Porfírio – which appeared in the list of the ten Brazilian cities with the highest number of deforestation alerts in July 2019. Data is from the National Institute for Space Research (Inpe).The initiative also benefited 29 families, who received technical assistance, inputs and equipment for the implementation of agroforestry systems (SAFs), such as: seedlings, limestone, fertilizer, according to the species/stage of the specimens, and mowers to help with cleaning and maintenance of SAFs.

Invested resources

BRL 70,000.00.

Main challenges faced

COVID-19 Pandemic.

Next steps

In 2021, another edition of the Forest Week will be held, which became part of our annual calendar of Responsible Development actions.The expectation is to plant more than 8,000 trees in the 2021 edition.

Relations with the SDG (Sustainable Development Goals)

2 – Zero Hunger:

End hunger, achieve food security and improved nutrition and promote sustainable agriculture;

12 – Responsible Consumption and Production:

To ensure sustainable consumption and production patterns;

13 – Climate Action:

To take urgent action to combat climate change and its impacts;

15 – Life on Land:

To protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

Does the Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Leroy Merlin Companhia Brasileira de Bricolagem

Name of the case

HQE-AQUA Certification: Use and Operation

HQE/AQUA Certification: Use and Operation.

Site

https://www.leroymerlin.com.br/

Corporate Email Address

sustentabilidade@leroymerlin.com.br

Type of Organization

Public limited company / privately held.

Economic activities (based on CNAE - National classification of economic activities)

Retail.

Theme

Reduction of direct emissions, scope 1 (according to Grenhouses Gases (GHG) Protocol – organization's own facilities, own transport).

Reduction of indirect emissions, scope 2 (according to GHG Protocol - purchased electricity, steam, heating/cooling purchased for own use), water resources and water efficiency.

Case description

Leroy Merlin Brazil is pioneer in the country to implement the AQUA Certification - High Environmental Quality. Today, there are already 25 units with valid certificates and, by December 2021, 44. The first certified AQUA-HQE store was Niterói, in 2009, being the first retailer in Brazil to achieve this certification.

AQUA-HQE is an international sustainable construction certification, developed from the French Démarche HQE (Haute Qualité Environnementale) certification and certificated in Brazil exclusively by the Vanzolini Foundation, a non-profit organization created and managed by professors from the Production Engineering department of the University of São Paulo (Poli-USP), to improve the effectiveness of the sustainable development process in Brazil.

The certificate is awarded to companies that stand out in 14 categories: Category 1 - Building and its surroundings; Category 2 - Construction products, systems and processes; Category 3 - Construction site; Category 5 - Water; Category 6 – Waste; Category 7 - Conservation and Maintenance; Category 4 – Energy; Comfort: Category 8 – Hygrothermal comfort; Category 9 – Acoustic Comfort; Category 10 – Visual Comfort; Category 11 – Olfactory Comfort; Health: Category 12 – Quality of Spaces; Category 13 – Air Quality. Category 14 – Water Quality.

Among the main categories, LEROY MERLIN stands out in Maintenance, Water and Energy, thanks to the construction process of its units. The consumption of water and energy, for example, is monitored periodically, enabling the identification of possible abnormalities in consumption.

In the last 3 years, the company has saved more than 3 million kilowatt hours of energy, avoiding the emission of more than 3 thousand tons of CO_2e into the atmosphere, considering the Brazilian energy mix (SIN). The efficiency of certified units can be proven by comparing the consumption of certified units with non-certified units.

In 2020 alone, certified stores consumed 7,853m³ of drinking water less than non-certified stores, in absolute values.

In 2019, Leroy Merlin once again innovated in its certification process, being the first company in Brazil to obtain certification for the Sustainable Management Axis, in the Mutualized methodology. In this methodology, certification takes place when a group of units apply for certification together. Therefore, the document audit is carried out in all units. The face-to-face ones are carried out by sampling and the results are replicated to all other units.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Social and Environmental Responsibility.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

5 to 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

In the last 3 years, the company has saved more than 3 million kilowatt hours of energy, avoiding the emission of more than 3 thousand tons of CO_2e into the atmosphere.

Impacts/results

In the last 3 years, the company has saved more than 3 million kilowatt hours of energy, avoiding the emission of more than 3 thousand tons of CO_2e into the atmosphere. The efficiency of certified units can be proven by comparing the consumption of certified units with non-certified units.

Invested resources

BRL 726,790.31.

Next steps

Leroy Merlin Brazil a pioneer in the country to implement the AQUA Certification - High Environmental Quality. Today, there are already 25 units with valid certificates and, by December 2021, 44.

Relations with the SDG (Sustainable Development Goals)

6 – Clean water and sanitation:

To ensure availability and sustainable management of water and sanitation for all;

7 – Affordable and Clean Energy:

To ensure access to affordable, reliable, sustainable and modern energy for all;

11 – Sustainable Cities and Communities:

To make cities and human settlements inclusive, safe, resilient and sustainable;

12 – Responsible Consumption and Production:

To ensure sustainable consumption and production patterns;

13 – Climate Action:

To take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes.

Other information regarded as relevant

In 2019, Leroy Merlin once again innovated in its certification process, being the first company in Brazil to obtain certification for the Sustainable Management Axis, in the Mutualized methodology. In this methodology, certification takes place when a group of units apply for certification together. Therefore, the document audit is carried out in all units. The face-to-face ones are carried out by sampling and the results are replicated to all other units.

EMPREENDEDR AQUA:
LEROY MERLIN COMPANHIA BRASILEIRA DE BRICOLAGEM

ESCOPO
LOJAS E MATRIZ EM OPERAÇÃO NO BRASIL
EIXO GESTÃO SUSTENTÁVEL

ENDEREÇO
RUA DOMINGAS GALLETERI BLOTTA, 315, JARDIM CONSÓRCIO - SÃO PAULO, SÃO PAULO - BRASIL

CICLO: **OPERAÇÃO** | **EIXO: GESTÃO SUSTENTÁVEL**

FASES: **ADMISSÃO** | **CICLO DE 5 ANOS**

Referencial Técnico de Certificação AQUA-HQE™

Edifícios Não Residenciais em Construção - Versão de 2016

N.º **AQUA-EMP-0005**

Emissão: **12/02/2021 (R01)** | Validade: **08/10/2024**

CERTIFICADO EMPREENDEDOR AQUA

LOJAS E MATRIZ EM OPERAÇÃO NO BRASIL - EIXO GESTÃO SUSTENTÁVEL

A Fundação Vanzolini atesta que o empreendedor aqui identificado foi avaliado em conformidade com o Referencial Técnico de Certificação AQUA-HQE™ para Edifícios em Operação - Eixo Gestão Sustentável no ciclo e na fase definidos neste certificado.

Atesta também que o empreendedor mantém um Sistema de Gestão de Empreendimentos aplicado a todos os empreendimentos abrangidos pelo escopo aqui definido de forma mutualizada, além de que se compromete a obter a certificação AQUA-HQE aos mesmos. As unidades incluídas neste certificado são: Leroy Merlin Campo Grande, Leroy Merlin Fortaleza, Leroy Merlin Interlagos, Leroy Merlin Jaguaré, Leroy Merlin Matriz, Leroy Merlin São Bernardo do Campo, Leroy Merlin Sorocaba, Leroy Merlin Taguatinga, Leroy Merlin Uberlândia, Leroy Merlin Londrina, Leroy Merlin Anhanguera, Leroy Merlin Niterói, Leroy Merlin Maceió, Leroy Merlin Porto Alegre, Leroy Merlin Curitiba Atuba, Leroy Merlin BH Norte, Leroy Merlin Jacarepaguá, Leroy Merlin BH Sul, Leroy Merlin S. J. R. Preto, Leroy Merlin Contagem, Leroy Merlin São Leopoldo e Leroy Merlin São José.

O empreendedor está, portanto, autorizado a utilizar a marca Empreendedor AQUA associada aos empreendimentos do escopo descrito.

Salvo revogação, suspensão ou modificação, este certificado é válido para o ciclo, fase e período detalhados.

Prof. Dr. José Joaquim do Amaral Ferreira
Diretor de Certificação

Processo AQUA
CONSTRUÇÃO SUSTENTÁVEL

Fundação Vanzolini
www.vanzolini.org.br
Tel.: + 55 11 3836 6566

HQE/AQUA Certification: Use and Operation.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Leroy Merlin Companhia Brasileira de Bricolagem

Name of the case

Postera Project

Postera Project: reverse logistics of uniforms and PPE.

Site

https://www.leroymerlin.com.br/

Corporate Email Address

sustentabilidade@leroymerlin.com.br

Type of Organization

Public limited company / privately held.

Economic activities (based on CNAE - National classification of economic activities)

Retail.

Theme

Reduction of indirect emissions, scope 3 (according to the Greenhouse Gases (GHG) Protocol - purchased goods and services, capital goods, fuel, transport and distribution, waste, business travel, etc.); Avoided emissions (authorization of rights and modes of transport, innovations in products and services, etc.).

Case description

The Postera Project aims to incorporate circularity in the disposal process of our uniforms, ensuring the reinsertion of the raw material generated in the process of de-characterization (defibration) of the pieces in other production chains, as well as their transformation into popular blankets, which are donated to partner institutions.

Disused uniforms are sent to the company's Distribution Center, where they are collected, and, in partnership with Retalhar, a social and environmental impact company, part of the items are transformed into blankets and donated to institutions social. The rest is reinserted as raw material in other production chains.

In 2020, the project also began to address the responsible disposal of personal protective equipment (PPE), which are intended for co-processing and energy use.

Until June 2021, Leroy Merlin Brazil destined 34.3 tons of uniforms and PPE, equivalent to approximately 94 thousand pieces. In total, avoiding the emission of more than 480 tCO_2e, that is, an average of 96tCO_2e per year, and the use of 244 m^3 of landfill.

According to Chavan, RB (2014), in an article published by the Journal of Textile Science & Engineering and entitled "Environmental Sustainability through Textile Recycling", the recycling of a ton of fabric, composed of 58% polyester and 42% cotton, prevents the generation of 14.7 tons of greenhouse gases, considering the emissions generated in the production process, since it is considered that, ultimately, the reintroduction of the material in the production chain eliminates the need for a new material production cycle.

Considering that the annual amount of treated waste remains stable and there are no changes in the alternatives adopted and their proportions (reuse, recycling and co-processing), a potential for preventing emissions of around 750 tCO_2e by 2025 is expected.

Since its creation, nearly 2,000 blankets have been produced and distributed to 29 institutions in six Brazilian states. In 2021, having donated 3,000 blankets to 18 social institutions in seven states and DF.

The manufacturing process of the blankets includes the removal of the trims from the uniforms, carried out by an inclusive labor force. The fabric is then crushed, shredded and blended with post-industrial recycled polyester threads to then be transformed into blankets. Approximately 1 ton of uniforms were used to manufacture the 3000 blankets distributed by Leroy Merlin in 2021.

Thus, in addition to brand safety, the Project reduces environmental impacts and generates social benefits and economic development, being fully aligned with the Responsible Development Objectives.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Social and Environmental Responsibility.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

5 to 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Considering that the annual amount of treated waste remains stable and there are no changes in the alternatives adopted and their proportions (reusing, recycling and co-processing), a potential for preventing emissions of around 750 tCO_2e by 2025 is expected.

Impacts/results

Until June 2021, Leroy Merlin Brazil destined 34.3 tons of uniforms and PPE, equivalent to approximately 94 thousand pieces. In total, we avoided the emission of more than 480 tCO_2e, that is, an average of 96tCO_2e per year, and the use of 244 m^3 of landfill.

Considering that the annual amount of treated waste remains stable and there are no changes in the alternatives adopted and their proportions (reuse, recycling and co-processing), a potential for preventing emissions of around 750 tCO_2e by 2025 is expected.

Since its creation, nearly 2,000 blankets have been produced and distributed to 29 institutions in six Brazilian states. In 2021, we donated 3,000 blankets to 18 social institutions in seven states and DF.

Invested resources

BRL 497,257.98.

Next steps

We plan to apply circularity in the design and production stages and to devolopment the LCA of our uniforms.

Relations with the SDG (Sustainable Development Goals)

8 – Decent Work and Economic Growth:

To promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

9 – Industry, Innovation and Infraestructure:

To build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

12 – Responsible Consumption and Production:

To ensure sustainable consumption and production patterns.

13 – Climate Action:

To take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes.

Postera Project: reverse logistics of uniforms and PPE.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Logum Logística S/A

Name of the case

Using Pipeline system to transport Ethanol with a significant reduction in carbon emissions

Logum Terminal of Guarulhos.

Logum Terminal of Uberaba.

Site

http://www.logum.com.br/

Corporate Email Address

sms@logum.com.br

Type of Organization

Private Limited Company.

Economic activities (based on CNAE - National classification of economic activities)

Transport, storage.

Theme

Reduction of direct emissions, scope 1 (according to the Greenhouse Gases Program (GHG Protocol), which includes the organization's own facilities, own transport)

Avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.)

Organizational innovations and business models

Case description

Modal shift from Roads to Pipeline for the Ethanol transport from production Mills to distribution centers in metropolitan regions.

Using Pipeline Modal brings great reductions in greenhouse gases emissions, reducing truck traffic flow and accident rates as well.

In additional, there are improvements in community health due to reductions in black carbon emissions, especially in São Paulo city and metropolitan area.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it was. It is being expanded and its benefits continues to go on.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

From 2013 to 2020 - 432,700 tons of CO_2;

2020-year - 68,000 tons of CO_2.

Forecast of annual reductions:

2021 - 106,000 tons of CO_2;

2025 - 220,170 tons of CO_2;

2030 - 225,890 tons of CO_2.

Impacts/results

Reduction of greenhouse gas emissions (e.g. Carbon emissions) due to the transport modal shift.

Reduction of trucks on highways and urban areas.

Reduction of Logistical Costs for Transportation.

Reduction in the number of road accidents in Ethanol transport.

Reduction of black carbon smoke emissions from Ethanol transport trucks.

Invested resources

Construction of a pipeline system for Ethanol transportation. There are Terminals to receive and store, pipelines for transportation and delivery at the distribution centers.

Investment of BRL 2 billion at the current infrastructure and an additional of BRL 1 billion in progress.

Main challenges faced

Pursuing an integrated logistics chain and committing all the actors involved to maximize the assets already available.

Changing the current transport matrix, increasing the large-scale modal share in long distances.

Getting all the authorizations, such as environmental license, for the construction and operation of the pipeline system.

Large-scale modal infrastructures, considered as public utility for its implementation, should have their use encouraged to generate benefits to the communities, such as reducing truck traffic flow, accident rates and black carbon smoke.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Logum would like to suggest discussions on public policies about regulatory and license procedures in order to improve environmental enterprises,

For example, Logum's case, despite its great CO_2 emissions reductions, it continues to fall under the same regulatory and licensing procedures as any other business with impacting emissions.

The distinction in licensing processes for enterprises that have a social interest or public utility in their business could bring agility and cost reduction, which would revert in support for the development of this kind of activity that directly and indirectly helps the environment.

Tax incentives could be part of this discussions to incentivize the business sector.

Developments of a Credit Generation Program could provide a favorable business environment for infrastructure investments, such as Renovabio (federal government - Brazil), RFS (federal government - United States) and LCFS (State government – California/USA).

Increasing the participation of large-scale modals will bring environmental, safety and health benefits to the communities.

Next steps

With the accomplishment of current investments in the construction of new pipelines and terminals, the annual emissions reductions (2030) can be increased by more than 220% over 2020-year result.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy:

To ensure reliable, sustainable, modern and affordable access to energy for all;

13 – Global Climate Change Action:

To take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes.

Other information regarded as relevant

Emissions reductions depend on companies' decision to use pipeline system to replace roads and trucks.

Logum Terminal of Ribeirão Preto.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Newsun Energy Brazil S.A.

Name of the case

UFV NewSun Sapucai

Earthworks and Cleaning of the terrain
Start of work - 07.2020.

UFV aerial photo completed
Completion of the work - 03.202.

Site

https://newsun.energy/

Corporate Email Address

nossaenergia@newsun.energy

Type of Organization

Privately Held Company.

Economic activities (based on CNAE - National classification of economic activities)

D. Electricity and gas, N. Administrative activities and complementary services.

Theme

Reduction of direct emissions, scope 1 (cf. GHG Protocol – organization's own facilities, own transport), Avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.), Actions to adapt to climate change, Carbon capture and storage, offsetting emissions.

Case description

Implementation of the company's own 1 MW Solar Photovoltaic Power Plant power.

- Annual generation: 1.97 GWh / year 1
- Avoided emission: 1,773 ton CO_2 equivalent / year

The UFV was built during a period of 7 continuous months, in which waste was legally disposed of, with disposal certificates, selective separation, reuse of rainwater and the use of organic inputs during assembly.

Waste management was carried out as follows: separation of waste into blocks (plastic, wires and cables, glass, wood, organic) and the main construction waste. The blocks were collected by the Selective Collection of the city of Patrocínio Paulista/SP and the construction waste was collected in buckets by the RCD recycling company in Franca/SP.

The rainwater was reused directly from the UFV's drainage system, one of the first items of the pre-work that was carried out. The drainage was built with hand gravel, gravel nº 3, bidim blanket and thick earth on top; directed to two main pockets in the terrain, which have two ¾ CV peripheral water pumps that recover rainwater (in rainy periods) and dump it to the UFV's 5,000 L water tank or can be directly used for cleaning the modules (O&M terms).

There was no audited inventory, but monthly reports from the team on the operation of the measures taken during the construction of the UFV.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Adaptation.

Has the Case been implemented?

Yes, it has been implemented and its benefits.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

About 2,830 tons of GHGs are avoided annually.

Impacts/results

BRL 5 million were invested in the project, which currently generates revenue of BRL 1.1 million / year and generates a savings of more than BRL 200 thousand per year for customers of energy credits from this UFV.

Invested resources

- BRL 5 million invested in a period of 6 months.
- 15 direct temporary jobs generated.
- More than 60 indirect jobs moved onto site.

Main challenges faced

The lockdown hit the job in full, paralyzing the supply chain, delaying the schedule and reducing the overall efficiency of the project (consequently delaying commissioning and the start of power generation).

Suggestions to improve the business environment (regulations, licensing, access to credit)

Provide greater access to credit for projects with a proven environmental footprint.

Mainly with regard to the financing of Desenvolvimento SP, there could be some reserve fund (technical reserve) to cover unforeseen events or fast turnarounds in works with a certified environmental footprint.

Next steps

NewSun's goal is to expand by 100 times its capacity of clean energy generation in the next 5 years.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and clean energy:

To ensure access to energy, accessible, reliable, sustainable and modern for all;

9 – Industry, innovation and infrastructure:

To build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

12 – Responsible consumption and production:

To ensure sustainable consumption and production patterns;

13 – Action against global climate change:

To take urgent measures to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Ordem dos Advogados do Brasil/ Seccional de São Paulo

Name of the case

Range of transformational actions of the class of lawyers regarding the climate change issue

OAB/SP Administrative Headquarters.

Site

https://www.oab.org.br

Corporate Email Address

secretaria.comissoes.adm@oabsp.org.br

Type of Organization

Others.

Economic activities (based on CNAE - National classification of economic activities)

Group: 69.1 Legal practices Class: 69.11-7 Legal practices, except registry offices Subclass: 6911-7/01 Lawyer services.

Theme

Elaboration of policies, communication, engagement of interested parties and promotion of best practices.

Mitigation actions for climate change and adaptations to its adverse effects.

Other themes, directly or indirectly related to the climate agenda, which can be understood as co-beneficiaries.

Case description

OAB-SP, the largest council section in Brazil, having 385,112 active subscribers, 253 subsections, 930 service offices (consisting of 27 sections, 903 subsections); 2,058 employees, and being aware of its social-environmental responsibility, in 2020 it began to survey environmental aspects and impacts of its premises, culture and institution. Furthermore, in 2022, it began a process to determine how to proceed in engaging the lawyer category to foster best practices and concrete measures targeted at mitigating climate change and adaptation to it, the adhesion to the São Paulo Environmental Agreement being a fundamental step.

Thus, the systematization of the "Range of transformational actions of the class of lawyers regarding the climate change issue" consists of a study, upon a participative, collaborative, and technical-legal process, under the methodology of Transformational Change, to identify which are viable options, within the extent of the five areas of Sustainability Policies of OAB-SP (Water resources, Energy and Solid Waste, Education for Sustainability and Regreening), which find resonance in the adherence among the institutional policies executors (lawyers, law firms, representatives of the subsections, and internal collaborators) and will be able to carry out concrete actions for the mitigation of emissions having institutional support and potentially financial support.

Following the audit on the report on Emissions of atmospheric pollutants, Water, Energy, Solid Waste, and liquid effluents (2020/2021), after the identification of acting demands in the areas (starting points), there will be a study and the systematization of actions aimed at a more efficient resource management, reduction of consumption and mitigation of emissions, within the headquarters (short-term); of subsections (mid-term), and upon the engagement of lawyers and their offices (long-term).

In the Regreening theme, the objective of the study is to survey how or if the landscape design of headquarters and subsection premises can be used to contribute to the sequestering of carbon, the improvement of the quality of air and the decrease of the temperature in the surroundings, as well as allowing for the increase of the diversity of plants. Depending on the findings of the study, OAB-SP plans the creation of sustainable gardens, using simple agroecological concepts in the subsections and public roads which surround them.

Considering the fostering of education as the base of Transformational Changes, OAB-SP already promotes and plans to intensify lectures cycles, and classes with the members of thematic commissions, registered members, and guests, in the virtual environment or presentially, having as its objective, the clarification and increase of attractiveness of the society in general, about the legislation and the progress of the Climate Agenda.

Does the Case show GHG emission level reduction?

Not in the first phase of the study and evaluation; nevertheless, upon the implementation of the identified actions.

How is the Case classified?

Social and environmental responsibility.

Has the Case been implemented?

No. It is under planning.

What is the forecast of continuity of the Case?

The *case* is being planned with a forecast implementing it throughout the current mandate (2022/2024)

Is the Case likely to expand??

This is the hope and the challenge of the Case Study. There is the perspective that the identification, and systematization of possible actions can be applied in the headquarters, the subsection premises, offices, as well as incentivizing or acting as a role-model to other sections of OAB in their respective jurisdictions, new managements, and even other class institutions.

Information about GHG emissions.

Is there any emission reduction?

Not in this phase of planning.

Is there GHG sequestration?

Not in this phase of planning.

Is GHG avoided?

Not in this phase of planning.

Is this reduction verified?

Not in this phase of planning.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Not in this phase of planning. The reductions of emissions will depend on the implementation at the post-study phase of actions identified, on the involvement of the sectors/departments of OAB-SP and the capacity of reporting.

Impacts/results

The expected impact is the engagement, promotion of best practices and implementation/action at large of the class of lawyers of OAB-SP, regarding the climate change issue.

The study aims, as well, as a result, to elaborate a uniform methodology for the data collection at the subsections and at the law firms, the modeling of Payment for Environmental Services (*Pagamento por Serviços Ambientis* – PSA), in which OAB-SP and the lawyers can build bilateral relations (of provider and receiver), as well as partnerships in lines of funding.

Invested resources

Commitment of members of the Permanent Commission of Environment (*Comissão Permanente de Meio Ambiente* - CPMA) and collaborators to identify the best options of actions.

Budget estimates might be carried out to raise additional data, research, consultancy, and audit, and, if opportune, to designate specific teams to follow the planning and systematization of actions.

For the development of cost estimates, financing sources might be sought to finance the research and preliminary options analysis of the direct actions becoming preservation of eco-systemic services in the extent of rules of enabling mechanisms, especially for the payment of Environmental Services.

Time investment and pre-stablished structure of the headquarters and existing platforms, regarding the planning and the realization of lecture cycles and classes, having as responsible, the members of the Permanent Commission of Environment, their coordinating body and other theme commissions.

Main challenges faced

Baseline information, reference scenarios; usual difficulties in the adoption of new technologies and management styles; technical specificities and unusual terminology.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Upon the conclusion of the study, the systematization of actions will serve as inputs for the decision making of institutional measures in favor of the themes and operations; only then, eventual improvements may be suggested. Lessons learned in the process may be considered sufficient to consider the case successful.

Next steps

To evaluate the relevance of designating specific teams to follow planning, to gather the macro topics which will be the objectives of the study and the systematization of actions/solutions.

To decide about service providers, to solicit new budget estimates from consultants, according to the needs in obtaining additional data, research, and audits.

Relations with the SDG (Sustainable Development Goals)

13 – Actions against global climate change:

Taking urgent measures to combat climate change and its impact;

16 – Peace, justice, and effective institutions:

Promoting pacific and inclusive societies with sustainable development, providing access to justice for all and the development of effective institutions, responsible and inclusive in all levels;

17 – Partnerships and means of implementation:

Strengthening the means of implementation and renovating the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Since the case is founded on the approach for Transformational Change (World Bank), it contributes for the business model to provoke lasting impacts, by providing inputs for decision making to OAB-SP, with regards to how to transform the climate change theme, not only in some isolated specific actions but into both institutional governance policies, as well as transversal policies.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Quanticum Análises e Mapeamentos Ltda.

QUANTICUM INTELIGÊNCIA EM SOLOS
Diagnóstico | Agro Data Science | Práticas de Manejo

Name of the case

Good Practices in Regenerative Agriculture

Stored CO_2 in the soil and carbon Map in hand, by cell phone.

Diagnosis of the clay type that helps to keep carbon in the soil.

Site

http://www.quanticum.com.br/

Corporate Email Address

contato@quanticum.com.br

Type of Organization

Private limited company.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry, fishing and aquaculture.

Theme

Reduction of direct emissions, scope 1 (according to the Greenhouse Gases Protocol (GHG Protocol – facilities of the organization itself, own transportation).

Case description

The case "Good Practices in Regenerative Agriculture" is related to more appropriated management practices in tropical agriculture, necessary to the increasement of the carbon permanence in the soil, reducing its degradation into CO_2 that scape in the atmosphere.

Soil plays a key role in the carbon cycle, which is often forgotten or does not receive proper attention. Soil is one of the main CO_2 regulators in the Planet and it is related to more than 40% of the different Sustainable Development Goals proposed by the Organization of Nations United (ODS - UN).

Agricultural and urban soils have great potential to positively impact social and environmental actions. About 4 out of 10 Brazil's green bonds come from the sustainable land use sector. Eco-efficiency, soil health diagnosis, sustainable production fiber, forest management and regenerative agriculture have being already in progress. QUANTICUM believes that tropical soils are strong Brazilian allies in the international green bond market.

According to the Food and Agriculture Organization (FAO), 2/3 of terrestrial carbon is stored in the soil. Therefore, any change in this natural reservoir significantly affects the CO_2 concentration in the atmosphere.

The researches of QUANTICUM generate basic science in order to understand the carbon dynamics in the soil of agricultural areas and help in the conversion of this knowledge in good practices for the field, which have being assisting the compliance of the 2030 agenda. QUANTICUM is a specialized high-tech company in diagnosing, mapping and managing tropical soils health; borned from one of the 15 top groups of researches in soil science, installed in one of the best universities in Latin America. The multidisciplinary team composed of experienced scientists in diagnosis of soil health and carbon monitoring, developed a methodology supported by the São Paulo Research Foundation (FAPESP) and by the Innovation Agency of the University of São Paulo State (UNESP), approved by the Brazilian Society of Soil Science and by a technical team of international scientists. The Quanticum methodology had been ranked among the TOP 120 of Latin America, considered as a socio-environmental impact positive by Dom Cabral Foundation, Innovation Awards Latam and more than 60 reviewers from different countries and institutions, including entrepreneurs, scientists and political managers.

The case solution of QUANTICUM, company with DNA of UNESP and FAPESP, is related to the identification and mapping of minerals naturally present in the Earth's soils. These minerals are nanometric structures in order of 2 millimeters divided in more than 1,000 parts. They are protein-sized structures or even of SARS-Cov-19 virus particle size. These nanoparticles manufactured by nature have a great capacity of reactivity with other compounds of the environment, such as carbon, gases, plants, animals and agricultural inputs, as nitrogen fertilizers. In some cases, about one gram of these minerals (nanoparticles that are formed in the soil) has a reactivity surface equivalent to 100 square meters; it means that 100 grams of minerals have the same reactivity area of the Maracanã field. This is the same principle of specific surface that results in CO_2 filtration by the lungs and absorption of nutrients by the intestine. As smaller the structure, more reactive it is.

The pilot projects carried out in different contexts of Brazilian agriculture and supported both by research institutions and productive sector, show that when these nanoparticles of soil, also called clay typology, are diagnosed, mapped, and direct the deployment of good practices for agricultural management, different sustainable gains and benefits are obtained, among them: a) identification of areas with different phosphorus sorption potentials (more than 300% of variation in the sorption potential, 200 up to 800 mg/kg of adsorbed phosphorus in places with different clay types); b) variations in compaction potential of the soil in the order of 30% in the same soil type. The compaction is a form of soil degradation and requires an agricultural practice called decompactation. It is one of the practices with the highest consumption of fuel and gas emissions. The mapping of the clay typology helped to reduce more than 20% in the fuel consumption and CO_2 emission in na area of bioenergy production; c) strategic use of wastewater, for example, the vinasse support capacity (m3/ha) varies more than three times depending on the clay typology; d) Variation of the erosion potential in the order of 0.2 to 1 ton/ha/year in soils with 80% of straw coverage, but with different clay typologies. A considerable part of the carbon stored in the soil is also lost during the erosive process; e) identification of areas for application of pre-emergence herbicides and nitrogen fertilizers with variation of more than five times in the degradation potential of molecules depending on the clay types. These are some examples of indirect impacts in the reduction of gases from different agro-related sources and chains related with typology of clays.

Despite the diagnostic and mapping technology of clay typology by field and laboratory sensors have different applications as mentioned before, the focus of this case is to show the relationships and benefits of the methodology already implemented by important companies of bioenergy and coffee production in Brazil with the stabilization of carbon in the soil, therefore, in the maintenance of carbon stock.

The potential of soil carbon stock is a consequence of the factors and natural processes of soil intensified by management. Mapping the quality of clays involves identifing places with different potentials of gases emission in order to store carbon, besides to help in the development of an action plan for carbon credit. Suitment of management practices aiming to maximize the carbon sequestration into the soil considering the quality of clays is already an available alternative for the sustainable market.

In the last two agricultural harvests, 2019-2020 and 2020-2021, QUANTICUM cataloged in detail 25 thousand hectares of soils, under good or bad management practices. Carbon concentration in the soil was monitored in a depth of 0 to 20 centimeters before good management practices implementation adapted to the clay typologies. At the end of each agricultural cycle, the concentration of carbon was monitored once more in the same points that have been georeferenced, this time, after the application of soil management considering the typology of clays. The concentration of carbon in the soil that reflects its stabilization and permanence have increased on average of 0.4 ton per hectare in this cultivable layer. Keeping this carbon into the soil of 25 thousand hectares is equivalent to avoid the emission of CO_2 equivalent to 10 thousand tons. In order to evaluate the carbon balance in the soil, it was collected more than 200 thousand subsamples of soil in different contexts of clay typologies, being each point georeferenced. Carbon analysis and diagnosis were made in a laboratory accredited by the National Institute of Metrology, Quality and Technology (INMETRO) and by the ISO17025, following the official Brazilian methodology of Brazilian Agricultural Research Corporation (EMBRAPA).

The different types of clay have a direct relationship with the speed of carbon degradation in the soil as already demonstrated by Brazilian scientists that were international references in the early 2000s and already presented at meetings of governmental technical panels, Scientific American and other technical-scientific discussions. According to the SOS Mata Atlântica calculator, the emission of 10 thousand tons of CO_2 that were kept in the soil in the context of the case presented, following the management according to the different clay typology, are equivalent to the amount of gases emitted by 3,600 buses traveling on average of 15 thousand kilometers per month during one year, which require the plantation of approximately 73,000 tree seedlings or to have almost 40 hectares of "standing forest" to offset this emission.

We reinforce that these equivalent CO_2 balance values considered only the carbon cycle in the soil over a period, not taking into account the non-emission of gases resulting from nitrogen fertilizers management, reduction of subsoiling activities for soil decompaction, and other strategies of carbon reduction, that reduce carbon emission according to the results obtained in the pilot project using scientific-technological basis. The inclusion of these retained carbon values ??would increase even more the first value of CO_2 not emitted or reduced presented in the case, simply by using good management agricultural practices considering the clay typology of soil. Overall, this case aimed to draw the attention of different managers and institutions for tropicalization of methodologies, directly related to the cities evolution and smart farms, and a better understanding of the soil, "land" in the popular speaking. The better comprehension of the various dimensions, ecosystem actions, impacts and opportunities generated by the "land" is related to the governance of the soil and society evolution in a more balanced way. The compiled 'Innovation in Agronomy' of the FAPESP Research Journal, an important communication channel about science and technology of Brazil and the world, showed gains and benefits of the ecosystem for the Agenda 2030 related to the methodology of clay typology contemplated in this case. The special report about innovation was attended by the São Martinho Group, the largest sugarcane milling unit of the world; Cooxupé, the largest cooperative of coffee of the Planet and the Development Foundation of the Cerrado Mineiro (FUNDACCER), innovation and technology branch of the Federation of Specialty Coffee Producers of the Cerrado Mineiro – Brazil.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Social and Environmental Responsibility.

Has the Case been implemented?

Yes. It is in execution.

What is the forecast of continuity of the Case?

The case has already been implanted.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Fuel replacement and models of transport, innovations in products and services etc.);

Biodiversity, conservation, management of forest assets, use of the soil;

Carbon capture and storage, offsetting of emissions.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Yes.

Next steps

The next steps of this case are related to the expansion and implementation of good practices methodologies and to a regenerative agriculture based on the typology of clays in more agricultural areas in Brazil. Currently, Brazil has about 18.6 million hectares cultivated with perennial crops (e.g. coffee, sugarcane, citrus and eucalyptus) and approximately 35 million hectares cultivated with annual crops such as cereals and grains. In total, there are about 54 million of arable and productive land. Considering a scenario of implementation of the methodology of clay typology in only 1% of the cultivated areas with perennial crops, those that stay in the soil longer and than assist in the increase of the carbon permanence into the soil, we are referring to about 186 thousand hectares. Extrapolating the results of the case, considering only 50% of the efficiency of carbon permanence in the soil, it means an average increasement of 0.2 t/carbon/ha into the 0 to 20 cm of soil layer instead of 0.4. The methodology of clay typology associated with good practices can enable the preservation of 74 thousand tons of CO_2 equivalent in the soil. It preserve and promoting an increasement of carbon in the soil in only 1% of agricultural areas cultivated with perennials crops in Brazil, the amount of CO_2 that would no longer be emitted owing to the degradation of carbon in the soil would equate to a fleet of about 26 thousand buses traveling on average of 15,000 miles per month for 1 year. In case of these CO_2 values offset, it would be necessary to plant approximately 540,000 tree seedlings or have the equivalent of almost 300 hectares of "standing forest".

Relations with the SDG (Sustainable Development Goals)

2 – Zero Hunger and Sustainable Agriculture:

To end hunger, achieve food security and improving nutrition, and promoting the sustainable agriculture;

7 – Accessible and Clean Energy:

To ensure reliable, sustainable, modern access and affordable energy for all;

12 – Responsible Consumption and Production:

To ensure patterns of sustainable production and consumption;

13 – Action Against Global Climate Change:

To take urgent action to combat changes in the climate and its impacts.

Does the Case contribute to technological development and/or to the business model?

Carbon credit market from the soil (inventory and soil carbon balance).

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Raízen Energia S.A.

Name of the case

Biogas from Vinasse

Aerial photo of the biogas plantat the Bonfim plant.

Site

https://www.raizen.com.br/

Corporate Email Address

sustentabilidade@raizen.com

Type of Organization

Publicly Traded Corporation.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry, fishing, and aquaculture.

Theme

Direct emissions reduction, scope 1 (as per the GHG Protocol, which includes the organization's own facilities, own transportation)

Direct emissions reduction, scope 2 (as per the GHG Protocol - purchased electricity, steam, heating/cooling purchased for own use).

Indirect emissions reduction, scope 3 (as per the GHG Protocol - purchased goods and services, capital goods, fuel, transportation and distribution, waste, business travel, etc.).

Avoided emissions (replacement of fuels and modes of transportation, innovations in products and services, etc.).

Climate change mitigation actions.

Case description

Biofuels produced from agro-industrial effluents play an important role in the decarbonization of the energy mix because they provide a significant reduction in emissions when compared to conventional fuels and treat waste that can potentially pollute the environment.

Vinasse is an agro-industrial waste product from the sugarcane industry that has a high organic load and can be treated to produce methane (biogas) and used for various energy purposes—such as in the transportation sector, one of the main challenges when it comes to decarbonization. Raízen is a pioneer in the production of biogas from vinasse and filter cake.

Today, there is one plant being commissioned in the city of Guaríba (State of São Paulo), adjacent to Raízen's second largest plant (Bonfim), with an annual production capacity of 138,000 MWh of electricity.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation and Adaptation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Flaring System at Bonfim Biogas Plant.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

In the 2019/2020 harvest, Raízen's biogas production avoided approximately 50,000 tons of CO_2, and for 2030, taking into account the expansion of new plants, the projection is to avoid nearly 290,000 tons of CO_2 per year (biogas replacing natural gas).

Impacts/results

One of the main impacts of the co-benefits for Raízen is that, during the treatment of vinasse for producing biogas, its nutritional load is concentrated. In this way, vinasse can be applied in areas farther away from the plants, thereby enabling an additional reduction in GHG emissions by replacing synthetic fertilizers.

The expected external impacts reflect mainly on: a) emissions reduction in the transportation sector as a result of the replacement of diesel with biomethane; b) lower levels of air pollution due to the cleaner burning of biogas in comparison to diesel, benefiting people's health; c) generation of new qualified jobs in the entire biofuels production and marketing industry, mainly in developing countries. In the 2019/2020 harvest, Raízen's biogas production avoided approximately 50,000 tons of CO_2, and for 2030, taking into account the expansion of new plants, the projection is to avoid nearly 290,000 tons of CO_2 per year.

Invested resources

Significant resources were invested in pilot plants, research, and innovation. As a pioneer in the production of biogas from vinasse, Raízen assumes several financial and technological risks that have been overcome in recent years. A total of USD 30 million have already been invested (ref. BRL 160 million have already been invested in the first plant, which has been in operation since 2019 and was officially opened on October 16, 2020, and there are plans to expand investments in new plants and research and development (R&D) projects by 2030.

Main challenges faced

The challenges encountered are mainly related to the learning and maturity journey to master the technology for producing biogas from vinasse, gain scale and process efficiency.

The processes for the vertical anaerobic digester (for the cake) and the commissioning of the generators were more complex than expected, but both have been solved.

Suggestions to improve the business environment (regulations, licensing, access to credit)

More aggressive lines of credit for this type of technology would be welcome in order to increase the attractiveness of projects of this nature. A more robust regulation for the use of biomethane as a substitute source for natural gas.

Next steps

The company intends to significantly increase the production of biogas in the coming years by investing in new plants and to use this biogas to produce biomethane to replace diesel in the company's agricultural machinery, thereby significantly reducing direct GHG emissions associated with Raízen's operations.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy:

To ensure access to affordable, reliable, sustainable and modern energy for all;

9 – Industry, innovation and infrastructure:

To build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

13 – Climate action:

To take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Raízen Energia S.A.

Name of the case

Biomass Energy (Bagasse Pellets)

Pellet plant of biomass.

Pilot pellet plant of biomass.

Site

https://www.raizen.com.br/

Corporate Email Address

sustentabilidade@raizen.com

Type of Organization

Publicly Traded Corporation.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry, fishing, and aquaculture.

Theme

Indirect emissions reduction, scope 3 (as per the GHG Protocol - purchased goods and services, capital goods, fuel, transportation and distribution, waste, business travel, etc.).

Avoided emissions (replacement of fuels and modes of transportation, innovations in products and services, etc.).

Climate change mitigation actions.

Case description

Replacing fossil fuels in the global energy mix is key to ensuring that global targets for reducing greenhouse gas (GHG) emissions are met.

Coal is the most polluting source of energy, and virtually all of the major signatories to the Paris Agreement have already made commitments—to a greater or lesser extent—to completely eliminate coal from their energy mix. Although replacing this fossil fuel with a renewable source provides an aggressive reduction in GHG emissions, the process is also complex in countries with limited energy alternatives.

Biomass pellets, small pieces of highly compressed dry biomass, have a high energy content and the potential to replace coal in electricity production. Pellets produced from sugarcane bagasse have the potential to replace coal in thermal power plants and reduce their emissions by nearly 95%.

Raízen is a pioneer in the use of this technology for the "pelletization" of sugarcane bagasse and straw and already produces approximately 50,000 tons of bagasse pellets annually, with the potential to mitigate 60,000 tons of CO_2 per year.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation and Adaptation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Raízen is a pioneer in the use of this technology for the "pelletization" of sugarcane bagasse and straw and already produces approximately 50,000 tons of bagasse pellets annually, with the potential to mitigate 60,000 tons of CO_2 per year (pellets replacing coal in a thermal power plant).

Impacts/results

The expected impacts reflect mainly on: a) global reduction of emissions in the power generation sector caused by the replacement of coal with bagasse pellets; b) lower levels of air pollution due to a reduction in the burning of coal in electricity generation, benefiting the health of people located mainly in large urban centers; c) generation of new qualified jobs, mainly in developing countries; d) use of agro-industrial waste for more valuable applications, such as energy production.

Invested resources

A total of BRL 120,000,000 was invested in the current plant, with a production capacity of 100K tons of pellets per year. At the height of construction, there were 320 employees, including company employees and contractors.

Main challenges faced

The main challenge was to develop an optimal configuration of the process in order to safely produce the bagasse pellets.

Suggestions to improve the business environment (regulations, licensing, access to credit)

More aggressive tax incentives and lines of credit for this type of technology that makes it possible to replace highly polluting fossil fuels such as coal.

Creation of decarbonization programs for the electricity sector, with incentives (example: via carbon credits) for renewable products that replace coal.

Next steps

There is a plan to expand the production of bagasse pellets that is based on investments in the construction of new plants and access to new markets as well as government lobbying to generate demand.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy:

Ensure access to affordable, reliable, sustainable and modern energy for all;

9 – Industry, innovation and infrastructure:

Bild resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

13 – Climate action:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Raízen Energia S.A.

Name of the case

Cellulosic Ethanol

Aerial photo of the 2G ethanol plant installed at the Costa Pinto unit.

Site

https://www.raizen.com.br/

Corporate Email Address

sustentabilidade@raizen.com

Type of Organization

Publicly Traded Corporation.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry, fishing, and aquaculture.

Theme

Indirect emissions reduction, scope 3 (as per the GHG Protocol, purchased goods and services, capital goods, fuel, transportation and distribution, waste, business travel, etc.).

Avoided emissions (replacement of fuels and modes of transportation, innovations in products and services, etc.).

Conservation, management of forest assets, land use.

Climate change mitigation actions.

Case description

Initiatives to decarbonize the transportation sector, in line with the most ambitious scenarios for limiting the increase in global temperature, depend heavily on the introduction of advanced biofuels.

Advanced biofuels produced from agro-industrial waste have lower carbon intensity than conventional biofuels and provide energy without the need to expand agricultural areas, thereby helping reduce the competition for land between the production of food and biofuels.

Cellulosic ethanol (E2G) is an advanced biofuel produced from sugarcane bagasse (a waste product with high energy value) with a carbon intensity about 30% lower than first-generation ethanol (E1G).

Raízen is a pioneer in the production of second-generation (2G) ethanol. It is currently the only company in the world producing E2G from sugarcane bagasse on a commercial scale. Nearly 20 million liters of 2G ethanol were produced in the 2019/2020 harvest, and 25 million liters are expected for 2021, responsible for an annual reduction of approximately 35,000 tons of CO_2 (avoided emissions).

Including the 2021 production, more than 75 million liters will have been produced, on aggregate, exported to the U.S. and Europe. The plan for the coming years is to significantly expand production by building new plants, thus establishing the company as a leader in the energy transition. Significant resources were invested in pilot plants, research, and innovation.

As a pioneer in this type of technology, the company assumes several financial and technological risks that have been overcome in recent years. More than USD 100 million has already been invested in the first plant, which has been in operation since 2015, and there are plans to expand investments in new plants and research and development (R&D) projects by 2030.

In this journey so far, significant efficiency gains have been achieved in the cellulosic ethanol (E2G) production process. As a result, in addition to producing advanced biofuel, Raízen has become a developer of power generation technologies.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation and Adaptation.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Nearly 20 million liters of 2G ethanol were produced in the 2019/2020 harvest, and 25 million liters are expected for 2021, responsible for an annual reduction of approximately 35,000 tons of CO_2 (avoided emissions - ethanol replacing gasoline).

Impacts/results

In this journey so far, significant efficiency gains have been achieved in the cellulosic ethanol (E2G) production process. As a result, in addition to producing advanced biofuel, Raízen has become a developer of technologies for generating clean energy.

The expected external impacts reflect mainly on: a) emissions reduction in the transportation sector as a result of the replacement of gasoline with ethanol; b) emissions reduction in the cosmetics industry due to the replacement of ethanol with an even cleaner source; c) lower levels of air pollution due to the cleaner burning of ethanol, benefiting the health of people living mainly in large urban centers; d) generation of new qualified jobs in the entire biofuels production and marketing industry, mainly in developing countries.

Invested resources

Significant resources were invested in pilot plants, research, and innovation. As a pioneer in this type of technology, the company assumes several financial and technological risks that have been overcome in recent years. More than USD 100 million has already been invested in the first plant, whose nominal capacity is 42 million liters/year and has been operating since 2015 at the Costa Pinto unit in Piracicaba. There are plans to expand investments in R&D and in new plants in Brazil and abroad by 2030. A dedicated and specialized team has been assigned for this operation, which includes the maintenance and laboratory structure dedicated to process development and optimization.

Main challenges faced

The challenges encountered are mainly related to the learning and maturity journey to master the technology for producing cellulosic ethanol (E2G) and gain scale and efficiency in production. With greater mastery of the technology, these challenges are increasingly being overcome and the new plants will benefit from this progress. Despite satisfactory returns, investment and production costs are still high, mainly related to managing biomass as feedstock (requires high volume).

Suggestions to improve the business environment (regulations, licensing, access to credit)

Policies that are more focused on differentiating advanced biofuels from conventional ones and more aggressive lines of credit for this type of advanced technology would be welcome in order to increase the attractiveness of projects of this nature. Reduction of international regulatory barriers, for example, in Europe, which has high tariffs on ethanol imports.

Next steps

As previously mentioned, Raízen believes that the global energy transition to a low-carbon economy depends on the increasing introduction of advanced biofuels. In this regard, Raízen intends to significantly increase production of cellulosic ethanol (E2G) by building new commercial plants and exporting the technology it has developed.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy:

Ensure access to affordable, reliable, sustainable and modern energy for all.

9 – Industry, innovation and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

13 – Climate action:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

The production of cellulosic ethanol is entirely based on technological innovation and is responsible for the scalability of the production of advanced biofuels required to achieve the emission reductions targeted by countries.

Aerial photo of the 2G ethanol plant installed at the Costa Pinto unit.

ACORDO AMBIENTAL SÃO PAULO

raízen

Corporate Name

Raízen Energia SA

Name of the case

Raízen and the creation of the Bioenergy Park: full circularity

The picture presents a sugarcane crop, with 5 sugarcane stalks in the front, among a green vegetation in the background.

Site

https://www.raizen.com

Corporate Email Address

comunicacaocorporativa@raizen.com

Type of Organization

Corporation / publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry, fishing, and aquaculture.

Theme

Avoided emissions (replacement of fuels and transport modes, innovations in products and services, etc.), biodiversity, conservation, management of forest assets, land use, actions to adapt to climate change.

Case description

Historically in Brazil, sugar and ethanol plants produce first-generation ethanol and sugar. However, circularity provides an opportunity for sugar and ethanol plants to go beyond, using the concept of Bioenergy Parks, where the use of waste generates a variety of by-products, thus increasing the renewable energy potential generated.

The use of the waste gives Raízen a diversified portfolio of renewable products that support the transition and mitigation of climate change, allowing the Company to transform a traditional plant into a bioenergy park. The by-products produced are:

- First-generation ethanol, which allows an 80% reduction in emissions compared with gasoline.
- Cogeneration of electricity using sugarcane bagasse.
- Second-generation ethanol (E2G), which reduces greenhouse gas emissions by 30% compared with traditional ethanol.
- Biogas and biomethane.
- Pellets.
- Solar energy.

Raízen is currently the largest sugar company in the world, producing in the 2021/2022 crop year 3.5 billion liters of ethanol, 6.2 million tons of sugar, and 2.9 TWh of bioenergy from sugarcane biomass. The Company operates 35 bioenergy parks, 25 of them in the State of São Paulo, with an installed capacity to crush 105 million tons of sugarcane, with approximately 1.3 million hectares of agricultural areas cultivated using cutting-edge technology and fully mechanized harvesting.

In terms of raw materials available for the production of biofuels in its plants, Brazilian sugarcane is seen as a readily available decarbonization alternative on a large scale, since it generates alternative by-products for energy transition, as mentioned above. Sugarcane also has essential attributes to be considered a sustainable solution, since it has low carbon footprint, does not promote deforestation, is efficient, and has low impact on land use and competition for food.

Brazilian sugarcane also offers other notable attributes:

- Compared with other raw materials used for ethanol production, sugarcane has the highest yield (approximately 7,000 liters per hectare). If 2G ethanol produced by Raízen is taken into account, the productivity can be as high as 8,148 liters of ethanol per hectare, increasing the yield per planted area.
- Despite all the potential area available for exploration in Brazil, only 1% is used for planting sugarcane, enough to supply 19% of the country's energy mix in the form of ethanol or bioelectricity and turn Brazil into the world's largest producer of sugar.
- Finally, according to a report published by the World Wildlife Fund (WWF) in 2021, there is no evidence of a significant competition between biofuels and food production to the point of negatively impacting Brazilian food supply.

Specifically in terms of Raízen's ethanol, it is important to note that its estimated carbon footprint is between 19.6 and 20.95 gCO_2e/MJ (ISO 14044 and ISO 14040), precisely due to the adoption of good practices by the Company, including the use of sugarcane by-products.

Throughout the production process in our bioenergy parks, by-products (second-generation ethanol, electricity, biogas, and biomethane) that have high energy value, are converted and reused. This way, Raízen reuses or recovers nearly 99.5% of all solid waste, thus promoting the circular economy and materializing the Company's proposal to expand E2G production to 280 million liters as of 2024, increasing its production capacity by more than 50%, with 20 additional bioenergy parks by 2030/2031.

In addition to first- and second-generation ethanol, biogas has also become an investment priority for the Company. In the 2019/2020 crop year, for example, Raízen's production of biogas in Guariba, SP, avoided the emission of close to 50,000 tons of CO_2 through the generation of electricity from biogas in comparison with the marginal electricity of the grid (equivalent to the electricity produced in a natural gas-powered thermoelectric plant). In addition, the production of second-generation ethanol in the unit in Piracicaba, SP already accounts for a reduction of 35,000 tons of CO_2 annually (emissions avoided by replacing gasoline).

Finally, Raízen also uses sugarcane bagasse to produce biomass pellets (small bits of densely packed dry biomass), suitable for replacing coal in the production of electricity and with potential to reduce emissions by 95%. The Company is a pioneer in the use of bagasse and cane trash pellets and produces nearly 50,000 tons of pellets per year, with the potential to mitigate 60,000 tons of CO_2 emissions per year by replacing coal. The pellet producing unit is located in Piracicaba, SP (information available in the Case "Energy from Biomass/Pellets in the São Paulo Environmental Agreement: 56 success cases on the climate agenda," CETESB, 2021).

This growing portfolio, combined with the increasing productivity and carbon capture (BECCS – Bioenergy with Carbon Capture and Storage) has the potential to place sugarcane products as net carbon sinks, since ethanol would have a negative carbon footprint throughout its life cycle.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Adaptation.

Has the Case been implemented?

Currently, the bioenergy park concept is in place at Raízen's Costa Pinto unit, in Piracicaba, SP, which produces sugar and first-generation ethanol and has the first second-generation ethanol plant and a biogas/biomethane plant currently under construction.

What is the forecast of continuity of the Case?

More than 10 years

Is the Case likely to expand?

The concept of "Bioenergy Parks" is likely to expand through the use of waste in other crops.

Information about GHG emissions.

Is there any emission reduction?

Yes. However, this implementation is accompanied by the expansion of sugarcane production and new products (e.g. 2G ethanol and biogas), which generates a gradual increase in the company's total absolute emissions (Scope 1). Therefore, Raízen is constantly investing in improving its production process that generates fewer emissions compared with conventional practices, but total emissions (Scope 1) tend to increase due to the expansion of our production capacity.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The GHG emissions avoided from the consumption of Raízen's products resulting from the circularity of sugarcane reach 5.2 million tons per year (70% of which are avoided in the State of São Paulo). This is equivalent to a reduction of almost 2.5 million cars on the roads every year. Taking the emissions avoided from ethanol alone, approximately 2 million tons of CO_2eq emissions are avoided compared with gasoline, which proves that the concept of the bioenergy park generates additional emission reductions compared with a traditional plant.

Impacts/results

Circular economy, promoting full use of the waste generated (99% use), higher energy output per hectare planted (potential 50% additional yield), and promoting further emission reductions through an additional portfolio of renewable products (potential 260% additional reduction in emissions).

Invested resources

The costs of the bioenergy park are the same as those of a traditional sugar and ethanol plant, plus the additional investments for processing the by-products generated from waste. In the case of biogas, USD 30 million (ref. BRL 160 million) has already been invested in the first plant. For E2G, more than USD 100 million has already been invested in the first plant, whose nominal capacity is 42 million liters/year and has been operating since 2015 at the Costa Pinto plant in the city of Piracicaba. For pellets, USD 22 million has been invested in the current plant, with a production capacity of 100,000 tons of pellets per year.

Main challenges faced

The main challenge is to support policy makers in developing a proper due diligence process so that information related to social and environmental impacts can be verified and made credible.

Next steps

To present the case study to policy makers in order to disseminate good practices in traceability control and due diligence that can attest to the real impacts of biofuel-oriented agricultural crops and the coproducts generated.

Relations with the SDG (Sustainable Development Goals)

7 – Accessible and clean energy:

Ensure access to affordable, reliable, sustainable and clean energy for all.

8 – Decent work and economic growth:

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

13 – Climate action: Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

Yes. The *Case* presents a new way to expand the portfolio of renewable products within a sugar and ethanol plant, innovating in the business model and in technologies for reusing waste.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Reservas Votorantim Ltda.

Name of the case

The structure of the *Legado das Águas* Private Reserve

31 thousand hectares of Atlantic Forest conserved in Legado das Águas.

Rio Juquiá, in Vale do Ribeira, SP, which crosses the territory of Legado das Águas.

Forest, waterfalls and rich biodiversity: all this less than 2 hours from São Paulo.

Aerial image of Legado das Águas, the largest private reserve of Atlantic Forest in the country.

Site

www.legadodasaguas.com.br

Corporate Email Address

contato@legadodasaguas.com.br

Type of Organization

Limited Partnership.

Economic activities (based on CNAE - National classification of economic activities)

Activities involving botanical gardens, zoos, national parks, ecological reserves and environmentally protected areas.

Theme

Biodiversity, conservation, management of forestry assets, use of soil.

Organizational innovations and business models.

Communication, engaging interested parties and disseminating best practices.

Capture and storage of carbon, offsetting emissions.

Hydro resources and efficiency.

Engaging vulnerable communities.

Case description

Legado das Águas, the largest private reserve of Atlantic Forest in the country, covering 31,000 hectares, approximately the size of the capital of Minas Gerais state (Belo Horizonte), is one of Votorantim's environmental assets. Located in the Vale do Ribeira region, in the Southern part of São Paulo state, the area was acquired in the 1940s and has since been conserved by the Companhia Brasileira de Alumínio (CBA), which maintained the forest to ensure, in the long term, the water resources in the hydrobasin of Juquiá river, where the company runs seven hydroelectric plants. In 2012, Legado das Águas was established as a private reserve via a signed protocol of Votorantim's intentions together with the São Paulo State Government, and with the support of the founding companies Nexa, Votorantim Cimentos, CBA and Votorantim Energia.

Today, Legado das Águas is managed by the company Reservas Votorantim, created to establish and implement a new management model for environmental assets. In this model, the sustainable use of natural resources in private protected areas generates return which, in turn, ensures not only the maintenance of the standing forest, but also its carbon stock, as well as social and economic benefits.

Market positioning

Legado das Águas is a company that blends the best use of the forest's potential with conservation and generation of shared value. It operates in an innovative business model, developing activities in the new economy, such as biotechnology (access to genetic resources), public use (eco-tourism), production of native Atlantic Forest plants and saplings for restoration and landscaping, as well as offsetting the legal reserve. Adding value to the forest encourages the maintenance of carbon stocks as it expands.

Legado das Águas management model

Legado das Águas is an innovative company because it puts into practice efforts that help develop the area in which it is located, engaging the population and its municipalities in maintaining the standing forest. Through research, environmental education and eco-tourism, it seeks out business possibilities that use the environmental resources available. Such activities have highlighted alternatives that are economically feasible. *Legado das Águas*' innovation lies precisely in using the forest resources to conserve the Atlantic Forest and generate value, which is shared among the local and traditional communities, the government and researchers. For this, it relies on a multidisciplinary team and partners from a variety of areas and with a wide range of know-how.

Threatened species (in danger of extinction)

The Atlantic Forest is one of the biomes with the largest number of species in danger of extinction. Taking into account that there is only 18% of the original territory remaining, both the fauna and the flora are in a critical state when it comes to the level of threat; many species of the fauna are in the "Brazil Red Book of Threatened Species of Fauna," published by the Chico Mendes Institute for Biodiversity Conservation (ICMBio). Considering this scenario, scientific research, including registering and monitoring fauna and flora, takes on a crucial role in the routine activities at *Legado das Águas*. Based on the premise that it is necessary to understand to conserve, initiatives are implemented to bring the Atlantic Forest closer to a broader public. *Legado das Águas* also strives to establish relevant partnerships with universities, centers for excellence, companies and start-ups, as well as renowned institutes and researchers.

Cataloging species

Up to 2020, at *Legado das Águas*, over 1,700 species of fauna and flora were identified. Of these, close to 1,000 were native flora, and within this number, more than 225 species are orchids catalogued in the reserve, eleven of which are in extinction. One orchid has been considered extinct in São Paulo for more than 50 years, and a new species, until now, had never been catalogued.

The Biodiversity Center produces more than 80 species of native plants, while the Orchid Garden has close to 900 plants of more than 120 identified species.

With regard to fauna, records have reached the following numbers of species:

Butterflies: 322 species, one of which has been extinct in São Paulo State for more than 50 years; amphibians and reptiles: 67; ichthyofauna (fish): 54; avifauna (birds): 296; mammals: 70.

These numbers represent a high level of conservation in the area, which, most importantly, includes the woolly spider monkey (macaco-muriqui, or *Brachyteles arachnoides)*, the largest primate in the Americas; the puma (onça-parda, or *Puma concolor*); the bush dog (cachorro-vinagre, or *Speothos venaticus*); and two albino tapirs (anta, or *Tapirus terrestris*) have been registered in the natural environment.

Legal reserve

Environmental legislation establishes that, for the Atlantic Forest, rural properties must dedicate 20% of their area to maintain the Legal Reserve (RL).

In this vein, Legado das Águas has areas for the RL, with the guarantee of forest management and maintenance. With a yearly payment, this is a different method compared to the traditional means for offsetting by acquiring areas. The contract between the parts can extend up to 15 years, with an annual payment per hectare by rural land owners.

The benefits include: the rural land owners will not have to purchase area, nor will they need to maintain them (caretakers, security, fences etc.), also removing the need to pay Rural Land Tax (ITR) and the maintenance costs of legal obligations, among others. Besides this, if the land owner is a company, they can record the amount paid as an expense and deduct it from their income tax. This way, they are encouraged to adhere to the Forestry Code, with the benefit of maintaining a mature forest and the stocked carbon.

Nursery of native Atlantic Forest plants and saplings

The nursery at *Legado das Águas* has the capacity to produce 200,000 plants per year, providing environmental solutions for landscaping in development, public parks and reforestation, including some species that are rarely produced in the market. All plants are produced by collecting seeds from the protected and conserved forest. To serve the landscaping market, the nursery has been producing plants focusing on small and medium-sized trees, including native Brazilian fruit trees such as *cambuci, uvaia* and the ice-cream bean (*ingá*), besides species with ornamental flowers or foliage, like bromeliads, shrubs, climbers and ground cover plants for use in cities. The Jucara palm (palmito-juçara, or *Euterpe edulis*), a species of Brazilian flora in danger, is one of the main highlights. This species, besides being important in environmental restoration, is ornamental and can be used indoors, including in offices.

Another focus of the Legado das Águas nursery is the production of native plants for forest recovery that meets, for example, the demand of companies and rural producers that need to recuperate areas on their properties to comply with environmental offsetting or to meet the requirements of the Forest Code. Since it was created in 2016, the *Legado das Águas* nursery has provided thousands of native plants for cultivation in its restoration areas. This initiative returns the Atlantic Forest to environments from where it had disappeared, expanding the capture of carbon, mainly in the city of São Paulo.

Eco-tourism activities

Since 2017, *Legado das Águas*, the largest private reserve of Atlantic Forest in the country, has established itself as an eco-tourism destination in São Paulo State. The Reserve offers activities that allow visitors, besides adventure and entertainment, an experience in the Atlantic Forest. Groups can go birdwatching, canoeing in the calm waters of the reservoirs along Juquiá river, or go biking along a trail through the Atlantic Forest. The Reserve also receives the public for studies and courses.

Bringing a broader public to the Atlantic Forest increases environmental awareness and the responsibility for maintaining and expanding forests, which helps understand and mitigate the effects of global warming.

Does the Case show GHG emission level reduction?

Legado das Águas stocks 10 million tons of carbon.

How is the Case classified?

Stocking and sequestering carbon.

Has the Case been implemented?

Yes, it was implemented and the benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes, the business model can be replicated in other private reserves.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Legado das Águas is a private reserve maintained by Votorantim S/A and its founders, CBA, Nexa, Votorantim Cimentos and Votorantim Energia, since 1940.

It is a mature forest, with 75% of the area at an advanced stage of conservation. For this reason, its forest coverage stocks 10 million tons of carbon.

Impacts/results

Legado das Águas is managed by the company Reservas Votorantim, created to establish a new model of protected private areas. In this model, activities generate social, environmental and economic benefits in a sustainable fashion, in addition to presenting solutions, not only for traditional businesses but also for new economies, based on conserving nature.

Legado operates on several business fronts, specifically in three initiatives. The first is the production of saplings for reforestation and landscaping, which includes a recently inaugurated retail space in São Paulo, known as Pátio Caeté. The second is the public use of the Reserve, with efforts that range from eco-tourism to renting out the space for audio-visual productions. The third front is to offset the Legal Reserve, which allows rural land owners that do not own the minimum area of native forest required to lease out their land and offset their legal reserve deficit at Legado.

Over its eight-year history, scientific research and monitoring the fauna and flora has resulted in the registration of 1,765 species in the area. Of this total, some 809 are animal species and, in this same group, a total of 50 are under the threat of extinction. The numbers also call attention to the diversity of the birds: there are 296 species catalogued at the location, which represents 40% of the entire avifauna in the state of São Paulo. In terms of flora, the list includes 956 species, of which 25 are in danger. Of the 809 animal species registered, some 296 are birds, 322 are butterflies, 70 are mammals, 67 are amphibians and reptiles, and there are 54 types of fish. Of the 956 species of flora, there are 233 orchids.

There is also work in social and economic development in the area of the Reserve. Since 2014, Legado das Águas, employing a social strategy, has sought to create and stimulate socio-economic, cultural and environmental initiatives that contribute to the development of cities in which the Reserve is included, such as Juquiá, Tapiraí and Miracatu, in the interior of São Paulo, and other nearby cities, as well as some in the region of Vale do Ribeira, namely Registro and Juquitiba. Over the last seven years, there were 41 initiatives, spread across programs and projects connected to government, tourism, education, culture, sport and job and income creation, besides diagnostics and other specific efforts to develop the territory, benefitting more than 60,000 people directly and indirectly. In addition to this, Environmental Education efforts offered by Legado das Águas included 66 events (among expositions and fun-based activities) and 118 educational lectures, covering nine municipalities and more than 45,000 people.

Invested resources

BRL 35 million invested since 2012 in monitoring the area, personnel, public use, scientific research and socio-environmental projects.

Main challenges faced

1 – Difficulties in implementing an innovative model to generate revenue using the standing forest, including to define the application within the legal and taxation scope.

2 – A lag in return to achieve the financial balance of a conservation operation in the areas.

3 – Difficulties in maintaining the large-scale territory due to risk of trespassers that degrade the forest / diversity.

4 – Workforce qualification and access in locations outside the large urban centers.

5 – Logistic difficulties (low quality linking highways that deter public form going to conserved areas / public parks / conservation units (UCs)).

Suggestions to improve the business environment (regulations, licensing, access to credit)

1 – The possibility of offsetting legal reserve deficits via Rural Environmental Register (CAR) works as a kind of payment for environmental services (PSA) for land owners that have conserved areas. CETESB / SIMA can develop platforms to promote business, increase the conserved area within the state, and to create a new market for conservation.

2 – Planting native species from São Paulo State should be encouraged in reforestation projects, with bonuses for those who comply.

3 – Legal planting obligations should be made available on a platform to easily link those that provide reforestation services to the various state and (even) municipal agencies that have reforestation obligations. For example, the expansion and improvement of the platform for the Spring Project (Projeto Nascentes).

Atlantic Forest conserved in Legado das Águas.

Next steps

Legado das Águas will continue to work towards increasing the synergy between local and state agencies to turn Vale do Ribeira into a tourist destination, which will boost conservation awareness, forest maintenance and expansion into other areas. Below are some highlights

- Eco-tourism: continuing stimulus for tourism not only at Legado das Águas, but also throughout the entire Vale do Ribeira, respecting the limitations imposed by protocols to prevent Covid-19;
- Biodiversity Center: using a distribution center in the city of São Paulo (Pátio Caeté), there are great expectations to expand business related to landscaping with native Atlantic Forest plants. Many reforestation projects should also be implemented in Conservations Units in São Paulo, using saplings and trees produced at the Legado nursery;
- Legal Reserve: consolidating legislation related to the Forestry Code; several proposals should be confirmed to offset the Legal Reserve at Legado das Águas;
- Research: the aim is to expand partnerships and increase the number of scientific research projects conducted at Legado, both with educational institutes in the region of Vale do Ribeira, and those abroad;
- Social efforts: we will encourage an increase in the number of local suppliers, and an expansion of local production chains integrated with the activities at Legado das Águas, helping municipalities in the territory to return to a path of economic recovery, and improving people's standards of living.
- Initiatives connected to ESG: strengthen efforts, as a consultant, offering socio-environmental solutions and partnerships to companies that wish to take up causes to affirm their commitment to sustainability and to environmental, social and governance criteria (ESG). In this vein, reforestation projects such as Planting for the Future, raising awareness and focusing on environmental education, will gain strength in the portfolio.
- Advancing the transformation of Legado das Águas' forest asset as a stock of carbon recognized in Reducing Emissions from Deforestation and Forest Degradation (REDD+), as well as a carbon sink with reforestation initiatives.

Relations with the SDG (Sustainable Development Goals)

4 – Quality Education:

Assuring quality inclusive and equality education, and fostering life-long learning opportunities for all;

8 – Decent Jobs and Economic Growth:

Fostering sustainable and inclusive economic growth, full-time and productive employment, and decent jobs for all;

13 – Efforts Against Global Climate Change:

Taking urgent measures to combat climate change and the effects;

15 – Land-based Life:

Protecting, recovering and promoting the sustainable use of land-based eco-systems, sustainably managing forests, combating desertification, deterring and reverting the degradation of soil and curbing the loss of biodiversity;

16 – Peace, Justice and Efficient Institutions:

Promoting pacific and inclusive societies for sustainable development, providing access to justice for all, and building efficient, responsible and inclusive institutions at every level;

17 – Partnerships and Means for Implementation:

Strengthening the means for implementing and revitalizing the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes. The business model applied to Legado das Águas has not only proven feasible, but also replicable. The Reserve has shown that it is possible to manage resources with production of nature, that is: the standing forest generates gains so as to protect its eco-systems and its biodiversity.

Other information regarded as relevant

A report on efforts is done every year, with detailed records that can be accessed at: **https://legadodasaguas.com.br/relatorios/**

Corporate Name

Rotta e Moro Sociedade de Advogados

Name of the case

Education and climate advocacy

Patricia Iglecias with the partners of RMA, Fernanda Rotta (right) and Carolina Moro (left) at the launch ceremony of the São Paulo Agreement.

Site

http://www.rottamoro.com.br/

Corporate Email Address

financeiro@rottamoro.com.br

Type of Organization

Simple company / law firm.

Economic activities (based on CNAE - National classification of economic activities)

Provision of legal services.

Theme

Communication, stakeholder engagement, and dissemination of best practices.

Case description

RMA, as a law firm, as well as its partners, individually, participate on networks and groups dedicated to sharing and producing knowledge for climate and environmental education, engagement; production of technical and scientific knowledge regarding the legal aspects of climate change; as well as in the preparation of products of impact for the adherence of Brazil to international goals of mitigation and adaptation to the effects of climate change. The collaborations takes place according to the demands and agenda of each initiative or the firm itself.

Among the actions in 2019, the following stand out:

1. Assistance in the preparation of the "White Paper: Potential of carbon markets and payments for results for the post-2020 period" of the Brazilian Coalition on Climate, Forests and Agriculture;

2. Participation in Working Groups regarding the climate agenda of the Brazilian Coalition on Climate, Forests and Agriculture;

3. Participation in the elaboration of a recommendation to the National Congress for discussions in the public hearing regarding the implementation of the National Policy on Climate Change with LACLIMA;

4. Elaboration of a report for the Observatorio Latinoamericano para la Acción Climática (OLAC) about climate policies in Brazil in the scope of LACLIMA;

5. Production of periodic informative posts on environment, climate and sustainability on the firm's LinkedIn profile.

Of the 2020 actions, we highlight:

1. Participation as a speaker at the event "Day of the Climate Professional" held on 11/24/2020 by Youth Climate Leaders in a panel that addressed perspectives of climate careers for young professionals.

2. Participation in Working Groups regarding the climate agenda of the Brazilian Coalition on Climate, Forests and Agriculture;

3. Participation in LACLIMA's Working Groups, regarding climate finance, carbon markets and AFOLU;

4. Production of periodic informative posts about the environment, climate and sustainability on the firm's LinkedIn profile.

5. Membership and participation in the Observatory of Partnerships in Protected Areas (OPAP).

Climate education and advocacy activities as a whole are related to the following objectives:

13 - Action against global climate change;

Networking activities have the role of improving education, raising awareness and human and institutional capacity on mitigation, adaptation, impact reduction, acting as a means of early warning of climate change.

17 - Partnerships and means of implementation.

Additionally, networking results in the formation of multi-sector partnerships that mobilize and share knowledge, expertise, technology and financial resources to support the achievement of sustainable development goals; and in incentives to promote effective public, public-private and civil society partnerships, based on the experience of the resource mobilization strategies of these partnerships.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it is in execution.

What is the forecast of continuity of the Case?

Over 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

As the public benefited, the scientific community, public policy managers, customers, entrepreneurs, and society in general stand out.

Invested resources

Availability of the team (BRL 18,000.00) and use of the firm's official communication means.

Main challenges faced

Constant updating and availability of time to participate.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Developing governance for climate policy implementation and improving the legal framework.

Next steps

Maintenance and constant improvement, as a continuous and long-term measure.

Relations with the SDG (Sustainable Development Goals)

13 – Action Against Global Climate Change:

Take urgent action to combat climate change and its impacts;

17 – Partnerships and Means of Implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

Post of the publication of the "Race to zero" Decree no 65,881, in the State of São Paulo.

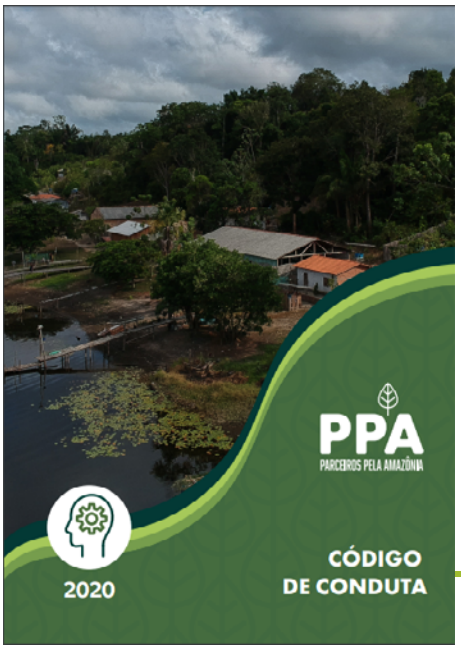
ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Rotta e Moro Sociedade de Advogados

Name of the case

Joining the Partnership Platform for the Amazon (PPA)



Code of Conduct and Activities Report of 2020.

Site

http://www.rottamoro.com.br/

Corporate Email Address

financeiro@rottamoro.com.br

Type of Organization

Simple company (*sociedade simples*) / law firm.

Economic activities (based on CNAE - National classification of economic activities)

Provision of legal services.

Theme

Biodiversity, conservation, forest asset management, land use.

Organizational innovations and business models.

Communication, stakeholder engagement, and dissemination of best practices.

Case description

In 2020, the office started its participation in the Markets working group of the Partnership Platform for the Amazon rainforest, collaborating with legal advice and/or support in the collective effort to develop projects and action strategies for the creation of sustainable development solutions for the Amazon rainforest.

Through its working groups, the Platform leverages social and environmental investments, fosters the development of transformative partnerships, shares best practices and creates a collaborative environment for the development of joint solutions to Amazonian challenges. The network already includes more than 40 large, medium and small companies, civil society organizations and international partners that share its goals.

In 2020, RMA worked on the revision of the Platform's Code of Conduct and started participating in the Markets working group, which aims to develop local value chains by stimulating the acquisition of products and services from local companies by the private sector present in the region.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it is in execution.

What is the forecast of continuity of the Case?

1 to 2 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

As the benefited public, we highlight participants of the actions of the Partnership Platform for the Amazon (PPA) and members of PPA.

As for the results, so far PPA has only released those for 2019; however, it already made some information regarding 2020 available (Information: https://ppa.org.br/resultados/).

As for the results of the 2020 activities, we highlight the collaboration of the firm in the drafting of the Code of Conduct, already in force.

The Markets working group is in full development, with the following defined lines of action: (a) local purchases and training of locals; (b) Amazônia brand; (c) Marketplace of Amazon products; and (d) certifications.

The activities of PPA as a whole are related to the following goals:

10 – Reduced inequalities;

Expand the income generation of local communities and promote training for their inclusion;

11 – Sustainable cities and communities;

Local purchases by the companies help in the sustainable development in the region, since the expenses and logistics of transportation, energy, waste reduction, among others, are avoided;

13 – Climate Action;

Local purchases by companies help mitigate climate change impacts by reducing GHG emissions.

15 – Life on Land;

The development of sustainable chains of local products and local biodiversity assets enhances the generation of economic alternatives for local communities, the development of the bioeconomy, and the conservation and sustainable use of land.

17 - Partnerships.

Expected Results:

The Partnership Platform for the Amazon (PPA) is a collective action platform led by the private sector that seeks to foster sustainable development solutions for the Amazon. Currently, it has more than 40 large, medium and small companies and civil society organizations and international partners, promoting the integration and synergy of individual and/or collective initiatives and demands and needs of the region.

Invested resources

Availability of team hours (BRL 25,000.00).

Main challenges faced

Implementation difficulties due to lack of logistics in the region.

Operation in remote regions.

Replacement of the activities initially planned due to the emergency actions resulting from Covid-19.

Connecting companies with projects that need investment.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Improve the regulation of biodiversity chains, with technical standards; integration, training and simplification of standards for the inclusion of communities and development with fewer bureaucratic obstacles in community businesses; with adaptations to local realities.

Next steps

Keeping the Working Groups in action and the performance of activities identified during the execution.

Relations with the SDG (Sustainable Development Goals)

10 – Reduced inequalities:

Expand the income generation of local communities and promote training for their inclusion;

11 – Sustainable cities and communities:

Local purchases by the companies help in the sustainable development in the region, since the expenses and logistics of transportation, energy, waste reduction, among others, are avoided;

13 – Climate Action:

Local purchases by companies helps mitigate climate change impacts by reducing GHG emissions;

15 – Life on Land:

The development of sustainable chains of local products and local biodiversity assets enhances the generation of economic alternatives for local communities, the development of the bioeconomy, and the conservation and sustainable use of land;

17 – Partnerships:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

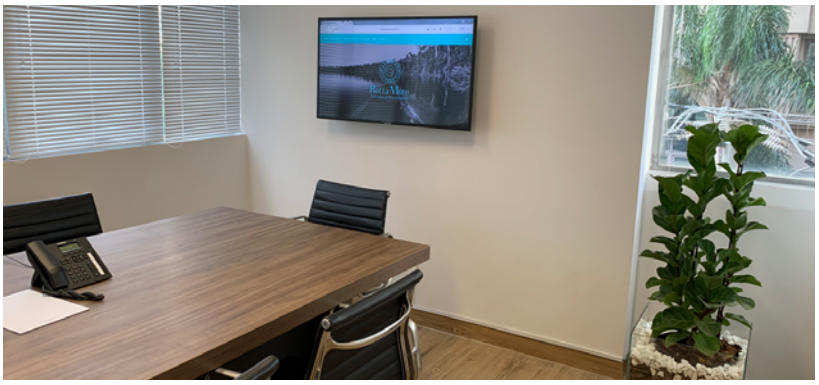


Photo of the headquarters of our law firm.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Companhia de Saneamento Básico do Estado de São Paulo - SABESP

Name of the case

Corporate Program of Sustainable Sewage Treatment Plants

Production of biomethane, a sustainable fuel obtained from biogas generated in sewage treatment, in the city of Franca-SP.

Site

http://www.sabesp.com.br

Corporate Email Address

protocolo.presidencia@sabesp.com.br

Type of Organization

Corporation / mixed economy, publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Water, sewage, waste management activities.

Theme

Reduction of direct emissions, scope 1 (according to the Greenhouse Gases (GHG) Protocol – organization's own facilities, own transport);

Reduction of indirect emissions, scope 2 (according to GHG Protocol – purchased electricity, steam, heating/cooling purchased for own use);

Organizational innovations and business models, Communication, stakeholder engagement and dissemination of good practices.

Case description

The purpose of the Program is to develop and disseminate the sustainability culture at Sabesp through the implementation of actions to improve operational management and continuously improve processes and environmental performance. It contemplates the use and transformation of by-products of Sewage Treatment Plants (STPs), such as biogas, sludge and effluent, into sustainable resources for beneficial use, considering environmental compliance, energy use, and in some cases, market opportunities for established solutions.

In this sense, the Sustainable STPs, in addition to fulfilling their role as a sanitary and environmental barrier, aim to minimize the consumption of natural resources and energy from the environment. As a prerequisite of the Program, all plants involved have an Environmental Management System (SGA - *Sabesp*) implemented or ISO 14001 Certification.

The actions aimed at sustainability include solutions such as the implementation of greenhouses for drying, composting and biodrying the sludge generated, reuse of water for urban, industrial or agricultural purposes, capture and energy use of biogas, generation of cleaner energy through plants Photovoltaics (UFVs), Small Hydroelectric Plants (PCHs), among others.

The Program establishes "Sustainability Levels" for the STPs, according to the criteria described below:

- Level 1: the STP must have considered and implemented sustainable solutions for the disposal of sludge, effluent and gases generated by the treatment.
- Level 2: in addition to Level 1 actions, it requires energy generation actions or the sale of a product developed from the adopted solutions.
- Level 3: in addition to Level 1 actions, it also requires actions for energy generation and the sale of products for use in the market.

In this context, an important initiative for sustainability and technological innovation at Sabesp is the use of part of the biogas generated at the STP in Franca to produce vehicle fuel to supply part of the Company's fleet in the municipality. This action has a biogas purification system, generating biomethane, which has a methane concentration above 97%. The technology used in the project is the result of a technical cooperation agreement with the Fraunhofer Institute, in Germany. The STP treats, on average, 500 liters of sewage per second and produces about 2,500 Nm^3 of biogas per day, with the resulting biomethane being equivalent to 1,500 liters of gasoline.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Improvement of operational processes and application of new technologies and use of by-products.

Has the Case been implemented?

Yes, it's running.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The processing of biogas at STP Franca, including its use as vehicle fuel as well as the burning of a surplus portion in flares, promotes an annual reduction in greenhouse gas emissions of around 4,300 tCO_2e.

Impacts/results

Improvement of environmental performance considering the observance of guidelines for eco-efficiency in treatment processes, with the minimization of energy use, contributing to the preservation of natural resources, the reduction and emissions of greenhouse gases and the application of solutions and practices to transform the by-products generated in sewage treatment plants (biogas, sludge and effluent) in sustainable resources, with value for use in the market.

Invested resources

Investments to adapt the infrastructure of the STPs and in research and technological development and innovation.

Specifically in the STP Franca project, the technology adopted is the result of the technical cooperation agreement with the Fraunhofer Institute, from Germany, with technology donation, without national similar and technology transfer, in addition to local and international training. The project's investment was in the order of BRL 7.4 million (reference year, 2018).

Main challenges faced

Consolidation of a culture focused on the sustainability of processes in operating units, from the beneficial use of sewage treatment by-products, considering the adoption of advanced technologies, required to achieve the desired results, in addition to market development for established solutions and the need to meet the requirements of the regulatory agency in the gas area, in the case of commercialization of biomethane.

Suggestions to improve the business environment (regulations, licensing, access to credit)

The strengthening of public policies aimed at sustainability in matters applied to sanitation, including simplification of environmental licensing procedures and enabling the beneficial use of generated by-products, associated with incentives for market development.

Next steps

Implementation of improvements in the infrastructure of the plants in order to obtain internal certification seals, including the progressive expansion of the program to other sewage treatment plants. In the case of biomethane, quality assessment studies, seeking approval as a product for commercialization.

Relations with the SDG (Sustainable Development Goals)

6 – Drinking water and sanitation:

For all;

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns;

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

The implementation of technology in the sewage treatment plants, aiming to direct the plants towards sustainability, which will promote an effective transfer of technology and knowledge, with the incorporation and development of new expertise by those involved in the Program. In this regard, the biogas purification systems, the sludge biodryers, among others, stand out.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Companhia de Saneamento Básico do Estado de São Paulo - SABESP

Name of the case

Distributed Generation Program - Photovoltaic Energy

Photovoltaic plant for generating solar energy installed in the area of Sabesp's Sewage Treatment Plant in Orindiúva-SP.

Site

http://www.sabesp.com.br

Corporate Email Address

protocolo.presidencia@sabesp.com.br

Type of Organization

Corporation / mixed economy, publicly traded.

Economic activities (based on CNAE - National classification of economic activities)

Water, sewage, waste management activities.

Theme

Reduction of direct emissions, scope 1 (according to the Greenhouse Gases (GHG) Protocol – organization's own facilities, own transport);

Reduction of indirect emissions, scope 2 (according to GHG Protocol – purchased electricity, steam, heating/cooling purchased for own use);

Avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.);

Organizational innovations and business models;

Adaptation actions to climate change;

Carbon capture and storage, emissions offsetting.

Case description

A relevant point in the provision of sanitation services is energy consumption, with several actions and programs at Sabesp aimed at energy efficiency and cleaner energy generation, such as electric generating plants, in addition to the use of solar energy to drive various operating equipment and lighting in administrative buildings.

Regarding the use of energy generation potentials, in 2019, we began the structuring of our Distributed Generation Program - Photovoltaic Energy, which is expected to be completed in 2023 and totaling installed power of up to 60 MWp, distributed in approximately 30 locations, corresponding to 4.5% of the Company's total consumption.

As part of the investments in actions aimed at innovation, efficiency and sustainability for the use of energy available in its facilities, each of these solar energy generation units will be installed around the Company's operating facilities, mostly in sewage treatment plants (STPs) of the Company.

The energy produced in these units will generate credit compensation in the total consumption of electricity that Sabesp uses in its operating water and sewage facilities and in administrative facilities.

Among the benefits achieved, the expected energy production, as it is based on energy use from a clean and renewable source, will help reduce greenhouse gas emissions in Sabesp's energy management processes and business activities, as well as in the national grid, helping to make it cleaner. In early 2021, we started producing energy at our first Photovoltaic Plant (UFV) of the Program, in the municipality of Orindiúva, adding to a series of projects developed to reduce energy consumption and diversify the energy mix of our operations.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it's running.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

With the Distributed Generation Program - Photovoltaic Energy, it is estimated that around 9,000 tCO_2e per year will no longer be released into the atmosphere, after the implementation of all the planned units.

Impacts/results

Improvement of SABESP's Environmental and Climate Agenda, contributing to the diversification of the energy mix in a cleaner way.

Invested resources

The Program for the Generation of Photovoltaic Energy by Distributed Generation has investments in the order of BRL 245 million financed by IDB Invest.

Main challenges faced

Expansion of emission reduction actions, considering technological, financial and operational issues.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Improvement of methodologies suitable for the correct appropriation of the benefits achieved by the implementation of the Program.

Next steps

In addition to expanding the scope of the actions mentioned above, studies are under development to optimize the use of cleaner energy sources in the Company's operations.

Relations with the SDG (Sustainable Development Goals)

3 – Health and well-being:

Ensure healthy lives and promote well-being for everyone at all ages;

6 – Drinking water and sanitation:

Ensure availability and sustainable management of water and sanitation for all;

7 – Clean and affordable energy:

Ensure access to affordable, reliable, sustainable and modern energy for all;

9 – Industry, innovation and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient and sustainable;

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

This is an innovation in the sanitation sector, through Sabesp's pioneering initiative in the adoption of photovoltaic generation in several locations in the State of São Paulo.

Corporate Name

Savin, Paiva Advogados

Name of the case

Low Carbon Advocacy

The Savin, Paiva Advogados Team.

Site

https://www.savinpaiva.com.br/

Corporate Email Address

savinpaiva@savinpaiva.com.br

Type of Organization

Law firm.

Economic activities (based on CNAE - National classification of economic activities)

Legal Services.

Theme

Reduction of the Direct Emissions (Scopes 1 and 2) and the Indirect Emissions (Scope 3) identified in the 2020 Corporate Greenhouse Gas Emissions Inventory. Planning GHGs mitigation and reduction (ex: substitute modes of transport, innovations in products and services, etc.). Offset Emissions. Internal and external communication, stakeholder engagement and dissemination of good practices.

Case description

The case is under implementation. In 2020, we started with an inventory that covered GHG emissions, waste, air emissions, energy consumption, water and fuels. We have already implemented mitigation and reduction actions. We signed a contract with Via Green Institute, on Apr/13/2021, to compensate non-avoided emissions corresponding to 1,472 tons of CO_2e (carbon dioxide equivalent), with the support of three projects aimed at reducing heating global: Project 1 - Prevention of methane emissions from municipal solid waste and food waste through composting, in India, State of Orissa, Municipality of Puri, Continent: Asia; Project 2 - Generation of electricity from renewable sources, developed in Brazil, in the State of Minas Gerais, in the Municipality of Uberlândia, on the continent of South America.

Furthermore, there was the adhesion to the additional initiative for the recovery of a Headspring in the Águas do Paraíso project, conceived by the Via Green Institute in partnership with the Rondônia Agroecological Association, which aims to recover water springs in degraded areas located in the municipalities of Ouro Preto do Oeste and Vale do Paraíso. (Planting 200 native seedlings; Enclosure of the area; Use of 100% organic fertilizer; Georeferencing; Monitoring for 5 years). Obtaining the Carbon Neutral stamp, which demonstrates the office's environmental responsibility and engagement in combating climate change.

Does the Case show GHG emission level reduction?

Yes, with the inventory of emissions and continuous monitoring, the office started to use the carpool system when times and destinations are compatible. There is also the practice of selective waste collection and avoiding the use of disposables.

There is a strong incentive to use sustainable means of transport.

Strong points:

Reusing draft paper, print ink reduction, keeping all files digitally archived, reusable cups and plates.

The use of digital documents has reduced paper usage.

Joining a recycling program.

How is the Case classified?

Mitigation, Offsetting, Social and Environmental Responsibility

Has the Case been implemented?

Under Implementation.

What is the forecast of continuity of the Case?

1 to 2 years for implementation, with expected continuity and permanence.

Is the Case likely to expand??

Likely.

Information about GHG emissions.

Is there any emission reduction?

Yes, the 2020 inventory was prepared, measures were implemented, but the measurement of the reduction will occur when the 2021 inventory is finalized.

Is there GHG sequestration?

Yes, indirect sequestration through the purchase of credits from the two projects mentioned and direct sequestration with planting 200 seedlings in the Águas do Paraíso project. Estimation of sequestering 28.57 tons of CO_2e (carbon dioxide equivalent) over the next few years).

Is GHG avoided?

Yes, the 2020 inventory was prepared, measures were implemented, but the measurement of the reduction will occur when the 2021 inventory is finalized.

Is this reduction verified?

Yes, verified by Instituto Via Green (third party).

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The 2020 inventory was made and measures were implemented immediately after identifying emissions and opportunities. Whatsoever, the reduction´s measurement will only occur in the end of 2021, when the inventory will be completed, and emissions will be recalculated and compared with the 2020 diagnosis .

Invested resources

Adherence to VGP Environmental Management under the management of Via Green Institute, a Non-governmental organization (NGO) that operates in the sustainability and carbon area.

Working hours of the employees involved in the implementation of the project and the changes; costs of digitizing the law´s firm archive. Offsetting the GHG footprint with the support of three projects: Project 1 - Prevention of methane emissions from municipal solid waste and food waste through composting, in India, in the state of Orissa, in the municipality of Puri, on the Continent: Asia ; Project 2 - Generation of electricity from renewable sources, developed in Brazil, in the state of Minas Gerais, in the municipality of Uberlândia, on the Continent: South America; and, Project 3 - Adherence to the additional project for the recovery of a headspring in the Águas do Paraíso Project, conceived by the Via Green Institute in partnership with the Rondônia Agroecological Association. Resources invested in total with the three projects and consulting company: BRL 9,847.48 (nine thousand, eight hundred and forty-seven and forty-eight reais), around USD 1832,09 according to the exchange rate of 27th September, 2021*.

*https://www.infomoney.com.br/ferramentas/cambio/.

Main challenges faced

Change of internal culture regarding the non-use or reduction of paper and change of mode of transportation used in business trips.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Step by step for those who want to implement similar policies. In the case of the office, there were no references for the area of expertise.

Next steps

To continue environmental monitoring for the current year, aiming to implement measures to reduce and mitigate the environmental impact.

Relations with the SDG (Sustainable Development Goals)

6 – Clean Water and Sanitation:

Ensure availability and sustainable management of water and sanitation for all;

7 – Affordable and Clean Energy:

Ensure access to affordable, reliable, sustainable and modern energy for all;

12 – Responsible Consumption and Production:

Ensure sustainable consumption and production patterns;

13 – Climate Action:

Take urgent action to combat climate change and its impacts;

14 – Life Below Water:

Conserve and sustainably use the oceans, seas and marine resources for sustainable development;

15 – Life on Land:

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss;

17 – Partnerships for the Goals:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes, because the office started to monitor its environmental impacts through an online platform, generating a database and indicators with the Via Green Institute software.

ACORDO AMBIENTAL SÃO PAULO

HOSPITAL SÍRIO·LIBANÊS

Corporate Name

Sociedade Beneficente de Senhoras Hospital Sírio Libanês

Name of the case

100% renewable energy

Wind farm.

Site

http://www.hospitalsiriolibanes.org.br/

Corporate Email Address

sustentabilidade.ambiental@hsl.org.br

Type of Organization

Association / others.

Economic activities (based on CNAE - National classification of economic activities)

Health and social services.

Theme

Reduction of indirect emissions, scope 2 (as provided by Greenhouse Gases Protocol - GHG Protocol), including acquired electrical energy, steam, acquired cooling/ warming for own use.

Case description

Hospital Sírio-Libanês has been trying to reduce emissions of greenhouse gases and increase the use of clean energy. The implemented action was the purchace of 45% renewable energy in 2019 and 2020, expanding to 100% renewable energy since the beginning of 2021 by purchasing renewable energy certificates (RECs) from wind power generation.

In the process, the energy is bought from the National Integrated System (*Sistema Integrado Nacional* - SIN), through energy free market contracts. The renewable energy certificates (RECs) are internationally recognized and serve as a guarantee that the energy comes from clean sources. In addition, we purchase the energy that has the Brazilian Renewable Energy Certificate, under REC Brasil seal.

Another important benefit of purchasing RECs is the incentive to the clean energy market.

Therefore, the organization is the first hospital to have 100% renewable energy and neutral carbon energy.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it was implemented and the benefits are ongoing.

What is the forecast of continuity of the Case?

Implemented *Case*.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Avoided emissions by purchasing 1,365 t CO_2e and 1,179 t CO_2e of renewable energy in 2019 and 2020, respectively. Up to July 2021, 2,056 t CO_2e were acquired.

Impacts/results

Avoided emissions by purchasing 1,365 t CO_2e and 1,179 t CO_2e of renewable energy in 2019 and 2020, respectively. Up to July 2021, 2,056 t CO_2e were purchased. Influenced increasing investments in renewable energy generation.

Invested resources

Purchase of approximately 10,800 RECs (BRL 56,000) in 2019 and 16,600 (BRL 63,000) RECs in 2020. Up to July 2021, BRL 45,600 have been purchased.

Main challenges faced

Understanding the concept of renewable energy certificates.

Next steps

Expand the portion of clean energy purchased in 2021.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy:

Ensure access to affordable, reliable, sustainable and modern energy.

13 – Climate Action:

Take urgent action to combat climate and its impacts.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

HOSPITAL SÍRIO·LIBANÊS

Corporate Name

Sociedade Beneficente de Senhoras Hospital Sírio Libanês

Name of the case

Actions contributing to low carbon emissions

Delivery of test results and reports.

Site

http://www.hospitalsiriolibanes.org.br/

Corporate Email Address

sustentabilidade.ambiental@hsl.org.br

Type of Organization

Association / others.

Economic activities (based on CNAE - National classification of economic activities)

Health and social services.

Theme

Reduction of direct emissions, scope 1 (as provided by Greenhouse Gases Protocol - GHG Protocol) - facilities of the organization, own transportation.

Reduction of indirect emissions, scope 3 (as provided by Greenhouse Gases Protocol - GHG Protocol), including acquired assets and services, capital goods, fuel, transportation and distribution, waste, business trips, etc.

Case description

Some of the actions contributing to low carbon emission implemented in 2019:

1. Delivery of test results and reports is made by bicycle and some transportation services are made using ethanol-fueled vehicles rather than high carbon emission fuel.

2. Exchange of tetrafluoroethane gas or R-134A of the chiller. The removed volume was sent for regeneration, with no gas emission.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it was implemented and the benefits are ongoing.

What is the forecast of continuity of the Case?

Implemented Case.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Approximately 2,305 t CO_2 in 2019.

Impacts/results

Many actions of supply management, such as delivery of test results and reports by vehicles with no carbon emissions and chilling gas regeneration, totaling approximately 2,305 t CO_2 e.

Invested resources

There was no cost in the regeneration process carried out by a company part of the Brazilian Program of Hydrocarbon (HCFC) Elimination.

Main challenges faced

Alignment of the process with the carbon emitting area that used gases (maintenance), changing its vision and exposing new possibilities of mitigation.

Next steps

Goal: reducing 50% of total emissions by 2030 and have zero emissions by 2050:

1. Maintain process improvement and have ethanol-fueled cars until electric cars are available. Implement electric motorcycle fleet.

2. Introduction of new flow to ensure no gas emission.

Relations with the SDG (Sustainable Development Goals)

13 – Climate Action:

Take urgent action to combat climate and its impacts.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

HOSPITAL SÍRIO·LIBANÊS

Corporate Name

Sociedade Beneficente de Senhoras Hospital Sírio Libanês

Name of the case

Compensation of emissions making investments in education

Purchase of premium carbon credits from ceramics company CGM.

Site

http://www.hospitalsiriolibanes.org.br/

Corporate Email Address

sustentabilidade.ambiental@hsl.org.br

Type of Organization

Association / others.

Economic activities (based on CNAE - National classification of economic activities)

Health and social services.

Theme

Capture and storage of carbon, emission compensation.

Case description

After adopting many mitigation actions, a strategy of purchasing premium carbon credits was devised to neutralize the carbon that could not be reduced with the actions of the year. Carbon credits are purchased from GSM, a ceramics company based in Ceara, which has a productive process with no fossil fuel and supports a social project focused on improving education in the region.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Compensation.

Has the Case been implemented?

Yes, it was implemented and the benefits are ongoing.

What is the forecast of continuity of the Case?

Implemented *Case*.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Compensation Case.

Impacts/results

A total of approximately 7,600 t CO_2e and 6,400 t CO_2e was compensated in 2019 and 2020, respectively, by purchasing carbon credits.

Invested resources

Compensation of about 7,600 t CO_2e in 2019 and 6,400 t CO_2e in 2020. The total purchased amount was BRL 95,0000 and BRL 83,000, in 2019 and 2020, respectively.

Main challenges faced

Understanding the premium carbon credit market.

Next steps

What cannot be mitigated will continue to be compensated, as defined by the organizational strategy.

Relations with the SDG (Sustainable Development Goals)

13 – Climate Action:

Take urgent action to combat climate and its impacts.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

HOSPITAL SÍRIO·LIBANÊS

Corporate Name

Sociedade Beneficente de Senhoras Hospital Sírio-Libanês

Name of the case

Hospital Sírio-Libanês: Strategies for management of Carbon Neutral and Zero Carbon in Energy

Hospital Sírio-Libanês reaches 100% renewable energy milestone.

Site

https://www.hospitalsiriolibanes.org.br/

Corporate Email Address

sustentabilidade.ambiental@hsl.org.br

Type of Organization

Simple society/others.

Economic activities (based on CNAE - National classification of economic activities)

Health and social services.

Theme

Reduction of direct emissions, scope 1 (cf. Greenhouse Gases Protocol - GHG Protocol), installations in the organization, own transportation); Reduction of indirect emissions, scope 2 (cf. GHG Protocol - acquired electrical power, steam, heating/cooling acquired for internal use); Reduction of indirect emissions, scope 3 (cf. GHG Protocol, acquired goods and services, capital goods, fuel, transportation and distribution, waste, business trips, etc.), Avoided emissions (replacement of fuels and transportation means, innovation in products and services, etc.).

Case description

To be defined as a carbon neutral organization, the top management has to be fully committed and a goal has to be set.

Thus, Hospital Sírio-Libanês made the commitment in 2019 through actions to measure greenhouse gas emissions, management of consumption that impacted carbon emissions, and compensation of what could not be reduced.

In summary, measuring the emissions of GHG was the first step for understanding the opportunities. Next, some immediate actions were executed, such as purchase of renewable energy certificates equivalent to 45% of the energy consumption, the determination of the emissions from the landfill, and better understanding the process of recycling refrigerant gas, having more clarity about the potential reductions. Goals for reduction were agreed on and more actions were unfolded to include different areas and resources, as it became something strategic for the organization.

At first, the commitment was to reduce by 15% over the previous years. It was compatible with the Race to Zero initiative, which included compliance with 50% reduction of emissions by 2030 and 100% by 2050.

The commitment with the initiative and the agreed goal, in addition to measuring and understanding the most significant emissions to guide the action prioritization, were drivers for new actions, such as:

- Purchase of 100% renewable energy (wind power), purchased through renewable energy certificates (REC) issued by international high-quality wind power mills (i-REC), which comply with all the high-quality standard requirements, being a reliable and traceable counting at the energy generation source. Thus, all the energy bought at Hospital Sírio-Libanês is clean and renewable.
- Avoided emission of HFC R-134a gas contained in a deactivated chiller, totaling 262.75 kg and 341.6 tCO_2e. The gas is sent to recycling carried out by an outsourced company, later to be sold as supplies. The process was incorporated by the Maintenance Department and it is conducted by a company accredited with the Brazilian Program for Hydrofluorocarbon (HFC) Elimination.
- High-efficiency air conditioning and refrigeration using global warming potential (GWP) refrigerant and purchase of new equipment to meet the standards of low emissions of GHG (switched equipment run by gas R22 to R32).
- Choice of a landfill that had burning of flare or reuse of generated methane gas.
- Recycling of construction waste, avoiding the destination of over 100,000 tons per year (2021) to civil construction landfills, which can be poorly controlled in terms of greenhouse gas emissions.
- Ban of mercury-based devices since 2009.
- Offset with purchase of premium carbon, providing social benefits to the ceramics industry in Ceara, with 4,368 tCO_2e.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Compensation.

Has the Case been implemented?

Yes, it has been implemented and the benefits are still being felt.

What is the forecast of continuity of the Case?

Implemented.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Approximately 5,820 tCO_2e in 2021

Impacts/results

Reduction of 5,820 tCO_2 and, in 2021, we purchased renewable energy and avoided emissions of 341.6 tCO_2e, recycling HFC gas R-134ª.

This reduction meant over 30% drop compared to the previous year, amounting to over 60% compared to the base year (2017).

Despite the major technology challenges to reach net zero emissions in hospital activities (scope 1 and 2), we are on the right track to meet the commitment of zero carbon by 2050.

Invested resources

Purchase of renewable energy amounting to total BRL 142,000 and purchase of BRL 66,000 in carbon credits.

Main challenges faced

Lack of technical material and market options to replace equipment and gases.

The challenges get even greater as more technologies are required to reduce the emissions of hospital activities required for successful operation of the organization.

Next steps

Some actions are under study and others are underway, such as:

- Exchange of fleet service provider from combustion engine to electric cars.
- Definition of use of electric cars to take the waste.
- Removal or exchange of combustion vehicles in the organization-owned fleet for electric vehicles.
- Feasibility study of an electric ambulance.
- Gases and anesthetic equipment - closed anesthetic systems, intravenous anesthesia, removing desflurane and minimizing the use of nitrous oxide.
- Expansion of efficient lighting (LED bulbs).
- Changes to shipping and distribution of products (low emission freight alternatives).
- Choices of PVC/DEHP free medical products.
- Search for sustainable electrical equipment.
- Search for reusable medical and surgical devices.
- Search for reusable or reprocessable instruments, equipment, hospital uniforms and gowns.
- Search for foods produced and processed locally.
- Search for reusable dishes and utensils.

Relations with the SDG (Sustainable Development Goals)

13 – Actions against Climate Change:

Take urgent measures to fight against climate change and its impact.

Does the Case contribute to technological development and/or to the business model?

Yes, we think it is an innovative case as it provides a positive brand exposure and market position in favor of the environment within the healthcare industry. It provides gains to an innovative and updated business model.

Corporate Name

Nova Sun Sim Energias Renováveis

SUN MOBI
A energia sem limites.

Name of the case

Community solar photovoltaic (PV) distributed generation

Distributed generation photovoltaic powerplant Mauricio Valter Susteras, 400kWp of installed capacity, in Araçoiaba da Serra-SP.

Pedro Mascaro

Distributed generation photovoltaic powerplant Wanda Maria Bueno, 1000kWp of installed capacity, in Porto Feliz-SP.

Site

https://sunmobi.com.br/

Corporate Email Address

curiosidade@sunmobi.com.br

Type of Organization

Limited Society.

Economic activities (based on CNAE - National classification of economic activities)

Administrative activities and complementary services.

Theme

Reduction of indirect emissions, scope 2 (according to GHG Protocol – acquired electrical energy, steam, acquired heating/cooling for self-consumption).

Case description

Enabling of implantation of a community solar photovoltaic distributed generation powerplant, allowing consumers - individual people or families and small business – to reduce their emission through replacing the source of their electrical energy.

Community distributed generation is a relatively new type of DG (distributed generation) in Brazil. In this type of DG, a group of people and/or companies get together to build a PV powerplant to attend their own consumption. The biggest difference is that, instead of the PV powerplant being installed in location (for example, in their own rooftop), the PV powerplant is installed in a distant location, where generation potential can be optimized and the cost of construction, lower – construction directly on the ground, in a rural area with higher solar incidence, for example. The energy generated by this PV powerplant is injected in the distribution network. The distribution company is informed previously of who participates in this "solar community" and compensates the amount of energy generated by the PV powerplant in these people/companies' energy invoices.

This arrangement allows people who cannot – either because they rent a property or because they live in an apartment, for example – or don't want to install a PV system in their rooftop access to clean, sustainable and renewable energy. The most interesting aspect of this type of DG is that it really democratizes access to clean energy. Today, it's possible to supply clean energy to a single person living in a flat, that consumes 100kWh per month and to a bakery that consumes 20,000kWh per month, with the same PV powerplant. The only limitation is geographical: the current regulation dictates that consumers and the DG powerplant must be connected to the same distribution company – in Sun Mobi's case, the distribution company is CPFL Piratininga, which means that Sun Mobi can supply clean energy to consumers in the region of Baixada Santista, Jundiaí, Sorocaba, Itu, etc. To attend consumers in other regions, it's necessary to build DG powerplants connected to other distribution companies.

Currently, Sun Mobi has three PV powerplants operating as community solar powerplants, all in São Paulo state: the first one began operating in November/2017, with the installed capacity of 75kWp, in Araçoiaba da Serra; the second one, also in Araçoiaba da Serra, with the installed capacity of 325kWp, began operating in September/2018; and the third one, in Porto Feliz, with the installed capacity of 1000kWp, began operating in February/2020. Altogether, they generate, in average, 176.000kWh per month, which is enough to supply clean energy to 440 residences of four-people family, that consumes an average of 400kWh per month.

Beyond democratizing access to clean energy, it's important to highlight other positive impacts of these projects: they inject money in the local economy. During the construction period, the majority of the workforce and contractors are locals. There is also a positive impact in the energy quality for the nearby residences and commerce: to connect these PV powerplants, it was necessary to invest in improvements of the local distribution network, with new light poles, cables and even improvements in the local substation.

Finally, it's important to highlight that community solar it different from International REC Standard (I-REC), global system which allows the renewable energy certificates trading, although the PV powerplants are eligible to be certificated to issue I-RECs.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it was implements and the benefits are still ongoing.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Emissions avoided in 2020: 120tonCO_2. Because one of the PV powerplants began operating in February/20, the annual avoided emission is lower than 12 completed months. The annual avoided CO_2 emission is 140ton.

This number is calculated monthly. The Science and Technology Ministry publishes the average CO_2/MWh emission factor for the National Interconnected System. So, considering the generation of the powerplants connected to the national grid and that operated in any given month, the factor of CO_2 per MWh of generation emitted is calculated (https://antigo.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/textogeral/emissao_corporativos.html).

By consuming energy from a clean source from a community solar powerplant, the consumer is not consuming energy from the national grid, therefore, having avoidedg the emission of CO_2, by the factor o CO_2/MWh published by the ministry.

This factor can vary from month to month, year to year, depending on if the national grid needs more or less thermal powerplant generation. However, on average, a certain level of stability is expected.

There is a project to expand this case. Today, in the area of the Porto Feliz powerplant, the project is to expand from 1MWp to 5MWp of installed capacity. There is also a project to install another 5MWp in Taubaté.

Impacts/results

More then 100 consumers receive energy from clean source, with the avoided emissions of 140tonCO_2 per year.

Invested resources

BRL 5 million.

Main challenges faced

Feasibility of electrical infrastructure to distribute the energy generated by the PV powerplants and financial resources to make the investment viable.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Alternative methods of financial guarantees to make fundraising viable; for example, a guarantee fund directed to initiatives of this nature.

All Sun Mobi's projects used DesenvolveSP (São Paulo development state bank) Linha Economia Verde (LEV) financing line, which requires real financial guarantees for the full amount financed. Sun Mobi used its partners' real states and letters of guarantees (which are very costly) as financial guarantees. The Fundo Garantidor was also used to partly cover the financial guaranties, but it is also very costly.

If there were a guarantee fund specifically for these types of projects, with lower costs, it would increase the feasibility of the projects.

Next steps

To expand operations, to service more consumers.

Build more 4MWp of PV powerplants in Porto Feliz – this would be enough to supply another 140 consumers, and would avoid the emissions of 396 tonCO_2 per year

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy:

Ensure reliable, sustainable, modern and affordable access to energy for all;

11 – Sustainable Cities and Communities:

Making cities and human settlements inclusive, safe, resilient and sustainable;

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption patterns.

Does the Case contribute to technological development and/or to the business model?

Yes. It's an innovative business model, because it's equivalent to a streaming service: the client will have the monthly payments debited from their credit card.

So the consumer has access to clean energy, without any hustle, no need of investments or infrastructure adaption in their house.

Beside this, and real time energy consumption sensor is installed in the client's house, with access to its consumption via an app, so beyond consuming clean energy, Sun Mobi's clients consume energy more consciously. Once you know how you consume energy, it is possible to change habits that reduce the final consumption effectively.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Sylvamo do Brasil Ltda

Name of the case

Raízes do Mogi Guaçu Program
(Mogi Guaçu Roots)

Planting on Mrs. Ellen Fontana, partner of Raízes do Mogi Guaçu program.

Evolution of restored area after one year. Mrs. Ellen Fontana, partner of Raízes do Mogi Guaçu program.

Site

https://www.sylvamo.com/us/en/

Corporate Email Address

comunidada@sylvamo.com

Type of Organization

Private limited company.

Economic activities (based on CNAE - National classification of economic activities)

Manufacturing industry.

Theme

Biodiversity, conservation, forest asset management, land use;

Climate change adaptation actions;

Engagement of vulnerable communities.

Case description

The Raízes do Mogi-Guaçu program aims to recover and restore springs and riparian areas of the Atlantic Forest in the Mogi-Guaçu river basin, in the eastern region of the state of São Paulo and southern Minas Gerais, prioritizing areas with high water supply but low resilience and vegetation cover. The initiative is the result of the technical-institutional cooperation agreement signed in 2018 between Sylvamo and WWF-Brazil with realization by the Copaíba Environmentalist Asso-ciation and the Federal Institute of the South of Minas Gerais.

The initial goal was to restore 100 hectares of forest in the region, and with recent sponsorship from HP, the project was able to double the restoration goal to 200 hectares by 2024, creating more resilient envi-ronments with greater water availability.

Raízes seeks to promote engagement and dialogue with different sec-tors and local players, broadening community awareness of the need for forest restoration, strengthening local governance, and creating a network for the protection of springs and ecological restoration in this important watershed.

In partnership with 18 owners, different restoration techniques were adopted in priority areas for water supply in the municipalities of So-corro, Serra Negra, and Águas de Lindóia in the state of São Paulo, as well as the cities of Inconfidentes, Bueno Brandão, and Monte Sião in the state of Minas Gerais.

As such, the program contributes and acts directly for the maintenance and recovery of the region's springs and rivers, in sustainable forest management and in the socioeconomic development of the local com-munity, working in an articulated manner with local players, empower-ing the localities in social and environmental causes.

The UN declared 2021-2030 as the Decade of Restoration, yet another indication that the planet expects scaled actions to tackle problems such as climate change and desertification, since forest restoration can be understood as an effective economic action to fight hunger and social inequalities.

Atlantic Forest

The Atlantic Forest is considered a global conservation hotspot, i.e. it is an environment with a high level of biodiversity and great importance for humanity, but it is under threat.

It is home to 7% and 5% of the Earth's plant and vertebrate species, respectively, and houses more than 20,000 species of plants and ani-mals, with a high rate of endemism. Furthermore, 75% of Brazil's GDP is generated within this ecosystem, which is also home to the main source of potable water for 60% of the country's population.

The water springs, which form small streams, ponds, and rivers, are located inside the forests, which, by helping the soil to absorb the rainwater, protect them from erosion. Despite all this importance, the Atlantic Forest is one of the most threatened biomes in the world, having already lost 88.3% of its historical extent.

As such, forest restoration work is fundamental for the maintenance of this ecosystem and, consequently, for the stabilization of the soil of the riparian forests, the maintenance of high quality potable water, of water availability, and the increase of important habitat areas for biodiversity and for the socioeconomic development of the region.

One of the major highlights of the program is the premise of promoting multisectorial dialogue, enhancing connectivity and amplitude in the involvement of the various players, especially in the identification and dialogue with rural owners. The Raízes do Mogi Guaçu program points to the importance of collaboration among the private initiative, producers, research institutes, public authorities, and civil society to rescue fundamental ecosystem services, benefiting not only the producers, but the entire region served by the Mogi Guaçu River.

To strengthen the network of partners, in addition to the proximity and interlocution with various players from the beginning, the Dialogue Cycle of the Raízes do Mogi Program was developed, a series of events that took place on site in 2019 and online in 2020/2021, in which various topics are addressed and experiences are shared, relying on the participation of multiple players, including landowners, who share experiences, challenges, and opportunities. The meetings are free of charge and so far 2 on site and 5 online have been held with topics ranging from restoration and its relationship with productivity and water availability to income generation on the property.

WWF-Brazil, a non-profit organization that works to change the current trajectory of global environmental degradation.

Does the Case show GHG emission level reduction?

Climate change adaptation actions.

How is the Case classified?

Mitigation, Adaptation, Sequestration, Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it's been implemented; Yes, it is underway.

What is the forecast of continuity of the Case?

Case implemented, more than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

1. As of March 2021, 64 hectares had already been restored.

2. Approximately 66,000 seedlings have already been planted.

3. 37 springs have already been protected by the Copaíba team, in the Peixe sub-basin, and by IFEAC/IF Sul de Minas Gerais – Núcleo Inconfidentes, in the Alto Mogi sub-basin.

4. 18 owners involved in the project.

5. More than 7,900 m of fences were installed to protect the seedlings.

6. Approximately 5 km of protected margins.

Invested resources

The amount invested by Sylvamo until 2022 will be BRL 1,000,000.00.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Regulated environments support long-term structured business processes. Business challenges that change the operation and contemplate 10 years or more should be considered best practices and have regulatory environments that are favorable to the transition.

Next steps

The initial goal was to restore 100 hectares of forest in the region, and with recent sponsorship from HP, the project was able to double the restoration goal to 200 hectares by 2024. In addition, it seeks to promote engagement and dialogue with different sectors and local players, broadening community awareness on the importance of the topic, strengthening local governance and creating a network for the protection of springs and ecological restoration in this important watershed.

Relations with the SDG (Sustainable Development Goals)

2 – Zero hunger:

Achieve food security and improved nutrition, and sustainable agriculture.

6 – Potable water and sanitation:

For all.

8 – Decent work and economic growth:

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

9 – Industry, innovation and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient and sustainable.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

15 – Life on land:

Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

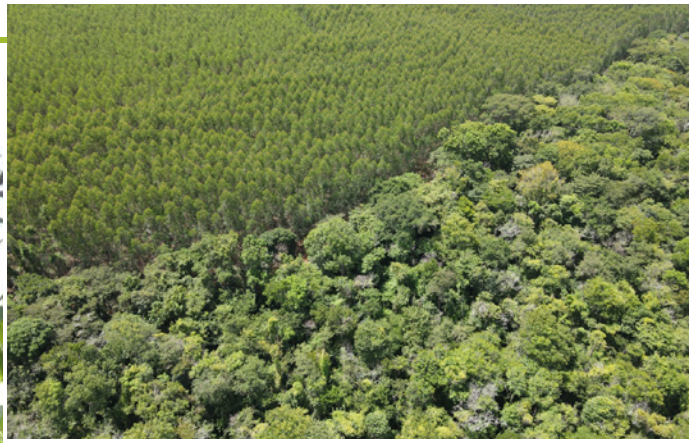
Corporate Name

Sylvamo do Brasil LTDA

Name of the case

São Marcelo Forest Park Natural Heritage Private Reserve

Area of the Forest Park São Marcelo Natural Heritage Sylvamo Private Reservation.



Vegetation of the São Marcelo Forest Park Natural Heritage Sylvamo Private Reservation.

Area of the Forest Park São Marcelo Natural Heritage Sylvamo Private Reservation.

Site

https://www.sylvamo.com/

Corporate Email Address

comunidade@sylvamo.com

Type of Organization

Limited liability company.

Economic activities (based on CNAE - National classification of economic activities)

Processing industry.

Theme

Biodiversity, conservation, forestry asset management, land use.;

Actions to adapt to climate change.

Carbon capture and storage, emission compensation.

Engagement of vulnerable communities.

Case description

Forests make up the essential mechanism for sustaining life on Earth. In addition to being fundamental to the supply of air, water, food, and biodiversity, forests ensure climate stability and are the means of life for more than 1 billion people in the world.

However, the forest preservation scenario in Brazil has been the cause for concern in recent years. Data from the National Institute for Space Research (INPE) indicate that between August 2019 and July 2020 deforestation in the Amazon grew 34%, increasing for 14 consecutive months, while in the Atlantic Forest there is only 12% of the remaining forests.

On the other hand, studies indicate that one hectare of forest can absorb up to 10 tons of carbon from the atmosphere in a year. This absorption helps to reduce pollution and global warming, and contributes to regional climate regulation.

In view of this situation, efforts to engage rural producers to adopt sustainable agricultural activities and initiatives in ecological restoration are fundamental for climate regulation, maintenance of biodiversity and the quality of life.

Committed to the conservation of healthy and abundant forests and the development of the communities of which it is part, Sylvamo, the world leader in the manufacture of pulp and paper based on renewable fibers, has carried out ecological restoration, which is the process of recovering an ecosystem that has been degraded, disturbed or destroyed. aiming to recover the native vegetation of its properties, especially in the last two decades.

As a special mechanism for the protection of these environments, the creation of Private Natural Heritage Reserves (RPPN) becomes an allied tool for this purpose. The São Marcelo Forest Park RPPN, located in Mogi Guaçu (SP), is one of these areas specially protected by Sylvamo. In 2002, 240 hectares with more than 100 native species of regional occurrence were reforested. Since the beginning of these activities, 40 permanent plots have been installed to monitor the native forest vegetation to be reestablished, which allowed, over the years, the development of research focused on the generation of scientific knowledge and technological dissemination of the methodologies implemented, whose results were the basis for parameters used in public policies of the state of São Paulo, in the context of ecological restoration.

Among the benefits already recorded, we highlight the high diversity of plant species in the mature forest, connectivity at the landscape level along the areas of permanent preservation of the Mogi Guaçu River and the influence of the associated fauna as propagule dispersal agents, both in the RPPN and in its surroundings. Just as important, the structure of forest vegetation (treetops, branches, trunks, and leaves) and soil are home to hundreds of species of fungi and bryophytes, indicator organisms of paramount importance in the ecological functionality of the area.

Thus, all actions aimed at the conservation and recomposition of native vegetation, especially through ecological restoration and creation of conservation units, generate direct benefits for society as a whole. This contributes to the restoration of local environmental functions, economic strengthening, ensuring water and food safety, as well as increasing the resilience of agricultural systems in the face of climate change and contributing to mitigating risks caused by natural disasters.

Sylvamo believes in Brazil's potential to further strengthen practices in conservation and ecological restoration, contributing to a better and more resilient country in the face of crises that may arise in the future.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Adaptation, Sequestration.

Has the Case been implemented?

Yes, it has been implemented and its benefits carry on.

What is the forecast of continuity of the Case?

Case implemented, over 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

Yes.

Is GHG avoided?

No

Is this reduction verified?

No.

Impacts/results

The São Marcelo Forest Park currently has 240 hectares of forests with a high diversity of species.

The area was restored by planting seedlings of pioneer and non-pioneer tree species with high diversity, focusing on individuals threatened with extinction and species of the various dispersal guilds. The distribution of seedlings in the field in mosaic format was carried out aiming at rapid soil cover, longevity and forest structuring in the shortest time and greater effectiveness possible. In addition, currently, the area has several species that have entered the system through the dispersion of seeds by animals by the associated fauna.

The work developed allowed an increase in the area's ecological functionality, so that the fauna became one of the main dispersing agents in the RPPN and its surroundings, which has contributed to the maintenance of the reproductive cycles of plants as well as animals.

With continuous studies developed over the two decades, 15 species of vascular epiphytes were observed and identified, distributed in four families and 11 genera, with 139 tree species recorded to date. The study also observed the presence of new species of decomposer fungi of the Lignicolous basidiomycetes group, bioindicators of advanced stage of ecological succession in the area.

Invested resources

The amount invested was USD 1,000,000.00 (from USD 4,000 to USD 5,000 per hectare in 2002).

Main challenges faced

The availability of native seedlings of high specific diversity was a challenge of the project. Another challenging point: an efficient definition of forest mosaic models for restoring areas, considering the distribution of seedlings in the field.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Regulated environments support long-term structured corporate processes. Business challenges that change the operation and whose expected term is over 10 years should be considered good practices and have regulatory environments favorable to the transition.

Next steps

The area has high added value for society as a whole in environmental, social, and scientific aspects. The data generated contributed to the definition of models that support ecological restoration activities currently performed, as well as public policies that govern the monitoring of areas that undergo restoration and are areas of continuous field study. In addition, we have the goal of expanding the areas intended for conservation, by implementing native forests, strengthening existing actions and supporting the conservation of vegetation already established by 2030.

Relations with the SDG (Sustainable Development Goals)

3 – Good health and well-being:

Ensure healthy lives and promote well-being for all at all ages.

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient, and sustainable.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

15 – Life on land:

Protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Innovation at the scientific level.

Other information regarded as relevant

In 2010, the RPPN was recognized by the United Nations (UN) Food and Agriculture Organization (FAO) as a reference in sustainable forest management in Latin America.

In 2022, Sylvamo received its first Ecology Expression Award in the Sustainable Forest Management category. The company's highlight was the project for ecological restoration of the São Marcelo Forest Park Private Natural Heritage Reserve (RPPN).

In addition, as a result, the Botanical Institute (IBt) developed studies in 98 reforested areas older than 10 years, around the São Marcelo Forest Park. Access the study at: **https://brazilianjournals.com/index.php/BJAER/article/view/32831/25719**.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Sylvamo do Brasil Ltda

Name of the case

Sustainability practices in the supply chain

Sylvamo Forest Area.

Site

https://www.sylvamo.com/us/en/

Corporate Email Address

comunidada@sylvamo.com

Type of Organization

Private limited company.

Economic activities (based on CNAE - National classification of economic activities)

Manufacturing industry.

Theme

Reduction of indirect emissions, scope 3 (Greenhouse Gases Protocol (GHG Protocol), which includes purchased goods and services, capital goods, fuel, transportation and distribution, waste, business travel, etc.).

Avoided emissions (replacement of fuels and modes of transportation, product and service innovations, etc.).

Case description

Decarbonizing supply chains is transformative for global climate action having the potential for major impact. A sustainable chain also includes processes that reduce negative impacts, whether social, environmental, economic, or governance.

For the purpose of maintaining the sustainability of our supply chain and establishing solid and consistent partnerships with our suppliers, the supply area conducts risk assessments every six months using the global Supply Security Assessment Matrix (SSAM) methodology. In these assessments, we identify possible/potential risks that affect the operational capacity of our suppliers and, consequently, our operations, connecting our 10-year goals with the 2030 Vision.

Throughout negotiations, partnerships, and developments were supported by the internal supply team with suppliers, we were able to leverage sustainable initiatives that enabled results in the following theme axes in 2020:

- Route reductions with km reduction.
- Reduction in fuel usage.
- Improvement and efficiency of machinery.
- Health and welfare in the chain.

With the support and engagement of our suppliers, we performed actions that resulted in the reduction of 123 tons (t) of CO_2 annually and savings of about BRL 416,000.

The calculation was made using the CO_2 Calculator, available on the website of the Paraná State Court of Justice (TJ-PR):

https://www.tjpr.jus.br/web/gestao-ambiental/calculadoraco2.

There was also a reduction of 2,352 tons of sulfur dioxide (SO_2). SO_2 is also present in vehicle emissions as a result of burning fossil fuels and its environmental level is decreasing due to increased emission control and reduction in sulfur content in fuels.

The SO2 present in the atmosphere can lead to the formation of acid rain and is a precursor to sulfates, one of the main components of inhalable particles.

There are also intangible results of these long-term partnerships, such as: (i) the creation of sustainability governance in suppliers, engaging them and structur-ing their operations for the topic, which in turn replicate within their chains creating a sustainable ecosystem; (ii) the impact on the health and welfare of the employees directly involved in the improvements, in addition to community health, since air pollution and climate change were ranked as one of the greatest threats to global health by the World Health Organization (WHO) in 2019. This is because the main cause of air pollution (burning fossil fuels) is also a major contributor to climate change.

Therefore, the actions developed during 2020 respond to various problems related to climate change. In addition, we continue to work hard on more initiatives that combat the advance of climate change.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it was implemented.

What is the forecast of continuity of the Case?

Case implemented, more than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

123 tCO_2e.

Impacts/results

8 initiatives completed:

Reduction of 123 tCO_2/year;

Reduction of 2352 tSO_2/year.

Forestry Operations Initiative:

Replacement of the bus fleet;

Replacement of field machinery;

Reduction of fuel and maintenance.

Result:

- Reduction of 17,424 liters (l) of diesel/year;
- Reduction of 40 t/year of CO_2;
- Reduction of BRL 101,000/year in maintenance and fuel;

Composting Operations

Initiative:

Scope review and centralization of operations;

Reduction of internal travel.

Results:

- Reduction of mileage traveled (5,340 km/year)
- Reduction of 03 t/year of CO_2

Transporting employees in the forest

Initiative:

Replacement of the bus fleet;

Route reductions;

Reduction of fuel and maintenance.

Result:

- Reduction of mileage traveled (43,200 km/year);
- Reduction of 26 t/year of CO_2 ;
- Reduction of BRL 315,000/year in maintenance and fuel.

Operations in the transportation of meals for forestry employees

Initiative:

Replacement of the fleet of cars that transport the meals to the forestry employees.

Result:

- Reduction in fuel consumption – 2295 km/Year;
- CO_2 emissions reduced by 06 t/year.

Replacement of cleaning products for forestry machines

Initiative:

Replacement of degreasing solvent (MT-200) for clean-ing forestry machines.

Result:

- 30% reduction in annual use (1176 l/year);
- Reduction of 26 t/year of CO_2.

Used tire disposal

Initiative:

Disposal of tires used in the forestry area:

With this initiative, we avoid incorrect disposal in land-fills.

Result:

- Reduction of 8 tons of tires in the forestry areas.

Replacing diesel used in the packaging transportation fleet.

Initiative:

Replacement of S500 diesel with S10 diesel used in the packaging transportation fleet at the Luis Antonio and Mogi Guaçu units.

Result:

- 98% reduction of annual sulfur emissions (2352 t/ppm);

Operations in timber transportation

Initiative:

Centralization in supplier operations

Review of the operation centers;

Route reductions

Replacement of the automobile fleet.

Result:

- Reduction of mileage traveled (30,756 km/year);
- Reduction of 22 t/year of CO_2.

Invested resources

Emissions in the supply chain are spread across hundreds of suppliers, routes, and vehicles. Also, the supplier base itself may experience change over time. This makes addressing supply chain emissions a complex task that requires the understanding and engagement of all parties. There are also organizational and emission management problems with this audience that is often unprepared to provide certain information, making the monitoring and tracking of emissions even more difficult. Thus, to engage and bring sustainability perspective to suppliers, the supply team has to be aware of low carbon alternatives and to apply criterias for purchasing decisions.

Another point is that reducing emissions in some cases requires intensive, long-term commitments with suppliers. This is what we call shared responsibility, understanding that every player in a given value chain influences the emissions of other players and therefore shares the responsibility to reduce them. In this context, we have extended the duration of our agreements to support our suppliers and give them long-term assurances on implementations and changes.

Decarbonizing the supply chain is a major untapped opportunity for Climate Action. Five years after the adoption of the Paris Agreement, COVID-19 reshaped the world and brought us to a crossroads. To succeed, the twin challenges of COVID-19 and climate change must be addressed together, with solutions to reduce emissions ready to accelerate our recovery to a healthier and more resilient future.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Regulated environments support long-term structured business processes. Business challenges that change the operation and contemplate 10 years or more should be considered best practices and have regulatory environments that are favorable to the transition.

Next steps

Other measures are already being implemented, contemplating other suppliers, and we are also working on the evolution and expansion of the scope of our existing initiatives.

Relations with the SDG (Sustainable Development Goals)

6 – Potable water and sanitation:

For all.

8 – Decent work and economic growth:

Promote sus-tained, inclusive and sustainable economic growth, full and productive employment and decent work for all;

9 – Industry, innovation and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation;

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient and sustainable;

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns;

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts;

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revital-ize the global partnership for sustainable develop-ment.

Does the Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Sylvamo do Brasil LTDA

Name of the case

Sustainable supply chain

Sylvamo Forest area.

Site

https://www.sylvamo.com/

Corporate Email Address

comunidade@sylvamo.com

Type of Organization

Limited liability company.

Economic activities (based on CNAE - National classification of economic activities)

Processing industry.

Theme

Reduction of indirect emissions, scope 3 (according to the Greenhouse Gases Protocol (GHG Protocol) – purchased goods and services, capital goods, fuel, transportation and distribution, waste, business trips, etc.).

Avoided emissions (replacement of fuels and modes of transport, innovations in products and services, etc.).

Case description

Seeking to effectively incorporate Environmental, Social, Governance (ESG) into the business strategy, Sylvamo considers an integrated approach between strategy, processes, and efficiency throughout the value chain.

In this sense, it is essential to understand the environmental, economic, and social impacts of products and services throughout the entire cycle, and thus to identify and conduct risk management. Therefore, in this search for an efficient production chain, we value a healthy supply chain, in which we select our suppliers using criteria related to the proximity of our operations, conduct guidelines, and safety and quality standards established and expected by us.

At Sylvamo, the Procurement area has sustainable action goals by supply category, where buyers contact suppliers and identify sustainable potential and concrete actions in partner operations. Furthermore, our premise includes the 2030 Goal - the company's long-term sustainability goals, which we use as a guide to sustainable actions. Thus, the 2030 targets show how Sylvamo intends to improve and to reach sustainable goals, which are connected to the SDGs. For the next decade, Sylvamo's objective are encompassed in three fronts.

- Sustainable forests: conserve and recover 100,000 hectares of native forests with high ecological value and 100% of raw material from sustainable fibers, conserving forests.
- Responsible operations: reduce 35% of greenhouse gasses scope 1,2, and 3 and define a path for zero liquid emissions, as well as reduce the use of water by 25%, and implement improvement processes for the management of water based on the context of each unit.
- Prosperous people and communities: protect and improve the life of professionals and support communities, providing a work environment free from accidents. Strengthen education in communities with 30% of women representation and 35% of women in leadership positions.

In 2021, the Procurement area conducted several sustainability actions with 21 suppliers, aiming to reduce our environmental impact focusing on decarbonization.

These reductions are accounted for through a GHG Protocol tool.

In total, we had 19 actions with 21 different suppliers, such as:

- Optimization of routes, ensuring the reduction of miles traveled, thus reducing diesel consumption.
- Reduction of the amount of chemicals in the process, lowering the environmental impact in the chain.
- Replacing S500 diesel oil with S10 diesel oil since it has lower sulfur concentration.
- Optimization of machinery, ensuring reduction in the use of fossil fuels.
- New bus fleet for transporting forestry employees.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Social, and Environmental Responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits carry on.

What is the forecast of continuity of the Case?

Case implemented, over 10 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

In 2021, 245 tons of carbon dioxide equivalent (tCO_2e) were reduced. The measures implemented are solidified so the impact is permanent rather than temporary.

Impacts/results

With the support and engagement of our suppliers, sustainability actions resulted in the reduction of 245 tons of CO_2e, the mitigation of emission of 1,881.60 Kg/Year of sulfur dioxide, and a reduction in the use of stretch film, PET resin and wood used in our processes.

Main challenges faced

Emissions in the supply chain are spread between hundreds of suppliers, routes, and vehicles. In addition, the supplier base itself may change over time. This makes the treatment of supply chain emissions a complex task that requires the understanding and engagement of all parties. There are also organizational problems and issues with the management of the emission of these stakeholders, who are often not prepared to provide certain information, making monitoring and tracking emissions even more difficult. Thus, in order to engage suppliers and offer them a Sustainability perspective, the Procurement team is aware of low carbon alternatives, and it applies criteria for purchasing decisions.

Another point is that in some cases, reducing emissions requires intense long-term commitments to suppliers. We call it shared responsibility, understanding that every player in a given value chain influences the emissions of other players and therefore shares the responsibility of reducing them. In this context, we extend the duration of our contracts to support our suppliers and give them long-term assurances in implementations and changes.

Relations with the SDG (Sustainable Development Goals)

9 – Industry, innovation, and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Sylvamo do Brasil LTDA

Name of the case

Verde Mel Project

Central Meliponary of Brotas - SP.

Meliponary for the multiplication of bees in Brotas -SP.

Native bee hive.

Site

https://www.sylvamo.com/

Corporate Email Address

comunidade@sylvamo.com

Type of Organization

Limited liability company.

Economic activities (based on CNAE - National classification of economic activities)

Processing industry.

Theme

Biodiversity, conservation, forestry asset management, land use.

Organizational innovations and business models.

Communication, stakeholder engagement and dissemination of good practices; and

Actions to adapt to climate change, and Engagement of vulnerable communities.

Case description

Bees are fundamental for the conservation of natural ecosystems, forest development, and agricultural sustainability. Bees pollinate 80% of the native forests, ensuring their health and abundance. 70% of agricultural crops also rely on pollination to ensure its development, and nearly one third of the world's food for human use also depends on this important process carried out by bees. (Data from the U.S. Department of Agriculture).

Climate change has caused changes in the habitats of various species. The impact on bees affects an entire chain. Several studies have shown that bees are important pollinators of many plants, which depend on pollination of these insects to reproduce and produce their fruits and seeds. There are reports of declining bee species, especially native, which puts food production at risk. Therefore, it is clear that in order to minimize the effects of climate change, it is necessary to work with the entire the ecosystem.

These significant figures are increased by the extinction of some species, a consequence of activities such as deforestation and indiscriminate use of pesticides. Given this scenario, sustainable bee management becomes the essential strategy for its conservation. Committed to the conservation of healthy and abundant forests as well as the development of the communities of which it is part, Sylvamo has partnered with the ATA Institute, a non-governmental organization whose main mission is to support the ingredients, producers, and productive territories of Brazil. The Verde Mel Project was launched in 2020 from the joint purposes of these organizations. The initiative aims to encourage responsible management of native stingless bees, to value the national meliponiculture and the ecosystem service of pollination of the Atlantic Forest. Its mission is to acknowledge the value of the existence of bees and forests and to expand the necessary conditions for the sustainability of this relationship.

Through integrated actions, the Verde Mel project operates in strategic territories, supporting production chains and promoting honey as a biological and gastronomic product in Brazil. The project now has a central meliponary in Brotas (SP), which works with the multiplication of colonies, expansion of the stock on a continuous basis; training of producers and professionals involved throughout the chain; production of honey and by-products; distribution of colonies after multiplication to strategic producers in ecological restoration and productive capacity. After the distribution of colonies, a strategic pollination is made of the restoration process, as well as the development of the local economy and family farming that, through honey and other by-products, will be able to increase income in a sustainable way.

The initiative also promotes nutritional, functional and gastronomic studies, and will have a modern laboratory of gastronomic research, whose objective is to develop recipes and by-products in order to expand access to the consumer market and add value to meliponiculture in Brazil. One of the goals of the Verde Mel project is to publish, at the end of 2022, books that address gastronomy with products of native bees and technical contents for breeders of native stingless bees.

Aligned with SDG 17 to strengthen the means of implementation and revitalize the global partnership for sustainable development, the project has a network of partners that includes private companies, civil society organization and publicly biased educational institution.

The project contribution focuses on biodiversity and family farming, in addition to strengthening ecological restoration and ecosystem services from the strategic and sustainable management of native stingless bees, fundamental for the conservation of native forests.

The goal is that, after 10 years of the project implementation, the contribution in the ecological recovery process reaches more than 120,000 hectares of native forest benefited from the pollination service.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Compensation, Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits are still ongoing.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No..

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

Formalization and structured strengthening of the activity from the creation of a meliponary in Brotas (SP), the development of products from native bees for consumption by Brazilian families and the generation of strengthened local income.

Support in the direct conservation of biodiversity of the fauna with native bees, and indirect conservation through by strengthening the ecological restoration and habitat for other species. In addition to the aforementioned biodiversity of flora for its pollination, strengthening the ecosystem and promoting advances in ecological restoration, thus protecting springs.

We currently have more than 200 bee colonies under multiplication, expanding the stock by more than 300%.

Training of more than 30 key players for dissemination and expansion of work, including producers, NGOs, professionals and other local multipliers.

Construction of a tropical gastronomy laboratory in the city of São Paulo/SP to develop recipes and by-products in order to expand access to the consumer market and add value to meliponiculture in Brazil.

More than 10 samples of products and by-products researched in the nutritional fronts, for processing and use in gastronomy.

Invested resources

Sylvamo made 100% of the financial investment of BRL 2 million, with a cooperation agreement until 2022.

Main challenges faced

The main challenges of the project are providing technical training and developing skills for meliponiculture and the engagement on the topic by the stakeholders and the market and the importance of pollination, to ensure the preservation and multiplication of native bees, in a sustainable, productive, and continual way.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Regulated environments support long-term structured corporate processes. Business challenges that change the operation and whose expected term is over 10 years should be considered good practices and have regulatory environments favorable to the transition.

Next steps

One of the goals of the Verde Mel project is to publish books that address gastronomy with products of native bees and technical contents for breeders of native stingless bees. Colonies of two different species will continue to be distributed free of charge to producers who have already received training.

Relations with the SDG (Sustainable Development Goals)

2 – Zero Hunger:

Achieve food security and improved nutrition and promote sustainable agriculture.

3 – Good health and well-being:

Ensure healthy lives and promote well-being for all at all ages.

8 – Decent work and economic growth:

Promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

13 – Action against global climate change:

Take urgent action to combat climate change and its impacts.

15 – Life on land:

Protect, restore, and promote the sustainable use of terrestrial ecosystems, manage forests sustainably, combat desertification and disrupt and reverse land degradation and stop biodiversity loss.

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes, aiming to raise information that is not well-known and to offer to consumers more information about the quality of the products of the stingless bees, one of the research areas of the Project Verde Mel is the nutritional, functional and probiotic analysis of the honey, pollen, propolis, and wax. In order to do that, ATA institute has established a partnership with VP Nutrição Funcional, a reference institute on the theme in Brazil. VP offers the project a scientific curatorship to carry out the analysis and reports, linking research centers, such as Universidade Federal de São Paulo (UNIFESP), Universidade do Estado de São Paulo "Julio de Mesquita Neto", and Universidade de Santa Maria. ATA has brought together a group of producers and 45 samples, from all regions in Brazil, which are being analyzed in the labs.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Allan Oliveira Tácito Me

TÁCITO CONSULTORIA AMBIENTAL E TURÍSTICA

Name of the case

TÁCITO A2030

TÁCITO headquarters.

Site

http://allantacito.wixsite.com/consultoria

Corporate Email Address

tacitoconsultoria@gmail.com

Type of Organization

Others.

Economic activities (based on CNAE - National classification of economic activities)

Administrative activities and complementary services.

Tourist activities and training.

Theme

- Reduction of direct emissions, scope 1 (according to the Greenhouse Gases Protocol (GHG Protocol) – organization's own facilities, own transport).
- Reduction of indirect emissions, scope 2 (according to GHG Protocol – purchased electricity, steam, heating/cooling purchased for own use).
- Reduction of indirect emissions, scope 3 (according to the GHG Protocol – acquired goods and services, capital goods, fuel, transport and distribution, waste, business trips, etc.).
- Avoided emissions (substitution of fuels and modes of transport, innovations in products and services, etc.).
- Communication, stakeholder engagement and dissemination of good practices.
- Adaptation actions to climate change. Carbon capture and storage, emissions offsetting.
- Water resources and water efficiency.
- Other axes directly or indirectly related to the climate agenda.

Case description

Make the company's headquarters and the execution of services more sustainable.

At the headquarters, the following were implemented:

- Selective collection: separation of generated waste, avoiding the sending of 2,400 liters/year of recyclable waste for disposal in landfills.
- Photovoltaic energy: savings in consumption and financial expenses, around 4,800 kWh/year and BRL 1,680/year, respectively.
- Rainwater harvesting: savings in drinking water consumption, around 5,000 liters/year.
- Natural lighting and ventilation: saving energy costs to light and air the work environment.
- Ecological sidewalks and urban afforestation: help in the microclimate, carbon sequestration and rainwater retention.
- Permeable areas inside the land: retention of rainwater and less overload of the urban drainage system.
- Electronic equipment with the Procel A seal: savings in consumption and financial expenses with electricity and a smaller ecological footprint.
- In the execution of the services, the following were adopted:
- Remote work in 50% of contracts, in addition to the use of renewable fuel (ethanol) for necessary displacements.
- The company generated approximately 4.2360 tCO_2e per year. With the exchange of renewable fuel and the installation of photovoltaic panels, GHG generation dropped to 0.2256 tCO_2e/year, considering the same mileage.
- With the reduction of trips made due to the pandemic and the use of remote work, the generation was 0.1123 tCO_2e/year.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it has been implemented.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes. The company generated approximately 4.2360 tCO_2e per year.

With the exchange of renewable fuel and the installation of photovoltaic panels, GHG generation dropped to 0.2256 tCO_2e/year, considering the same mileage and energy consumption.

With the reduction of trips made due to the pandemic and the use of remote work, the generation was 0.1123 tCO_2e/year.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes. The company generated approximately 4.2360 tCO_2e per year.

With the exchange of renewable fuel and the installation of photovoltaic panels, GHG generation dropped to 0.2256 tCO_2e/year, considering the same mileage.

With the reduction of trips made due to the pandemic and the use of remote work, the generation was 0.1123 tCO_2e/year.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The company generated approximately 4.2360 tCO_2e per year.

With the exchange of renewable fuel and the installation of photovoltaic panels, GHG generation dropped to 0.2256 tCO_2e/year, considering the same mileage.

With the reduction of trips made due to the pandemic and the use of remote work, the generation was 0.1123 tCO_2e/year.

Impacts/results

Decrease in GHG emissions and financial costs in the execution of services.

Invested resources

In 2018, approximately BRL 30,000.00 were invested.

The amounts were spent on the acquisition of the photovoltaic energy system, installation of the rainwater collection system, installation of internal and external permeable areas, acquisition of air conditioning equipment with the Procel A seal, and replacement for vehicles with better fuel consumption efficiency.

Main challenges faced

High initial cost.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Opening of specific credit lines with interest close to zero (0) for incentives.

Next steps

Maintenance of equipment and services performed.

After the pandemic phase, the remote work system and the installations already carried out will be maintained, with only preventive maintenance on the air conditioning system, vehicle inspections and cleaning of gutters and photovoltaic plates, aiming at maximizing the generation of electricity.

Relations with the SDG (Sustainable Development Goals)

6 – Drinking Water and Sanitation:

Ensure availability and sustainable management of water and sanitation for all;

7 – Affordable and Clean Energy:

Ensure reliable, sustainable, modern and affordable access to energy for all;

8 – Decent Work and Economic Growth:

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all;

11 – Sustainable Cities and Communities:

Make cities and human settlements inclusive, safe, resilient and sustainable;

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption patterns;

13 – Action Against Global Climate Change:

Take urgent action to combat climate change and its impacts;

16 – Peace, Justice and Effective Institutions:

Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels;

17 – Partnerships and Means of Implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Tereos Açúcar e Energia Brasil S.A

Name of the case

Replacement of Nitrogen Fertilizers.

Application of Nitrogen Fertilizer with low CO_2eq emission.

Site

https://tereos.com/

Corporate Email Address

ambiental@tereos.com

Type of Organization

Privately held corporation.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry production, fishing and aquaculture based.

Theme

Direct emissions reduction, scope 1 (conform Greenhouse Gases Protocol (GHG Protocol),which includes the organization's own facilities, own transportation).

Case description

Use of URAN (fertilizer solution) from vinasse or biological inoculants in this area.

In the 2017/2018 harvest, the Tereos group started its localized stillage operation. Using applicator equipment with flow control, it was possible to improve the process, with the addition of potassium to the soil, due to the increase in the operating radius and gains in the environmental aspect, through the elimination of potential risk of potassium saturation, occurrence of flies in stables, puddles and contamination of water bodies. In addition to the mentioned benefits, there was also the issue of uniformity of application, flow control and less dependence on mineral fertilizers, since by controlling the flow, there is no excessive application, and it is possible to use the nutrients present in the vinasse in a sustainable and rational way.

The association of URAN (Ammonium Nitrate and Urea) fertilizers with a concentration (28-32% N) in vinasse presented a potential gain associated with the elimination of a mechanized operation, performing a single operation instead of two, eliminating traffic and decreasing the potential for compaction, densification and trampling. In addition to the gains from the association of an organic and mineral source, the acidification of the medium and complexation by organic colloids, there is a reduction in the potential for loss by volatilization.

Does the Case show GHG emission level reduction?

Yes .

How is the Case classified?

Mitigation, Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes, by increasing application area.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

This project reduces the nitrogen recommendation in the second harvest of sugarcane plants from 1.2 kg N/ t estimated to 0.9 kg N/t estimated. The innovation in this case was the search for new products and operational optimizations, achieving the quality of crop management and the reduction in fertilizer application. Therefore, the GHG reduction observed is 10,480 tCO_2e.

Impacts/results

With the use of localized vinasse it was possible to improve the process, soil quality, increase the range of action, eliminate risks and generate gains in the environmental aspect. Some of them mentioned below:

Uniform application, flow control and lower dependence of mineral fertilizers and reduction of nitrogen recommendation criteria in sugarcane from 1.2 kg N/t estimated to 0.9 kg N/t, which led to a higher quality of crop management and reduction in fertilizer application.

Invested resources

The invested amount was BRL 66,680.00.

Main challenges faced

Being able to perform a single operation instead of two, eliminating traffic and decreasing the potential for compaction, densification and trampling.

Next steps

To seek new fertilizers in the market with substitution potentials to those currently used.

Relations with the SDG (Sustainable Development Goals)

6 – Drinking Water and Sanitation:

Ensure the availability and sustainable management of water and sanitation for all;

7 – Affordable and Clean Energy:

Ensure reliable, sustainable, modern and affordable access to energy for all;

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption patterns;

13 – Action Against Global Climate Change:

Take urgent action to combat climate change and its impacts;

15 – Terrestrial Life:

Protect, recover and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, stop and reverse land degradation and stop the loss of biodiversity.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Tereos Açúcar e Energia Brasil S.A

Name of the case

Restaurant Waste Composting Project

Field application of organic compost.

Site

https://tereos.com/

Corporate Email Address

ambiental@tereos.com

Type of Organization

Privately Held Corporation.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry production, fishing and aquaculture based.

Theme

Reduction of indirect emissions from scope 3 of the Greenhouse Gases Protocol (GHG Protocol) that encompasses purchased goods and services, capital goods, fuel, transportation and distribution, waste, business travel, etc.

Case description

It is a project implemented in 2019 that destined Class 2 waste for the composting process. The project's objective of reducing emissions by 276.84 tCO_2e per year was achieved, so that the annual value was 59.81 tCO_2e.

How is the Case classified?

Mitigation and Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it has been implemented and its processes are being monitored.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes. There is the possibility of deploying the project to other units of the Tereos group.

Information about GHG emissions.

Is there any emission reduction?

With the implementation of the project it was possible to obtain a reduction of 336.65 tCO_2e to 59.81 tCO_2e.

Is there GHG sequestration?

Yes, with the composting of waste from restaurants, we were able to considerably reduce the emission and sequester GHG, as mentioned above.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

There was a reduction of 276.84 tCO_2e in relation to the residue class.

Impacts/results

Class 2 waste was no longer transported to the landfill and was sent to the composting process, which enabled the reduction of emissions by 276.84 tCO_2e.

Invested resources

Financially, very little was invested; however, the technical knowledge and the experience of those involved were fundamental for the project's implementation.

Main challenges faced

As the main challenge encountered in the implementation of the project, one can mention the alignment and communication between all the teams of the company involved in the steps.

Next steps

To expand the project seeking other destinations for composting.

Relations with the SDG (Sustainable Development Goals)

6 – Drinking Water and Sanitation. Ensure the availability and sustainable management of water and sanitation for all.

7 – Affordable and Clean Energy.

Ensure reliable, sustainable, modern and affordable access to energy for all.

12 – Responsible Consumption and Production.

Ensure sustainable production and consumption patterns.

13 – Action Against Global Climate Change.

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Tereos Açúcar e Energia Brasil S.A

Name of the case

Vinasse Biodigestion Project

Vinasse Biodigester.

Site

https://tereos.com/

Corporate Email Address

ambiental@tereos.com

Type of Organization

Publicly held corporation.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry production, fishing and aquaculture base.

Theme

Reduction of direct emissions, scope 1 (conform Greenhouse Gases Protocol (GHG Protocol) - own facilities. organization, own transport).

Case description

The Project provides greater diversification of the production with a strong environmental appeal, mitigating the effects of vinasse use on the ground, allowing the fleet of sugarcane trucks to operate 100% with biomethane.

The biodigester uses vinasse to perform a process of converting methane into biogas. The residue not used for biogas production goes through a biodigester and is taken to the field as a source of organic fertilization. The gas, when passing through the biorefinery, receives an additive that transforms it into biomethane, a product used to replace diesel, as well as in the generation of electricity.

The impact that can be generated by the project is remarkable:

- Reduction in the use of diesel in agricultural equipment (3,920,000 L/year).
- Reduction in the use of natural gas (5,620,000 m³/year).
- Reduction in water catchment volume (1,250,000 m³/year).

Above all, the project is capable of reducing CO_2 emissions by 131,490 tCO_2e /year, in addition to generating CBIOS for 3,000 tCO_2/year.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Sequestration.

Has the Case been implemented?

Yes.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes, for all of the Group's Units.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes. For the construction of the vinasse biodigester, only the sugarcane area was converted, there was no deforestation. It is also interesting to highlight the company's voluntary revegetation programs and voluntary terms of planting native seedlings, developed as part of the biodigester program, contributing significantly to GHG sequestration

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

131,490 tons of CO_2 equivalent per year, in addition to generating CBIOS for 3,000 tons of CO_2 per year.

Impacts/results

A reduction in the use of diesel in agricultural equipment (3,920,000 L/year); a reduction in the use of natural gas (5,620,000 m³/year); a reduction in the volume of water collection (1,250,000 m³/year); the generation of CBIOS (3,000 tCO_2/year) for sale at B3.

Invested resources

The amount of BRL 58,750,000.00 was invested in an industrial unit. With ecological investments in the amount of BRL 28,000,000.00 and financing with green targets in the amount of BRL 30,000,000.00.

Main challenges faced

The biggest challenge is to ensure that the biodigester performs well with the use of vinasse, so that the established goals can be achieved. Not to mention the risk to which the company is exposed due to variations in the energy market. On the other hand, there is an opportunity to export biomethane to industrial customers, to mitigate the seasonality of the operation, in addition to the learning curve with low risk for the company.

Next steps

To make the best and most strategic application of the resources obtained from the investments, in order to achieve goals in an agile and satisfactory way.

Relations with the SDG (Sustainable Development Goals)

6 – Drinking Water and Sanitation:

Ensure availability and sustainable management of water and sanitation for all;

7 – Affordable and Clean Energy:

Ensure reliable, sustainable, modern and affordable access to energy for all;

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption patterns;

13 – Action Against Global Climate Change:

Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

With regard to the business model, it includes a co-generation structure of energy from the vinasse.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Tetra Pak Ltda.

Tetra Pak®
PROTEGE O QUE É BOM

Name of the case

Tetra Pak's Journey to Zero Landfill

Fertilizer generated at the composting facilities of Tetra Pak in Monte Mor.

Employees working on the composting process.

Educating employees about the composting process.

Site

https://www.tetrapak.com/

Corporate Email Address

she.mm@tetrapak.com

Type of Organization

Limited Liability Company.

Economic activities (based on CNAE - National classification of economic activities)

Manufacture of paper packaging.

Theme

Indirect emissions reduction, scope 3 (according to Greenhouse Gases Protocol (GHG Protocol) – purchased goods and services, capital goods, fuel, transport and distribution, waste, business travel, etc.), biodiversity, conservation, forest asset management and land use.

Case description

The disposal of waste in landfills is harmful to the environment, because landfill construction requires the deforestation of large areas, destroying fauna and flora biodiversity. In addition, when not properly controlled, landfills can cause soil contamination due to leakage or even air pollution due to Greenhouse Gas (GHG) emissions from the decomposition of waste.

In the year 2021, Tetra Pak already recycled more than 90% of its waste in its unit located in the city of Monte Mor, São Paulo. However, organic waste and garden trimmings were still sent to landfills. Considering to eliminate this disposal, Tetra Pak prioritized the investment in sustainable initiatives aligned to its 2030 strategy, which aims at acting as a strategic player, leading the transformation in sustainability.

To this end, alternative destination solutions were sought for such waste, and the year 2022 was established as the goal to eradicate landfill disposal. Composting was the best solution found, because it breaks down the organic waste and turns it into fertilizer. A compost bin was implemented in the Tetra Pak Monte Mor club area to receive a monthly average of 5.93 tons of food waste from the cafeteria and garden pruning, resulting in 3.5 tons of fertilizer monthly.

Does the Case show GHG emission level reduction?

Yes..

How is the Case classified?

Mitigation, adaptation, socio-environmental responsibility.

Has the Case been implemented?

Yes, it was implemented.

What is the forecast of continuity of the Case?

Case implemented.

Is the Case likely to expand?

Yes. There is a possibility of implementing the solution in the future at the Ponta Grossa plant in Paraná.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

In 2021, this calculation was made using the GHG Emissions Calculator for waste provided by the National Sanitation Secretariat of the Ministry of Regional Development in partnership with the German Cooperation for Sustainable Development through the Deutsche Gesellschaft für Internationale Zusammenarbeit. This tool allows estimating a comparison of the climate effect of landfills and composting. The calculations considered an average waste generation of 71 ton/year, which is based on the volume of 2021, being 90% food waste and 10% garden pruning waste. This resulted in emissions of 60 tCO_2e from the landfill, which considered not only the treatment and final disposal, but also the accumulated emissions that this amount of waste would generate during degradation. Finally, the result from composting was $3tCO_2e$, considering the same points of the landfill. Therefore, we discovered that, on average, Tetra Pak Monte Mor, reduces its emissions by $57tCO_2e$ annually. This difference is due to the higher calorific value of landfills, which release more gases during the process of waste degradation and require deforestation of fauna and flora for their construction.

Impacts/results

In February 2022, the target of zero landfill was reached, a result never seen before in Tetra Pak's plants in the Americas. An achievement that made us very proud. The monthly average of 5.93 tons of waste previously sent to landfills, is now sent for composting.

Currently, we produce an average of 3.5 tons/month of fertilizer, which is used in the factory gardens.

Invested resources

The financial investment was relatively low in view of the positive impact of the initiative: required only hiring a consultant to provide instructions regarding the application of the composting method. Internal communications on the subject were published in order to raise employee awareness. Education is also Tetra Pak's commitment to sustainability and protecting the planet, which is part of the promise to protect what's good (also including people and food).

Main challenges faced

One of the main challenges was to elaborate procedures and training for the contractors who are responsible for the daily maintenance of the compost bin. In addition, it was difficult to find the ideal space to implement the compost bin. It is worth pointing out that maximum capacity of the compost bin is 6.5 tons of residues monthly, which requires controlling the food waste generated in the in-house restaurant to avoid exceeding this limit, implying in constant user education regarding environmental culture, including, for example, carrying out campaigns and announcements.

Next steps

The surplus fertilizer will be donated to the local community. There is planning to bring school children to visit the composting facility in order to contribute with the environmental education of future generations.

Relations with the SDG (Sustainable Development Goals)

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient and sustainable.

12 – Responsible consumption and production:

Ensure sustainable consumption and production behaviors.

13 – Action against global climate change: Take urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

No. However, this case strongly contributes to the internal strategy, as well as raising people's awareness regarding this issue.

ACORDO AMBIENTAL SÃO PAULO

TOYOTA

Corporate Name

Toyota do Brasil Ltda.

Name of the case

Circular Economy in the Value Chain

Picture of Corolla vehicle using the Insulator part.

Site

https://www.toyota.com.br

Corporate Email Address

sustentabilidade@toyota.com.br

Type of Organization

Limited Society.

Economic activities (based on CNAE - National classification of economic activities)

Manufacture of cars, vans and utilities.

Theme

Reduction of indirect emissions, scope 3 (according to the Greenhouse Gases Program (GHG Protocol), which includes purchased goods and services, capital goods, fuel, transport and distribution, waste, business travel, etc.);

Case description

Reuse of personal protective equipment and uniforms to be used in the manufacture of thermal and acoustic insulating element of the produced vehicles. These materials (EPI and Uniforms) leave the company and return as raw material (thermal insulation), through a partnership with the supplier, using all the transport that already exists in the process.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, It was implemented and it's benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The avoided emission in 2020 was 156 tonCO_2 equivalent. In comparison with the scenario where the supplier uses new fabrics to manufacture the acoustic insulation pieces that would emit this volume of CO_2.

Impacts/results

825 kg/month or 9900 kg/year of PPE(personal protective equipment) and uniforms not sent for co-processing, cost reduction for the company, raw material guarantee for the supplier's process.

Invested resources

Human resources invested in the meetings of alignment between the two companies

Main challenges faced

To enable, without increasing costs and emissions during transport, a meeting to convince and engage related areas and raise awareness of employees for the return and clean condition of used PPE(personal protective equipment) and uniforms.

Next steps

To expand to other units.

Relations with the SDG (Sustainable Development Goals)

9 – Industry, innovation and infrastructure:

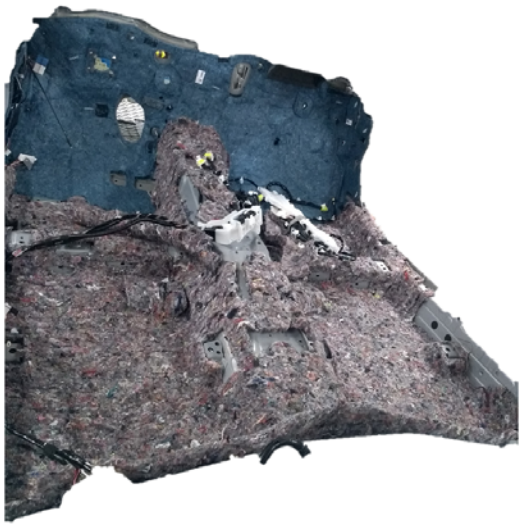
Build resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation;

17 – Partnerships and Means of Implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

Yes.



Example of the Insulator part made with the uniforms that were previously disposed of as waste.

ACORDO AMBIENTAL SÃO PAULO

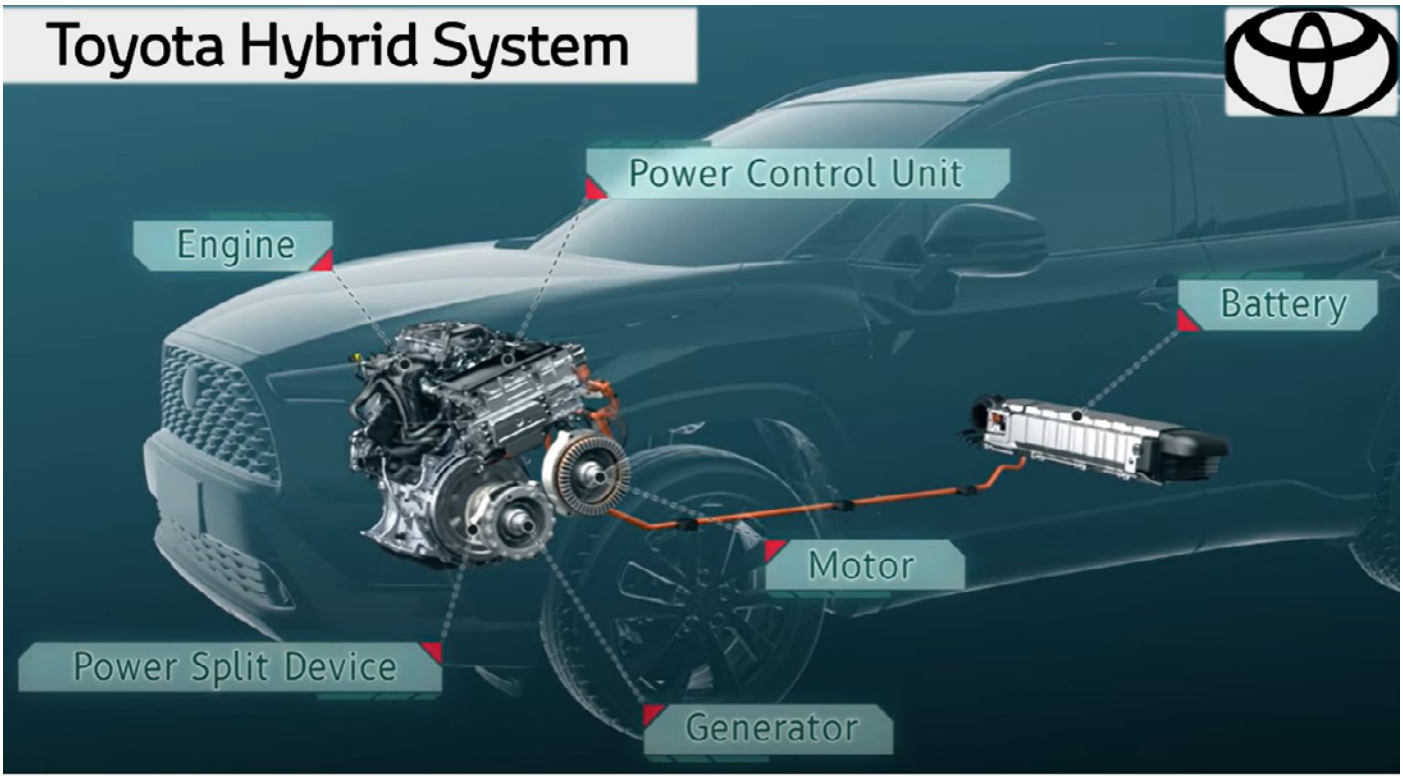
Corporate Name

Toyota do Brasil Ltda.

TOYOTA

Name of the case

CO_2 Reduction through Hybrid Vehicles



Toyota Hybrid System Image.

Site

https://www.toyota.com.br

Corporate Email Address

sustentabilidade@toyota.com.br

Type of Organization

Limited society.

Economic activities (based on CNAE - National classification of economic activities)

Manufacture of cars, vans and utilities.

Theme

Avoided emissions, with the replacement of fuels and modes of transport, innovations in products and services, etc.

Case description

Toyota has been producing hybrid vehicles since 1997 and in Brazil the sale of this type of vehicle started in 2013.

In 2019, Toyota launched, in Brazil, the first hybrid flex vehicle (which can be fueled by gasoline and/or ethanol). In other countries, the hybrid models sold by Toyota do not have the option of being fueled by ethanol.

As the hybrid flex vehicle provided by Toyota in Brazil had no precedent in other countries, there was also no systematic way to calculate and verify whether the use of this type of vehicle has any environmental benefit superior to non-flex hybrid vehicles already in the market.

To develop the calculation methodology and confirm whether or not there was an environmental benefit, the Toyota do Brazil engineering team contacted the CETESB team of experts and, after many technical discussions, a consensus was reached on how to do the calculation.

After developing the methodology, calculations were made, and it was confirmed that the use of the Hybrid Flex Vehicle contributes considerably to decarbonization process of automotive market.

The calculation to verify whether there was an environmental benefit was done as follows:

1. Study of the percentage of gasoline consumption in flex vehicles in the state of São Paulo; (page 41, table 3).

2. Study of the average mileage that a vehicle travels annually; (page 120, appendix Q).

3. Study the percentage of vehicles that remain in use after sale (average annual survival rate). (page 37, chart 1).

The study was based on the State of São Paulo Vehicle Emissions Report and extrapolated to other regions of Brazil.

https://cetesb.sp.gov.br/veicular/wp-content/uploads/sites/6/2020/11/Relatorio-Emissoes-Veiculares-no-Estado-de-Sao-Paulo-2019.pdf

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it was implemented and it's benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Avoided CO_2 emissions, year by year, at the Brazilian level.

Actual avoided emissions based on the volume of cars already sold in 2019 and 2020:

2019= 1140 t CO_2e

2020= 3985 t CO_2e

Estimated avoided emissions based on projected sales volume

2021= 8450 t CO_2e

2022= 14074 t CO_2e

2023= 20249 t CO_2e

2024 = 27023 t CO_2e

2025 = 34450 t CO_2e

2026 = 42451 t CO_2e

2027 = 50330 t CO_2e

2028= 58007 t CO_2e

2029= 65429 t CO_2e

2030= 72543 t CO_2e

Total (most estimated real from 2019 to 2030) = 398,131 t CO_2e.

Impacts/results

Real: Avoided emissions: 5,125 t CO_2e; 19,851 vehicles sold between 2019 and 2020;

Estimated: Avoided emissions: 393,006 t CO_2e; from 2021 to 2030.

Increase of the products portfolio adapted to the Brazilian market that meets customer demand and contributes to decarbonization.

Invested resources

Human resources engineering and development of innovative products and communication.

Main challenges faced

Meeting technical and quality requirements with cost-effectiveness acceptable to the customer.

Suggestions to improve the business environment (regulations, licensing, access to credit)

As it is a product that delivers mobility with less environmental impact, it could have mid and long-term public policies for the migration of conventional technologies to more efficient ones considering climate change.

Next steps

Develop new and more affordable models for all types of the consumers.

Relations with the SDG (Sustainable Development Goals)

9 – Industry, innovation and infrastructure:

Build resilient infrastructure, promoting inclusive and sustainable industrialization and fostering innovation;

11 – Sustainable cities and communities:

Making cities and human settlements inclusive, safe, resilient and sustainable;

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

Does the Case contribute to technological development and/or to the business model?

Yes.

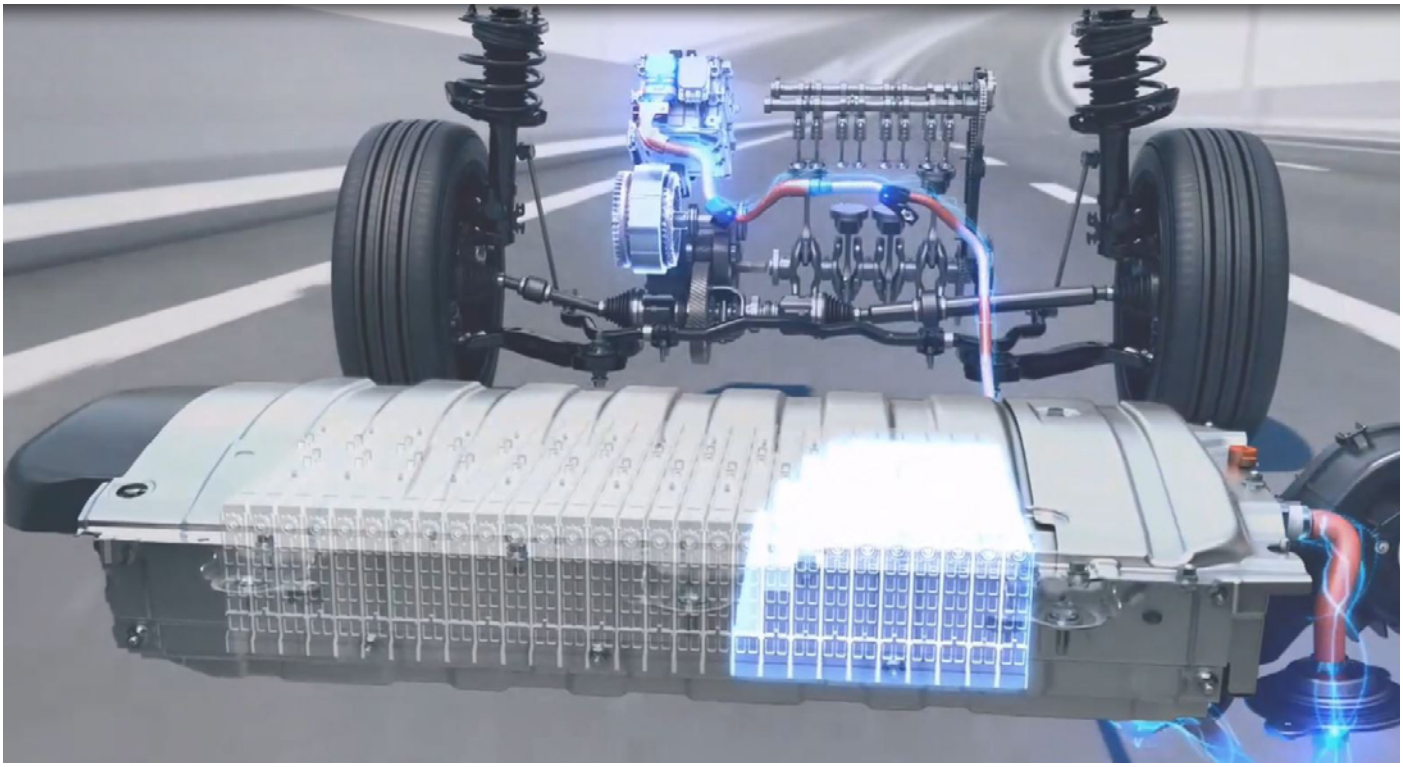


Image of Hybrid System recharging the battery.

ACORDO AMBIENTAL SÃO PAULO

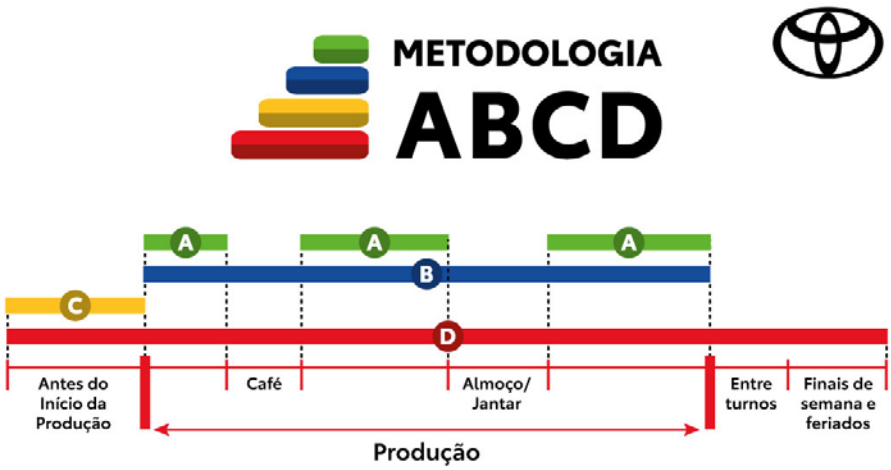
TOYOTA

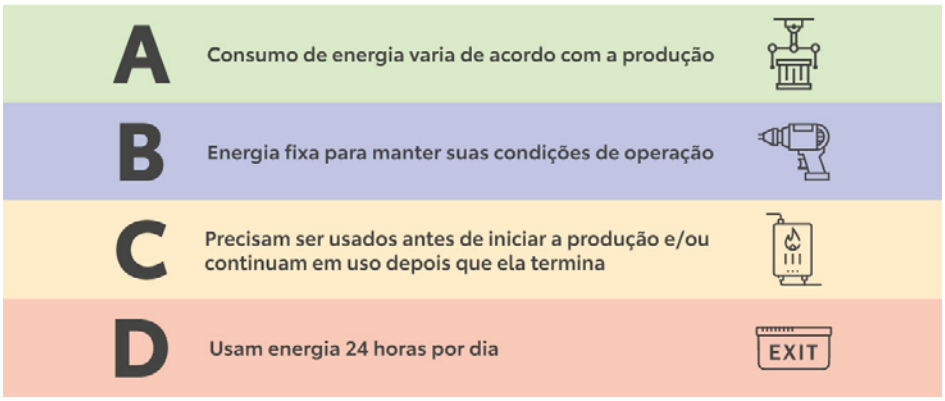
Corporate Name

Toyota do Brasil Ltda.

Name of the case

Energy efficiency – applying "just in time" concept in equipment





Concept of ABCD methodology for energy efficiency..

Site

https://www.toyota.com.br/mundo-toyota

Corporate Email Address

wino@toyota.com.br

Type of Organization

Limited liability society.

Economic activities (based on CNAE - National classification of economic activities)

Converting company.

Theme

Reduction of direct emissions, Scope 1 (cf. Greenhouse Gases (GHG) Protocol), own facilities, own transport, Reduction of indirect emissions, Scope 2 (cf. GHG Prtocol) – purchaced electricity, steam, heating and cooling acquired for own use.

Case description

The concept "*just in time*", used in production by Toyota is meant to produce only the necessary according to the client's demand. Using the same reasoning in the equipment and machines used in the production, it was possible to identify situations where we could turn off the equipment that usually was left on.

Based on the use of the machines it was possible to identify four situations classified from A to D, so we called it the ABCD methodology.

- Equipment "A" uses energy only when production is running.
- Equipment "B" uses energy through the shift.
- Equipment "C" uses energy to warm up and cooldown for the production.
- Equipment "D" are the ones that use electricity for processes for 24 hours.

Equipment classified as D may use more energy if they remain on continuously and are usually forgotten because previously they have always been left on, one example is a heating system of a machine that usually takes a while to achieve the ideal temperature and is left turned on all the time, however we can evaluate the time necessary to achieve the necessary temperature and change the classification of this system to C, so they can be turned on a short time before the production and turned off after the production shift.

Likewise, equipments C can be repositioned as B, and equipemnts B as A. Thus, it is possible to optimize the production line so that it only runs and uses energy when necessary.

For four years more than 800 equipments were evaluated and the way how they were being used was changed, as result it was possible to reduce around 5% of electricity consumption.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, avoided emissions.

Has the Case been implemented?

Yes. *Case* implemented and benefits are ongoing

What is the forecast of continuity of the Case?

3 to 5 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Reduction of around 3,000 MWh/year, that is equivalent to 185 tCO_2e/year according Brazilian GHG Protocol in 2020.

Impacts/results

Reduction of use of electricity that could be used by others, reducing the necessity of the generation for the grid.

Invested resources

Around one working day of maintenance team per month and small devices as timers to allow the turning on and off automatically.

Main challenges faced

Breaking paradigms to change the way how equipment's were being used wasting energy without necessity. Also, it was necessary to carefully evaluate the time necessary to warm up the equipment's to avoid any production impact throughout the year as condition changes during summer and winter.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Incentives to activities related to energy efficiency, energy saving.

Next steps

As new equipments are installed, the situation of the production line changes, so it is necessary to evaluate again if it is possible to optimize and set new use for the equipments in the line as usually the new ones are installed in the default condition of the maker and it's possible to find a better situation in terms of energy efficiency.

Relations with the SDG (Sustainable Development Goals)

7 – Clean and accessible energy:

Guarantee access to accessible, reliable, sustainable, and modern energy to all.

12 – Responsible consumption and production:

Guarantee sustainable standards of production and consumption.

13 – Actions against global climate change:

Take urgente actions to combat climate change and their impacts.

Does the Case contribute to technological development and/or to the business model?

Yes, energy use reduction.

Other information regarded as relevant

This activity is simple to implement and can marginally reduce the use of energy and the use of natural resources, this means the carbon footprint can be reduced and the operational costs at the same time. Also it can develop a different mindset in the people about how energy can be used. For these reasons Toyota is also helping the partners to apply the same principles to their processes and improve their use of energy.

ACORDO AMBIENTAL SÃO PAULO

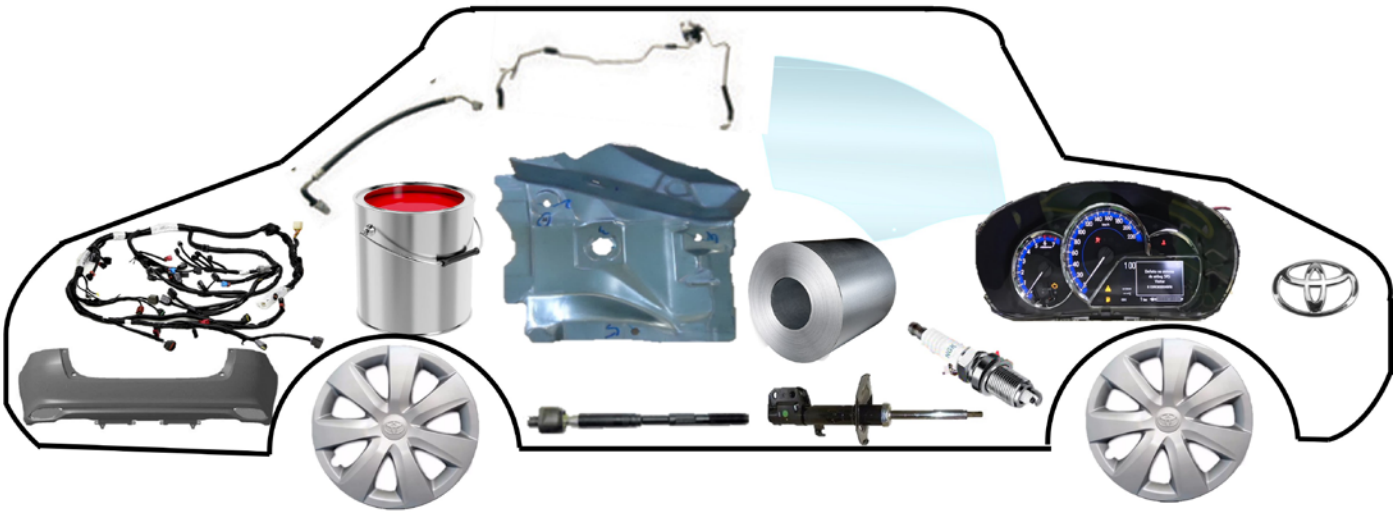
TOYOTA

Corporate Name

Toyota do Brasil Ltda

Name of the case

Engaging the Supply Chain



Partnership with suppliers to reduce the environmental impact on vehicle production.

Site

www.toyota.com.br

Corporate Email Address

aabe@toyota.com.br

Type of Organization

Limited liability society.

Economic activities (based on CNAE - National classification of economic activities)

Transport, storage and shipping.

Theme

Reduction of indirect emissions, Scope 3 (cf. Greenhouse Gases Protocol – purchased goods and services, capital assets, fuel, transport and shipping, waste, business trips etc.).

Case description

These challenges are widely promoted to Toyota's suppliers aiming at engaging them, especially those who still do not have a robust sustainable agenda, to create one.

This case refers to the annual mentoring cycle in TBP and ABCD, which will be explained below, in which Toyota do Brasil promotes to its suppliers with the goal of creating a sustainable environment agenda and expanding the culture of continuous improvement and, thus, contributing to the reduction of environmental impacts by businesses that supply to Toyota.

Toyota, concerned about the migration to a low carbon economy and the reduction of environmental impacts, has developed activities in partnership with its suppliers to increase engagement around such themes. To ease the governance in the development of activities with its suppliers, Toyota founded BRASA (*Brazilian Automotive Suppliers Association*) which currently encompasses 76 direct suppliers and are enterprises, in their majority, related to metallurgical, automobile parts, and chemical sectors.

Toyota is world-renowned for its production system, known as TPS = Toyota Production System. TBP, in short, is a problem resolution tool. It is important to point out that Toyota understands that one of the forms of continuous improvement is the resolution of problems that pervade the entire productive process. Therefore, whenever there is a problem, there is an opportunity to improve. Thus, TBP is a problem resolution technique that leads to an improvement in the process. Since there are innumerable problems in the productive process and problems are seen as opportunities, TBP technique helps to notice the problems and understand what the resolution priority should be. Within Toyota's culture, if all problems were tackled at once, it would be very inefficient. Hence, TBP helps to clarify and prioritize the resolution of problems and consequently leads to continuous improvement.

TBP technique consists in 8 steps which are summarized below:

Step 1: Clarifying the Problem – the step consists in acknowledging a problem and clarifying the "maximum objective" of its responsibilities and work, as well as the "Ideal Situation" of its work, and the "Current Situation" of its work.

Step 2: Stratifying the Problem – stratifying a complex and vague problem, reducing it to smaller and more concrete problems. Prioritizing problems and understanding their situations through the collection of qualitative and quantitative information in loco, as well as the processes involved.

Step 3: Establishing Targets – establishing measuring directives for challenging results, yet realistic.

Step 4: Analyzing the Root Cause – Aiming to clarify the root cause, thoroughly investigating the processes involved.

Step 5. Defining Countermeasures – developing the greatest possible number of potential countermeasures, restricting the countermeasures to the most practical and effective, creating a clear and detailed action plan.

Step 6: Implementing the Countermeasures – implementing the countermeasures with quick coordination and no obstacles.

Step 7: Monitoring Results and Processes – objectively evaluate processes and results, as well as learn with the aces and failures.

Step 8: Standardizing Successful Processes – establish successful processes as role models and continue to raise the bar for the levels of success.

Another tool that Toyota has developed and has often been using in its factories around the world is what it calls ABCD.

ABCD, in short, consists of mapping inside of the productive processes, all the equipment which consume energy and classifying them as A, B, C, or D.

What does this classification stand for?

In a very simple way, the classification means: Equipment classified as A: is equipment that only use energy when there is demand in the productive process. For instance, the stamping equipment will only be turned on and in operation when it is necessary to print. Therefore, it will only use electricity at this moment.

Equipment deemed as B is: equipment that need to be on during all the production shift. Lights in the productive assembly line shed at Toyota, for example, are turned on in the beginning of the shift and are only turned off at the end of it.

Equipment rated as C: is equipment that has to be turned on before the start of each shift and has to remain on after its end. For example, heating chambers that cure the vehicles which are painted in Toyota's factories have to operate at 120° C and when the first painted vehicle arrives at the heating chamber, it already has to be at 120° C.

Equipment classified as D: is equipment that has to be on, hence consuming electricity 24-7, 365 days per year. It is equipment that can never be shut off, for instance, safety lamps.

Many times, factories are set up and equipment continues to operate in the same way since its beginning.

ABCD technique consists of mapping all the equipment and classifying according to what has been explained if there are opportunities to improve the process. According to the description, it becomes quite clear that the same equipment, if operating according to classification A, will save a lot more energy than according to classification D.

One of the strategies Toyota has used to improve engagement and reduce environmental impacts within its suppliers is the TBP mentoring annual cycle (since 2013) and ABCD (since 2020). In each cycle, Toyota trains and follows up with its suppliers throughout the year so that they themselves can carry out their activities of continuous improvement. Following the training sessions, the suppliers have to investigate their processes with the aim of raising problems/opportunities for improvement. Toyota follows up and provides support throughout the entire cycle.

Therefore, the environmental suppliers are led to monitor their environmental indicators – GHG emissions, water consumption, waste generation etc. – and apply TBP, and ABCD tools, with the objective of reducing their environmental impacts. With this activity, every year there are several improvement activities developed, which internally are called *kaizen* or successful cases.

In 2021 the following companies took part of the TBP, and ABCD mentoring: Axalta, NGK, GKT-B, Denso, Kanjiko, MAHLE, Pilkington, Soluções Usiminas, Yazaki, ZF, TRBR, KYB, and Hilex.

At the end of each TBP, and ABCD mentoring cycle there is a contest that awards the best effort carried out over the period. At the end of each cycle there is an event, called *Convenção da Brasa* (Brasa Convention), where the finalist suppliers are invited to take part and there it becomes known the supplier whose work was considered the best, within the enrolled efforts of that year.

Besides TBP, and ABCD mentoring, which result in cases about energetic efficiency, Toyota has also promoted, within its suppliers, rounds of conversation about ESG, Sustainability, Neutral Carbon, Carbon Market, and other subjects.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the case been implemented?

Yes, it has been implemented.

What is the forecast of continuity of the Case?

Over the next 5 years continuity of TBP, and ABCD mentoring within its suppliers is foreseen.

Is the case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

1,149 tCO_2e emissions have been avoided. This value refers to the sum of all improvement projects which have been carried out over 2021, by the companies who took part in TBP, and ABCD mentoring. The calculation was done using the free tool from the *GHG Protocol,* Brazilian program.

Impacts/results

In total, throughout 2021, there have been improvement efforts developed in 15 enterprises, and when added up, reach the following results:

- 41.4 tons of raw materials were spared, due to improvement in the efficiency of the process.
- 5,363 m^3 of water were saved.
- Reduction in the generation of 242 tons of waste.
- 1,149 tCO_2e of emissions were avoided.
- Some examples of improvement projects that have contributed to the results were:
- Seeking leakages of compressed air, improving the efficiency of compressor.
- Decrease of compressors' working pressure.
- Optimiztion of forklift's routes and plans to change from gas-operated to electricity.

- Equipment automation to function only during operation (ABCD).
- Implementation of water quality control and of closed circuits in e-coat.
- Reevaluation of waste which was sent to landfills and substitution to composting, recycling, and reutilization. An example of waste that was sent to landfills is food leftovers which started to be sent to composting, paper towels used for drying hands were sent to companies that recycle paper, torn gloves were destined to recycling in companies that use fabric, the glove materials were substituted, increasing the durability, and the mixed rubber started to be sent to recycling companies to produce floor mats, among others.

Invested resources

Human resource hours for TBP, and ABCD mentoring and the follow up of the development of improvement projects.

Main challenges faced

Every annual cycle, the main challenges faced are:

- Raising suppliers' awareness so they adhere to the cycle and recommend their collaborators to take part in the training sessions, because the suppliers' collaborators that take part of the training have to be at least 2 days away from their common activities in the training; besides, they have to dedicate part of their working day by day to develop the improvement project.
- Guaranteeing that the proposed schedule by Toyota do Brasil is carried out by the participating enterprises every cycle.
- Many times, the developed projects by the participating companies depend on several sectors working together and most of the times the participating enterprises refer only one participant for the training. This often increases the difficulty of the course of action because people who do not participate of the training struggle to understand the use of the tools.
- Some of the projects need small investments to be carried out and many times the participating companies do not have available money to apply to these new demands.
- And lastly, a challenge that always comes up is the difference of culture between enterprises. As the cycle consists of many enterprises, each of them has its own culture and reality.

Next steps

In 2022 and 2023 there will be many other activities aiming at increasing the number of participating enterprises in this process of improvement of environmental indicators.

Relations with the SDG (Sustainable Development Goals)

7 – Clean and assessible energy:

Guarantee the acess to accessible, reliable, sustainable, and modern energy to all.

9 – Industry, innovation, and infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation.

13 – Action against global climate change:

Take urgent actions to combat climate change and its impacts.

17 – Partnerships and means of implementation:

Strengthen the means of implementation and revitalize global partnerships for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

Other information regarded as relevant

In 2015, Toyota globally took on an environmental commitment called 2050 Challenge which has the following objectives:

- Decarbonization of all sold products – Challenge 1.
- Decarbonization, through engagement, of all productive chain linked to Toyota – Challenge 2.
- Decarbonization of Toyota's own operations – Challenge 3.
- Reduction in water consumption in Toyota's own operations – Challenge 4.
- Reduction in waste generation in Toyota's own operations – Challenge 5.
- Establishing a society in harmony with nature – Challenge 6.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Toyota do Brasil Ltda.

TOYOTA

FUNDAÇÃO TOYOTA DO BRASIL

Name of the case

Project ReTornar - Reusage of uniforms and automotive fabrics for making sustainable gifts

Seamstresses from the ReTornar project.

Site

https://www.toyota.com.br

Corporate Email Address

sustentabilidade@toyota.com.br

Type of Organization

Limited Society.

Economic activities (based on CNAE - National classification of economic activities)

Manufacture of cars, vans and utilities.

Theme

Reduction of indirect emissions, scope 3 (according to the Greenhouse Gases Program (GHG Protocol), which includes purchased goods and services, capital goods, fuel, transport and distribution, waste, business travel, etc.);

Communication, stakeholder engagement and dissemination of good practices.

Case description

In nature there is no concept of garbage, everything is reused in intelligent and natural cycles, everything is transformed!

And it was by bearing in mind the transformation of people and waste that the ReTornar project was born, a bridge that unites Toyota with the communities surrounding its plants, generating a positive impact in a collaborative way.

Today, various Toyota production residues such as air bags, automotive fabrics, uniforms and seat belts are used as raw materials for sewing groups in Indaiatuba and Sorocaba, generating work and income for several families.

Toyota donates waste materials, invests in training the work of seamstresses and buys the products produced, expanding its relations with the community and developing increasingly positive cycles.

Related video:

https://www.youtube.com/watch?v=QGKofTwPkP0

The Project was born in 2011 with the approach of our Social Responsibility department with Cooperativa Uniarte and in 2015 with the adhesion of the ASCA Association of Sorocaba to the project, since then, more than 6.5 tons of uniforms and automotive fabrics have been reused in the production of 77 thousand sustainable gifts.

In addition to training and professionalizing more than 253 people in the community with training in Cutting and Sewing.

The project involved three suppliers:

- Toyota Boshoku: hiring seamstresses,
- Seiren: supply of automotive fabric,
- Joyson: seat belt fabric and airbag supply).

Distribuitors are also being invited to promote similar environmental social projects in their cities.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

Impacts/results

6.5 tons of reused waste, 100 million liters of water saved, 1,365 people directly and indirectly impacted, 77 thousand gifts produced, 42 seamstresses relocated to the labor market (Toyota Boshoku).

104 tons of CO_2 emissions were avoided.

Invested resources

In 2019 alone, BRL 375,000 were invested in Training, Consulting and Repurchase of Gifts.

Main challenges faced

One of the biggest challenges was the company's internal bureaucracy (a donation requires authorization from the Japanese headquarter). It was necessary to negotiate with the audit, legal and presidency division to avoid this process, creating an original donation procedure.

There is a need for continuous communication about this project to everyone, inside and outside the company, to ensure continuity and understanding of the importance of this project.

The awareness of employees to deliver their used uniforms in clean condition.

The difficulty of keeping the project running and expanding sales to other potential customers, for example: Toyota suppliers and distributors.

Next steps

For 2021, it is planned to expand sales through e-commerce, to create exhibition areas at dealerships and to search for new partners so that projects become self-sufficient.

Relations with the SDG (Sustainable Development Goals)

1 – Eradication of Poverty:

End poverty in all its forms, everywhere.

4 – Quality Education:

Ensure quality inclusive and equitable education and promote lifelong learning opportunities for all.

5 – Gender Equality:

Achieve gender equality and empower all women and girls.

8 – Decent Work and Economic Growth:

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

10 – Reduction of Inequalities:

Reduce inequality within and between countries.

11 – Sustainable Cities and Communities:

Make cities and human settlements inclusive, safe, resilient and sustainable.

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption patterns.

17 – Partnerships and Means of Implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

Sample Product of the ReTornar Project.

ACORDO AMBIENTAL SÃO PAULO

TOYOTA

Corporate Name

Toyota do Brasil Ltda

Name of the case

Projeto ReTornar - Etios Aibo

Safety net for the side windows made with leftover of seat belt.

Site

https://www.toyotacomunica.com.br/toyota-etios-aibo-fortalece-a-customizacao-de-portfolio-com-economia-circular/

Corporate Email Address

aabe@toyota.com.br

Type of Organization

Limited society.

Economic activities (based on CNAE - National classification of economic activities)

Manufacture of cars, vans, and utilities.

Theme

Organizational innovations and business models, Engagement of vulnerable communities.

Case description

Since 2011, Toyota do Brasil and The Toyota do Brasil Foundation develop partnership with seamstress institutions in the cities of Indaiatuba and Sorocaba called The ReTornar Project.

Basically, the project consists of transforming waste that would be disposed of into new products, a process known as upcycling in partnership with seamstress institutions.

Toyota do Brasil and Foundation Toyota verified that large amounts of waste (uniform used by employees), were destined for landfills and sought a creative, sustainable solution that could contribute to society and the environment.

Because, instead of relocating as waste, why can't the used uniforms be used for the manufacture of new products? It was with *this mindset* that the project got the kickoff.

With the idea designed, it was the time to seek partnerships to put the project into action. Toyota has vehicle assembly plants in the cities of Sorocaba and Indaiatuba and therefore understood that these cities were strategic for the development of the activity. In the city of Indaiatuba, a partnership was signed with the UniArte Costura Cooperative and in the city of Sorocaba with the Social Association Community Love (ASCA).

Over the years of the project, Toyota and Toyota Foundation have contributed to educational development, generation of work and income for seamstresses; with the culture of TPS (*Toyota Production System*), a way of producing world-renowned parts design; *e-commerce* among others, always focusing on these women who, for various reasons did not have opportunities to enter the formal labor market or for personal issues, chose to work in a format that meets their family demands.

At the beginning of the project, the items produced, such as bags, cases, etc., were acquired by Toyota do Brasil itself for the award of its employees and institutional visit programs that received mainly public schools, as presented in the case already published Retornar Project - Reuse of uniforms and automotive fabrics for the manufacture of sustainable gifts.

The making of gifts is a permanent project. This case is a project parallel to the gifts mentioned in the previous paragraph in which we seek to enable the circular economy in our products. From this moment on the same seamstresses began to manufacture a PN (*Part-Number*) of the vehicle Etios Aibo.

This vehicle model is exported to Argentina and is used there for the transportation of small cargo in large cities, bringing greater mobility and speed in deliveries. Because it is used for this purpose, this vehicle needs to have a safety net for the side windows of the rear doors, and it is fixed on a structure which is also removable, facilitating the access of loads through the rear side doors.

Instead of simply hiring an external company to make this safety net, the challenge was raised if this item could not be produced by the seamstresses of the Retornar Project. To enable this idea, to make the associations of seamstresses of the project a supplier of a PN of the vehicle Etios Aibo exported to Argentina, the sectors of Accessories Engineering, Purchasing and the Foundation of Toyota do Brasil did several studies with the seamstresses, until it reached the desired result.

After many studies and development of ideas, it was verified the opportunity to reuse the leftovers of the seat belts that would not be used in the production process, and that could be transformed into protection nets of Etios Aibo, this material was donated by the supplier and project partner, Joyson Safety Systems Brasil Ltd., Located in Balneário Piçarras/SC., as a way to contribute to the seamstresses served by the Retornar Project.

This project of making a PN(part numebr) of a vehicle is very important within the ReTornar. The seamstresses had the opportunity to work with several internal areas of Toyota, such as Engineering, Purchasing, Quality, Production and know how the development of a piece works from the conception of the idea to its approval, among other learning.

It is noteworthy that the institutions entered the parts supply chain for the first time, as well as all other parts acquired from Toyota's other suppliers in Brazil for the production of their vehicles, in addition, bringing as benefits the contribution with the seamstresses institutions and with some of the Sustainable Development Goals (SDGs), mentioned in the specific Field of SDG.

Does the Case show GHG emission level reduction?

Yes, avoid emission by reuse of discharged materials.

How is the Case classified?

Mitigation, Social responsibility.

Has the Case been implemented?

Yes, It was implemented and it's benefits continue.

What is the forecast of continuity of the Case?

1 to 2 years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

No.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

9.6 tons of Carbon Dioxide (CO_2) (Ref.: 15.7 kg CO_2/ kg of fabric).

Impacts/results

The project entered into force in January 2022 and will remain active until September 2023 and the estimated results will be the reuse of 1.2 tons of seat belt/ year and will have a direct social impact on the income of 24 families.

Invested resources

In 8 months, from April to December 2021, for the Etios Aibo project, 256 hours of Accessory Development Engineering were invested.

Main challenges faced

As this project was unique, without previous example, we had to do several tests and design proposals, where we had to propose solutions to problems never seen before, such as:

Example 1: The first design (use of push button) was good, but with little mechanical resistance (easy loosening), we had to switch to elastic + metal hooks, which in addition to increased resistance, added absorption of the mounting variation.

Example 2: Difficulty sewing seat beltwithout proper industrial machine. Several sewing proposals were made until the best shape was found.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Toyota do Brasil has an Accessories Division that works on the development of accessory items for the vehicles produced. The positive repercussion of the Etios Aibo case was so great that this division of the company is seeking to develop new accessories taking into account the concept of circular economy and continuity of the generation of work and income of the project.

Relations with the SDG (Sustainable Development Goals)

1 – Eradication of poverty:

In all places and in all ways;

4 – Quality education:

Ensure inclusive and equitable and quality education, and promote lifelong learning opportunities for all.

5 – Gender equality:

Empower all women and girls.

8 – Decent work and economic growth:

Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all.

10 – Reduced inequalities:

Reduce inequality within and between countries.

11 – Sustainable cities and communities:

Make cities and human settlements inclusive, safe, resilient and sustainable.

12 – Responsible consumption and production:

Ensure sustainable consumption and production patterns.

17 – Partnerships for the goals:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

The innovation is in the application of a reused raw material (seat belt) for the cargo attachment of a vehicle product.

ACORDO AMBIENTAL SÃO PAULO

TOYOTA

Corporate Name

Toyota do Brasil Ltda.

Name of the case

Use of certified green energy

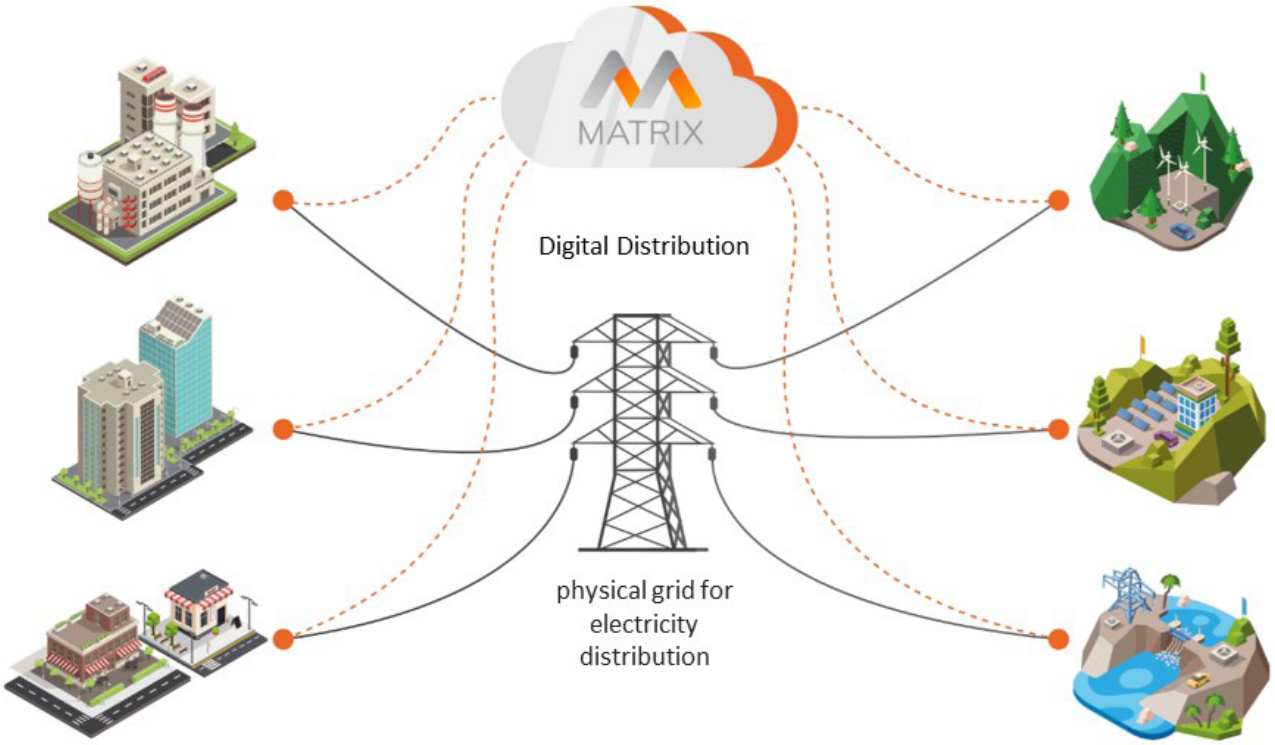


Illustration of the free electricity market.

Site

https://www.toyota.com.br

Corporate Email Address

sustentabilidade@toyota.com.br

Type of Organization

Limited society.

Economic activities (based on CNAE - National classification of economic activities)

Manufacture of cars, vans and utilities.

Theme

Reduction of indirect emissions, scope 2, according to the Greenhouse Gases Protocol (GHG Protocol), that is, purchased electricity, steam, heating/cooling purchased for use.

Case description

Since 2015, Toyota has been using clean energy (incentivized) in order to mitigate CO_2 emissions in its factories.

As of 2019, with the arrival of the I-Recs certificates (certification of source of renewable energy), it was changed from the incentivized energy to conventional energy with I-Recs proving the renewable source.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, It was implemented and it's benefits continue.

What is the forecast of continuity of the Case?

From three to five years. Awaiting for the definition of new regulatory frameworks for the electricity sector.

Is the Case likely to expand??

Maybe.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Approximately 5,000 tons of CO_2 were avoided in 2020.

Impacts/results

Incentive of the development of new clean energy projects.

Invested resources

1. Financial investment in external consultancy to seek alternatives for certificates valid in Brazil and internationally.

2. Human resources: working hours to evaluate and validate consultancy information.

Main challenges faced

Validate the reliability of the certifying company, as the certificate was new in the country.

Suggestions to improve the business environment (regulations, licensing, access to credit)

There is small dissemination of the I-Rec Certificate (clean and certified energy) in the country. Slowly note that some companies are offering the certificate, but it is restricted to the knowledge of a few.

Next steps

Implement in units that are not yet part of the Free Energy Market.

Relations with the SDG (Sustainable Development Goals)

7 – Affordable and Clean Energy:

Ensuring everyone has reliable, sustainable, modern and affordable access to energy.

13 – Action Against Global Climate Change:

Take urgent action to combat climate change and its impacts.

17 – Partnerships and Means of Implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

BRAZILIAN SUGARCANE INDUSTRY AND BIOENERGY ASSOCIATION - UNICA

Name of the case

Greener Ethanol ('Etanol Mais Verde')

Reforestation nursery plants.

Aerial photo of a permanent preservation area next to a sugar cane plantation.

Site

https://unica.com.br

Corporate Email Address

unica@unica.com.br

Type of Organization

Association.

Economic activities (based on CNAE - National classification of economic activities)

Business representation.

Theme

Reduction of direct emissions, scope 1 (see Greenhouse Gases Protocol (GHG PROTOCOL) – association facilities and transport), biodiversity, conservation, management of forestry assets, land use; organizational innovations and business models; carbon capture and storage, emissions compensation; water resources and water efficiency.

Case description

The São Paulo Sugar Energy Sector's Agro-environmental Protocol, which was signed on August 26, 2017 by the Government of the State of São Paulo, represented by the Secretariat of Agriculture and Supply (SAA), the Secretariat of Infrastructure and Environment (SIMA) and the Environmental Company of the State of São Paulo (CETESB), and the sugarcane sector, represented by the Brazilian Sugarcane Industry and Bioenergy Association - UNICA and the Organization of Cane Producers Association in Brazil (ORPLANA) and is known as "Etanol Mais Verde" (Greener Ethanol), assumed as a central premise the relevance of the sugarcane sector for economic development and the generation of jobs, income, foreign exchange, and taxes for the State, throughout the entirety of its production chain. Implementation of the Technical Directives defined under the Protocol has since sought to consolidate the sector's sustainable development process in the State of São Paulo. The 130 signatories, 117 industrial units (84% of the plants operating in SP) and 13 sugarcane supplier associations, representing more than 5,120 suppliers (50% of the sugarcane suppliers active in the state of São Paulo), send documentation presenting indicators related to these directives each year for monitoring purposes. A total of 4.4 million hectares are subject to commitments related to best practices for agriculture and the environment, representing 91% of the sugarcane processed in the state of São Paulo and 43% of Brazil's ethanol production. Highlights of the Protocol's directives include: (i) the moving forward of legal deadlines for eliminating the controlled burning of sugarcane straw; (ii) the protection of riparian forest and natural springs located in areas of sugarcane production; (iii) the adoption of best practices for soil conservation; (iv) the proper disposal of pesticide packaging; (v) the reduction of water consumption in the agricultural processing of sugarcane; and (vi) the adoption of best practices aimed at reducing atmospheric emissions associated with industry. The Protocol therefore does not merely involve compliance with current legislation, since one of the main technical directives under 'Green Ethanol' (currently, 'Greener Ethanol') specifically refers to the moving forward of targets for eliminating burning as a pre-harvest agricultural method established under Federal Law no. 11,241, of September 19, 2002, and regulated by Federal Decree no. 47,700, of March 11, 2003. In practice, this means that the sugarcane production sector moved legal deadlines for ending burning in the state forward from 2021 to 2014 in areas considered to be capable of mechanization and from 2031 to 2017 in areas in which mechanization was not considered to be possible. Another very effective action taken under the Agro-Environmental Protocol is related to the planting of native seedlings. The Protocol bound signatories to the objective of guaranteeing the restoration of riparian forests and water springs located in areas in which sugarcane is cultivated, thereby establishing the sugar-energy sector as an industry reference for environmental practices and implementing the largest project aimed at protecting and restoring riparian forests and water springs in the state of São Paulo. By 2021, more than 46,674,586 seedlings had been planted, 132,285 hectares of riparian areas reforested, and 7,315 springs recovered, fulfilling legal requirements that will only become effective once the Environmental Regularization Program (PRA) established under Federal Law no. 12,651/2012 has been formalized. The PRA has not yet been implemented in the state of São Paulo and the recovery of riparian forests, in anticipation of legal requirements, thereby represents immediate actions that are being taken to capture carbon.

Another important aspect of the Protocol are technological innovations related to the commitments that were made in signing the agreement. Eliminating burning required investments towards adapting cultivation areas to allow the circulation of machines, including the eliminating of terracing. The associated presence of unburned straw on the soil required greater attention from the production sector in order to prevent vinasse puddles from forming on the soil, which could subsequently contribute to the proliferation stable fly populations in nearby livestock production areas. This scenario led to the development of techniques for concentrating vinasse and the directed application of concentrated or low volume vinasse, which led to increased water savings and effectiveness in the use of nutrients present in vinasse and minimized the risk of water contamination. Vinasse is rich in potassium, and is therefore an excellent natural fertilizer, increasing soil quality and avoiding the use of synthetic fertilizers.

Adherence to the Protocol therefore had an impact on production processes themselves. Perhaps the most significant result achieved under the Protocol was the realization that voluntary adherence to legal requirements can lead to improvements in production processes, aggregating value for both economic activities and the environment. Of the signatories to the 'Greener Ethanol' Protocol, 90% are active in regional forest fire prevention and firefighting frameworks such as Mutual Assistance Plans (PAM) and the Integrated Emergency Network (RINEM). The forest fire prevention and fighting force represented by the Protocol includes more than 1,860 fire tanker trucks and 11,700 firefighters. The signatories widely make use of biological controls to avoid the presence of pests in sugarcane and consistently seek to expand upon best practices for the use of pesticides, a result of the commitment that plants have made to adhering to the directives established under the Greener Ethanol Protocol.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Social and Environmental Responsibility.

Has the Case been implemented?

Yes, and the case continues to provide benefits.

What is the forecast of continuity of the Case?

More than 10 years.

Is the case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Since the Agro-Environmental Protocol entered into effect (2007), more than 11.8 million tons of CO_2eq and more than 71 million tons of air pollutants (carbon monoxide, particulate matter and hydrocarbons) have been eliminated. In 2021, the electricity generated through bagasse and sugarcane straw was 34.3 TWh, where 14.1 TWh was for the self-consumption of the mills and 20.2 TWh for the national grid, this surplus represented 4% of the national electricity consumption (equivalent to the annual consumption of more than 10.2 million households). Today most of the straw is destined to soil cover, assisting in soil regeneration and physical protection against erosion, and the biomass destined for burning in boilers for cogeneration of energy is mostly represented by sugarcane bagasse. In 2021, the generation of bioelectricity from sugarcane to the national grid avoided the emission of approximately 7 million tons of CO_2, estimated according to the methodology "Tool to calculate the emission factor for an electricity system" (UN, 2022). In order to estimate the CO_2 emissions that were eliminated as a result of the moving forward of burning restrictions, the studies carried out by the Intergovernmental Panel on Climate Change (IPCC) were used as a reference. It was found that, for each hectare of unburned sugarcane, 0.62 t of CO_2 is eliminated. As for the possibility of burning straw in boilers for cogeneration of thermal energy and renewable electricity from biomass, it is difficult to recover more than 50% of the straw from the field because the recovery efficiency is limited by the need to leave a significant amount of straw, for agronomic reasons (Project BRA/10/G31 - SUCRE - Sugarcane Renewable Electricity, 2020). Currently, mainly due to the logistic costs of bale and transportation of sugarcane to the mill, this use does not take place on a commercial scale, and the maintenance of straw on the ground is the predominant scenario, recomposing nutrients and physically protecting the soil from the action of wind and other weather.

Impacts/results

Sugarcane-producing municipalities.

Invested resources

Under the 'Greener Ethanol' Project, the sugar-energy sector in the state of São Paulo has accumulated almost 4,000 sugarcane harvesters (taking both mills and third parties into consideration). During the 2007/2008 harvest alone, 750 sugarcane harvesters were brought under the Protocol. Additionally, more than 400,000 employees received additional training and skills upgrading since the program was implemented.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Lack of financing.

Next steps

Create additional targets in order to overcome the challenges arising from the advance elimination of burning as a pre-harvest agricultural method.

Relations with the SDG (Sustainable Development Goals)

1 – End poverty (in all its forms everywhere).

2 – Zero hunger (achieve food security and improved nutrition) and sustainable agriculture.

3 – Good health and well-being (ensure healthy lives and promote well-being for all at all ages).

4 – Quality education (ensure inclusive and equitable quality education and promote lifelong learning opportunities for all).

5 – Gender equality (empower all women and girls).

6 – Clean water and sanitation for all.

7 – Affordable and clean energy (ensure access to affordable, reliable, sustainable and modern energy for all).

8 – Decent work and economic growth (promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all).

9 – Industry, innovation and infrastructure (build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation).

10 – Reduce inequalities within and among countries.

11 – Sustainable cities and communities (make cities and human settlements inclusive, safe, resilient and sustainable).

12 – Responsible consumption and production (ensure sustainable consumption and production patterns).

13 – Climate action (take urgent action to combat climate change and its impacts).

14 – Life below water (conserve and sustainably use the oceans, seas and marine resources for sustainable development).

15 – Life on land (protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification and half and reverse land degradation and halt biodiversity loss).

17 – Partnerships for the goals (strengthen the means of implementation and revitalize the Global Partnership for Sustainable Development).

Does the Case contribute to technological development and/or to the business model?

Yes, through new harvesting methodologies, in addition to new models for processing sugarcane and using its by-products (sugarcane straw, vinasse, etc.).

Other information regarded as relevant

CETESB is a member of 'Greener Ethanol'.

CERTIFICADO

X/2021

CERTIFICATE

ETANOL mais verde

Certificamos que/This is to certify that

XXXXXXX

XXXXX - SP

Assumiu o compromisso de implementar as Diretivas Técnicas descritas no Protocolo Agroambiental Etanol Mais Verde, firmado entre o Governo do Estado de São Paulo, representado pela Secretaria de Agricultura e Abastecimento, pela Secretaria do Meio Ambiente e pela Companhia Ambiental do Estado de São Paulo, e pelo setor Sucroenergético, representado pela União da Indústria da Cana-de-açúcar - UNICA e pela Organização de Plantadores de Cana da Região Centro-Sul do Brasil - ORPLANA. Este Certificado é válido até 15/04/2022.

The signatory assumed the commitment to implement the Technical Directives described in the Greener Ethanol Agroenvironmental Protocol, signed between the Government of the State of São Paulo, represented by the Secretariat for Agriculture and Supply, the Secretariat for Environment and the São Paulo State Environmental Company, and the Sucroenergetic Sector, represented by the Union of the Sugarcane Industry - UNICA and by the Organization of the Sugarcane Producers from the Center-South Region of Brazil - ORPLANA. This Certificate is valid until April 15th, 2022.

São Paulo, XX/XX/2021

Carolina Matos

Secretária Executiva

ORPLANA UNICA CETESB SÃO PAULO GOVERNO DO ESTADO

Greener Ethanol Protocol Certified model.

ACORDO AMBIENTAL SÃO PAULO

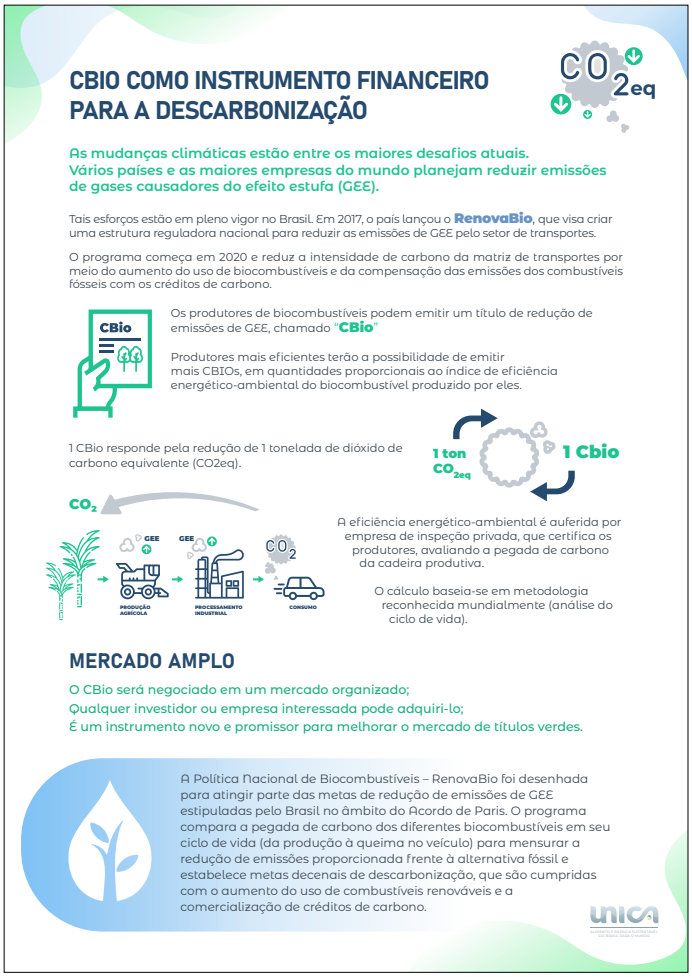
Corporate Name

União da Agroindústria Canavieira do Estado de São Paulo - UNICA

UNICA
ALIMENTO E ENERGIA SUSTENTÁVEL DO BRASIL PARA O MUNDO

Name of the case

RenovaBio



Site

sugarcane.org

Corporate Email Address

unica@unica.com.br

Type of Organization

Association.

Economic activities (based on CNAE - National classification of economic activities)

Agriculture, livestock, forestry, fishing and aquaculture,

Electricity and gas,

Transport, storage and mail,

Business representation.

Theme

Reduce direct emissions, scope 1 (according to the Greenhouse Gases Protocol (GHG Protocol), which includes the organization's own facilities and transport). Reduce indirect emissions, scope 2 (according to the GHG Protocol), which includes purchased electricity, steam and heating/cooling purchased for private use. Reduce indirect emissions, scope 3 (according to the GHG Protocol), which includes purchased goods and services, capital goods, fuel, transport and distribution, waste, business trips, etc.

Prevent emissions (substitution of fuels and modes of transport, innovations in products and services, etc.).

Biodiversity, conservation, management of forest assets and land use.

Organizational innovations and business models.

Communication, stakeholder engagement and sharing of good practices.

Moves taken to adapt to climate change.

Carbon capture and storage, and offsetting emissions.

Water resources and water efficiency. Other priorities directly or indirectly related to the climate agenda.

Case description

The National Biofuel Policy (RenovaBio, in Portuguese), established by Law No. 13.576/2017, has as its main objective to increase the use of biofuels in the Brazilian transport matrix, based on predictability and economic, environmental and social sustainability, also as a means of reducing greenhouse gas emissions in the country. The RenovaBio Program is made up of three strategic priorities: 1) Decarbonization Goals; 2) Biofuel Production Certification; and 3) Decarbonization Credit (CBIO). For the first priority, annually, the Government sets national goals for ten years, which are deployed to fuel distributors, who are the mandatory part of the policy. For the second priority, producers voluntarily certify their production and as a result receive energy-environmental efficiency ratings. These notes are multiplied by the volume of biofuel traded, which results in the number of CBIOs that a given producer may issue and sell on the market, which is the third priority. One CBIO equals one ton of emissions prevented, which would equal seven trees in terms of carbon captured. By 2029, the expected national level of prevented greenhouse gas emissions will be equivalent to planting 5 billion trees. Some of its goals are: Valuing biofuels; Promoting energy security; Ensuring predictability of investments; Reducing emissions in the transport sector; Improving air quality in large metro areas; Encouraging technological innovation; Creating jobs and income. 2030 Benefits: Contribute to the Brazilian goal of a 43% reduction in emissions. The program compares the carbon footprint of different biofuels in their life cycle (from production to combustion in the vehicle) in order to measure the reduction of emissions provided by fossil fuel alternatives and sets ten-year decarbonization goals, which are met with the increased use of renewable fuels and trading of carbon credits (CBIO). The national goal for 2019/2020 was revised with the drop in fuel consumption which was caused by the pandemic and totaled 14.898 million CBIOs for the period. The policy allows distributors to postpone, until the following year, up to 15% of volume, as long as they have fully met the goal the previous year. The goal for 2021 was set by the CNPE at 24.86 million CBIOs and the market has already recorded their operations – 4.87 million CBIOs are available for trading, and the distributors have already acquired 506 thousand credits.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Adaptation, Compensation, Sequestration, Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

More than 10 years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

Yes.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

The goals determine the reductions in greenhouse gas emissions this year due to each fuel distributor that sold fossil fuels. Reductions are made by means of acquiring CBIOS (1 CBIO is equivalent to 1 ton of CO_2 prevented due to biofuel of the producer that issued that title). The mandatory annual goal of 24,860,000 CBIOs, defined by CNPE Resolution No. 8/2020 for the year 2021, was deducted from the number of CBIOs removed from circulation in the market in 2020, by an un-obligated party, corresponding to only 177 CBIOs, which led to the annual goal of 24,859,823 CBIOs. After the CBIO Platform, a tool made available by SERPRO through a contract with the ANP, started operations, certified biofuel producers started generating CBIO guarantees, allowing for bookkeeping and trading of credits on the B3 stock exchange. As for the decarbonization target established for the 2019-2020 period by the CCNPE, equivalent to 14.9 million CBIOs, 18.7 million were generated, of which about 15 million were sold at B3 at an average price of BRL 43.41 . CNPE Resolution No. 8/2020, in addition to defining mandatory annual goals, with the exception of revising the goal for 2020, established the goal for 2021 (24.86 million CBIOs) and also stipulated the goals for the 2022 to 2030 period, with the respective tolerance ranges.

The ten-year decarbonization goals for the transport sector, established by the Ministry of Mines and Energy – MME up through 2030, foresee the need to expand fuel ethanol production in the country from the current 30 billion liters to an amount closer to 50 billion liters. This condition will require investments in new facilities and/or technologies that allow for increased productivity in the sugar energy agroindustry, one of the key sectors for reaching the established carbon intensity limits.

Impacts/results

Since this is a national policy to reduce emissions, RenovaBio impacts the community as a whole. Specifically, it impacts the whole fuel production and consumption chain in Brazil. In general, it impacts society as a whole, as it contributes to the mitigation of climate change. RenovaBio, established by Law No. 13.576/2017, introduces mandatory and individual decarbonization goals to fuel distributors (available for consultation at: **https://www.gov.br/anp/pt-br/assuntos/renovabio/metas-individuais-compulsorias-definitivas-de-reducao-de-emissoes-de-gases-causadores-do-efeito-estufa-para-2021**), determining the offsetting of emissions of fossil fuels traded year after year through the acquisition of CBios. Focusing on impacts on the production chain, RenovaBio forecasts that by 2030 there will be a reduction of 847 thousand tons of CO_2 with ethanol and biodiesel. With the expansion biofuels offered up to meet decarbonization goals, investments in the order of BRL 1.4 trillion are expected, mainly in terms of efficiency gains for the production of biofuels. It is also estimated that 1.4 million new jobs will be created.

The State of São Paulo has the largest number of companies participating in RenovaBio. Currently, there are 119 production units certified by the Program, out of a total of close to 240 certified companies. The emissions prevented from using ethanol in the State since the introduction of the flex fleet, up to the year 2020, already total 230.5 million tons of CO_2e. To better understand the scale of these reductions, a useful analogy is to compare them with the amount of carbon captured through the growing of native vegetation. In this case, the total CO_2e prevented through the use of ethanol, in the State of São Paulo alone, is equivalent to planting and maintaining 1.65 billion trees for 20 years. It is worth noting that specific data on emissions prevented in the State of São Paulo during the RenovaBio term are in their final stages; however, the positive impacts of using ethanol fuel in São Paulo help highlight the importance of São Paulo's contribution to the national effort to reduce CO_2 emissions.

The production units in the State of São Paulo represent around 40% of the ethanol fuel sold in the country. In 2021, up through June, 96% of this volume came from companies certified by RenovaBio. Therefore, these companies are essential not only for supplying the fuel market, but also for issuing decarbonization credits in a volume that allows staying within the established limits for emissions in the Brazilian vehicle transport matrix.

Invested resources

While RenovaBio is being carried out, investments in the order of BRL 1.4 trillion are expected, mainly in efficiency gain for biofuel production, and it is estimated that 1.4 million new jobs will be created. These investments will be made individually by the sugarcane processing units as they seek to improve energy efficiency, by reformulating their industrial plants, and developing new technologies. In this sense, it would be premature to define an amount already invested by the plants, since such investments are still taking place, making it difficult to measure them at this time.

Main challenges faced

Legal security; maintenance and compliance with decarbonization goals by distributors (judicialization of the program); access to investment lines to increase efficiency in the biofuel production chain.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Creation of a regulatory environment that provides legal security for the execution of the Program, guaranteeing investments. Clarifying the public's questions about the environmental, social, economic and health benefits arising from the use of renewable biofuels in place of fossil fuels, including analysis of the production chain, paying attention to the origin of the final energy used. Creation of financing lines with better conditions for environmentally sustainable companies. Regulation of mechanisms (PSA) that guarantee the value is given to the standing forest, and incentivize the operation of carbon markets, the regulation of models for the provision of environmental services, conversion of fines into the provision of environmental services, etc.

Next steps

Maintain decarbonization goals; reinforce the communication of the program to the population; create a regulatory environment that guarantees legal security; develop a voluntary carbon market

Relations with the SDG (Sustainable Development Goals)

3 – Health and Well-being:

Ensure a healthy life and promote well-being for everyone, at all ages;

6 – Drinking Water and Sanitation:

Ensure the availability and sustainable management of water and sanitation for all;

7 – Affordable and Clean Energy:

Ensure reliable, sustainable, modern and affordable access to energy for all;

8 – Decent Work and Economic Growth:

Promote inclusive and sustainable economic growth, full and productive employment and decent work for all;

9 – Industry, Innovation and Infrastructure:

Build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation;

11 – Sustainable Cities and Communities:

Make cities and human settlements inclusive, safe, resilient and sustainable;

12 – Responsible Consumption and Production:

Ensure sustainable production and consumption patterns;

13 – Action Against Global Climate Change:

Take urgent steps to combat climate change and its impacts;

14 – Life in the Water:

Conserve and promote the sustainable use of oceans, seas and marine resources for sustainable development;

15 – Terrestrial Life:

Protect, restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, fight desertification, halt and reverse land degradation and halt the loss of biodiversity;

17 – Partnerships and Means of Implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

RenovaBio is based on efficiency in the production of biofuels. The more efficient from an environmental and energy point of view, the higher the energy efficiency rating of the biofuel producer will be and the more CBIOS it will be able to issue. This leads to a constant search for new technologies, such as the use of vinasse in producing Biogas.

Other information regarded as relevant

The RenovaBio Program opened the doors to a new dimension in the evaluation of private investments. If, on the one hand, it is essential to increase production capacity, on the other hand, this increase must be accompanied by greater environmental efficiency of the fuel produced. To this end, in the coming years, new investments in the agricultural and industrial process should be observed, which foresee a lower carbon intensity in the production of biofuels.

In the agricultural stage, investing in more productive sugarcane varieties that require less fertilizer, or renewing the tractor and truck fleet with more efficient vehicles that use less diesel or utilize renewable energy sources (such as ethanol or biomethane) to meet transport needs.

In the industrial phase, companies should seek to expand or develop bioelectricity co-generation units, which already represent around 4.1% of the country's total generation. Biomethane generation units from the biodigestion of vinasse (a residue from the ethanol production process) should also become a common goal for these companies' new investment resources. These initiatives, in particular, not only have a positive effect on the carbon intensity of the ethanol produced, but also make it possible to supply the electricity market with renewable energy, diversifying the energy sources used, and helping to guarantee the national energy supply and security.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Lins Agroindustrial S/A

Usina Lins

Name of the case

"Preventing Fires Together" - Awareness, Prevention and Firefighting Campaign

Newspaper ad – 2nd year of the campaign.

Newspaper ad – 1st year of the campaigncampaign.

Campaign stamp "Preventing Fires Together".

Site

www.usinalins.com.br

Corporate Email Address

juridico_or@usinalins.com.br

Type of Organization

Business Corporation Publicly Traded Corporation/ Privately Held Company.

Economic activities (based on CNAE - National classification of economic activities)

Ethanol and Sugar Production.

Theme

Biodiversity, conservation, forest asset management, land use, communication, stakeholder engagement and dissemination of good practices, other areas directly or indirectly related to the climate agenda.

Case description

Fires, in addition to causing significant material damage and threatening life, also cause great environmental impacts, degrading native vegetation, ecological preservation areas, and local biodiversity.

The campaign "Preventing Fires Together" covers the region of Lins, located in the center-west of the state of São Paulo, where there is a predominance of hot and dry weather, and is characterized by periods of drought from May to September, which favors the incidence of fires.

The predominant biome in the region is the Atlantic Forest and tension zone (contact area of two biomes), in this case, Atlantic Forest and Cerrado, two very important biomes for Brazilian biodiversity, as they harbor numerous species.

Fires are also responsible for the emissions of large amounts of greenhouse gasses (GHG) which is one of the main causes of climate change.

Aiming to promote collective awareness about the importance of fire prevention in society, Usina Lins invited several companies, public institutions, and civil society organizations to start together a campaign to raise awareness and prevent and fight fires.

The initiative proposes raising awareness and adopting effective measures to prevent the occurrence of fires, such as: not setting fire to garbage, not throwing cigarette ends on roads, not releasing balloons etc., as well as encouraging the population to report suspicious attitudes and call the firefighters in case of fire.

The focus of the campaign is the awareness of the population in general about the prevention of forest and urban fires since many fires start in urban areas bordering rural areas, and in small rural properties (rural sites, ranches, etc.), which use fire to burn garbage, causing unintentional forest fires.

Virtual meetings are held with all participating companies, where the theme, communication pieces, communication plan, and awareness actions are defined in common.

At the beginning of 2021, Usina Lins conceived this campaign and contacted institutions and companies from different segments, inviting them to participate.

The 2021 campaign took place from May to October with 15 companies/institutions involved.

For the 2022 campaign, there was an increase in the area of influence of the action, inviting institutions and companies from other cities neighboring Lins; since fires affect the entire region, especially smaller cities that do not have firefighting structures, mills in the region are responsible for helping to fight urban and forest fires in these cities.

The 2022 campaign has 29 companies/institutions, representing an increase of approximately 93% compared to 2021.

The companies participating in the 2022 campaign are:

1. 37th Brazilian Army Battalion.
2. Association of Producers and Olericulturists of Lins (APOL) and region.
3. Novo Horizonte Sugarcane Suppliers Association.
4. AES Brazil.
5. Comprehensive Technical Assistance Coordination (CATI).
6. Tietê Batalha River Basin Committee.
7. Municipal Council for Urban Policy and the Environment (CONDEMA) of Lins.
8. Fire Department.
9. Córrego Azul Distillery.
10. Environmental Military Police.
11. Municipality of Lins.
12. Municipality of Pongaí.
13. Cafelândia City Hall.
14. Municipality of Sabino.
15. Guaimbê City Hall.
16. Guaiçara City Hall.
17. Araújo RTC - Risk Management for Life.
18. Basic Sanitation Company of the State of São Paulo (SABESP).
19. Transbrasiliana Triunfo.
20. National Bioenergy Union (UDOP).
21. Cafealcool Plant.
22. Clealco Plant.
23. Diana Plant.
24. Ipiranga Agroindustrial Plant.
25. Lins Plant.
26. Renuka Plant.
27. São José da Estiva Plant.
28. Tietê Agroindustrial Plant.
29. Via Rondon.

The launch of the 2022 campaign was held on May 2, with a face-to-face event, where a lecture on fire awareness and prevention was held

The educational campaign counts with the promotion in online and offline media: signs on busses, billboards, news ads, stickers for vehicles, plaques,banners for motorways, leaflets, videos and social networks, including a fan page on Facebook.

Besides this action in partnership of the businesses, each company defines and develops its communication strategy within their internal and external public, such as lectures, training sessions etc.

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation, Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it was implemented, and its benefits continue.

What is the forecast of continuity of the Case?

More than ten years.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

Reduction not verified.

The biggest impact is the awareness of the population and consequently the reduction of fires.

Due to the large area of coverage of the campaign, it has not yet been possible to control the number of fires, to measure the effective results of this campaign; however, official information from the National Institute for Space Research (INPE) is used as a reference.

In the INPE's Queimadas Program, it is possible to verify the historical series of fire outbreaks by region.

In the Lins region, located in the center-west of the state of São Paulo, it is possible to evidence that there was a significant reduction in the number of fires, to which the campaign may have contributed in some way.

Here is a link to access this INPE information:

https://queimadas.dgi.inpe.br/queimadas/portal-static/estatisticas_estados/

Invested resources

Usina Lins created the campaign and holds all the costs related to the elaboration of the pieces and other communication materials, such as radio and video spots, and each participating company pays for the dissemination of the campaign it carries out.

The approximate investment of Usina Lins for carrying out the campaign is BRL 50,000.00 to BRL 70,000.00 per year.

Main challenges faced

Putting together companies and institutions from different segments for a common goal.

Next steps

Because awareness raising is a slow process, which often involves cultural issues of the place and the people, the campaign must be a continuous and progressive process. In this way, it is intended to carry out this campaign every year, so that, in the medium to long term, it is possible to quantify, with more precision, the number of fires in the region covered by the campaign.

Relations with the SDG (Sustainable Development Goals)

13 – Climate Action:

Take urgent action to combat climate change and its impacts.

15 – Life on Land:

To protect, restore and promote sustainable use of terrestrial ecosystems: sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss.

17 – Partnerships for the goals:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

Other information regarded as relevant

Usina Lins has 100% of its sugarcane harvest mechanized, i.e., it does not burn sugarcane straw for pre-harvest.

To prevent and fight fires, Usina Lins maintains a large structure, with a surveillance team properly trained and equipped, which includes 162 fire brigade employees, 17 water trucks, tank trucks to supply kites and two observation towers installed at strategic points, with 24-hour monitoring.

It is also part of a Mutual Assistance Plan (PAM) for firefighting, which includes 16 plants in the region, where all participating help each other in fighting fires.

Usina Lins also donated firefighting equipment to the Lins Fire Department to be attached to a pickup truck, in order to help them fight smaller fires.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Lins Agroindustrial S/A

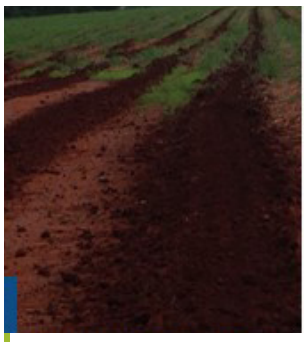
Usina Lins

Name of the case

Programa SEMEAR

Seedlings ready.

Area cleaning.

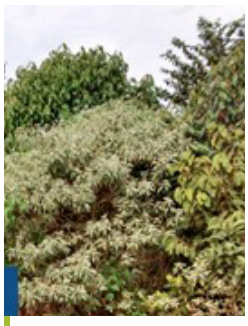


Area preparation.

Planted area.

Area under maintenance.

Area under development.



Ready area.

Permanent preservation area of the alvorada farm - reforested by the semear program.

Site

https://www.usinalins.com.br/

Corporate Email Address

comunicação@usinalins.com.br

Type of Organization

Corporation / Privately Held Company.

Economic activities (based on CNAE - National classification of economic activities)

Sugar and Ethanol Production.

Theme

Biodiversity, forest asset management, land use, carbon capture and storage, offsetting CO_2 emissions, water resources and water efficiency.

Case description

Since 2010, Usina Lins has had a Permanent Preservation Area (APP) reforestation program, in which trees are planted on the banks and springs of rivers on farms that the company uses to plant sugarcane, being fully funded by Usina Lins.

Usina Lins carries out the entire reforestation process, including field survey, area preparation and planting, as well as maintenance in the area for two years, until the forest is in the stage where it does not need to care to continue its self-development.

Does the Case show GHG emission level reduction?

No.

How is the Case classified?

Carbon sequestration, social and environmental responsibility.

Has the Case been implemented?

Yes, The project is in progress.

What is the forecast of continuity of the Case?

5 to 10 years.

Is the Case likely to expand??

Likely.

Information about GHG emissions.

Is there any emission reduction?

There is no information, because the Greenhouse gases Inventory was carried out for the first time in 2021, and it is the year 2020 which will serve as a basis for defining the reduction targets.

Is there GHG sequestration?

Yes, but there is no information on the value of this sequestration, because the calculation of carbon sequestration related to the practice of reforestation has not yet been carried out.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

This Project does not reduce emissions, it captures greenhouse gases by planting trees.

Impacts/results

Recovery and conservation of environmental preservation areas and water resources aimed at increasing water availability and consequently reducing the impacts of drought on water courses.

Increased local biodiversity.

Assistance to suppliers and partners to comply with the Environmental Code.

Invested resources

Approximate cost of BRL 13,000.00 per hectare, with the total cost of the program from 2010 to 2020 being approximately BRL 7,000,000.00.

Main challenges faced

Adhesion of partners and suppliers in the program.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Provide greater access to financial credits to fund environmental programs and offer some extra benefit in licensing processes, such as extending the maturity date, etc.

Next steps

The projection is to reforest 60 hectares per year. There are contacts with partner companies in order to help fund the project in order to expand the program to realize more areas per year. The goal is to regularize the permanent preservation areas of all farms of partners and suppliers that the company uses to plant sugarcane.

Relations with the SDG (Sustainable Development Goals)

6 – Drinking Water and Sanitation:

Ensure availability and sustainable management of water and sanitation for all;

13 – Action Against Global Climate Change:

Take urgent action to combat climate change and its impacts;

15 – Protection of Earth Life:

Restore and promote the sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, halt and reverse land degradation and halt the loss of biodiversity;

17 – Partnerships and Means of Implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Pitangueiras Açúcar e Álcool Ltda.

Name of the case

Regular planting since 2016.

Seedling nursery owned by Pitangueiras Plant.

Event of reforestation promoted on the day of the 2019 Tree by the Pitangueiras Plant.

Reforestation event promoted on the Day of 2019 Tree by the Plant Pitangueiras trees.

Site

http://www.usinapitangueiras.com.br/

Corporate Email Address

contato@usinapitangueiras.com.br

Type of Organization

Limited Society.

Economic activities (based on CNAE - National classification of economic activities)

Processing industry, Sugar and alcohol sector.

Theme

Reduction of indirect emissions, scope 3 (as per The Greenhouse Gases Program (GHG Protocol), which includes purchased goods and services, capital goods, fuel, transport and distribution, waste, business travel, etc.).

Biodiversity, conservation, management of forest assets, land use, carbon capture and storage, emissions offsetting and engagement with vulnerable communities.

Case description

Plantings carried out with own seedlings grown in the seedling nursery of Usina Pitangueiras, where more than 3,000 seedlings are planted per year (2016, 2017, 2018 and 2019), with the exception of 2016, which was the first year and 1,500 seedlings were planted, accounting for one total planted area of more than 72,000 m² (equivalent to approximately 6.5 football fields like Maracanã).

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Social and Environmental Responsibility.

Has the Case been implemented?

Yes, it has been implemented and its benefits continue.

What is the forecast of continuity of the Case?

More than 10 years, at least. The planning is to be done annually, and the intention of the board is to keep the project for the subsequent years.

Is the Case likely to expand??

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

Yes.

Is GHG avoided?

Yes.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

These emissions are not monitored, the project aims to raise environmental awareness in the community and employees.

Impacts/results

Projects with the community of the city of Pitangueiras, residents of the plant colony and employees. The main result was to be able to raise awareness and stimulate the concern of those involved in general with environmentally correct actions and with the impacts of actions that could harm the environment.

In the first year, in 2016, after the first project, an employee of the Plant participating in the project asked the manager of the Environmental Department to go to her house and see her backyard. The employee, with the knowledge acquired in the project, built a suspended vegetable garden on an entire wall of his backyard – vegetables grown in PET bottles, nailed to reused wooden pallets and fixed to the wall. The manager was very moved by the initiative, the bearing of fruits from the Pitangueiras plant project.

In recent years, there have been several testimonies from participants talking about the good things they learned in the project, including the testimony of an employee at the Plant telling about the moment and the joy of planting a tree with his son.

It can be concluded that small actions make a difference. And together, in increasing numbers, it is possible to collaborate for a sustainable country.

It is gratifying to observe the results obtained in schools, especially before the pandemic. The children's excitement about learning and participating in the project, especially in planting trees, becomes one of the greatest motivations for the initiative.

Also noteworthy are the results of social inclusion perceived during the project with the interaction of APAE students with those from public schools. Interaction favors the development of capacities and values of respect for others and differences.

The result that most contributed to the environment is undoubtedly the reforested area, which expanded the fauna and flora, providing shelter and food for various species. There is a video – Guardians of the Forest – Tree Planters (2019), produced by UNICA, illustrating this work and available at: **https://youtu.be/Oysv2XzOAFQ.**

The video shows the reforestation carried out at Fazenda Santa Rita and São Rafael, as part of the Usina's environmental project. There is no specific mention of the project, but it is possible to observe the results obtained, such as the reforestation at Fazenda Santa Rita, aimed at protecting the body of water, a dam, located in a region close to the Plant.

UNICA, in the video, portrays the work developed by the sugar and alcohol sector, mainly in the Plants, in order to disseminate it to other sectors and to the population in general.

The aim is to spread the work done with great care, thinking not only about the environment in the short term, but also in the long term. Make the population aware of the importance of perpetuating the sustainability of companies so that there is conservation of the environment and an increase in environmentally correct actions by all. Even if an action for the preservation / conservation / improvement of the environment is small, when all actions are put together, they make a difference.

Usina Pitangueiras is concerned with monitoring all its processes in a way that does not negatively impact the environment, but rather that its actions preserve and improve what already exists. Usina Pitangueiras wants not only to plant trees, but to plant trees in previously studied places that have an environmental function, such as the formation of ecological corridors, densification of riparian forests, etc., and also show the population that small actions make a difference.

It is worth noting that the project is encouraged by the entire Board of the Plant, which spares no effort so that it can continue and be expanded in the future.

Invested resources

The seedlings are from their own nursery, with the participation of employees from the environmental and agricultural sector.

The directors set aside an annual budget for investments in the project, which include gifts to participants, costs of posters and models for school students (aid for needy students).

Main challenges faced

Production of own seedlings, maintenance and care with the nurseries, and transportation to the planting areas and maintenance of the post-planting area.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Expand the plantations, taking advantage of possible leftovers of seedlings from other plantations, and plan, in the future, after the pandemic, to increase community participation.

Next steps

Post-planting maintenance as continuity and monitoring of donated seedlings.

After the pandemic, plan an exhibition space for photos of trees from seedlings taken by former participants.

The main goal is to expand the number of people involved in the project to further spread awareness and the planting of native seedlings.

Include all the city's schools in the project and even involving schools from neighboring cities that want to participate, promoting awareness of the preservation of the environment.

Relations with the SDG (Sustainable Development Goals)

11 – Sustainable cities and communities:

Making cities and human settlements inclusive, safe, resilient and sustainable;

13 – Action against global climate change:

Taking urgent measures to combat climate change and its impacts;

17 – Partnerships and means implementation:

Strengthen the means of implementation and revitalize the global partnership for sustainable development.

Does the Case contribute to technological development and/or to the business model?

No.

Other information regarded as relevant

Usina Pitangueiras' commitment to the community is continuous, always aiming to talk about the importance of taking care of our planet, being aware and sustainable.

The local community participates together with settlers, students from schools and APAE and employees of the Plant, attending lectures, getting to know the seedling nursery from the nursery to the seedling itself made for planting. The Plant selects students through posters and models assembled by them, employees and parents. Those selected visit the plant, participate in breakfast and integration actions and are then sent to the seedling nursery. The children and adults involved are taken to the planting area, where, with the help of plant employees, they help and learn how to plant.

The objective of this work is to make people aware of the preservation of the environment and encourage preservation actions. This awareness is made through lectures, setting up posters, activities involving recyclable materials (children assemble toys made from recyclable material) and even planting trees.

Right after the initial planting, usually 300 seedlings, the Plant offers a lunch to the participants. Planting continues with the nursery employees, at least 3,000 seedlings per project.

The seedlings are cultivated by the plant's agricultural collaborators who work on the project.

All cultural care and treatment, such as crowning, irrigation, monitoring of ants, etc., is carried out by Usina Pitangueiras.

The Plant donates tree seedlings to everyone who wants them during the Environment Week.

ACORDO AMBIENTAL SÃO PAULO

VIRACOPOS
Aeroportos Brasil

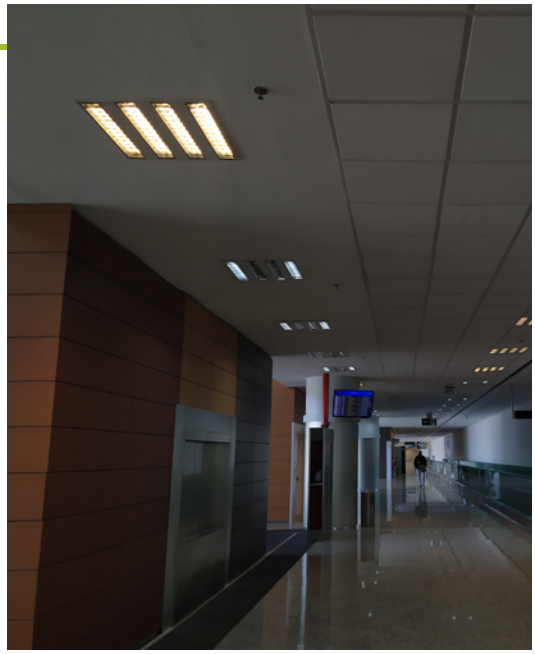
Corporate Name

Airports Brasil Viracopos SA

Name of the case

Replacement of metal steam lamps with LED.

LED Lighting – Viracopos Airport.



LED Lighting – Passenger terminal.

Lamp replacement.

Site

http://viracopos.com/

Corporate Email Address

coord.meioambiente@viracopos.com

Type of Organization

Corporation/privately owned.

Economic activities (based on CNAE - National classification of economic activities)

Airports.

Theme

Reduction of indirect emissions, scope 2 according to Greenhouse Gases Protocol (GHG Protocol), which includes purchased electricity, steam, heating/cooling purchased for own use.

Case description

Within the scope of energy efficiency, the systematic replacement of metallic steam lamps has been carried out by Light Emitting Diode(LED - Light Emitting Diode) lamps throughout the airport. The action started in 2015 and will be completed in 2024, totalizing the replacement of approximately 30,000 lamps. In addition to the 70% reduction in energy consumption with lighting, it will be possible to reduce CO_2 emissions related to this use by approximately 67% (calculation basis according to the emission factor of *International Civil Aviation Organization (ICAO), Guidance on the Development of States' Action Plans on CO_2 Emissions Reduction Activities, 2016, 1kwh = 0,03 kg of CO_2).*

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Case implemented and still in progress.

What is the forecast of continuity of the Case?

5 to 10 years.

Is the case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

A reduction of 55.30 tCO_2/year from 2015 is estimated, reaching 66.66 tCO_2/year when 30,000 lamps replacements were completed.

Impacts/results

19,892 metal vapor lamps were replaced by 10.006 LED lamps between 2015 and 2021, resulting in a reduction of approximately 74% in energy consumption for lighting, reaching an estimated emission reduction of 332 tCO_2 until 2021.

The estimated conclusion for the 30,000 lamps replacement is the year 2024, reaching an accumulated emission reduction in the order of 600 tCO_2.

Places where the lamps were replaced: Administrative Building, Cargo Terminal, Piers, Passenger Terminal, Patios P, N and Q, Sidewalks – airside and Garage Building.

The annual CO_2 saving from the lamp replacements were:

- 2015 – 20 tCO_2
- 2016 – 7 tCO_2
- 2017 – 9 tCO_2
- 2018 – 30 tCO_2
- 2019 – 161 tCO_2
- 2020 – 76 tCO_2
- 2021 – 29 tCO_2.

Expected saving for the next years:

- 2022 – 145 tCO_2
- 2023 – 76 tCO_2
- 2024 – 70 tCO_2.

The disposal of the changed lamps is sent to the Mercury decontamination and recovery process because it is dangerous waste.

LED lamps are sent as electronic waste, for the recycling and reuse process of materials, following the recommendations of the Solid Waste Management (PGRS) at Viracopos International Airport.

Invested resources

Hours of technical staff work and electrical maintenance management were invested, as well as financial allocation for the acquisition of LED lamps and the optimization of the waste disposal of replaced lamps.

Main challenges faced

Limitation of financial resources.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Until this present phase of the project, suggestions for improvements haven't been identified.

Next steps

To replace another 10,074 metallic steam lamps with LEDs over the next 5 to 10 years, achieving a 70% in energy reduction.

The CO_2 economy in the period (2015 to 2024) is approximately 600.

tons. After the replacement of the 30.000 lamps, the definition of the next project's steps and goals will be evaluated.

Relations with the SDG (Sustainable Development Goals)

7 - Affordable and Clean Energy:

Ensuring reliable, sustainable, modern, and affordable access to energy for everyone.

13 - Action Against Global Climate Change:

Taking urgent action to combat climate change and its impacts.

Does the Case contribute to technological development and/or to the business model?

No.

Other information regarded as relevant

No.

ACORDO AMBIENTAL SÃO PAULO

Corporate Name

Airports Brasil Viracopos SA

VIRACOPOS
Aeroportos Brasil

Name of the case

Valorization of solid waste to Waste Derived Fuel (CDR) generation.

Waste collection at Viracopos Airport.

Waste Value Plant.

Pressed material to generate Waste Derived Fuel (CDR).

Receipt of waste at the Value Plant.

Site

http://viracopos.com/

Corporate Email Address

coord.meioambiente@viracopos.com

Type of Organization

Corporation/privately owned.

Economic activities (based on CNAE - National classification of economic activities)

Airports.

Theme

Reduction of indirect emissions, scope 3 according to Greenhouse Gas Protocol, which includes generation of solid waste and destination for appropriate treatments. The action promotes the non-sending of waste to landfills.

Case description

The action was implemented in the end of 2020 and during 2021 and 2022, the non-recyclable waste*, similar to household waste (typology: class D – Brazilian Health Regulatory Agency (ANVISA) RDC number 661/2022 and class IIA – Brazilian Association for Technical Standards (ABNT) - NBR 10004) were diverted from landfills, with the referral to a Solid Waste Value Plant for the Waste Derived Fuel (CDR) generation, which is a fuel for the cement industry.

(*) Non-recyclable waste is generated in administrative areas, in common areas of the Passenger Terminal and public spaces at the airport's access.

Note: According to PNRS (National Policy on Solid Waste in Portuguese), before the waste is sent allocated to generation of Refuse Derived Fuel (RDF), there is the separation of residue type D: the recyclable waste is sent for recycling and the non recyclable, to RDF (however, at the moment of separation of the nonrecyclable waste, there is a small quantity of refuse generated in the process).

Does the Case show GHG emission level reduction?

Yes.

How is the Case classified?

Mitigation.

Has the Case been implemented?

Yes, it has been implemented and actions/ improvements are still underway.

What is the forecast of continuity of the Case?

Case implemented permanently.

Is the Case likely to expand?

Yes.

Information about GHG emissions.

Is there any emission reduction?

Yes.

Is there GHG sequestration?

No.

Is GHG avoided?

No.

Is this reduction verified?

No.

If the Case reduces emissions, how many tons of GHG are/will be reduced per year?

There was a reduction of 131 tCO_2/year (reference: landfills that makes methane recovery in their operation, to power Generation, for example) and 1,193 tCO_2/year (reference: landfills that do not carry out methane recovery in their operation) from 2021, with an estimate annual update, considering the volume of waste to be diverted from landfills year by year.

In relation to the transportation, the distance from the landfill or recovery plant is the same.

The waste that is allocated for Refuse Derived Fuel (RDF), is the nonrecyclable* (type class D) - ANVISA (National Agency of Sanitary Surveillance in Portuguese) RDC no. 661/2022 and class IIA - ABNT (Brazilian Association of Technical Norms in Portuguese) NBR 10004.

Examples of nonrecyclable waste: food leftovers, residues from sweeping, spice sachets etc.

Impacts/results

In 2021, 1,159 tons of solid waste were diverted from landfills, resulting in the reduction of greenhouse's gas emissions in the order of approximately 131 tCO_2/year (reference: landfills that carry out methane recovery in their operation) and 1,193 tCO_2/year (reference: landfills that do not carry out methane recovery in their operation).

In the first half of 2022, approximately 724 tons of solid waste were diverted from the landfills, resulting in the reduction of greenhouse gas emissions in the order of approximately 82 tCO_2/year (reference: landfills that carry out methane recovery in their operation) and 745.41 tCO_2/year (reference: landfills that do not carry out methane recovery in their operation).

Invested resources

Hours of work were invested by the environment team, for the search of sustainable alternatives to transport solid waste in the most sustainable way, that do not generate additional expenses in the waste collection, transportation and disposal, seeking improvement and optimization in processes.

Main challenges faced

Few companies have technology for Waste Derived Fuel (CDR) generation.

Suggestions to improve the business environment (regulations, licensing, access to credit)

Until this present phase of the project, there haven't been identified suggestions for improvements.

Next steps

Permanent and critical analysis on solid waste management, seeking to increase the volume of waste to be diverted from landfills. The project has a permanent basis implementation.

Relations with the SDG (Sustainable Development Goals)

12 - Ensure sustainable consumption and production patterns.

Does the Case contribute to technological development and/or to the business model?

No.

Other information regarded as relevant

No.

ACORDO AMBIENTAL SÃO PAULO

APPENDICES

-TECHNICAL NOTE

-QUESTIONS AND ANSWERS

ACORDO AMBIENTAL SÃO PAULO

CETESB - Environmental Company of São Paulo State

São Paulo Environmental Agreement

Environmental Chamber of Climate Change

Working Group Tools, Methodologies, and Information Sharing for Compliance with São Paulo Environmental Agreement

TECHNICAL NOTE 01.1

QUANTIFICATION AND REPORTING OF GREENHOUSE GAS EMISSIONS

1.ed. rev., current

São Paulo, November 2022

Internacional Cataloging Data

(CETESB – Library, SP, Brasil)

C418t CETESB (São Paulo)
Technical note 01.1 [eletronic resource] : quantification and reporting of greenhouse gas emissions / CETESB ; Authors Cristiane Lima Cortez ... [et al.] ; Colaborators Arthur Ngai ... [et al.]. – 1.ed. rev., current. – São Paulo : CETESB, 2022.
1 test file (40 p.) : il. color., PDF ; 145 MB.

Also available in pen drive and paper.
Available at: <https://cetesb.sp.gov.br/acordo-ambiental-sao-paulo/>
ISBN 978-65-5577-043-8.

1. Applied methodology 2. Climate change 3. Environmental agreement 4. Global warming 5. Greenhouse effect – gases 6. Low carbon I. Title.

CDD (21. ed. Esp.) 363.738 74
CDU (2. ed. Port.) 504.7:531.791

Cataloging at source: Margot Terada – CRB 8.4422

Distribution and marketing rights reserved.

Reproduction is permitted provided the source is cited.

© CETESB 2022

Av.[avenue] Prof. Frederico Hermann Jr., 345

Pinheiros - São Paulo/SP - Brazil - Zip Code 05459-900

CETESB - ENVIRONMENTAL COMPANY OF SÃO PAULO STATE

SÃO PAULO ENVIRONMENTAL AGREEMENT

ENVIRONMENTAL CHAMBER OF CLIMATE CHANGE

WORKING GROUP TOOLS AND METHODOLOGIES AND INFORMATION SHARING FOR COMPLIANCE WITH SÃO PAULO ENVIRONMENTAL AGREEMENT (WG 1 - TOOLS)

TECHNICAL NOTE 01.1 – Quantification and Reporting of Greenhouse Gas Emissions

version 01.1 – November 2022

CEO

Patrícia Iglecias

Department of Strategic and Institutional Development

Jorge Luiz Nobre Gouveia

Sector Coordination Division

Vivian Marrani de Azevedo Marques

Presidency of the Environmental Chamber of Climate Change

Evandro Gussi

Executive Secretary of the Environmental Chamber of Climate Change

Josilene Ticianelli Vannuzini Ferrer

Technical Data

Authors

Cristiane Lima Cortez (Federation of Trade in Goods, Services and Tourism of the State of São Paulo - Fecomercio SP)

Joana Bercht Canozzi (The Chemours Company)

José Pedro Fittipaldi (São Paulo Agency for the Promotion of Investments and Competitiveness InvestSP)

Josilene Ticianelli Vannuzini Ferrer (CETESB)

Ricardo Esparta (BlockC Tecnologia e Gestão)

Thaís Pagotto (Concessionária Auto Raposo Tavares - CART)

Collaborators

Arthur Ngai (The Chemours Company), Carolina Moro (Rotta e Moro Sociedade de Advogados), Carlos Ibsen Vianna Lacava (CETESB), Clarice Aico Muramoto (CETESB), Daniel Soler Huet (CETESB), Davi Strauss, Fernanda Rotta (Rotta e Moro Sociedade de Advogado), José Contrera Lopes Neto (CETESB), Karen Midori Nagai (BlockC Tecnologia e Gestão), Lilian Pavani (Aeroporto Brasil Viracopos), Marcelo Leopardi Zeferino (Logum Logística S.A.), Maria Cristina Poli (CETESB), Marina Muniz Rossi (Braskem), Priscila Grutzmacher (Braskem), Raquel Martins Montagnoli (Companhia Brasileira de Alumínio - CBA), Renata Camargo (UNICA), Ruth Maria de Barros Reicao Cordido (Savin, Paiva Advogados), Thiago Pietrobon (Ecosuporte Assessoria Ambiental Ltda.), Wilson Issao Shiguemoto (CETESB).

ABNT normative revision

Library and Institutional Memory Sector

Acknowledgments

To the organizations and their professionals that make up the Environmental Chamber of Climate Change (CAMC), and to its Working Groups that supported the debates that underpinned the preparation and revision of this Technical Note, namely: UNICA - Sugarcane Industry Union, which presides the CAMC, Aeroportos Brasil Viracopos, Brazilian Association of Biogas - ABIOGÁS, Brazilian Association of Vegetable Oil Industries - ABIOVE, Brazilian Association of Glass Industries - ABIVIDRO, Brazilian Association of Refrigeration, Air Conditioning, Ventilation and Heating - ABRAVA, Brazilian Association of Photovoltaic Solar Energy - ABSOLAR, São Paulo Association of Supermarkets - APAS, BlockC Tecnologia e Gestão S.A., Braskem S.A., Concessionária Auto Raposo Tavares - CART, Brazilian Aluminum Company - CBA, The Chemours Company, OAB/SP Environment Commission, Duratex S/A, Eco Solar Energia Solar Ltda. Ecosuporte Assessoria Ambiental Ltda, Federation of Trade in Goods, Services and Tourism of the State of São Paulo - Fecomercio SP, Ferrari Agroindústria S/A, Flsmidth Ltda., Gail Guarulhos S/A Indústria e Comércio, Guarany Indústria e Comércio Ltda., Global Forest Bond - GFBOND, Hospital Sírio Libanês, National Institute for Empty Packaging Processing - inpEV, São Paulo Agency for the Promotion of Investments and Competitiveness - Invest SP, Johnson Controls- Hitachi Ar Condicionado do Brasil Ltda., Kaan Architecten - Serviços de Arquitetura Ltda., Leroy Merlin Companhia Brasileira de Bricolagem, Logum Logística S.A., Maringá Ferros e Ligas S.A., Raízen Energia S.A., Reservas Votorantim Ltda., Rotta e Moro Sociedade de Advogados, Basic Sanitation Company of the State of São Paulo - SABESP, São Martinho S.A., Savin Paiva Advogados, Stocche Forbes Filizzola Clapis Pássaro e Meyer Sociedade de Advogados, Tereos Açúcar e Energia Brasil S.A., Toyota do Brasil Ltda., Pitangueiras Açúcar e Álcool Ltda., Usina Açucareira São Manoel S.A..

To CETESB professionals who contributed with readings and revisions of the Technical Note (some with numerous readings), to those who participate in CAMC and its Working Groups, for their support, contributions and participation in the debates during the presentations of the document at CAMC meetings.

In particular, to the professionals of the Department of Strategic and Institutional Development (PD), of the Division of Sector Coordination (PDC), of the Division of Climate Change and Multilateral Agreements (PDM), for their support in carrying out CAMC's activities; and to the team from the Library and Institutional Memory Sector (ADGB), for reviewing and guiding the citation and referencing of sources in the document and standardization according to ABNT.

To Logum Logística S.A and its staff, especially to Marcelo Leopardi Zeferino, who took part in São Paulo Environmental Agreement, who kindly translated this Technical Note to English, expanding the reach of this document to an even larger public.

To Invest São Paulo and its staff, especially to José Pedro Fittipaldi, who greatly contributed by managing Logum's participation in the conclusion of this translation.

Glossary

Adaptation

Initiatives and measures to reduce the vulnerability of natural and human systems to the current and expected effects of climate change.

Absolute and relative emissions

Absolute emissions indicate the total emissions. Relative emissions, also called emission intensity, express emissions related to a parameter that indicates some activity, for example, emissions per unit of product, per unit of gross domestic product (in the case of countries) or revenue (in the case of organizations) etc.

Anthropogenic emissions

Release of greenhouse gases (GHG) into the atmosphere due to human activities.

Direct GHG emissions

Emissions from sources that are owned by or controlled by the reporting company.

Base year emissions

GHG emissions in the base year.

Fugitive emissions

Diffuse release into the atmosphere effected by a source lacking a device designed to direct or control its flow; Emissions that are not physically controlled but that result from intentional or accidental GHG releases. They commonly result from the production, processing, transmission, storage and use of fuels and other chemicals, often through joints, seals, gaskets, etc.

Indirect GHG emissions

Emissions that are a consequence of the reporting company's operations, but that occur at sources owned or controlled by another company.

Emission factor

Factor that allows GHG emissions to be estimated from an available unit of activity data (e.g., tons of fuel consumed, tons of production) and absolute GHG emissions.

Floresta+

National Program for Payments for Environmental Services instituted by the Ministry of Environment through Ordinance no. 288/2020, to promote the private market of payments for environmental services in areas maintained with native vegetation cover and the articulation of public policies for the conservation and protection of native vegetation and climate change.

Greenhouse Gases (GHG)

Gases constituting the atmosphere, capable of absorbing and re-emitting infrared radiation. For the purposes of this Technical Note, GHGs are the seven gases listed in the Kyoto Protocol: carbon dioxide (CO_2); methane (CH_4); nitrous oxide (N_2O); hydrofluorocarbons (HFCs); perfluorocarbons (PFCs); sulfur hexafluoride (SF_6); and nitrogen trifluoride (NF_3).

GHG Protocol

The GHG Protocol, according to the Brazilian GHG Protocol Program, is a tool used to understand, quantify, and manage GHG emissions that was originally developed in the United States, in 1998, by the World Resources Institute (WRI) and is the most used method by companies and governments worldwide to carry out GHG inventories. It is also compatible with the ISO 14,064 standard and with the Intergovernmental Panel on Climate Change (IPCC) quantification methods.

Global Warming Potential (GWP)

Global warming potential (GWP): measurement of the radiative effect over a given period of time, caused by the emission of a mass of GHG in relation to the emission of an equivalent mass of carbon dioxide (CO_2).

GPC

Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories.

Removals or sinks

Absorption or sequestration of GHGs from the atmosphere through natural processes (photosynthesis) or by capture and storage technologies.

REDD+

Reduction of greenhouse gas emissions from deforestation and forest degradation, considering the role of conserving forest carbon stocks, sustainable forest management and increasing forest carbon stocks.

List of Acronyms and Symbols

ABNT

Brazilian Association of Technical Standards

ABRAPP

Brazilian National Association of Pension Funds

ACERT

Airport Carbon and Emissions Reporting Tool[1]

AD

Activity data

AFOLU

Agriculture, Forestry, and Other Land Use

ANAC

Brazilian Civil Aviation Authority

ANBIMA

Brazilian Financial and Capital Markets Association

ANP

Brazilian Agency of Petroleum, Natural Gas, and Biofuels

APIMEC

Brazilian Association of Investment Analysts, and Professionals of the Capital Market

APU

Auxiliary Power Unit

[B]³

Brasil, Bolsa, Balcão (Stock Exchange Market)

BTU

British Thermal Unit

C40

C40 Cities Climate Leadership Group

CAMC

Environmental Chamber of Climate Change

CDP

Carbon Disclosure Initiative

CEBDS

Brazilian Business Council for Sustainable Development

CETESB

Environmental Company of São Paulo State

CFB

Biodiversity and Inspection Coordination

CFC

Chlorofluorocarbon

CH_4

Methane

CISE

ISE Deliberative Council

CNPE

Brazilian National Council for Energy Policy

CO_2

Carbon dioxide

CO_2e

Carbon dioxide equivalent

CONAREDD+

National REDD+ Committee

COP

Conference of Parties

[1] Free translation.

CORSIA

Carbon Offsetting and Reduction Scheme for International Aviation

CRAs

Refrigerant Fluid Regeneration and Analysis Centers

DEFRA

Department for Environment, Food, and Rural Affairs

GRI Guidelines

GRI Standards for Sustainability Reporting

EDC

Dichloroethane

EF

Emission Factor

EFDB

Emission Factors Data Base

EPE

Energy Research Office

ESG

Environmental, Social, and Governance

EUD

Fugitive GHG emissions from the disposal of old air conditioning or refrigeration units

EUE

Fugitive GHG emissions from existing air conditioning or refrigeration units

EUN

Fugitive GHG emissions from new air conditioning or refrigeration units

FAA

US Federal Aviation Administration

FGVces

Center for Sustainability Studies at Fundação Getúlio Vargas

GHG

Greenhouse Gases

GPC

Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories

GRI

Global Reporting Initiative

WG

Working Group

WG Good Practices

WG - 2 - Good Practices and Actions for Compliance with São Paulo Environmental Agreement and Suggestions for Evolving Regulation

WG Tools

WG - 1 - Tools, Methodologies, and Information Sharing for Compliance with São Paulo Environmental Agreement

GWP

Global Warming Potential

HFC

Hydrofluorocarbon

HCFCs – PBH

Brazilian Program for the Elimination of Hydrochlorofluorocarbons

HCFCs

Hydrochlorofluorocarbons

IBAMA

Brazilian Institute of Environment and Renewable Natural Resources

IBGC

Brazilian Institute of Corporate Governance

ICAO

International Civil Aviation Organization

ICLEI

Council for Local Environmental Initiatives – Local Governments for Sustainability

ICMA

International Capital Market Association

IFC

International Finance Corporation

INVESTSP

São Paulo Agency for the Promotion of Investments and Competitiveness

IPCC

Intergovernmental Panel on Climate Change

IPPU

Industrial Processes and Product Use

ISE B3

Corporate Sustainability Index

ISO

International Organization for Standardization

MBRE

Brazilian Emissions Reduction Market

MCTI

Ministry of Science, Technology, and Innovation

MCTIC

Ministry of Science, Technology, Innovation, and Communication

CDM

Clean Development Mechanism

MMA

Ministry of Environment

MME

Ministry of Mines and Energy

N_2O

Nitrous oxide

NDC

Nationally Determined Contribution

NF_3

Nitrogen trifluoride

ODP

Ozone Depletion Potential

PAG

Brazilian acronym for Global Warming Potential (Potencial de Aquecimento Global) – GWP

PBGHGP

Brazilian GHG Protocol Program

PBH

Brazilian Program for the Elimination of Hydrofluorocarbons (HCFCs)

PEMC

State Policy on Climate Change

PFCs

Perfluorocarbons

PNMC

National Policy on Climate Change

PNPSA

National Policy for Payments for Environmental Services

UNEP

United Nations Environment Program

PROCLIMA

State Policy on Climate Change

Mata Ciliar Program

Program of Incentives for the Recovery of Riparian Forests and the Recomposition of Vegetation in the Basins Forming Water Springs

PSA

Payments for Environmental Services

REDD+

Reduction of GHG emissions from deforestation and forest degradation, including forest conservation, sustainable forest management and increasing forest carbon stocks

RenovaBio

National Biofuels Policy

RenovaCalc

Biofuels carbon intensity calculation tool

ODS

Ozone-Depleting Substances

S&P

Standard & Poor's 500

SERI

State Secretariats for International Relations (SERI)

SF_6

Sulfur hexafluoride

SIMA

Secretary of Infrastructure and Environment of the State of São Paulo

TCRA

Term of Commitment to Environmental Recovery

UCLG CGLU

United Cities and Local Governments

UNEP

United Nations Environment Programme

UNFCCC

United Nations Framework Convention on Climate Change

VCM

Vinyl chloride

WBCSD

World Business Council for Sustainable Development

WRI

World Resources Institute

List of Tables

Table 1 - Template for submission of GHG Inventory to CETESB 335
Table 2- Examples of global warming potential (GWP) 340
Table 3 – Types of approach 344
Table 4 – Examples of sources and data to be collected 345
Table 5 - Calculation tools recommended by the Brazil GHG Protocol Program 348
Table 6 - GWP for selected refrigerant gases 349
Table 7 - Average emission factor of the Brazilian National Interconnected System in 2019 350
Table 8 - Emission factors for air trips 351

List of Figures and Diagrams

Diagram 1 - "Decision tree," estimate of stationary combustion emissions 341
Diagram 2 - "Decision tree" calculation of emissions of CH_4 from enteric fermentation 342
Figure 3 - Steps for preparing the greenhouse gas emissions inventory 343
Figure 4 - Modal Change in the Transportation of Liquids 353

List of Equation

Equation 1 340
Equation 2 349
Equation 3 350
Equation 4 350
Equation 5 351

Sumário

1. INTRODUCTION 328

2. REGULATORY AND ORGANIZATIONAL REFERENCES FOR SÃO PAULO ENVIRONMENTAL AGREEMENT 329

2.1 INTERNATIONAL CLIMATE AGREEMENTS 329

2.1.1 United Nations Framework Convention on Climate Change: Kyoto Protocol and Paris Agreement 329

2.1.2 Protection of the ozone layer and greenhouse gases: Montreal Protocol and Kigali Amendment 330

2.1.3 Aviation Greenhouse Gases: The Carbon Offsetting and Reduction Scheme for International Aviation 330

2.2 MAIN REGULATORY REFERENCES 331

2.2.1 Federal sphere: National Policy on Climate Change and cross-references to the climate agenda 331

2.2.2 State regulation in São Paulo: State Policy on Climate Change and government action 332

3. CLIMATE CHANGE AND MARKET REFERENCES 336

3.1 GREEN BONDS AND CLIMATE CHANGE 336

3.2 ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG) 337

3.3 CAPITAL MARKETS - ISE B3 (CORPORATE SUSTAINABILITY INDEX) 337

3.4 SECTOR ACCREDITATIONS - THE AIRPORT CARBON ACCREDITATION EXAMPLE 338

4. CALCULATION OF GHG EMISSIONS AND PUBLICATION OF INVENTORIES: TOOLS AND METHODOLOGIES 339

4.1 INTRODUCTION: IPCC GUIDELINES 339

4.2 ISO STANDARD-14064-1 342

4.2.1 Organizational limits 344

4.2.2 Operating limits 344

4.2.3 Selection of calculation methodology 345

4.2.4 Selection and collection of data on GHG activities and emission factors 345

4.2.5 Base year selection 346

4.2.6 Calculation of emissions 346

4.2.7 Report 346

4.3 GHG PROTOCOL 346

4.4 GLOBAL PROTOCOL FOR COMMUNITY - SCALE GHG EMISSIONS (GPC) 348

4.5 "TAYLOR-MADE" METHODOLOGIES FOR GHG ESTIMATION 349

4.6 METHODOLOGIES FOR QUANTIFYING PROJECT-BASED EMISSION REDUCTIONS 351

4.6.1 LOGUM CDM methodology for modal change in the transportation of liquids 352

4.7 COMMENTS ON PUBLISHING INVENTORIES AND OTHER GHG-RELATED INFORMATION 354

4.7.1 GHG Protocol – Public Emissions Registry 354

4.7.2 Carbon Disclosure Project (CDP) 354

4.7.3 Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories (GPC) 355

4.7.4 Methodology of the Intergovernmental Panel on Climate Change (IPCC) 355

4.7.5 The importance of ISO standard no. 14064 for the publication 355

4.7.6 Global Reporting Initiative (GRI) standards for sustainability reporting 356

4.7.7 Own tools and publication 356

5. CONCLUDING CONSIDERATIONS 356

1. INTRODUCTION

The State of São Paulo has significantly advanced in the management of greenhouse gas (GHG) emissions with the tools and resources possible, considering that the main GHG, carbon dioxide (CO_2), is not a regulated pollutant in the country yet. As a subnational entity, São Paulo joins the world efforts to contain global warming below the average temperature rise of 1.5°C.

São Paulo Environmental Agreement was launched by the Environmental Company of São Paulo State (CETESB) in November 2019 with 55 adherents, in an effort to update this agenda to act in the fight against climate change, promoting the engagement of the main actors of the business sector and of public management towards adequate measures of mitigation and adaptation to global climatic phenomena.

It has the support of the State Secretariats for International Relations (SERI) for Infrastructure and Environment (SIMA). Its objective is to encourage companies, entities and municipalities in São Paulo to undertake voluntary commitments to reduce GHG emissions. Voluntary adherence to the Agreement will be automatically renewed until 2030 and is intended to induce GHG reduction in this period, in addition to strengthening government action for the evolution of this agenda.

This initiative is expected to foster an environment of technical cooperation, which is fertile for the implementation of new technologies and innovative solutions. It is urgent to add energy and efforts to reduce GHGs, improve water and energy efficiency, and expand socio-environmental responsibility actions, encouraging the productive sector and municipalities to act more effectively and with less carbon emissions.

Announced in November 2019, during the launch of the Agreement, the Environmental Chamber of Climate Change (CAMC) was installed in March 2020 by video conference. It is made up of 10 full members and 10 alternates, elected every two years among the members adhering to the Agreement. They meet regularly, with the presence of numerous observers and guests, which are also members of the Agreement. Among its objectives is the consolidation of a robust technical exchange forum to enable the implementation of the Agreement, with innovations and voluntary reduction of GHG emissions, including organizations with less capacity to assimilate new policies, towards a low carbon economy.

Each of the parties to the Agreement has voluntarily sent, or will send annually to CETESB, information on their GHG emissions, including the methodology used to measure them, the schedule of targets for reduction and/or implementation of actions to avoid emissions, its achievements in terms of emission reductions, and/or other environmental improvements for the period from 2020 to 2030. The Agreement also includes the possibility of sending annual information on the existence of indicators and actions to reduce vulnerability and expand adaptation to climate change.

The start of the receiving of information on GHGs was in 2021, relative to the year 2020, for organizations that joined in 2019 and 2020; or in 2022, for organizations that joined in 2021, and so on.

With the objective of supporting those which adhere to the Agreement in providing guidance on the proper reporting of their emissions and emission reductions, CAMC created two Working Groups (WGs) to technically support the Agreement and its entities, namely: WG-1 - Tools, Methodologies, and Information Sharing for Compliance with São Paulo Environmental Agreement, and WG-2 - Good Practices and Actions for Compliance with São Paulo Environmental Agreement and Suggestions for Evolving Regulation, called WG Tools and WG Good practices, respectively.

A Sub WG has been created within the scope of the WG Tools for the preparation of this Technical Note, composed of professionals from the following organizations: Blockc Tecnologia e Gestão, Concessionária Auto Raposo Tavares (CART), Environmental Company of São Paulo State (CETESB), The Chemours Company (Chemours), Federation of Trade in Goods, Services, and Tourism of the State of São Paulo (Fecomercio SP), São Paulo Agency for the Promotion of Investments and Competitiveness (Invest SP). The interaction of this group with the members of CAMC and the components of its 2 WGs greatly favored the writing and revision of this Technical Note. Numerous versions of the document were presented and sent for reading, as well as several contributions added new content and revisions from various professionals that make up the constellation of adherents of the Agreement, who improved the content presented here.

The Technical Note consists of four sections. The first one addresses the main normative and organizational references for São Paulo Environmental Agreement, which includes a brief overview of international climate agreements and the main regulatory references at national and state levels.

The second section deals with climate change and market benchmarks, which includes a glance at green bonds, the Environmental, Social and Governance (ESG) indices, the market's corporate sustainability index (ISE B3), and sectoral accreditations.

Section three includes the presentation of the calculation of GHG emissions and publication of inventories, tools, and methodologies, inserting the guidelines of the Intergovernmental Panel on Climate Change (IPCC), ISO standard 14064-1, GHG Protocol, Global Protocol for Community- Scale GHG Emissions Inventories (GPC), methodologies and main references that will comprise the organizational and operating limits, selection of the calculation methodology and data collection from GHG activities and emission factors, base year, calculation of emissions, for good practices of inventory, and reporting of emissions.

And, lastly, the concluding considerations, which consolidate the set of information in the Technical Note. Throughout the document, the references for each topic are exposed as footnotes, to facilitate access to the sources of information.

This document aims at guiding and facilitating the progression of São Paulo Environmental Agreement, since once the GHG inventory has been carried out, in a comparative format, with technical parameters that are already agreed upon, the publication of the information obtained will be relevant for the transparency of organizations and to disseminate not only information that can be compared, but also to encourage other actors to contribute in reducing emissions and to further expand technical consistency for the development of São Paulo Environmental Agreement.

The authors of this Technical Note anticipate that this Technical Note will be continuously updated, as it contains guidelines in terms of tools, methodologies, legal and organizational instruments, in constant evolution, so that the entities of the Agreement may monitor their emissions and voluntary actions to reduce GHG emissions, and inform CETESB about the evolution of compliance with its voluntary GHG reduction targets, strengthening the technical bases of São Paulo Environmental Agreement.

2. REGULATORY AND ORGANIZATIONAL REFERENCES FOR SÃO PAULO ENVIRONMENTAL AGREEMENT

This section aims at presenting the main international references, laws, decrees, normative instruments, which support the theme "Quantification and Reporting of Greenhouse Gas (GHG) Emissions" with a view to reporting GHG emissions and reduction targets under the Term of Adherence to São Paulo Environmental Agreement. It also provides a succinct overview of the instruments, focusing on the description of voluntary and mandatory initiatives of companies related to the calculation and reporting of GHG emissions, as well as the role and counter entries of the State of São Paulo.

2.1 INTERNATIONAL CLIMATE AGREEMENTS

This item presents the international climate agreements referring to climate change, the protection of the ozone layer, and the control of GHG emissions in the international aviation sector, highlighting the participation of Brazil and the State of São Paulo.

2.1.1 United Nations Framework Convention on Climate Change: Kyoto Protocol and Paris Agreement

In 1992, during the United Nations Conference on Environment and Development, the United Nations Framework Convention on Climate Change (UNFCCC) was signed, a fundamental document of the origin of the International Regime on Climate Change. It entered into force in 1994, being enacted in the country through Decree no. 2,652/1998[2] , and establishes commitments to combat global climate change for all signatory countries. However, the convention did not set GHG reduction targets. Effective actions to reduce GHGs would only be proposed by its Kyoto Protocol, signed in 1997, the result of the evolution of global negotiations that took place in the Conferences of the Parties (COPs), during the years 1995 to 1997, which would only come into effect in February 2005. It was ratified by Brazil in 2002 and enacted in the country through Decree no. 5,445/2005[3], which established effective GHG reduction targets for the developed countries that are part of Annex I of the aforementioned document, being able to use projects from developing countries to fulfill their targets, such as the Clean Development Mechanism (CDM).

More recently, through the Paris Agreement, ratified by Brazil and enacted in the country through Decree no. 9,073/2017[4], the signatory parties acknowledge the need to tackle climate change globally, and all signatory countries now have targets, and for that purpose, they must present their respective Nationally Determined Contribution (NDC), representing the greatest ambition of the country, progressively. The other points that stand out are long-term objectives: decarbonization, climate finance, forest protection and damage repair. Brazil elaborated its NDC presenting as targets the reduction of GHG emissions by 37% in 2025 and a reduction of emissions by 43% in 2030, with reference to the emission index observed in the year 2005 (BRAZIL, 2020)[5].

The three international climate agreements, together with their regulations and instruments, make up the international technical, scientific, and legal framework that guide States to build their internal policies to combat the effects of climate change.

The main greenhouse gas anthropogenically emitted is carbon dioxide (CO_2), an unregulated pollutant in the country. Despite such limitation of legislation that regulates the challenge of managing public policies to reduce

[2] BRAZIL. **Decree no. 2,652, of July 1, 1998**. Enacts the United Nations Framework Convention on Climate Change, signed in New York on May 9, 1992. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, July 02 1998. Available at: http://www.planalto.gov.br/ccivil_03/decreto/d2652.htm. Accessed in: Aug. 2021.

[3] BRAZIL. **Decree no. 5,445, May 12, 2005**. Enacts the Kyoto Protocol to the United Nations Framework Convention on Climate Change, open for signature in Kyoto, Japan, on December 11, 1997, on the occasion of the Third Conference of the Parties to the United Nations Framework Convention on Climate Change. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, May 13 2005. Available at: http://www.planalto.gov.br/ccivil_03/_Ato2004-2006/2005/Decreto/D5445.htm. Accessed in: Aug. 2021.

[4] BRAZIL. **Decree no. 9,073, June 05, 2017**. Enacts the Paris Agreement under the United Nations Framework Convention on Climate Change, signed in Paris on December 12, 2015, and signed in New York on April 22, 2016. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, June 06, 2017. Available at: http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2017/decreto/D9073.htm . Accessed in: Aug. 2021.

[5] BRAZIL. **Paris Agreement:** Brazil's Nationally Determined Contribution (NDC). Brasília: MRE. 2020. Available at: https://www4.unfccc.int/sites/NDCStaging/Pages/Party.aspx?party=BRA . Accessed in: Aug. 2021.

GHG emissions in the country, the State of São Paulo has advanced significantly in this agenda. Since 1995, when the State Climate Change Program (PROCLIMA) was created, as soon as the Climate Convention came into force, with the legal tools and resources available for it, the State of São Paulo integrates the group of subnational states to keep global warming below the average temperature increase of 1.5°C in this century.

2.1.2 Protection of the ozone layer and greenhouse gases: Montreal Protocol and Kigali Amendment

Montreal Protocol is the international treaty signed by 197 State Parties that set goals and commitments for progressive reduction and elimination of the production and consumption of substances that deplete the ozone layer (ODS).

In Brazil, it was ratified and enacted through Decree no. 99,280/1990[6] and is currently based on the Brazilian Program for the Elimination of Hydrochlorofluorocarbons (HCFCs) - (PBH), with the purpose of eliminating the consumption of ODS (substances of Group I, Annex C, of Montreal Protocol). Its regulatory basis in the country are the Normative Instructions of the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) 04/2018[7] and 05/2018[8]. The PBH is responsible for freezing the consumption of ODS since 2013, in relation to the average consumption between the years 2009 and 2010, followed by staggered reductions until total elimination of HCFCs in 2040[9].

Many of the ODS also have a high global warming potential (GWP), thus making the link with this Technical Note; and as of the amendment agreed at the 28th Meeting of the Parties in Kigali, Rwanda, on October 15, 2016, the Montreal Protocol now includes hydrofluorocarbons (HFCs) as they have a high impact on the global climate system.

Brazil, as a signatory of the amendment, must undertake, upon ratification, the goals defined for group 1 of the Kigali Amendment[10], committing to freeze the consumption and production of HFCs from the year 2024 on, and to apply gradual reductions up to 85 % in the year 2047 to reduce the consumption of these substances.

In this context, substances based on HFCs, used in various applications, such as foam blowing agents, refrigerants for air conditioning and refrigeration systems, solvents, aerosol propellants, among others, will have their consumption and production controlled and reduced, exemplified by what has already been happening with chlorofluorocarbons (CFCs) and HCFCs, all of which have a relevant contribution to climate impact.

The State of São Paulo centralizes the national ODS waste management structure, with three out of the six Refrigerant Fluid Regeneration Centers (CRAs) and two ODS disposal companies. It has CETESB's Environmental Chamber for Refrigeration, Air-Conditioning, Ventilation, and Heating, created in 2009, to carry out the dialogue of the sector with CETESB, whose Technical Group for Disposal of Refrigerant Fluids, Disposable Cylinders, Leak Control, and Systems Retrofit is dedicated to establishing educational and legal guidelines on the subject.

2.1.3 Aviation Greenhouse Gases: The Carbon Offsetting and Reduction Scheme for International Aviation

The Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) is the market and emissions offsetting mechanism developed by the International Civil Aviation Organization (ICAO) for reducing and offsetting GHG emissions. Established through ICAO Resolution no. A39-03[11], the scheme will be in force between 2021-2035 with the purpose of limiting international civil aviation emissions from 2021 on, based on the volume of emissions of the sector in 2020.

Brazil is included in the scope of CORSIA countries, with the National Civil Aviation Agency (ANAC) being

[6] BRAZIL. **Decree no. 99,280, June 06, 1990**. Promulgation of Vienna Convention for the Protection of the Ozone Layer and Montreal Protocol on Ozone-Depleting Substances. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, June 7 1990. Available at: http://www.planalto.gov.br/ccivil_03/decreto/1990-1994/d99280.htm#:~:text=DECRETO%20No%2099.280%2C%20DE,Destroem%20a%20Camada%20de%20Oz%C3%B4nio. Accessed in: Aug. 2021.

[7] IBAMA. **Normative Instruction no. 04, February 14, 2019**. Regulates the control of imports of Hydrochlorofluorocarbons - HCFCs and mixtures containing HCFCs, in compliance with Decision XIX/6 of Montreal Protocol, and other provisions. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, February 16 2018. Available at: https://www.in.gov.br/materia/-/asset_publisher/ Kujrw0TZC2Mb/content/id/3347424/do1-2018-02-16-instrucao-normativa-n-4-de-14-de-fevereiro-de-2018- 3347420. Accessed in: Aug. 2021.

[8] IBAMA. **Normative Instruction no. 05, February 14, 2019**. Regulates the environmental control of the exercise of potentially polluting activities related to substances subject to control and elimination according to Montreal Protocol. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, February 16 2018. Available at: https://pesquisa.in.gov.br/imprensa/jsp/visualiza/index.jsp?data=16/02/2018&jornal= 515&pagina=68&totalArquivos=126. Accessed in: Aug. 2021.

[9] More information can be found at O Programa Brasileiro de Eliminação dos Hidrofluorcabonos (HCFCs). O Brasil e a Proteção da Camada de Ozônio: uma parceria bem-sucedida entre governo, setor produtivo e sociedade. Available at: http://www.protocolodemontreal.org.br/site/quem-somos/protocolo-de-montreal/sobre-o-protocolo-de-montreal. Accessed in Aug. 2021.

[10] The ratification of the Amendment in Brazil is being processed as a Legislative Decree Draft of Agreements, Treaties or International Acts PDC1100/2018, awaiting consideration by the Plenary of the National Congress, as a matter of urgency, since December 4, 2018. PINTO, N. Legislative Decree Draft no. 1100/2018, November 28, 2018. Approves the text of Kigali Amendment to Montreal Protocol on Ozone-Depleting Substances, adopted in Kigali, Rwanda, on October 15, 2016. Brasília. 2018. Available at: https://www.camara.leg.br/proposicoesWeb/prop_mostrarintegra;jsessionid=99D96A6B91CE56CD4D847CEBE9F46197.proposicoesWebExterno2?codteor=1669513&filename=MSC+308/2018. Accessed in: Aug. 2021. To consult the Kigali Amendment: UNITED NATIONS (2018). Kigali Amendment. Brasilia, Legislative Chamber. More information can be found at: https://www.camara.leg.br/proposicoesWeb/prop_mostrarintegra;jsessionid=99D96A6B91CE56CD4D847CE BE9F46197.proposicoesWebExterno2?codteor=1669513&filename=MSC+308/2018. Accessed in: Aug. 2021

[11] To consult **Resolution no. 39-3**, of October 6, 2016: ICAO. DOC 10075, Assembly Resolutions in Force (as of October 2016). 2017. Montreal. I-80 - I-86. Available at: https://www.icao.int/Meetings/a39/Documents/Resolutions/10075_en.pdf. Accessed in: Aug. 2021.

the body responsible for its implementation and for the inspection of its air operators. The process of monitoring international CO_2 emissions started in January 2019, based on ANAC Resolution no. 496/2018[12] , in the Brazilian Civil Aviation Regulation no. 38[13] approved by means of ANAC Resolution no. 501/2018 and Ordinance no. 4005/ASINT/2018[14], and its subsequent amendments, which regulate the methods for monitoring, reporting and verifying CO_2 emission data for international air transport.

2.2 MAIN REGULATORY REFERENCES

Following the international discussion on climate change, this item addresses the national and São Paulo regulations that are connected to this topic, with attention to the institution of public climate policy and legislation related to land use change, biofuel production, and environmental conservation.

2.2.1 Federal sphere: National Policy on Climate Change and cross-references to the climate agenda

Below, federal regulations related to climate change are summarized. Since the establishment of the National Policy on Climate Change in 2009, the Union has revised the legislation on the protection of native vegetation in 2012, created a policy to encourage the production of renewable energy from biofuels in 2017, and more recently, in 2021, it instituted a policy to instrumentalize payments for environmental services.

Law no. 12,187, of December 29, 2009

Establishes the National Policy on Climate Change (PNMC) and other measures.

Law no. 12,187, of December 29, 2009[15], foresees in its article 4 the reduction of anthropogenic GHG emissions in relation to their different sources, as well as the stimulus to the development of the Brazilian Emissions Reduction Market (MBRE), currently in discussion regarding its regulation.

Additionally, among other aspects, it defines as instruments of the PNMC, the National Plan on Climate Change; the National Fund for Climate Change; the Action Plans for the Prevention and Control of Deforestation in biomes; the National Communication of Brazil to the United Nations Framework Convention on Climate Change, in accordance with the criteria established by this Convention and its Conferences of the Parties; and the establishment of quantifiable and verifiable environmental standards and targets for the reduction of anthropogenic emissions by sources and for anthropogenic removals by GHG sinks. Among them, there are also records, inventories, estimates, assessments, and any other studies of GHG emissions and their sources, prepared based on information and data provided by public and private entities (Article 6, XIII). It also defines the bases of the PNMC, emphasizing that most of its instruments have not been regulated and/or implemented yet[16].

Law no. 12,651, of May 25, 2012

Provides for the protection of native vegetation and other measures

In the field of land use, land use change and forests, article 41 of Federal Law no. 12,651/2012[17] (New Forestry Code) establishes the need to create programs to support and encourage environmental conservation, as well, and for the adoption of technologies and good practices that reconcile agricultural and forestry productivity.

In compliance with the aforementioned article 41, Ordinance of the Ministry of Environment (MMA) no. 288/2020[18], it establishes the National Program for Payments for Environmental Services (Floresta+), reaching

[12] ANAC. **Resolution no. 496, of November 28, 2018**. Regulates the monitoring, reporting and verification of CO_2 emission data related to international air transport. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, December 3 2018, amended on February 05 2020. Available at: https://www.anac.gov.br/assuntos/legislacao/legislacao-1/resolucoes/2018/resolucao-no-496-28-11-2018/@@display-file/arquivo_norma/RA2018-0496%20-%20Compilado%20at%C3%A9%20RA2020- 0558.pdf. Accessed in: Aug. 2021.

[13] ANA. **Brazilian Civil Aviation Regulation n. 38. Requirements for CO2 emissions from airplanes**. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, December 18, 2018 Available at: https://www.anac.gov.br/assuntos/legislacao/legislacao-1/rbha-e-rbac/rbac/rbac-038/@@display-file/arquivo_norma/RBAC38EMD00.pdf. Accessed in: Aug. 2021.

[14] ANAC. **Ordinance no. 4,005/ASINT, of December 26, 2018**. Establishes the procedures for monitoring and providing CO_2 emission data by national air operators related to international air transport. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, December 28, 2018 Available at: https://www.anac.gov.br/assuntos/legislacao/legislacao-1/portarias/2018/portaria-no-4005-asint-26-12-2018/@@display-file/arquivo_norma/PA2018-4005%20-%20Compilado%20at%C3%A9%20PA2019- 1018.pdf. Accessed in: Aug. 2021.

[15] BRAZIL. **Law no. 12,187, of December 29, 2009**. Establishes the National Policy on Climate Change – PNMC and other provisions. **Federal Official Gazette:** Federative Republic of Brazil, Brasília, DF, December 30 2009. Available at: http://www.planalto.gov.br/ccivil_03/_ato2007-2010/2009/lei/l12187.htm. Accessed in: Aug. 2021.

[16] An example of an instrument of the National Policy on Climate Change that has been regulated and implemented is presented by Decree no. 9,578/2018, which consolidates normative acts issued by the federal Executive Power that provide for the National Fund on Climate Change (acc. Law no. 12,114/2009) and the National Policy on Climate Change (acc. Law no. 12,187/ 2009).

[17] BRAZIL. **Law no. 12,651, of May 25, 2012**. Provides for the protection of native vegetation (...). Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, May 28, 2012. Available at: http://www.planalto.gov.br/ccivil_03/_Ato2011-2014/2012/Lei/L12651.htm . Accessed in: Aug. 2021.

[18] MMA. **Ordinance no. 288, of July 02, 2020**. Establishes the National Program for Payments for Environmental Services - Floresta+, within the scope of the Ministry of Environment. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, July 03 2020. Available at: . https://www.in.gov.br/en/web/dou/-/portaria-n-288-de-2-de-julho-de-2020-264916875. Accessed in: Aug. 2021.

all Brazilian biomes. In turn, Resolution no. 02/2020[19], of the National REDD+ Committee (CONAREDD+), creates the Technical Working Group on Measurement, Reporting, and Verification of REDD+ results (reduction of GHG emissions from deforestation and forest degradation, including forest conservation, sustainable forest management, and increase of forest carbon stocks), with the purpose of providing inputs for the next Brazilian REDD+ submissions under the United Nations Framework Convention on Climate Change.

Law no. 13,576, of December 26, 2017

Provides for the National Biofuels Policy (RenovaBio) and other measures.

The law [20] instituted the National Biofuels Policy (RenovaBio), which operates on three strategic axes: Decarbonization targets; Certification of Biofuel Production; and Decarbonization Credit. For the purposes of this Technical Note, RenovaCalc, a tool for calculating the carbon intensity of biofuels, stands out.

Law no. 14,119, of January 13, 2021

The National Policy for Payments for Environmental Services - PNPSA, established by the recently published Law no. 14,119[21], of January 13, 2021, became the legal framework that consolidates the relevance of incentive policies, recognizing the complementarity of the PSA in relation to the instruments of command and control.

The legislation aims at guiding the actions of the various actors in order to maintain, recover, or improve ecosystem services throughout the national territory. To this end, the Law aims at preventing the loss of native vegetation, encouraging measures to guarantee water security; contributing to climate regulation and the reduction of emissions from deforestation and forest degradation; encouraging the private sector to incorporate the measurement of losses or gains from ecosystem services in the production chains linked to their businesses; stimulating scientific research on the valuation of ecosystem services and development of methodologies for PSA projects; as well as promoting sustainable development, encouraging the creation of a market for environmental services, with a guarantee of transparency, participation and control of society, among others (article 4, IV, V, VI, IX, X, XII, XIII, and XIV).

2.2.2 State regulation in São Paulo: State Policy on Climate Change and government action

São Paulo regulations related to climate change are summarized below. In 2012, the State began to require the presentation of a GHG Inventory for some projects. In 2014, the State started the actions of the now known "Nascentes Program" in order to conserve the environment, with attention to water security. In 2009, the State Policy on Climate Change was enacted. In 2019 the São Paulo government began to articulate São Paulo Environmental Agreement to encourage the voluntary commitment to reduce GHG emissions by the year 2030. And in 2021, CETESB updated the list of enterprises that must send GHG inventory to CETESB.

Law no. 13,798, of November 09, 2009

Establishes the State Policy on Climate Change (PEMC).

One of its guidelines is to prepare, periodically update and make publicly available inventories of anthropogenic emissions, broken down by sources, and removals through sinks, of GHGs not controlled by Montreal Protocol, using nationally and internationally comparable methodologies.

The PEMC [22], in its article 9, determined that the State should create and maintain the Public Emissions Registry, with the purpose of establishing measurable criteria and transparent monitoring of the result of GHG mitigation and absorption measures, as well as helping private and public agents in the definition of strategies to increase efficiency and productivity. Participation in the Public Registry, when implemented, will be voluntary.

The PEMC also provides for the Public Power to define, among others, the following incentives for joining the Public Emissions Registry, which have not been created yet:

1. Promotion of GHG emission reductions
2. Extension of the period for renewing environmental licenses
3. Prioritization and lower interest rates on public financing
4. Certification of compliance
5. Tax incentives

This law was partially regulated by State Decree no. 55,947, of June 24, 2010[23], amended by State Decree no.

[19] CONAREDD+. **Resolution no. 02, of July 22, 2020**. Creates the Technical Working Group on Measurement, Reporting and Verification of REDD+ Results. Federal Official Gazette(?). Brasília, MMA. Available at:. http://redd.mma.gov.br/images/publicacoes/Resolucoes/Resoluo-n-2-de-22-de-Julho-de-2020.pdf. Accessed in: Aug. 2021.

[20] BRAZIL. **Law no. 13,576, of December 26, 2017**. Provides for the National Biofuels Policy (RenovaBio) and other provisions. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, December 27 2017. Available at: http://www.planalto.gov.br/ccivil_03/_ato2015-2018/2017/lei/l13576.htm. Accessed in: Aug. 2021.

[21] BRAZIL. **Law no. 14,119, of January 13, 2021**. Establishes the National Policy for Payments for Environmental Services (...). Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, January 14 2021. Available at: https://www.in.gov.br/en/web/dou/-/lei-n-14.119-de-13-de-janeiro-de-2021-298899394. Accessed in: Aug. 2021.

[22] SÃO PAULO (State). **Law no. 13,798, of November 09, 2009**. Establishes the State Policy on Climate Change - PEMC. Official Gazette State of São Paulo, São Paulo, SP, November 10 2019. Available at: https://www.al.sp.gov.br/repositorio/legislacao/lei/2009/lei-1379809.11.2009.html#:~:text=Institui%20ª%20Pol%C3%ADtica%20Estadual%20de%20Mudan%C3%A7as%20Clim%C3%A1ticas%20%2D%20PEMC.&text=Artigo%201%C2%BA%20%2D%20Esta%20lei%20institui,objetivos%20e%20instrumentos%20de%20aplica% C3%A7%C3%A3o. Accessed in: Aug. 2021.

[23] SÃO PAULO (State). **State Decree no. 55,947, of June 24, 2009**. Regulates Law no. 13,798, of November 09, 2009, which provides for the State Policy on Climate Change. Official Gazette State of São Paulo, São Paulo, SP, June 25, 2010. Available at: https://www.al.sp.gov.br/repositorio/legislacao/decreto/2010/decreto-55947-24.06.2010.html. Accessed in: Aug. 2021.

56,918, of April 08, 2011[24], aiming, among other things, at regulating the necessary adaptations to the impacts arising from climate change, as well as contributing to reduce the concentration of GHGs in the atmosphere.

These regulations taken together are quite comprehensive, instituting the PEMC Steering Committee and the State Climate Change Council as a government advisory body, adding guidelines for when the Public Emissions Registry is created and regulating the way these new PEMC bodies work. Additionally, it defines the chemical formulas, common names, and the greenhouse effect potential of GHGs that must be reported in the Public Emissions Registry (Table 1, Annex II), outlining the bases of CETESB Board Decision (DD) no. 35/2021/P, described below. Among the non-regulated items, the standardization and criteria for licensing sources and the renewal of environmental licenses stand out.

CETESB Board Decision no. 35/2021/P, of April 13, 2021.

Provides for the criteria for preparing the inventory of GHG emissions in the State of São Paulo and other provisions.

DD (Board Decision) no. 35/2021/P updates and replaces Board Decision no. 254/2012/V/I[25] and is based, among other instruments, on the provisions of State Decree no. 8,486/1976[26] and subsequent amendments[27], with emphasis on Decree State Law no. 54,487/2009[28], which regulates State Law no. 997/1976[29]. This broad structuring regulation defines as CETESB's attributions, among others, "to carry out an organized survey and maintain a register of sources of pollution and inventory the priority sources - fixed and mobile - of pollution, according to internationally recognized methodologies, to be adopted at the discretion of CETESB" (Article 6, item II); as well as that "sources of pollution are obligated to submit to CETESB, when requested, the complete plan for release of liquid, solid and gaseous waste" (Article 79).

This Board Decision instituted, within the scope of the State of São Paulo, the Inventory of GHG Emissions, per enterprise. The GHGs that must be part of the inventory are:

1. Carbon dioxide (CO_2)
2. Methane (CH_4)
3. Nitrous oxide (N_2O)
4. Sulfur hexafluoride (SF_6)
5. Hydrofluorocarbons (HFCs)
6. Perfluorocarbons (PFCs)

This inventory is mandatory for enterprises that develop the following activities[30]:

1. Coking plants
2. Ferrous metal foundries with a production capacity of over 7,500 t/year
3. Pulp and paper industry using lime kilns
4. Petrochemical industry
5. Pig iron or steel production facilities with capacity exceeding 22,000 t/year
6. Glass production facilities, including those intended for the production of glass fibers, with a production capacity of more than 7,500 t/year
7. Metallic minerals sintering facilities
8. Production of adipic acid
9. Production of phosphoric acid
10. Production of nitric acid
11. Production of acrylonitrile
12. Production of aluminum
13. Production of ammonia
14. Production of lime
15. Production of calcium carbide
16. Production of silicon carbide
17. Production of cement
18. Production of vinyl chloride (VCM)

[24] SÃO PAULO (State). **State Decree no. 56,918, of April 08, 2011**. Changes the composition of the Management Committee and the State Council of the State Policy on Climate Change – PEMC. Official Gazette State of São Paulo, São Paulo, SP, April 09 2011. Available at: https://www.al.sp.gov.br/repositorio/legislacao/decreto/2011/decreto-56918-08.04.2011.html. Accessed in: Aug. 2021.

[25] CETESB. **DD no. 35, of Abril 13, 2021**. Provides for the criteria for preparing the inventory of greenhouse gas emissions in the State of São Paulo and other provisions. Official Gazette State of São Paulo, São Paulo, SP, August 24 2012. Available at: https://cetesb.sp.gov.br/wp- content/uploads/2021/04/DD-035-2021-P-Criterios-para-a-elaboracao-do-inventario-de-emissoes-de-gases- de-efeito-estufa-no-Estado-de-Sao-Paulo-e-da-outras-providencias.pdf. Accessed in: Aug. 2021.

[26] SÃO PAULO (State). **State Decree no. 8,486, of September 08, 1976**. Approves Regulation that governs the execution of Law no. 997, of 05/31/1976, which deals with environmental pollution control. Official Gazette State of São Paulo, São Paulo, SP, September 09, 1976. Available at: https://www.al.sp.gov.br/repositorio/legislacao/decreto/1976/decreto-8468-08.09.1976.html. Accessed in: Aug. 2021.

[27] A compiled version of this Decree for consultation, updated until 2019, is available at: https://smastr16.blob.core.windows.net/home/2020/10/de_8468_1976_compilado-ver.71.pdf. Accessed in: Aug. 2021.

[28] SÃO PAULO (State). **State Decree no. 54,487, of June 26, 2009**. Changes the wording and includes provisions and annexes in the Regulation of Law no. 997, of May 31, 1976, approved by Decree no. 8,468, of September 8, 1976, which provides for the control of environmental pollution and other measures. Official Gazette: State of São Paulo, São Paulo, SP, June 27, 2009. Available at: https://www.al.sp.gov.br/repositorio/legislacao/decreto/2009/decreto-54487-26.06.2009.pdf. Accessed in: Aug. 2021.

[29] SÃO PAULO (State). **State Law no. 997, of May 31, 1976**. Provides for the control of environmental pollution. Official Gazette: State of São Paulo, São Paulo, SP, June 01, 1976. Available at: https://www.al.sp.gov.br/repositorio/legislacao/lei/1976/lei-997-31.05.1976.html. Accessed in: Aug. 2021.

[30] DD (Board Decision in Portuguese) no. 35/2021 adds three categories to the list previously defined by Board Decision no. 254/2012. These enterprises starts to send inventories in 2022 to CETESB, namely: airports with annual movement equal to or greater than 5 million passengers; sanitary landfills with an average annual receipt of urban solid waste equal to or greater than 400 t/day; transport of cargo or passengers whose fleet of diesel vehicles (trucks or buses) exceeds 300 vehicles.

19. Production of dichloroethane (EDC)
20. Production of ethylene
21. Production of methanol
22. Production of carbon black
23. Production of ethylene oxide
24. Production of caustic soda
25. Oil refineries
26. Thermoelectric plants powered by fossil fuels
27. Installations that emit HFCs, PFCs, SF_6 gases in quantities exceeding 20,000 t/year of CO_2equivalent
28. Other facilities with fossil fuel consumption that emit more than 20,000 t/year of CO_2equivalent
29. Airports with annual movement equal to or greater than 5 million passengers
30. Sanitary landfills with an annual average receipt of urban solid waste equal to or greater than 400 t/day
31. Transport of cargo or passengers whose fleet of diesel vehicles (trucks or buses) exceeds 300 vehicles

Emissions must be recorded in the inventory according to the following scopes:

- Scope 1 – direct GHG emissions, that is, those from sources owned or controlled by the enterprises: burning of fuels to generate energy and steam; transportation of people, materials, products, or waste in the enterprise's vehicles; fugitive or evaporative emissions and other processes that emit GHGs.
- Scope 2 – indirect GHG emissions from the acquisition and consumption of electrical and thermal energy by the enterprise.
- Scope 3 - indirect GHG emissions: from the transport of goods and services purchased or sold by an outsourced fleet equal to or greater than 300 vehicles[31].

The methodology for calculating the estimated emissions may be that of ABNT NBR ISO standard 14064-1:2007[32] or that of the "GHG Protocol"[33] or a similar one, until CETESB defines a methodology for the aforementioned calculation.

The equivalence of GHGs to carbon dioxide, expressed in CO_2equivalent to be used in the calculations, must comply with the Global Warming Potential used in the National Communication, as established by the Intergovernmental Panel on Climate Change (IPCC) (FOSTER et al. 2007[34]).

The emission estimates must be declared to CETESB, electronically, with calculation memories in open spreadsheets that allow importation and handling of data, and the results must be presented as provided in **Table 1** - Template for submission of GHG inventory to CETESB.

The declarations of emission must be sent[35] with an annual frequency, between the period from September 1st to October 31st[36], comprising the period from January to December of the previous year, based on the consolidated data in December of the previous year.

Detailed information for the application of calculation methodologies may be found on CETESB page[37], which also provides a Filling Manual[38] that aims at guiding companies in the correct submission of information related to the greenhouse gas (GHG) emissions inventory.

[31] The information on this component of Scope 3, defined by DD no. 35/2021, by CETESB, will be received as of 2022.

[32] ABNT. NBR ISO no. 14064-1:2007. São Paulo, ABNT. **Greenhouse Gases**. Part 1: Specification and guidance for organizations to quantify and report greenhouse gas emissions and removals.

[33] FGVces. GHG PROTOCOL. São Paulo, **GHG Protocol**. More information at: http://www.ghgprotocolbrasil.com.br/ferramenta-de-calculo . Accessed in: May 2021.

[34] FOSTER, P. et al. Changes in atmospheric constituents and in radiative forcing. In: SOLOMON, S. et al. (Ed.). Climate Change 2007: the physical science basis. Cambridge, UK: Cambridge University Press, 2007. Chap. 2, p. 129-234. (IPCC Fourth Assessment Report, AR 4). Contribution of Working Group to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. Available at: https://cetesb.sp.gov.br/inventario-gee-empreendimentos/potencial-de-aquecimento-global-de-gee/. Accessed in: Aug. 2021.

[35] Declarations of emission must be forwarded to the email: inventario-gee_cetesb@sp.gov.br.

[36] According to DD no. 125/2015/V/I, available at: https://cetesb.sp.gov.br/inventario-gee- empreendimentos/decisao-de-diretoria/decisao-de-diretoria-no-1252015vi-26-de-maio-de-2015/. Accessed in: Aug. 2021. DD no. 125/2015/V/I amends DD no. 254/2012/V/I, updated by DD no. 35/2021/P.

[37] For more information, refer to: https://cetesb.sp.gov.br/inventario-gee-sp/. Accessed in: Aug. 2021.

[38] CETESB, SÃO PAULO. **Corporate Greenhouse Gas Emissions Inventory**: Filling Manual. São Paulo. CETESB. 2015. Available at: https://cetesb.sp.gov.br/inventario-gee-empreendimentos/wp-content/uploads/sites/35/2019/09/MANUAL-DE-PREENCHIMENTO-INVENT%C3%81RIO-GEE.pdf. Accessed in: Aug. 2021.

Table 1 - Template for submission of GHG Inventory to CETESB

SOLE ANNEX

(referred to in Article 6 of Board Decision No. 035/2021/P, of 04/13/2021)

Identification:
Company Name:
CNPJ (National Register of Legal Entities):
Address:
Inventoried Operating Units:
Name of Person Responsible for the Inventory:
Email of Person Responsible for the Inventory:
Telephone of Person Responsible for the Inventory:
Year of Inventory:

	Emissions in metric tons			Emissions in metric tons of CO_2 equivalent (tCO_2e)		
$GHG_{(t)}$	Scope 1	Scope 2	Scope 3	Scope 1	Scope 2	Scope 3
CO_2						
CH_4						
N_2O						
HFCs						
PCFs						
SF_6						
Total				-		-

Source: CETESB, 2021[25]

São Paulo Environmental Agreement

In 2019, in an action coordinated by CETESB, with the support of the State Secretariats for Infrastructure and Environment and International Relations and the São Paulo Agency for the Promotion of Investments and Competitiveness (InvestSP), São Paulo Environmental Agreement was launched[39] to encourage business associations, their members, and companies from São Paulo and/or companies operating in the state, to make voluntary commitments to reduce GHG, in an effort that will be renewed by 2030.

The launch of São Paulo Environmental Agreement took place in a ceremony presided by the State Governor, initially counting on the adhesion of 55 companies and private sector entities. In January 2021, the Agreement already had 185 adherents and an international observer, encompassing a broad representative group of São Paulo economy with a voluntary commitment to reduce GHG emissions and, in addition, the possibility of implementing environmental improvements.

To join the Agreement, the entity or company is informed that it shall voluntarily submit its GHG emissions, the methodology used to measure them and the schedule of targets to reduce their emissions by 2030, as soon as possible. The information to be sent to CETESB, as well as the voluntary commitments assumed, may include adaptation actions to climate change. The schedule for presenting the adherent's goals will be defined by the adherent and updated annually.

To support entities, companies and municipalities that wish to take part in the Agreement, including for technical support, the Environmental Chamber of Climate Change was installed in March 2020, which brings together 20 members of the Environmental Agreement, with the participation of numerous other entities and companies in the two working groups, created to consolidate the system for obtaining information on GHGs and good practices for their reduction.

These pioneering initiatives in the State aim at guiding companies in fulfilling their voluntary commitments. The development of the Chamber's work is expanding the possibilities for exchanging information and good practices among the parties to the Agreement, in order to make it possible to include small and medium-sized companies and entities in this initiative, which will encourage the implementation of new technologies and innovative solutions, highlighting the protagonism of its parties in the agenda[40].

[39] More information, including the Agreement Adhesion Term and the updated list of adherents, may be obtained in SÃO PAULO. CETESB. Acordo Ambiental São Paulo. CETESB. 2021. Available at: https://cetesb.sp.gov.br/acordo-ambiental-sao-paulo/. Accessed in: Aug. 2021.

[40] For more information and as an official channel for membership, CETESB has provided the email: acordo2030_cetesb@sp.gov.br.

Nascentes Program

Nascentes Program[41] began in 2014 as a Program of Incentives for the Recovery of Riparian Forests and the Recomposition of Vegetation in the Basins Forming Water Springs – Mata Ciliar Program. In 2015, it was renamed "Nascentes Program", and was reorganized in 2017 by State Decree no. 62,914/2017[42]. Nascentes Program aims at promoting restoration of native vegetation in the state of São Paulo, considering the conservation of biodiversity and water security, by means of territorial guidance for compliance with legal environmental obligations, whether voluntary or resulting from licensing or inspection.

Among the legal environmental obligations that can be equated with the program, the terms of commitment for environmental recovery (TCRAs) signed with CETESB and with the Inspection and Biodiversity Coordination (CFB) of the Secretariat of Infrastructure and Environment stand out. These terms define the environmental offsetting measures that must be adopted by entrepreneurs in the licensing processes or as a result of inspection activities.

Within the scope of SIMA Resolution no. 48/2020[43], which regulated aspects of the program, it was established in its article 4 that individuals and legal entities interested in voluntarily financing forest compensation projects, aiming at offsetting GHG emissions, neutralizing the water footprint or another purpose, may do so through the financing of projects within the scope of Nascentes Program.

3. CLIMATE CHANGE AND MARKET REFERENCES

In response to this global environment that is increasingly sensitive to the consequences and risks of investment projects, markets have reacted quickly in creating new mechanisms and instruments aimed at improving climate performance and sustainability. Initiatives such as the launch of green bonds and climate bonds, the emergence of the ESG movement in finance and business management and the emergence of stock market indices in the universe of publicly traded companies are rapidly assuming a central role in the planning and development of investment decisions, confirming a new and dynamic panorama of alternatives for planners and managers.

This new scenario, while creating new opportunities, brings to the fore the issue of climate management within organizations, giving strategic importance not only to the ability to measure emissions and impacts, but also to manage the elements of this agenda in search of advantages such as improved access to financing, access to sectoral and geographic markets, and better risk management capabilities.

In this section, some of these market references will be briefly presented, always with the purpose of indicating to the participants of São Paulo Environmental Agreement concepts and cutting-edge mechanisms that may provide important solutions in the daily life of organizations, always having the improvement of the climate footprint as a main reference.

3.1 GREEN BONDS AND CLIMATE CHANGE

For the World Economic Forum, green finance is "any structured finance activities designed to ensure a better outcome from an environmental point of view"[44]. One of the most dynamic fronts of this broad market movement in favor of sustainability is the so-called labeling of financial instruments, a broad category of management and auditing systems for financial instruments that encompasses varied alternatives for thematization, including green bonds or loans, climate bonds, social bonds, and sustainability bonds, among other formats. In common, the existence of a set of principles and practices that aim at ensuring the best social-environmental result, with strong adherence to international initiatives, such as the United Nations Sustainable Development Goals[45].

According to the Climate Bonds Initiative, "institutional investors are increasingly demanding financial products that address non-financial risks in their investment portfolios, and Brazil is in a privileged position to meet such demand, through the issuance of green bonds or other types of green financial instruments in different sectors of the economy"[46].

Since the first green bond launched in Brazil in 2015, the market has been growing at great strides – by mid-2019, more than 3,000 bonds had already been launched, representing USD 5.9 billion or 30% of the Latin American market[46], with a predominance of energy, land use (agriculture), and industry sectors. Globally, the World Bank estimates that the green bond market

[41] More information about Nascentes Program may be obtained on the initiative's official page, available at: http://www.programanascentes.sp.gov.br/. Accessed in: Aug. 2021.

[42] SÃO PAULO (State). **State Decree no. 62,914/2017**. It reorganizes the Program of Incentives for the Recovery of Riparian Forests and the Recomposition of Vegetation in the Basins Forming Water Springs-Nascentes Program and makes correlated provisions. Official Gazette: State of São Paulo, São Paulo, SP, November 9, 2017. Available at: https://www.al.sp.gov.br/repositorio/legislacao/decreto/2017/decreto-62914-08.11.2017.html#:~:text=Reorganiza%20o%20Programa%20de%20Incentivos,Nascentes%20e%20d%C3%A1%20provid%C3%AAncias%20correlatas. Accessed in: Aug. 2021.

[43] SÃO PAULO (State). **SIMA Resolution no. 48**, of August 06, 2020. It defines requirements for the approval of ecological restoration projects and makes other provisions for the implementation of Nascentes Program, whose organization was established by Decree no. 62,914, of November 08, 2017. Official Gazette: State of São Paulo, São Paulo, SP, August 13 2020. Available at: https://smastr16.blob.core.windows.net/legislacao/sites/40/2020/08/resolucao-sima-048-2020-republicada-processo-sma-5.982-2014-%E2%80%93-processo-digital-sima-022139-2020-080-programa-nascentes-sma-.pdf.. Accessed in: Aug. 2021.

[44] FLEMING, Sean. **What is green finance and why it is important**. World Economic Forum. [S.l.]. Nov. 09 2020. Available at: https://www.weforum.org/agenda/2020/11/what-is-green-finance/. Accessed in: Aug. 2021.

[45] More information can be found at: https://brasil.un.org/pt-br/sdgs. Accessed in: Aug. 2021.

[46] CLIMATE BONDS INITIATIVE. **Destravando o Potencial de Investimentos Verdes para Agricultura no Brasil**. [S.l.]. 2020. Available at: https://www.climatebonds.net/system/tdf/reports/brazil_agri_roadmap_portugues_0.pdf?file=1&type=node&id=47432&force=0 . Accessed in: Aug. 2021.

represents an accumulated total of approximately USD 2.3 trillion[47], including sovereign bonds, private loans, financing carried out by entities linked to governments or multilateral banks, corporate investments and securitized instruments backed by asset-based securities, among other modalities.

One of the most relevant aspects of the green bond agenda is the so-called Green Bonds Principles[48], used as references for initiatives around the world. These are voluntary guidelines that bring to the processes of development of operations and financial products recommendations on transparency and disclosure, as well as integrity in the process of developing and launching a bond.

According to the International Capital Market Association, there are four principles: (i) use of resources, which must be directed to provenly green projects in activities such as renewable energy generation, energy efficiency, pollution prevention and control, sustainable land use, conservation, etc.; (ii) project evaluation and selection process, encompassing the sustainability objectives of a bond, the process of classifying projects within these objectives and other eligibility criteria; (iii) the management of resources, in order to guarantee their use for the specific purpose linked to sustainability; and, (iv) reporting to investors regarding the use of resources and their impacts.

In this context, as the case of GHG inventories, the issue of external verification plays an important role in ensuring the market that the elements of a given bond are true and reliable. Green bond issuers may seek the opinions and advice of credible industry organizations, structured independent verification processes, certifications, and ratings as a means of providing investors with the appropriate level of security for investment decision making.

Considering that investors in general are not able to verify all these characteristics on their own, it is clearly seen that there is a direct relationship between the ability to provide this information reliably and the market receptivity of a bond, and the preparation of greenhouse gas inventories as a key tool in this process.

3.2 ENVIRONMENTAL, SOCIAL, AND GOVERNANCE (ESG)

The best environmental, social, and governance (ESG) practices are indices or criteria that assess business operations according to their impacts on the environment, social, and governance. A business analysis using these criteria may provide investors with more transparency about potential investment target companies.

Environmental metrics may guide investors to understand the company's relationship with the environment and the use of natural resources. Social metrics may help investors understand where potential tensions or relationships could cause human rights violations, impact labor relations or traditional communities among other possibilities and with the public[49]. Governance assessment, on the other hand, involves anti-corruption and compliance management practices, as companies with a better internal governance structure are perceived as more reliable and less prone to deviations, such as corruption or coercion.

ESG-related challenges and risks are not new, and neither is this approach. Corporate governance (G) is older and includes aspects such as financial accounting, leadership, structure and role of the board of directors, ethics, among other aspects. And more recently, companies have focused efforts on the development of environmental and social (ES) agendas.

An example of the expansion trend of this ES agenda is the fact that a significant portion of companies listed on the New York Stock Exchange S&P 500 index[50] produced some form of ESG reporting in 2018, around 85%, indicating the growth in demand for information by investors Equity markets are responding to increasing investor demands for standardized ESG information associated with financial performance. Another example in this regard is the European Union's Non-Financial Reporting Guidelines, which in 2017 defined that companies with operations in member states should prepare a statement containing information on environmental protection, social responsibility and treatment of employees, respect for human rights and combating corruption.

In Brazil, the ESG criteria or parameters are in their initial stage, but this approach tends to evolve. National, state, and municipal legislations to protect the environment are robust. Many public and private initiatives with a focus on sustainable development are in full swing in the country and in São Paulo, which may contribute to create a corporate environment, which includes broad participation in São Paulo Environmental Agreement, to expand the incorporation of the ESG approach in the corporate universe.

3.3 CAPITAL MARKETS - ISE B3 (CORPORATE SUSTAINABILITY INDEX)

The Corporate Sustainability Index (ISE B3)[51] is a stock index, operated by Brazil, *Bolsa, Balcão*- B3 , which is

[47] FLEMING, Sean. **What is green finance and why it is important**. World Economic Forum. [S.l.]. Nov 09. 2020. Available at: https://www.weforum.org/agenda/2020/11/what-is-green-finance/. Accessed in: Aug. 2021.

[48] INTERNATIONAL CAPITAL MARKET ASSOCIATION. **Green Bond Principles**: Voluntary Process Guidelines for Issuing Green Bonds. Paris. jun. 2018. Available at: https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/Green-Bonds-Principles-June-2018-270520.pdf. Accessed in: Aug. 2021.

[49] For further information, refer to: GROSSI, Marina; BLOWER, Luke. **ESG: as três letras que estão mudando os investimentos**. Conselho Empresarial Brasileiro para o Desenvolvimento Sustentável. Rio de Janeiro. 05/23/2019. Available at: https://cebds.org/esg-as-tres-letras-que-estao-mudando-comportamento-os-investimentos/. Accessed in: Aug. 2021.

[50] Abbreviation for Standard & Poor's 500 or S&P, an index composed of five hundred assets listed on the NYSE or NASDAQ exchanges. For other information, refer to: S&P Dow Jones. S&P U.S. **Indices: Methodology**. [S. l.]. mar. 2021. Available at: https://www.spglobal.com/spdji/en/documents/methodologies/methodology-sp-us-indices.pdf . Accessed in: Aug. 2021.

[51] For further information, refer to: ISEB3. **O que é ISE B3**. B3. [S.l.]. 2019. Available at: http://iseb3.com.br/o-que-e-o-ise . Accessed in: Aug. 2021.

responsible for its technical management. ISE B3 aims at supporting investors in the assessment of socially responsible investments and inducing companies to adopt the best corporate sustainability practices and encouraging the ethical responsibility of corporations.

A pioneering initiative in Latin America and fourth in the world, ISE B3 was created in 2005 by several institutions such as the ETHOS Institute, the Ministry of Environment (MMA), among others[52], which make up the ISE Deliberative Council (CISE), together with the United Nations Environment Program (UNEP), which later joined. It was originally financed by the International Finance Corporation (IFC), the financial arm of the World Bank, and its methodological design was developed by Fundação Getúlio Vargas Sustainability Center (FGVCes) and B3.

ISE B3 is also a comparative analysis tool that takes into account the performance of companies, based on environmental balance, social justice and corporate governance. With annual validity, the 200 companies holding the most liquid shares in B3 are invited to compete for the ISE B3 Portfolio. The company answers the ISE B3 questionnaire, divided into seven dimensions and sends seven pieces of evidence that are randomly selected in each of the dimensions. After technical analysis of responses and deliberation of the Portfolio by CISE, the ISE B3 Portfolio is disclosed.

The ISE B3 portfolio announced in December 2020, which will be valid until December 2021, brings together 39 companies[53], represents 15 sectors and totals BRL 1.8 trillion in market value. This amount is equivalent to 38% of the total market value of companies with shares traded on B3, based on the closing date of 11/25/2020.

3.4 SECTOR ACCREDITATIONS - THE AIRPORT CARBON ACCREDITATION EXAMPLE

Airport Carbon Accreditation is a voluntary carbon management program exclusively for airports. The purpose is to encourage airports to implement best carbon management practices in order to make it carbon neutral. The program was launched by Airport Council International Europe in 2009 and was extended to Asia in 2011, Africa in 2013, and the Americas in 2014[54].

Airports may participate in four progressive levels of accreditation: 1. Mapping, 2. Reduction, 3. Optimization, and, 4. Neutralization. To carry out the inventory, a specific tool called Airport Carbon and Emissions Reporting Tool (ACERT) was developed, an Excel spreadsheet based on the GHG Protocol. The information must be verified by a third party according to the criteria of ISO 14064.

To join the program, at level 1 - Mapping, airports must know their emissions through a GHG inventory that includes scopes 1 and 2 and present a policy of commitment to reduce emissions. To renew certification at this level, it is necessary to submit the inventory annually. To move to level 2 - Reduction, in addition to presenting the inventory, it is necessary to establish reduction targets, submit an emissions management plan and demonstrate the reduction of emissions related to these scopes in relation to the moving average of the last three years. At each renewal, it is necessary to prove the continuity of reductions based on the previous three years. The review of the emissions management plan must be carried out at least once every three years.

Level 3 - Optimization, includes, in addition to the provisions of the two previous phases, the inclusion of scope 3 in the inventory. Emissions from activities that are central to airport operations, which may be influenced or guided by the aerodrome operator, must be considered, including at least the take-off and landing cycle, engine testing, auxiliary power unit (APU) operation, ground support equipment operations, business trips of its direct employees, and forms of transportation to access the airport used by customers and employees. For level 3, it is necessary to develop a stakeholder engagement plan, disseminating airport best practices and establishing joint projects in order to obtain the participation of the airport community. Operational services and airlines must be included, as well as their own staff and passengers[55].

After three consecutive years of certification at level 3 (annual frequency), the airport may renew every three years. To do so, it must submit the updated engagement plan, the reductions achieved with stakeholders and the unverified inventory of the intermediate years.

In the last level, Neutralization, also called level 3+, in addition to the evidence related to level 3, the airport must carry out the offset of emissions that could not be avoided and evidence all the emissions of scope 1 and 2, in addition to the business trips of scope 3. To renew certification at this level, every three years the airport must submit information regarding level 3 compliance plus evidence of the offset performed in intermediate years[56].

[52] Brazilian National Association of Pension Funds (ABRAPP); Brazilian Financial and Capital Markets Association (ANBIMA); Brazilian Association of Investment Analysts and Professionals of the Capital Market (APIMEC); B3; Brazilian Institute of Corporate Governance (IBGC); International Finance Corporation (IFC); Ethos Institute for Business and Social Responsibility; Ministry of Environment (MMA).

[53] Information available on these companies, the publication of their responses to the assessment questionnaire, among other updated information, refer to ISEB3. "O que é ISE B3". **B3**. [S.l.]. 2019. Available at: http://iseb3.com.br/o-que-e-o-ise. Accessed in: Aug. 2021.

[54] The initiative is overseen by an Advisory Board, composed of members of the International Civil Aviation Organization (ICAO), United Nations Framework Convention on Climate Change (UNFCCC), United Nations Environment Program (UNEP), European Commission, EUROCONTROL, US Federal Aviation Administration (FAA), and Manchester Metropolitan University.

[55] To renew the level 3 certification, it is necessary to submit the information previously presented for level 2, already including scope 3 in the inventory, and the engagement plan reviewed at least every three years. It is necessary to demonstrate the implementation of the plan annually.

[56] For further information, refer to Airport Carbon Accreditation. **Guidance Document**, Issue 11. Available at: https://www.airportcarbonaccreditation.org/ . Accessed in: Aug. 2021.

4. CALCULATION OF GHG EMISSIONS AND PUBLICATION OF INVENTORIES: TOOLS AND METHODOLOGIES

According to its homepage[57], "São Paulo Agreement aims at encouraging companies from São Paulo to make voluntary commitments to reduce the emission of greenhouse gases, in order to keep global warming below 1.5ºC, confirming the commitment of the Government of the State of São Paulo." But any commitment to reduce GHG emissions necessarily depends on the accounting of the emissions of adherents. Considering that the Agreement does not prescribe how to carry out such accounting, or even which method to use for calculations and estimates of emissions, the "Working Group Tools" presents below a non-exhaustive survey of methods for accounting for GHG emissions and, additionally, indicators based on GHG emissions, which meet the IPCC guidelines.

4.1 INTRODUCTION: IPCC GUIDELINES

The need to create standardized guidelines for drawing up inventories of GHG emissions comes largely from the 1992 Climate Convention[58], which came into force in 1994, and has in its article 4 the following text:

1. All Parties, taking into account their common but differentiated responsibilities and their specific national and regional development priorities, objectives and circumstances, shall:

a) Develop, periodically update, publish and make available to the Conference of the Parties, in accordance with Article 12, national inventories of anthropogenic emissions by sources and removals by sinks of all greenhouse gases not controlled by the Montreal Protocol, using comparable methodologies to be agreed upon by the Conference of the Parties.

Therefore, an introduction reporting the process within the Climate Convention in the development of inventories seems quite appropriate here. The text that follows is essentially the material used during the UNFCCC Parties Inventory Review Training held in late 2019 by one of the authors of this section.

Inventories of natural and anthropogenic emissions are used by researchers/scientists, as model input data, by public authorities in the development and monitoring of public policies, by regulatory agents and regulated entities to determine compliance with regulation and, additionally, by corporations and companies (regulated or not) for strategic planning.

As mentioned before, the Parties to the Climate Convention are committed to prepare, periodically update, publish and make national inventories available[59]. A transparent inventory must include sufficient information and data to allow third parties to understand the assumptions and methodologies applied and to reproduce the calculations and results obtained.

The Inventory of GHG emissions and removals is the estimate report of the amount of GHG emitted to or removed from the atmosphere, normally in a calendar year, by a country, subnational government or company. An inventory is generally characterized by the following:

- Chemical identity of the GHGs included, in the case of the UNFCCC, carbon dioxide (CO_2), methane (CH_4) nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), and nitrogen trifluoride (NF_3).
- Delimitation of the geographic area covered (country, region, state, municipality) and, in the case of companies, the financial or operational control as well;
- Specific period (of time, commonly, annual) of accounting.
- Sectors and activities (energy, industry, waste, agriculture, and forests, etc.).

In order to compare the effect of the different GHGs, the concept of the Global Warming Potential (GWP) is used for a horizon of 100 years. For example, **Table 2** provides GWP values brought by the IPCC 4th Assessment Report – AR4 (IPCC, 2007)[60]. These values are regularly checked and, if necessary, updated. It should be noted that within the scope of the Climate Convention, it is up to each inventory country to establish which value to use. In Brazil, the Ministry of Science, Technology, and Innovation (MCTI) used 100-year GWP values of the IPCC 5th Assessment Report – AR5 (IPCC, 2013)[61], in its national inventory.

[57] CETESB, SÃO PAULO. Acordo Ambiental São Paulo. São Paulo. CETESB. Available at: https://cetesb.sp.gov.br/acordo-ambiental-sao-paulo/. Accessed in: Aug. 2021.

[58] United Nation Framework Convention on Climate Change or UNFCCC. The full text of the Climate Convention translated into Portuguese may be found as an annex to Decree no. 2,652/1988, which enacts it in Brazil (BRASIL. Decree no. 2,652, of July 1, 1998. Enacts the United Nations Framework Convention on Climate Change, signed in New York on May 9, 1992. Federal Official Gazette: Federative Republic of Brazil, Brasília, DF, July 2, 1998. Available at: http://www.planalto.gov.br/ccivil_03/decreto/d2652.htm. Accessed in: Aug. 2021.

[59] According to the Climate Convention: inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases not controlled by Montreal Protocol.

[60] IPCC. **Climate Change 2007:** The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 996 pp.The Physical Science Basis Contribution of Working Group I to the Fourth Assessment Report of the IPCC. Bonn, 2007. Available at: https://www.ipcc.ch/site/assets/uploads/2018/05/ar4_wg1_full_report-1.pdf. Accessed in: Aug. 2021.

[61] IPCC. **Climate Change 2013:** The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp. Available at: https://www.ipcc.ch/site/assets/uploads/2018/02/WG1AR5_all_final.pdf. Accessed in: Aug. 2021.

Table 2- Examples of global warming potential (GWP)

GHG	GWP
CO_2	1
CH_4	25
N_2O	298
SF_6	22800

Source: IPCC (2007)

The Guidelines developed by the IPCC serve as a basis for the preparation of inventories of the Parties[62] to the UNFCCC.

The first IPCC guidelines were initially approved in 1994[63] and revised in 1996 (IPCC, 1996)[64]. Within the scope of the UNFCCC, the IPCC guidelines for national GHG inventories should be used as "methodologies for estimating anthropogenic emissions by sources and removals by sinks of greenhouse gases" in the calculation of targets.

In 2003, the "Good Practice Guidance for the Land Use, Land Use Change and Forestry" (IPCC, 2003) was published[65]. And in 2006, the second version of the guidelines was published (IPCC, 2006)[66], which is the applicable version, with the 2019 refinement[67], which only contains additions to the 2006 version in categories in which there have been significant advances or in points in which additional guidelines have been required.

The IPCC guidelines (2006) are divided into five volumes, namely:

1. General Guidance and Reporting

2. Energy

3. Industrial Processes and Product Use - IPPU

4. Agriculture, Forestry, and Other Land Use - AFOLU

5. Waste

The IPCC guidelines are based on a concept of "best practices", defined as a set of methodological principles aimed at ensuring that inventories are accurate/precise, in the sense that they are neither overestimated nor underestimated and that uncertainties are reduced as much as possible. The concept of good practices is defined by the search for continuous improvement in the quality of inventories through the following principles:

- Transparency, so that information about processes, procedures, assumptions, and limitations of the GHG inventory is exposed in a clear, factual, neutral, and understandable way, based on easily intelligible and traceable documentation and files (in other words, with an accurate trail of audit). The information must be sufficient to allow third parties to reach the same results based on the data presented.
- Consistency, considering that those interested in monitoring and comparing information on GHG emissions over time aim at identifying trends and assessing the company's performance, being of extreme importance the consistent application of accounting approaches, inventory limits and calculation methodologies - or, in other words, with the same information collection and processing methodology used for all reported years.
- Comparability, that is, information is processed and presented in a way that allows comparison between the results of other Parties.
- Integrity must cover all sources and removals for which methodologies are available and the entire territory of the Party.
- Accuracy and relevance, being that data must be sufficiently accurate to allow users to make decisions with reasonable confidence that the reported information is credible. GHG measurements, estimates or calculations must not be systematically above or below the actual value of emissions, as far as it may be judged, and uncertainties must be reduced as much as possible. The quantification process must be conducted in order to minimize uncertainties.

The basic approach used is to combine the level of human activity (activity data) multiplied by the coefficient that quantifies emissions or removals per unit of activity (emission factor) – **Equation 1**.

Emissions = AD x EF	**Equation 1**

Where:
AD = Activity data
EF = Emission factor

The methodologies of the IPCC guidelines are structured in tiers, usually with three levels, with level 1 being the simplest and level 3 the most demanding, in terms of complexity and need for information.

[62] Parties are the signatory member countries of the Convention.

[63] IPCC. 1994 IPCC Guidelines for National Greenhouse Gas Inventories. Intergovernmental Panel on Climate Change. **Intergovernmental Panel on Climate Change**. [S.l.]. 1994.

[64] IPCC. Revised 1996 IPCC Guidelines for National Greenhouse Gas Inventories. **Intergovernmental Panel on Climate Change.** [S.l.]. 1996. Available at: https://www.ipcc-nggip.iges.or.jp/public/gl/invs1.html. Accessed in: Aug. 2021.

[65] IPCC. **"Good Practice Guidance for Land Use, Land-Use Change, and Forestry. Intergovernmental Panel on Climate Change.** [S.l.]. 2003. Available at: https://www.ipcc-nggip.iges.or.jp/public/gpglulucf/gpglulucf.html. Accessed in Aug. 2021.

[66] IPCC. 2006 IPCC Guidelines for National Greenhouse Gas Inventories. **Intergovernmental Panel on Climate Change**. Intergovernmental Panel on Climate Change. [S.l.]. 2006. Available at: https://www.ipcc- nggip.iges.or.jp/public/2006gl/index.html . Accessed in: Aug. 2021.

[67] IPCC. 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories. **Intergovernmental Panel on Climate Change**". Intergovernmental Panel on Climate Change. [S.l.]. 2019. Available at: https://www.ipcc-nggip.iges.or.jp/public/2019rf/index.html. Accessed in: Aug. 2021.

Level 1 is designed to be used from national and international statistics, which are generally readily available, in combination with standard emission factors and other parameters provided in the guidelines. The purpose is that the calculation of emissions and removals through level 1 is feasible for all countries. Level 2 is similar to level 1, but using country-specific factors and parameters, and finally, level 3 involves more complex approaches that may even include templates.

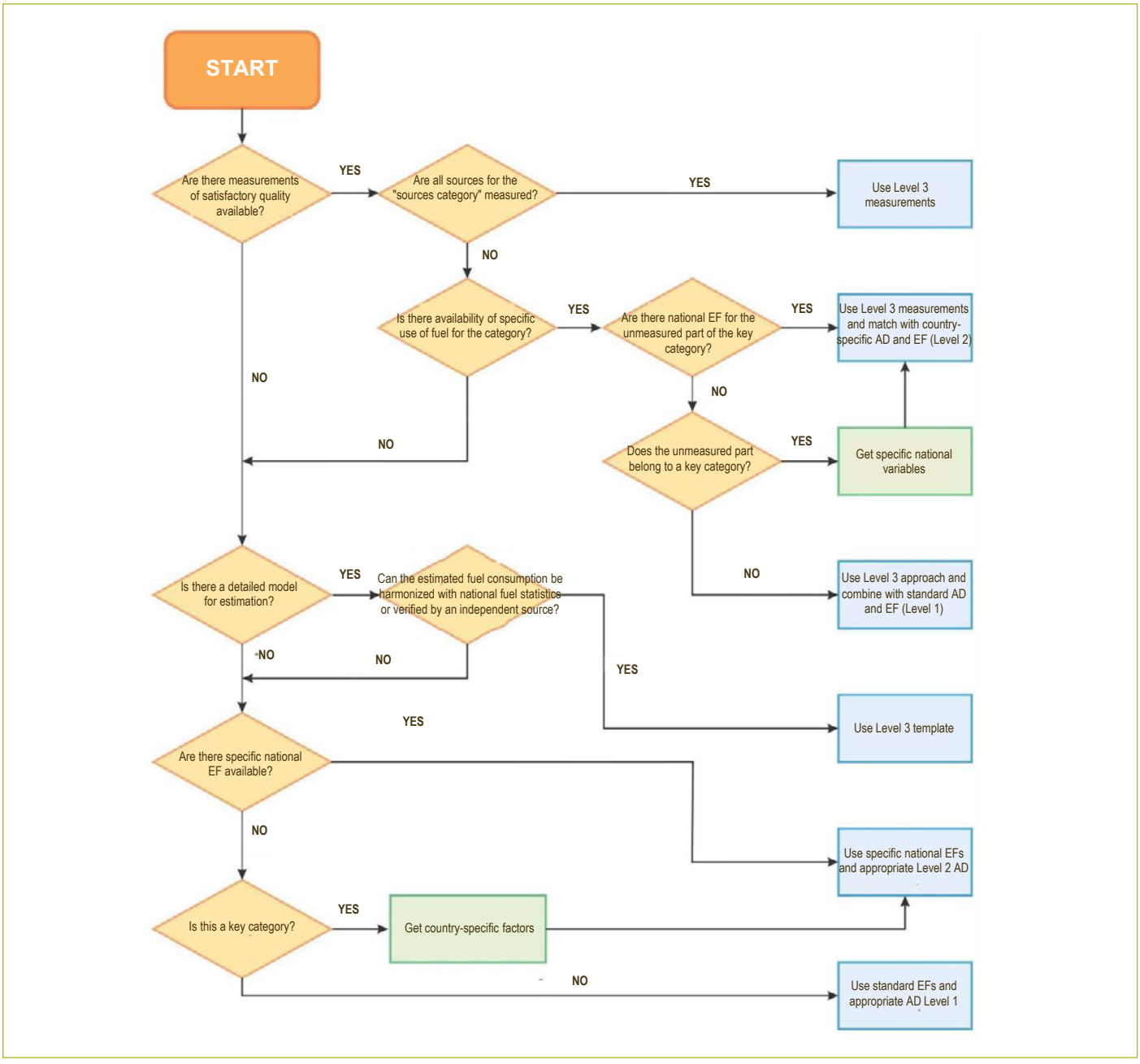
Another concept to assist in the preparation of inventories is that of "key categories", that is, categories that have a significant influence on the inventory in one of the following aspects:

- Absolute total of emissions and removals
- Emissions and removals trends
- Uncertainty in emissions and removals

Key categories should be prioritized in resource allocation, data collection and compilation, quality control and assurance, and reporting efforts.

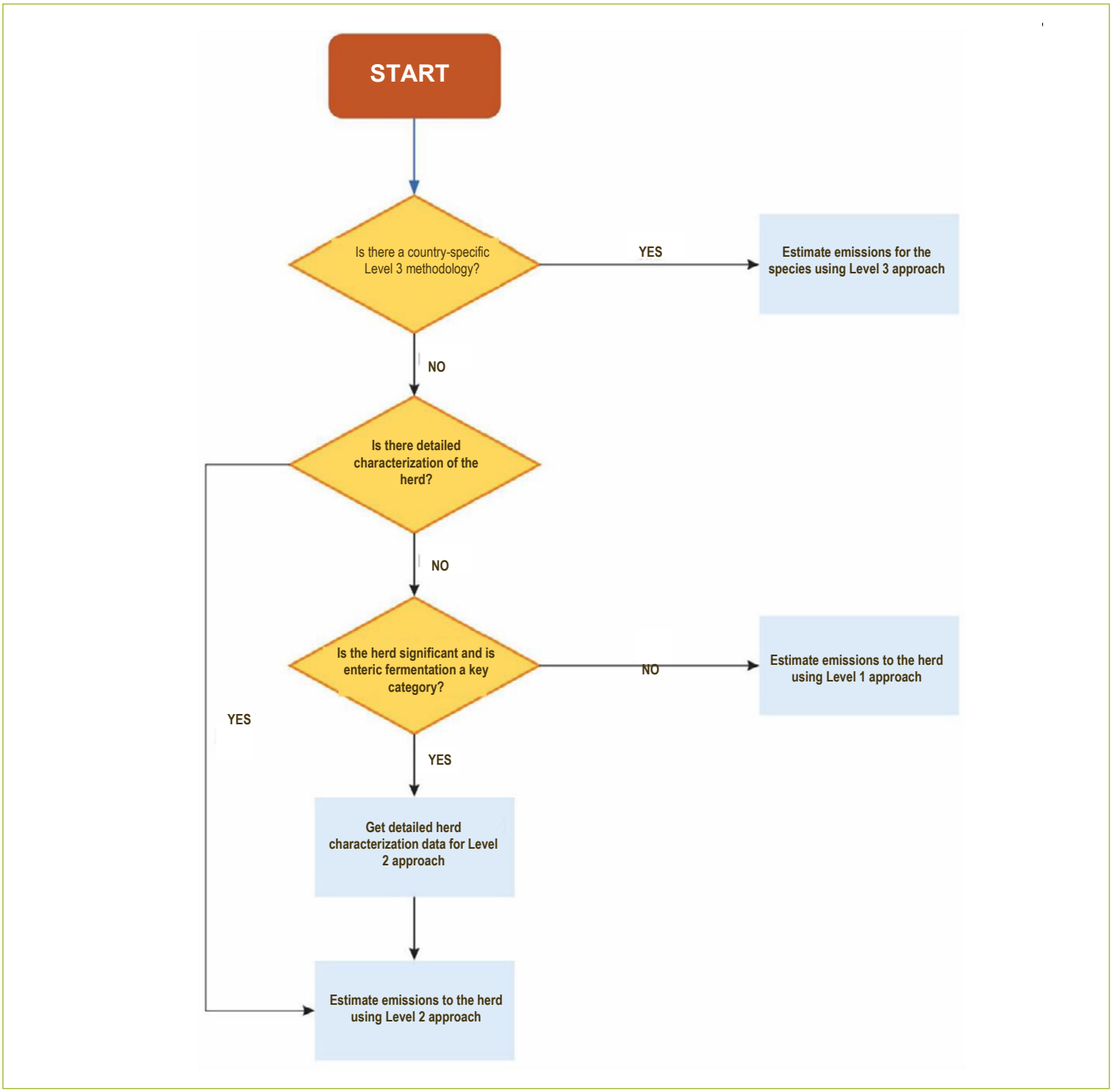
The expectation is that as the information processing capacity and experience with the preparation of inventories increase, each country will be able to clearly identify its key categories and, at least for these, will begin to use more elaborate levels and emission factors and locally determined parameters (see **Figure 1** and **Figure 2**) with examples of decision making – "decision tree" – on which level to use).

Diagram 1 - "Decision tree," estimate of stationary combustion emissions



Source: IPCC (2006)

Diagram 2 - "Decision tree" calculation of emissions of CH_4 from enteric fermentation



Source: IPCC (2006)

The IPCC guidelines were and are developed to help the Parties to the Climate Convention to develop national inventories[68], but they serve and are often used as basis for other tools and approaches to quantify emissions and removals by anthropogenic activities, briefly presented in the following items.

4.2 ISO STANDARD-14064-1

The standards in ISO-14064 comprise three standards detailing, respectively, (i) specifications and guidelines for corporations/organizations; (ii) projects and (iii) validation and verification. The Portuguese versions are based on the versions published in 2006[69]:

[68] IPCC. "IPCC Task Force on National Greenhouse Gas Inventories". **Intergovernmental Panel on Climate Change**. [S.l.]. [20--]. Available at: https://www.ipcc.ch/working-group/tfi/. Accessed in: Aug. 2021.

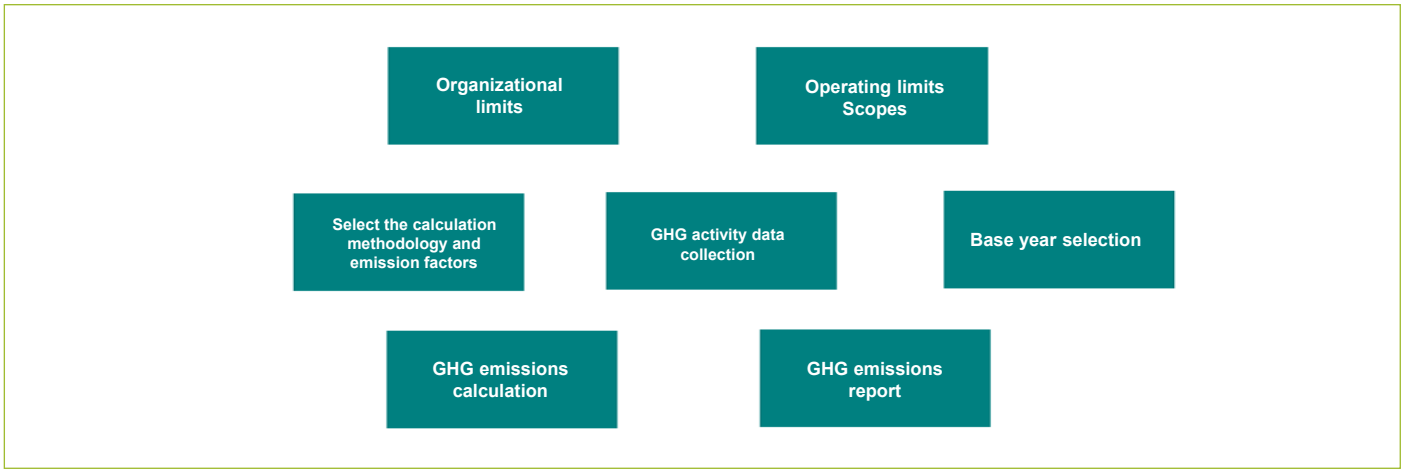
[69] Revised versions were published in 2018 (ISO-14064-1) and 2019 (ISO no. 14064-2 and ISO no. 14064-3) and are in the process of being translated by ABNT.

- ABNT NBR ISO 14064-1:2007[70].Greenhouse Gases. Part 1: Specification and guidance to organizations for quantification and reporting of greenhouse gas emissions and removals.
- ABNT NBR ISO 14064-2:2007[71].Greenhouse Gases. Part 2: Specification and guidance of projects to quantify, monitor and report emission reductions or improved greenhouse gas removals.
- ABNT NBR ISO 14064-3:2007[72].Greenhouse Gases. Part 3: Specification and guidance for the validation and verification of greenhouse gas declarations.

For the purpose of this Technical Note, only the guidelines of part 1 will be summarized, essentially in the form of a summary of the guide published by ABNT & SEBRAE (2015)[73].

According to ABNT & SEBRAE (2015), it is recommended that the organization that intends to start working with GHG management begins with the preparation of its inventory of GHG emissions and removals. This aspect cannot be managed without having knowledge about its emissions. The GHG emissions inventory is a report of all sources and sinks of emissions, belonging to the small business and influenced by its activity and quantified GHG emissions and removals, using standardized methodologies. For its preparation, the steps presented in **Figure 3** must be followed.

Figure 3 - Steps for preparing the greenhouse gas emissions inventory



Source: ABNT & SEBRAE (2015)

[70] ABNT. **NBR ISO no. 14064-1:2007**. São Paulo, ABNT. Greenhouse Gases. Part 1: Specification and guidance for organizations to quantify and report greenhouse gas emissions and removals. Available at: https://www.abntcatalogo.com.br/norma.aspx?ID=1258 . Accessed in: Aug. 2021.

[71] ABNT. **NBR ISO no. 14064-2:2007**. São Paulo, ABNT. Greenhouse Gases. Part 2: Specification and guidance of projects to quantify, monitor and report emission reductions or improved greenhouse gas removals. Available at: https://www.abntcatalogo.com.br/norma.aspx?ID=1262#:~:text=Objetivo%20%3A,de%20gases%20de%20ef eito%20estufa. Accessed in: Aug. 2021.

[72] ABNT. **NBR ISO no. 14064-3:2007**. São Paulo, ABNT. Greenhouse Gases Part 3: Specification and guidance for the validation and verification of greenhouse gas declarations. Available at. https://www.abntcatalogo.com.br/norma.aspx?ID=1319. Accessed in: Aug. 2021.

[73] ABNT. **Management of Greenhouse Gas Emissions**: Implementation guide: Management of Greenhouse Gases Emissions and Removals. Rio de Janeiro. 2016. Available at: https://www.abntonline.com.br/sustentabilidade/Documentos/ghg/METODOLOGIA_GuiaDeAcoes.pdf. Accessed in: Aug. 2021.

4.2.1 Organizational limits

The organizational limits refer to the approaches on how GHG emissions will be consolidated, establishing which units or facilities will be covered by the inventory (**Table 3**). It is interesting to note that in the case of the signatories of São Paulo Environmental Agreement, the member can define their goals and, consequently, report GHG emissions limited or not to the State of São Paulo, just by making it clear in the public notices which approach is used.

Table 3 – Types of approach

Type of Approach		Percentage of reported emissions	Definition
Control approach	Operational	The company accounts for 100% of GHG emissions and/or removals from operations over which it has operational control.	The company or one of its subsidiaries has full authority to introduce and implement its operating policies.
	Financial	The company accounts for 100% of GHG emissions and/or removals from operations over which it has financial control.	The company has authority to manage the financial and operational policy of operations, with a view to obtaining economic benefits from its activities.
Approach	Equity participation (equity interest)	The company is responsible for the percentage of GHG emissions and/or removals proportional to its shareholding in the respective facilities, i.e., corresponding to the organization's ownership in each facility.	Percentage of economic interest or benefits obtained from an installation.

Source: ABNT & SEBRAE (2015)

4.2.2 Operating limits

After defining the organizational limit used in the inventory, the operational limits must be defined, that is, identifying the sources, sinks and reservoirs of GHG emissions associated with the organization's operations, categorizing GHG emissions and removals into:

- Direct emissions, SCOPE 1. All sources, sinks and reservoirs existing within the established organizational limits owned or controlled by the organization, such as:
  - Stationary combustion: burning of fuels by stationary equipment owned or leased to operate under its management.
  - Mobile combustion: burning of fuels by mobile equipment such as automobile, truck, forklift, etc.
  - Fugitive emissions: emissions resulting from the intentional or accidental release of GHGs, such as air conditioning gas leaks, fire extinguishers, insulating gases from transformers or circuit breakers, etc.
  - Industrial processes and material use: this category includes all emission sources from industrial processes that chemically or physically transform materials.
  - Treatment of effluents and solid waste: if the company carries out any treatment of effluents or solid waste generated within the established organizational limit, the emissions resulting from this process must be accounted for as direct emissions (i.e., scope 1).
  - Agricultural processes: emissions generated from agricultural processes such as enteric fermentation, manure management, rice cultivation, etc.
  - GHG removals: all processes that remove carbon from the atmosphere within the established limits must be accounted for as scope 1, such as vegetation restoration, biogas flaring and carbon capture and storage. If carried out outside the organizational limits, these removals may be reported as additional information in the GHG report.
- Indirect emissions from energy use, SCOPE 2. This scope comprises the accounting of GHG emissions in the generation of electricity, heat or steam used within the established operational limits purchased but generated remotely with emissions carried out outside the operational limits.
- Other types of indirect emissions, SCOPE 3. Taking into account the purposes of the inventory, the organization may report GHG emissions that are a consequence of its activities; however, produced by GHG sources that belong to or are controlled

by other organizations. Scope 3 emissions may be classified as upstream or downstream emissions. Upstream or upstream emissions refer to indirect GHG emissions related to goods and services purchased or acquired. Downstream emissions refer to indirect GHG emissions related to goods and services sold.

Often, GHG programs and legislation require reporting of direct emissions (scope 1) and indirect emissions from energy use (scope 2), with optional reporting of other types of indirect emissions (scope 3).

4.2.3 Selection of calculation methodology

If the user has little familiarity with methodologies and emission factors and the organization has processes that are not simple, it is recommended to read the chapter corresponding to their activity, for example, in IPCC (2006)[74].

Any methodology selected must result in accurate, consistent and reproducible data, and the organization must explain in its report how the quantification methodology was chosen. If, in any following year, it is decided to change the methodology used, such change must be explained and the need to recalculate the selected base year must be analyzed.

4.2.4 Selection and collection of data on GHG activities and emission factors

It is important to determine a procedure for the collection of all information related to the quantification of emissions and respective documents to prove such information for the given reporting period, usually annually. Failures in the collection and storage of data will force the organization to use estimated data in a conservative way, but which will prevent an accurate overview of the possibilities of actions related to avoided, reduced or offset emissions. Examples of records to be collected are presented in **Table 4**.

Table 4 – Examples of sources and data to be collected

Scopes	Sources of emission	Category	Records
Scope 1	Diesel generators	Stationary combustion	- Diesel purchase bills - Internal equipment refueling records
Scope 1	Gasoline-fueled vehicles	Mobil combustion	- Characteristics of the vehicle such as year and type
			- Gasoline purchase bills
			- Equipment refueling record - Vehicle mileage
Scope 1	Substation (emissions from the use of SF_6)	Fugitive emissions	- Documents related to equipment maintenance and its specifications - Gas recycling
			- Activity reports
Scope 1	Lime manufacturing	Process emissions	- Process flowchart and stoichiometric calculations of reactions
			- Lime type
			- Quantity of inputs used (chemical composition)
			- Quantity of final product
Scope 1	Composting	Solid waste treatment	- Mass of waste intended for composting
			- Registration if there is recovery of biogas and its destination
Scope 2	Energy acquired	Energy purchases	- Electricity distributor/supplier bills
Scope 3	Trips	Company trips	- Travel registration (boarding passes)

Source: ABNT & SEBRAE (2015)

[74] IPCC. "2006 IPCC Guidelines for National Greenhouse Gas Inventories. Intergovernmental Panel on Climate Change". **Intergovernmental Panel on Climate Change**. [S.l.]. 2006. Available at: https://www.ipcc- nggip.iges.or.jp/public/2006gl/index.html. Accessed in: Aug. 2021.

Regarding emission factors, i.e., what is emitted from each GHG relative to a process unit or a combination of process units, they may be obtained from standard literature data or obtained experimentally. Several institutions provide standardized emission factors, for example in IPCC or regional guidelines. In the case of Brazil, for example, the Ministry of Science, Technology, Innovation and Communication (MCTIC) released standards for emission factors for electricity consumption in the National Interconnected System[75]. Regardless of which option is used, adequacy of the emission factors and their sources must be clearly presented.

4.2.5 Base year selection

Generally, the base year is the first year of reporting, but considering that the first inventories are often a learning process and contain some information gaps, the important thing in this determination is that the inventory of the chosen year is verifiable, even if such check has not been or is not carried out. Verifiable is any inventory based on information that may be verified and proven with a high degree of reliability and based on available evidence, and that may be reproduced through this information.

4.2.6 Calculation of emissions

From the collected activity data and emission factors, the simplest calculation of emissions is the product of these two pieces of information, as shown in **Equation 1**.

For example, for the "stationary combustion" activity using diesel oil, assuming complete oxidation of the fuel, we have the following parameters:

- Fuel density[76] = 0.840 kg/l
- Lower calorific value of fuel = 10,110 kcal/kg = 8,484 kcal/l = 35,521 kJ/l
- Emission factor[77], CO_2 = 74,100 $kgCO_2/TJ$ = 2.632 $kgCO_2/l$
- Emission factor, CH_4 = 3 $kgCH_4/TJ$ = 0.000107 $kgCH_4$
- Emission factor, N_2O = 0.6 kgN_2O/TJ = 0.0000213 kgN_2O

Therefore, to calculate the emissions of a generator that consumed 5 liters of diesel oil, we will have:

- Emissions of CO_2 = 5 liters (activity data) × 2.632 $kgCO_2/l$ (emission factor) = 13.16 $kgCO_2$
- Emissions of CH_4 = 5 l × 0.000107 $kgCH_4/l$ (emission factor) = 0.000535 $kgCH_4$
- Emissions of N_2O = 5 l × 0.0000213 kgN_2O/l = 0.0000107 kgN_2O

If we want to convert these emissions into carbon dioxide equivalent emissions, we just need to multiply the values obtained by the respective applicable global warming potentials, for example, those of **Table 2**.

- Emissions of CO_2 = 13.16 $kgCO_2$ = 13.16 tCO_2e
- Emissions of CH_4 = 0.000535 $kgCH_4$ = 0.0134 tCO_2e
- Emissions of N_2O = 0.0000107 kgN_2O = 0.0317 tCO_2e
- Total emissions in CO_2e = 13.21 tCO_2e

4.2.7 Report

The inventory report must contain the following components:

1. Description of the organization, contact address and contemplated activities
2. Responsible for carrying out the inventory and contact details
3. Period covered by the report
4. Description of the GHG program (or legislation/regulation) to which the inventory will be submitted, if applicable
5. Definition and justification of organizational limits
6. Direct emissions (scope 1), indirect emissions (scope 2) and, if applicable, other emissions and removals (scope 3)
7. Explain and justify the treatment given to biomass emissions and exclusions from any sources or sinks
8. Reference and justify the quantification methodologies chosen
9. Declaration that the inventory was carried out in accordance with ABNT NBR ISO-14064-1 and that verification was carried out, identifying the type of verification and level of confidence obtained

4.3 GHG PROTOCOL

This introduction to the GHG Protocol tool for preparing GHG inventories is essentially a summary, including literal citations, from FGVces (2010).

The GHG Protocol was developed by the World Resources Institute (WRI) in association with the World Business Council for Sustainable Development (WBCSD). Among the features of the tool, we highlight the fact that it offers a structure for accounting for GHGs, its modular and flexible nature and its neutrality in terms of policies or programs.

[75] CO_2 emission factors of the Brazilian National Interconnected System. Available at: http://antigo.mctic.gov.br/mctic/opencms/ciencia/SEPED/clima/. Accessed in: Aug. 2021.

[76] EPE. 2019 National Energy Balance. Ministry of Mines and Energy. Rio de Janeiro: MME/EPE. 2019. Available at: https://www.epe.gov.br/sites-pt/publicacoes-dados-abertos/publicacoes/PublicacoesArquivos/publicacao-377/topico-494/BEN%202019%20Completo%20WEB.pdf. Accessed in: May 2021.

[77] Acc. IPCC (2006). 2006 IPCC Guidelines for National Greenhouse Gas Inventories. Intergovernmental Panel on Climate Change. Available at: https://www.ipcc-nggip.iges.or.jp/public/2006gl/index.html. Vol. 2 (Energy), Ch. 2 (Stationary Combustion). Accessed in: Aug. 2021.

The methodology of the GHG Protocol[78] is compatible with the norms of the International Standardization Organization (ISO) and with the methodologies for quantification of the IPCC. Its application in Brazil, from the beginning of the Brazilian GHG Protocol Program (GHG Protocol Brazil), in 2008, occurs in a way adapted to the national context.

The implementation of the Brazil GHG Protocol is a joint initiative of the Center for Sustainability Studies at Fundação Getulio Vargas (FGVces) and WRI, in partnership with the Ministry of Environment (MMA), the Brazilian Business Council for Sustainable Development (CEBDS) and WBCSD.

Among the priorities of the program, we have:

- To follow the internationally accepted GHG accounting standards and methodologies, in order to increase the Program credibility.
- To facilitate compatibility with other registers and simplify participation of entities that are already following the best practices.
- To ensure the production of consistent inventories of absolute emissions[79] over time, as relative emissions unaccompanied by absolute emission data are considered insufficient to assess the organization's contribution to climate change.
- To provide a clear and appropriate distinction between accounting for GHG emissions from projects and organizations. It is understood that project accounting deals with determining the impacts of GHG emissions from mitigation projects and is based on a structure different from that of development of a corporate inventory.
- To ensure compatibility with programs existing in Brazil for accounting and preparing GHG inventories and, at the same time, avoiding the creation of redundant information structures.
- To ensure relevance to the main economic sectors in Brazil.
- To adopt the accounting and inventory principles of the GHG Protocol Corporate Standard[80].

The accounting, quantification, preparation, and publication of a GHG inventory within the scope of the Brazilian GHG Protocol Program must comply with the five GHG accounting principles presented in the GHG Protocol Corporate Standard and in the best practices of the IPCC, namely, transparency, consistency, comparability, integrity, accuracy, and relevance.

The first step in the process of preparing any inventory is to establish the boundaries for accounting for GHG emissions. In the case of corporate inventories, object of the GHG Protocol, the boundaries are established in line with the ISO standard 14064-1, namely:

1. Geographic limits, often national, with international emissions optionally and separately reported.
2. Organizational limits.
3. Operating limits.

The next step after defining the inventory boundaries is to establish the frequency with which emissions will be monitored. Frequency is important so that it is possible to properly compare the emissions during the life of the organization, considering that it is quite likely that they will undergo structural changes (acquisitions, mergers, separations) and changes in products and/or services. In order to establish monitoring, the base year relating to which inventories will be regularly produced must be chosen.

After completing the first two steps, defining the boundaries and establishing the base year and monitoring frequency, the next action is related to the calculation of emissions through the following steps:

1. Identification of emission sources.
2. Selection of calculation methodology.
3. Collection of activity data and determination of emission factors.
4. Performance of calculations.

In the case of the GHG Protocol, there are standardized tools (calculation sheets available on the initiative's website[81]) to assist in the calculation (**Table 5**).

[78] FGVces; WRI. **Especificações do Programa Brasileiro GHG Protocol**: Contabilização, Quantificação e Publicação de Inventários Corporativos de Emissões de Gases de Efeito Estufa. 2nd Edition. Centro de Estudos em Sustentabilidade da Fundação Getúlio Vargas. World Resources Institute. [S. l.]. [20--]. Available at: https://s3-sa-east-1.amazonaws.com/arquivos.gvces.com.br/arquivos_ghg/152/especificacoes_pb_ghgprotocol.pdf. Accessed in: Aug. 2021.

[79] Absolute emissions indicate the organization's total emissions. Relative emissions, sometimes also called emissions intensity, express emissions related to a parameter that indicates some activity of the organization, for example, emissions per unit of product, per billing, etc.

[80] WBCSD; WRI. **The Greenhouse Gas Protocol**: A Corporate Accounting and Reporting Standard. Revised Edition. World Business Council for Sustainable Development. World Resources Institute. [S. l.]. [20--]. Available at: https://ghgprotocol.org/sites/default/files/standards/ghg-protocol-revised.pdf . Accessed in: Aug. 2021.

[81] For further information refer to GHG Protocol Initiative. Available at www.ghgprotocol.org or www.ghgprotocolbrasil.com.br. Accessed in: Aug. 2021.

Table 5 - Calculation tools recommended by the Brazil GHG Protocol Program

		Part of the cross-sector calculation tool	Main features
Intersectoral tool	Brazilian GHG Protocol Program (www.fgv.br/ces/ghg)	Stationary combustion	- Calculates direct and indirect emissions resulting from burning fuels in stationary equipment. - Provides standard IPCC and US-EPA average emission factors for fuels and MCTIC for electrical energy. - Considers the % of biofuels in national fuels.
		Mobile combustion	- Calculates direct and indirect emissions resulting from burning fuels in mobile equipment. - Provides calculations and emission factors for road, air, water, and rail transport. - Considers the % of biofuels in national fuels.
		Fugitive emissions, HFC resulting from the use of air conditioning (AC) and refrigeration	-Calculates direct HFC emissions during production, use and disposal of refrigeration and AC equipment in commercial uses. -It provides three calculation methodologies: sales-based, lifecycle-based, and emission factor-based.
		Purchase of electricity	- Calculates Scope 2 emissions resulting from the purchase of electricity from the Brazilian National Interconnected System using monthly emission factors published by MCTIC.
		Purchase of steam	- Calculates Scope 2 emissions resulting from the purchase of steam.
		Indirect mobile combustion	- Calculates Scope 3 emissions resulting from the transportation of employees.
		Business trips	- Calculates Scope 3 emissions resulting from air travels.

Source: FGVces (2010)

4.4 GLOBAL PROTOCOL FOR COMMUNITY - SCALE GHG EMISSIONS (GPC)

The Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) was launched in 2014 by WRI, the C40 Cities Climate Leadership Group (C40) and the International Council for Local Environmental Initiatives – Local Governments for Sustainability, or ICLEI, with the approximate purpose of being for cities what the "GHG Protocol" tool is for corporations.

Cities are an integral part of the global effort to tackle climate change and are essential as they are an important source of GHG emissions, as well as innovative solutions for reducing these emissions. It is estimated that 70% of the world's energy-related emissions come from cities[82].

The GPC provides a consistent and transparent method for measuring and reporting GHG emissions. It created conditions for the comparability of urban emissions, as it allows GHG calculations and reports following the same principles established by IPCC (2006).

ICLEI has systematically carried out training and provides remote support for the preparation of the Municipal Inventory of GHG Emissions using the tool developed by the initiative, called CLEARPATH, which includes calculations for the energy, transport, and waste sectors[83]. Additionally, with the inventory prepared, cities may report their emissions to climate registers and to other reporting platforms, such as the Carbon Disclosure Project (CDP).

The GPC was adopted as a central component of the *Global Compact of Mayors for Climate and Energy*[84], an action complementary to the efforts of the United Nations Framework Convention on Climate Change. Also launched in 2014, it is the largest ongoing global cooperation initiative between mayors and city authorities

[82] For further information refer to ICLEI. Launch of the First Global Standard for Measuring Greenhouse Gas Emissions from Cities. Available at: http://sams.iclei.org/novidades/noticias/arquivo-de-noticias/2014/lancamento-gpc.html. WRI; C40 CITIES; ICLEI. Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. Accessed in Oct. 2020. Available at: https://ghgprotocol.org/sites/default/files/standards/GHGP_GPC_0.pdf. Accessed in: Aug. 2021.

[83] ICLEI. Online Training for the preparation of Greenhouse Gas Inventories. Available at: http://sams.iclei.org/pt/rede/acesso-dos-membros/documentos-de-apoio-capacitacoes-inventario.html. Accessed in: May 2021.

[84] C40 Cities; UCLG CGLU; ICLEI. **The Compact of Mayors**: Goals, Objectives and Commitments. [S.l.]. [20--]. Available at: https://www.c40.org/researches/compact-of-mayors. Accessed in: Aug. 2021.

underway to reduce GHG emissions and track the progress of city initiatives to prepare cities for the impacts of climate change.

4.5 "TAYLOR-MADE" METHODOLOGIES FOR GHG ESTIMATION

If the organization is small and has a limited number of activities that result in GHG emissions, one option to consider is merely tabulating those activities and their emissions in a simple spreadsheet[85] and estimating emissions through it.

Thus, assuming the assumptions above for a typical office or small-sized business, it is possible to conservatively estimate the most common/frequent emissions per scope by monitoring the following parameters:

- Scope 1 - monitor fossil fuel consumption and fugitive emissions, calculating emissions using standard local emission factors and, in the absence of these, international emission factors, e.g., from IPCC (2006)
  - Land transport by own vehicles.
  - Stationary combustion equipment.
  - Maintenance of air conditioning, refrigeration, and fire extinguisher equipment: Volume of gases used (replacement) or discarded, per type.
  - Generation of waste and effluents are examples of other possible sources of emissions that must be assessed, but which often have a low impact on the total result.

Example 1: Consumption of fossil fuels

Assuming that an organization has a generator that used 1500 liters of diesel (stationary combustion) in the inventoried period, we will have the following calculation given by **Equation 2**:

$$Emission\ (stationary\ combustion) = \frac{Q_c \times d_c \times PCI_c \times \sum_{GEE}(GWP_{GEE} \times FE_{c,GEE})}{10^9}$$ Equation 2

[legend]: GEE = GHG

Where:
Emissions (stationary combustion) = stationary combustion emissions ($kgCO_2e$)
Qc = amount of fuel "c" (liters)
Dc = density of fuel "c" (kg/l)
PCIc = lower calorific value of fuel "c" (kJ/kg)
FEEc,GHG = emission factor of "c" for gas "GHG" (kg_{GHG}/TJ)

[85] It is important to emphasize that, despite being simple, the entire accounting process must minimally follow the principles of transparency, consistency, relevance, comparability, integrity, and accuracy explained in all previous methods.

Taking the example of 1500 liters of diesel and using the same parameters of the calculation example in item ISO 14064 and GWP of **Table 02**:

- Q_{diesel} = 1500 liters
- D_{diesel} = 0.840 kg/l
- PCI_{diesel} = 35,521 kJ/l = 42,287 kJ/kg
- $FE_{diesel}^{CO_2}$ = 74,100 kg_{CO2}/TJ
- $FE_{diesel}^{CH_4}$ = 3.0 kg_{CH4}/TJ
- $FE_{diesel}^{N_2O}$ = 0.6 kg_{CO2}/TJ
- GWP_{CO_2} = 1
- GWP_{CH_4} = 25
- GWP_{N_2O} = 298
- Emissions (stationary combustion) = $Emissions_{CO2}$ + $Emissions_{CH_4}$ + $Emissions_{N_2O}$ = 3,938.16 + 4.00 + 9.53 = 3,961.68 kg_{CO_2e}

Example 2: Fugitive emissions

CO_2 extinguisher recharges must be inventoried, although in small-sized companies, with few extinguishers, even with annual recharges, these fugitive emissions, whose GWP is 1, result in a negligible volume in an inventory.

Unlike CO_2 extinguishers, maintenance of refrigeration and air conditioning equipment, which is increasingly common, comprises a significant share of emissions in commerce, buildings with administrative activities and its own fleet equipped with automotive air conditioning. Most common refrigerant gases have a high GWP, as seen in **Table 6**.

Table 6 - GWP for selected refrigerant gases

Refrigerant gas	GWP values for a 100-year period	
	AR4	AR5
R22 / HCFC-22	1,810	1,760
R32 / HFC-32	675	677
R134a / HFC-134A	1,430	1,300
R404A / HFC-404A	3,922	3,942.8
R410 / HFC-410A	2,088	1,923.5

Source: IPCC AR4 and AR5

Considering the air conditioning or refrigerator, the following aspects must be taken into account:

- New units are those installed during the inventoried year. For these units, only load data for units purchased empty should be counted. Do not include data for new units that have been preloaded by the manufacturer. Unless they have to be "filled up".

- Dismissed units are units that were dismissed/discarded during the inventoried year.
- Existing units are all units other than the new and dismissed ones.
- Charge / Recharge is gas added to units by the organization or contracted supplier (does not include pre-charges made by the manufacturer).
- Capacity is the sum of the capacities of all units.
- Recovered Amount is the total gas recovered from all dismissed units.

We may calculate emissions from the volume of gas used in maintenance or the volume contained in discarded equipment and gas packages, according to **Equation 3**:

$$Fugitive\ emissions = (EUN + EUE + EUD) \times GWP_{refrigerante} \quad \text{Equation 3}$$

[legend]: refrigerante = refrigerant

Where:

Fugitive emissions = losses to the atmosphere related to GHGs used as refrigerant gas (in $kgCO_2e$).

EUN = emissions from the installation of new units purchased empty, or that have lost gas before being used: Thus, the amounts of gas used to fully charge the new equipment or the gas load to complete the total capacity of the equipment must be inventoried. Such difference corresponds to losses to the atmosphere and must be inventoried (in kg).

EUE = emissions from existing units. It is gas added to existing units during maintenance, either by the organization carrying out the inventory or by a contracted supplier (does not include pre-charges made by the manufacturer). If gas had to be added, it is because it was emitted to the atmosphere, and then needs to be accounted for in the inventory (in kg).

EUD = emissions from old discarded units: it is the volume of gas from the discarded unit minus the amount of gas recovered[86] (only this difference corresponds to losses to the atmosphere, and thus considered fugitive emissions of GHG) (in kg).

$GWP_{refrigerant}$ = reference value for GWP of refrigerant gas, contained in the Fourth Assessment Report of the IPCC (Fourth Assessment Report or AR4) and/or Fifth Assessment Report of the IPCC (Fifth Assessment Report or AR5)[87]. (Refer to **Table 6**).

In practice, in the maintenance of just one Split device of 24,000 BTUs, whose technician reported having replaced 1.7 kg of R410 refrigerant gas, we have:

EUE = 1.7 kg

GWP refrigerant = 2,088 (R410A, base AR4) (Refer to **Table 6**).

Fugitive emissions =3.549,6 kg_{CO_2e}, according to the calculation made as per **Equation 3**.

- Scope 2 – monitor electricity consumption and use emission factors published by MCTIC[88]. GHG emissions from electricity consumption are calculated according to **Equation 4**:

$$Emissions_{GHG,eletr} = \sum EC_y \times FE_{rede} \quad \text{Equation 4}$$

[legend]: rede = grid

Where:

$Emissions_{GHG,electr}$ = GHG emissions from grid electricity consumption (tCO_2)

EC_y = Energy consumed by the organization in year y (MWh/year)

FE_{grid} = Grid emission factor (National Interconnected System, in the case of Brazil) in year y (tCO_2/MWh)

y = inventory year

As an example of the calculation, assuming a consumption of 1,500 MWh in 2019, we have the following emission factors according to **Table 7**:

Table 7 - Average emission factor of the Brazilian National Interconnected System in 2019

Average factor (tCO_2/MWh)						Annual (tCO_2/MWh)
January	February	March	April	May	June	0.0750
0.036	0.067	0.053	0.051	0.048	0.043	
July	August	September	October	November	December	
0.091	0.107	0.102	0.104	0.108	0.091	

Source: MCTIC (2020)

[86] Amount recovered when sending old equipment, used gas packages or the gas itself collected before maintenance to the Regeneration and Analysis Centers (CRA), ensuring recovery and proper destination of the refrigerant gas, neutralizing its global warming potential (GWP) and ozone depleting potential (ODP). Refer to the CRAs at: http://protocolodemontreal.org.br/. Accessed in: Aug. 2021.

[87] For further information on GWP AR4, refer to FORSTER, P., V. RAMASWAMY, P. ARTAXO, T. BERNTSEN, R. BETTS, D.W. FAHEY, J. HAYWOOD, J. LEAN, D.C. LOWE, G. MYHRE, J. NGANGA, R. PRINN, G. RAGA, M. SCHULZ AND R. VAN DORLAND, 2007: Changes in Atmospheric Constituents and in Radiative Forcing. In: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. Available at: https://www.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html. Accessed in: Aug. 2021. To consult the AR5, refer to the document, available at: https://www.ipcc.ch/pdf/assessmentreport/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf. Accessed in: May 2021.

[88] Ministério da Ciência, Tecnologia e Inovações. "Fator médio - Inventários corporativos". [2022]. Disponível em: **https://www.gov.br/mcti/pt-br/acompanhe-o-mcti/sirene/dados-e-ferramentas/fatores-de-emissao**. Acessado em 21 set. 2022.

If monthly consumptions are available, the calculation may be done month by month. By adopting the consumption and annual factor, we have:

$$\text{Emissions} = 1{,}500\ \text{MWh} \times 0.0750\ \text{tCO}_2/\text{MWh} = 112.5\ \text{tCO}_2$$

- Scope 3
  - Air travels, monitor the number and approximate distance of each trip and, through this information, make estimates (HILL et al, 2011)[89].
  - Transportation of employees (home to work and return), monitor the approximate distance traveled and modal used by each employee. Estimates of emissions for each modal must be obtained, ideally locally, for example, for the city of São Paulo they have been consolidated in the Bikes for Planet project[90].

In the case of air transport data, there will likely be no fuel consumption data, as such transport is often not controlled by organizations. In any case, GHG accounting may be estimated, for example, from the distance traveled calculated from the data of air segments and the number of flights in the segment.

There are several online calculators to estimate emissions per person in air transport[91], here an example of calculation is presented according to Hill et al (2011), the method divides flights into three classes, as shown in **Table 8**:

Table 8 - Emission factors for air trips

Distance of the route	Emission factor (gCO_2/km/p)
Short flights (< 463 km)	163.1
Medium flights (>463 < 3700 km)	95.9
Long flights (> 3700 km)	110.4

Source: HILL et al (2011)

The methodology also indicates that the total value of calculated emissions must be increased by 9% in order to consider non-direct routes and aircraft landing delays.

The total result of GHG emissions generated by air transport is calculated by multiplying the emission factor determined in **Table 8** by the distance traveled during flights, as in **Equation 5**:

$$Emissions_{GHG,eletr} = \sum EC_y \times FE_{rede} \qquad \text{Equation 5}$$

[Legend]: trechos = segments / aereo = air.

Where:

$Emissions_{GHG,air}$ = GHG emissions from air transport (tCO_2e)

s = Distance traveled between segments (km)

$Q_{segments}$ = Number of segments traveled

FE_{air} = Emission factor for flights (gCO_2/km.p)

Taking the example of a round trip (2 segments) from São Paulo to Brasília:

s = 874.55 km [92]

$Q_{segments}$ = 2

FE_{air} = 95.9 gCO_2/km.p

$Emissions_{GHG,air}$ = 0.183 tCO_2e (using the calculator mentioned in the footnote 90, we have: 0.176 tCO_2e)

4.6 METHODOLOGIES FOR QUANTIFYING PROJECT--BASED EMISSION REDUCTIONS

The tools and techniques presented so far quantify the total emissions of an organization over a given period, usually annually. But there are cases in which an organization wants to quantify the emission reductions achieved with a given initiative. For these situations there are "project-based methodologies". Methodologies do not necessarily need to be developed using standardized guidelines, for example, the Clean Development Mechanism (CDM) of the Climate Convention, ISO-14064-2 standard, the Platform, among others. In this document, the characteristics of the methodologies approved under the CDM will be described, with a brief description of some developed by members of the Environmental Chamber of Climate Change.

Methodologies within the CDM scope may be proposed by project developers or developed internally by the Secretariat of the Climate Convention itself. In both cases, they must follow the procedures for the development of Baseline and Monitoring Methodologies[93] (UNFCCC, 2017[94]) and the Mechanism and be approved by[95] the CDM Executive Board and the Climate Convention[96].

[89] HILL, Nicholas et al. **2011 Guidelines to Defra / DECC's GHG Conversion Factors for Company Reporting**: Methodology Paper for Emission Factors. Department for Environment, Food and Rural Affairs. London. Aug. 2011. Available at: http://www.defra.gov.uk/publications/files/pb13625-emission--factor-methodology-paper-110905.pdf. Accessed in: Aug. 2021.

[90] ZSCORE S.A. **Project 1884**: Bikes for Planet - Brazil. São Paulo. 2019. Available at: https://registry.verra.org/app/projectDetail/VCS/1884. Accessed in: Aug. 2021.

[91] For example: **ICAO. ICAO Carbon Emissions Calculator**. [S.l.]. [20--]. Available at: https://www.icao.int/environmental-protection/Carbonoffset/Pages/default.aspx. Accessed in: Aug. 2021.

[92] Flight distance between GRU (São Paulo GRU Airport) and BSB (Brasilia International Airport) airports according to the "Distance Calculator" website. Information available at: https://pt.distance.to/. Accessed in: Aug. 2021.

[93] Baseline means the reference scenario of greenhouse gas emissions, modeled for the situation of provision of the same product or service in the absence of the proposed project.

[94] UNFCCC. **Procedure**: Development, revision and clarification of baseline and monitoring methodologies and methodological tools. Version 02.1. [S.l.]. 2017. Available at: https://cdm.unfccc.int/filestorage/e/x/t/extfile--20170830140939893-Meth_proc09.pdf/Meth_proc09.pdf?t=NEp8cXk-1ZDU5fDCAem3wBf2YJWJyKzpKiYGN. Accessed in: Aug. 2021.

[95] Approved Clean Development Mechanism (CDM) methodologies, as well as procedures for proposing new methodologies, are available on the CDM website. Available at: https://cdm.unfccc.int/methodologies/index.html. Accessed in: Aug. 2021.

[96] Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol (CoP/MoP).

CDM methodologies contain the information needed to determine the amount of certified emission reductions generated by a project, or in CDM jargon, by a "mitigation project activity" (UNFCCC, 2019[97]). CDM methodologies have the following structure:

a. Approach for determining the baseline scenario, that is, which strategy will be used to determine the emissions that would occur in the absence of the project - strategies that may be essentially two, namely:

ii. Existing emissions, whether real or historical.

iii. Emissions from a technology that represents an economically attractive course of action.

b. Description of the conditions of applicability, precisely defining which were the assumptions made in the development of the methodology and the prerequisites that a project must follow in order to use it.

c. Description of project boundaries/limits, defining which emissions (local, regional, national) should be considered as resulting from the project.

d. Procedure for determining the baseline scenario and emissions, indicating the mathematical model that must be followed to quantify the scenario emissions in the absence of the project activity.

e. Description of the project scenario and procedures for calculating the related emissions, indicating the mathematical model that must be followed to quantify the emissions of the project activity.

f. Procedures for determining leakage, i.e. emissions outside the boundaries of the project activity, but which may reasonably be attributed to the initiative.

g. Description of the necessary monitoring procedures, that is, which parameters must be monitored, with what precision and what are the procedures for monitoring.

Below is a real example of a methodology approved in CDM, developed by a member of CAMC, the company Logum Logística S.A.[98].

4.6.1 LOGUM CDM methodology for modal change in the transportation of liquids

Logum developed a methodology for calculating emissions avoided by the use of its pipeline modal compared to the road modal, approved in 2015 within the scope of CDM (AM0110[99]), see summary of the conditions of applicability of the methodology in **Figure 4**.

The system user is able to estimate avoided emissions based on the volume handled and the segments operated. For the calculation of emission reductions, the user will need the following information:

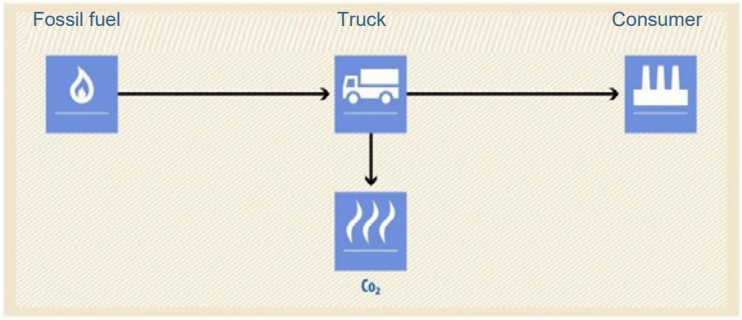
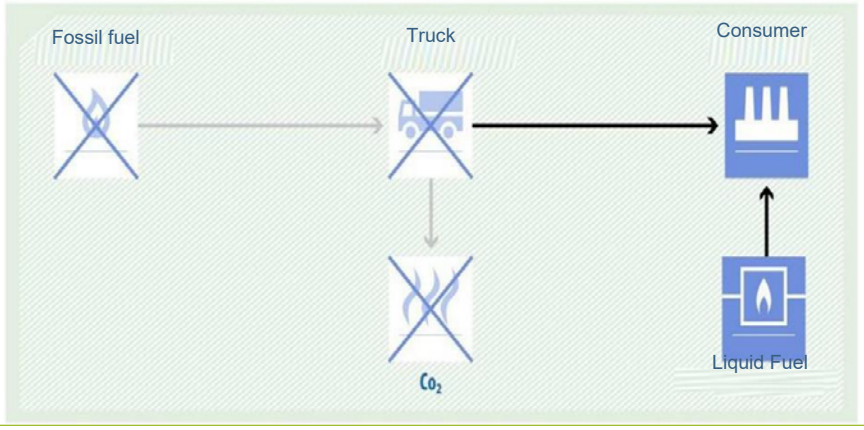
- Distance (km) between the Plant and the pipeline terminal.
- Volume delivered (m^3) to pipeline terminals.
- "Origin-destination" segments contracted in the pipeline system.
- Movement period "month/year".

[97] UNFCCC (2019). **Clean Development Mechanism Methodology Booklet** (11th edition). United Nations Framework Convention on Climate Change. Available at https://cdm.unfccc.int/methodologies/documentation/meth_booklet.pdf. Accessed in: Aug. 2021.

[98] Logum Logística S.A. **Methodology (carbon emissions avoided- CO_2)** [S.I.]. [20--]. Available at: . http://www.logum.com.br/php/desenvolvimento-sustentavel.php. Accessed in: Aug. 2021.

[99] UNFCCC. **AM0110**: Modal shift in transportation of liquid fuels. Version 2.0. [S.I.]. 2021. Available at: https://bit.ly/38R94T7. Accessed in: Aug. 2021.

Figure 4 - Modal Change in the Transportation of Liquids

Typical project(s)	• Transportation of liquid fuels using newly constructed pipeline networks.
Type of mitigation action for GHG emissions	• Energy efficiency. • Displacement of more intensive transportation means in carbon emissions.
Important applicability conditions	• The pipeline network operator is participating in the project. • Liquid fuel is transported using two or multiple pre-identified nodes of a pipeline network. • The type of liquid fuel transported by the project activity is defined at the time of registration (cannot be changed). • Operational improvements to an existing/operating pipeline network are not applicable. • The geographical conditions of the project site allow the use of different means of transportation (e.g., pipelines, trucks, etc.). • There is sufficient land/road/street capacity to transport liquid fuels by trucks at the time of implementation of the project activity and for the entire duration of the crediting period.
Important parameters/variables	At the time of validation: • Amount of fuel consumed by trucks in the transportation of liquid fuels on the route. • Distance from the baseline route. • Amount of liquid fuel transported in trucks. Monitored: • Amount of liquid fuel transported in the pipeline network.
Reference scenario (baseline) Liquid fuels transported in trucks.	
Project scenario Liquid fuels transported using newly constructed pipeline network.	

Source: UNFCCC (2019)

4.7 COMMENTS ON PUBLISHING INVENTORIES AND OTHER GHG-RELATED INFORMATION

The publication of the GHG emissions inventory aims at increasing transparency in the disclosure of organizational data, establishing sectoral benchmarks, as well as raising public awareness on the issue of climate change. This action is linked to the institutional strategy, demonstrating accountability for plans and actions to combat and adapt to climate change.

The public and private sectors are increasingly being encouraged to revisit their practices and demonstrate actions to reduce their emission rates. As drivers of this practice, the own financial market that provokes the private sector may be listed, since the largest investors in the world are betting on companies that have sustainability as a pillar and with that the GHG inventory is one of the tools that demonstrate solidity and security for investors. In the public sector, incentive policies have increasingly adopted environmental issues as being extremely relevant for financing, as is the case of the *Município Verde* e *Azul* Program, which has the number 8 among its directives: Air Quality, which contains an item on GHG emissions.

With that, companies and municipalities have options for publishing their GHG inventory and must adopt the one that is best linked to their strategy among the available platforms.

4.7.1 GHG Protocol – Public Emissions Registry

The GHG Protocol is aimed at organizations, whether private or public companies, NGOs, the third sector, etc., with a tool for calculating greenhouse gas emissions that includes formulas for various intersectoral calculations and sectoral and supporting Technical Notes. The Brazilian GHG Protocol Program is also used to record and disseminate the results of GHG emissions by companies that are part of this program, through its Public Emissions Registry.

The tool and Technical Notes are free and freely accessible, allowing many organizations to have access to calculate their emissions. Training for the use of this tool is available only to member companies that pay an annual fee, but even without training, it is possible to use the most intuitive fields of the tool in a broad way.

The GHG Protocol is known worldwide and the PBGHGP (Brazilian GHG Protocol Program) makes the necessary adaptations to the national reality. The tool is updated annually and uses several international sources, such as the IPCC and national data, such as data from the Ministry of Mines and Energy, Ministry of Science, Technology and Innovation, among others. All calculation references are available in the tool with their access links. It is one of the most used tools for calculating organizational GHG emissions in Brazil, being widely disseminated.

The Brazilian GHG Protocol Program – PBGHGP has a platform called *Registro Público de Emissões* (Public Emissions Registry, in English), in which inventories may publish their emissions results. This platform belongs to the PBGHGP and should not be confused with the Public Emissions Registry mentioned in Law 13,798/2009 (State Policy on Climate Change). According to the GHG Protocol, the *Public Emissions Registry* is the largest corporate inventory database in Latin America and the first in Brazil.

Anyone may access the corporate inventories registered on the PBGHGP platform, as well as export the graphs and tables and consult the participants' emissions history. In this way, it is possible to make sectoral benchmarks and verify companies engaged with the theme of climate change and that are reducing their emissions.

The information made available on the platform includes a brief summary of the company, its organizational structure, pre-inventory data, its organizational limits, its GHG emissions for the year, methods used, other elements and offsets and reductions (purchase or generation of carbon credits).

GHG emissions are disclosed in totals grouped by scope and type of gases, and broken down by categories, emissions by country and by units. The PBGHGP tool itself already has a tab in which data are grouped by scope, type of gases and emission categories to facilitate insertion in the online platform.

4.7.2 Carbon Disclosure Project (CDP)

It is an organization that aims at establishing a connection between shareholders and companies to expand business opportunities, mitigate environmental risks and encourage transition to a low carbon economy.

CDP presents a platform formulated by institutional investors and addressed to companies present in the main stock exchanges. Cities, states and regions also participate. The result of this initiative is the dissemination of information on climate change policies, as companies that measure their environmental risks are able to manage them strategically.

In 2007, the organization published emissions data from 2400 of the largest global companies, responsible at the time for 26% of global GHG emissions. Thousands of companies, among the world's largest corporations, report their climate data through the CDP platform and more than 900 cities are releasing their environmental information on the platform each year[100] to manage emissions, demonstrate GHG reductions, build resilience, protect climate impacts and create better living conditions for their citizens. Starting in 2020, ICLEI and CDP have joined their platforms so that local governments can register their GHG emissions.

The information collected by the platform may sup-

[100] CDP (2019). **A List 2019.** Available at: https://www.cdp.net/pt/companies/companies-scores . Accessed in: Aug. 2021.

port investors, companies, public decision-makers and insurance companies to manage risks for companies and the environment, support decisions and capitalize on opportunities, in addition to favoring the implementation of a corporate environment with less impact on the issue of GHG emissions in the climate change, water and forests agendas and supply chains[101]. Among its benefits are mapping the major causes of GHG emissions, defining a global standard for reporting GHG emissions and energy use; the transparency of activities for shareholders, customers, governments and others; identification of risks in the value chain; among other possibilities.

4.7.3 Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories (GPC)

According to the version summarized and translated by ICLEI, the Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories[102] is applicable to develop GHG emissions inventories for local governments, cities around the world with the purpose of being a robust and clear methodology, allowing greater aggregation and reliability of data and more reliable comparisons between different inventories, pre-establishing requirements and providing guidelines for calculations and reporting inventory results.

GPC has been disseminated internationally for preparation of GHG emissions inventories for cities, and as it was developed in partnership with C40 and ICLEI, it has reached several cities in the world that participate in these networks, in addition to other cities interested in the topic. C40 has 96[103] affiliated cities and approximately 1750[104] cities and regions around the world are members of ICLEI.

In accordance with the guidelines of the GPC guide, this methodology seeks to disaggregate emissions data in order to identify the largest sources of GHG in a city. As with other methodological guidelines, the GPC uses the 2006 Manuals for National GHG Inventories, published by the IPCC, which facilitates comparison with other available methodologies.

The GPC determines six different sectors for allocating issuing activities: Stationary Energy; Transport; Waste; Industrial Processes and Product Use (IPPU); Agriculture, Forestry and Other Land Uses and Other Indirect Emissions.

The GPC methodology guide is available on the internet at the aforementioned link. In order to prepare the inventory, it is necessary to collect data and quantify emission estimates, which may be done by the city hall itself in conjunction with its secretariats or by contracting service providers.

Among the positive points, we can highlight the fact that it helps cities to develop effective strategies for the management and mitigation of their GHG emissions through the understanding of the GHG impacts resulting from their anthropic activities; support consistent and transparent publication and harmonize existing international protocols and guidelines for the local context. The GPC further supports cities' ability to demonstrate the global impact of collective local actions and helps measure collective progress over time, facilitating local governments' access to climate change-related funding opportunities.

4.7.4 Methodology of the Intergovernmental Panel on Climate Change (IPCC)

This Methodology, which is obligatorily used by all signatory countries of the Climate Convention, standardizes information, avoiding, among other factors, double counting and omission of data, allowing adequate comparison between inventories. Considering the above, it is more suitable to be used to carry out the inventory of countries, but any company, individual or institution can use it as a repository or source of guidelines.

The submission of information is made through the IPCC's GHG Emission Factors Database (EFDB), whose purpose is to make it available to a variety of users, in particular the compilers of inventory of Parties to the United Nations Framework Convention on Climate Change (UNFCCC), with well-documented emission factors and other parameters, as well as establishing a communication platform to disseminate and comment on new research and measurement data.

EFDB is intended to be a recognized data repository where users may find emission factors and other parameters with background documentation or technical references[105].

Users are encouraged to provide the EFDB with any relevant proposals on emission factors or other related parameters.

4.7.5 The importance of ISO standard no. 14064 for the publication

Promoting GHG validation and verification through ISO 14064 certification is a way to highlight one's climate change and sustainability credentials. Third party valida-

[101] CDP. **Cities are vital in the transition to a sustainable economy.** [S.l.]. 2019. Available at: https://www.cdp.net/en/cities. Accessed in: Aug. 2021.

[102] More information avallable on **ICLEI** at: http://sams.iclei.org/fileadmin/user_upload/SAMS/Institucional/ Documentos_Capacitacoes_Inventario/Cartilha_GPC_Port.pdf. Accessed in May 2021.

[103] More information on C40: **C40 Cities.** Cities. [S.l.]. [2021?]. Available at: https://www.c40.org/cities . Accessed in: Aug. 2021

[104] More information on ICLEI: ICLEI. **All ICLEI Members**. Bona. [2021?]. Available at: https://iclei.org/en/members-search.html. Accessed in: Aug. 2021.

[105] To publish data through this tool, contact the IPCC TFI Technical through the Support Unit (TSU)ipcc-efdb@iges.or.jp. Some documents must be sent, such as a data entry form according to the template available at the address. Available at: https://www.ipcc-nggip.iges.or.jp/EFDB/main.php. Accessed in: Aug. 2021. Detailed information regarding data submission and disclosure may also be found at this address, arranged in a user manual with information on how to use the emission factor database (EFDB): https://www.ipcc-nggip.iges.or.jp/EFDB/documents/EFDB_User_Manual.pdf . Accessed in: Aug. 2021.

tion that the process is able to deliver GHG emission removals or reductions according to a set of criteria agreed, as well as evidence that the appropriate management system generates true, fair and reliable climate change data may be extremely important for the institution.

Conducting a gap analysis in an audited environment helps identify points where specific improvements can be made to one's GHG emissions by determining the ability of one's existing processes to meet climate change targets, identifying gaps through an ISO 14064 checklist.

ISO 14064 has two phases. Validation involves a review of project documentation and data, with a statement of validation opinion confirming that the institution is able to provide proper GHG removals or reductions in accordance with agreed criteria.

Verification ensures that one's climate change data and information is truthful, fair, and reliably backed by a rigorous management system.

Certification is a guarantee provided after completion of validation or verification (audit) that provides a brief overview of the commitment, the level of assurance and materiality applied, and finally, an opinion. The guarantee statement provides credibility to one's GHG claims and states that they are free from errors, omissions, and misstatements.

Organizations with multiple management systems in quality, occupational health and safety, information security and sustainability may optimize the certification process through an integrated system.

4.7.6 Global Reporting Initiative (GRI) standards for sustainability reporting

The Global Reporting Initiative (GRI) is an independent, not-for-profit global institution created in 1997 to define a globally accepted reporting framework on the sustainability performance of organizations. Currently, GRI presents the most widespread methodology worldwide for sustainability reporting, a topic that encompasses the publication of GHG inventories by different types of organization: the GRI Standards for Sustainability Reporting, formerly known as GRI Guidelines[106].

The purpose of the GRI Standards is to consolidate reliable, relevant and standardized information so that companies are able to assess opportunities and risks based on the impacts identified in their operations, related to the environment, economy and civil society. The GRI methodology presents a differential for the management of companies and organizations, as it is a tool for promoting sustainability and not just a tool for preparing reports, in addition to being universally applicable to companies and entities of all sizes, types and sectors of the Marketplace.

Until 2016, the main GRI references for sustainability reporting were the so-called Sustainability Reporting Guidelines (GRI), which were in their fourth version (GRI G4). As of the end of 2016, the GRI G4 Guidelines underwent a reformulation process that gave rise to the GRI Standards currently applicable. Valid from 2018, they were the first global standards for sustainability reporting and include indicators arranged in modules that represent the best reporting practices available on the economic, environmental, and social impacts of business.

The main motivations for companies to prepare reports based on the GRI Standards are: commitment to environmental and social impacts; transparency in relationships; ability to participate in competitive markets; planning activities focused on sustainability; and compliance with legislation. Companies may use the GRI Standards to develop their sustainability reports, not having to use all the standards. It is possible to use specific parts of the document to report only information that is valid for one's company/institution.

4.7.7 Own tools and publication

Considering the range of signatories to São Paulo Agreement, the format of its own tools is an option both for calculating emissions and for publishing inventory information. Once the methodology to be used has been defined and the inventory compiled, the information can be disseminated through their own tools selected by the institutions.

The preparation of the document is the first measure for a sector, institution, or company to contribute and mitigate climate change. It establishes strategies, plans, and goals for the reduction and management of GHG emissions, in addition to developing initiatives to minimize the risks of the effects of climate change.

It is recommended to structure a report with measurements obtained reliably, promoting principles such as transparency, consistency, and accuracy, and published through a formal report in digital media capable of understanding the institutions or companies' own electronic addresses (website), or other forms of publication that could be considered publicly disclosed.

5. CONCLUDING CONSIDERATIONS

Once the inventory is carried out, the publication of the information obtained is extremely relevant for transparency of organizations and to disseminate not only information that may be compared, but also encourage other actors to contribute to the purpose of climate change.

The public and private sectors are increasingly being encouraged to revisit their practices and demonstrate their leadership in actions to promote sustainability by reducing their emission rates. Throughout this publication, we seek to compile clarifying information in a summarized way about methods and tools already

[106] The complete set of standards for sustainability reporting, including original English versions and translations into eleven languages, can be found at: https://www.globalreporting.org/standards/download-the-standards/. Accessed in: Aug. 2021.

consolidated, such as the GHG Protocol widely used by different types of companies and institutions; the GPC, whose main focus is the accounting of emissions from municipalities and cities, to be used by municipal managers; GRI reports for global standardization of organizations, which allow them to develop their sustainability reports, without having to adopt all the standards contained in the tool; or even the IPCC itself, for the signatory countries of the climate convention, which standardizes information, avoiding, among other factors, double counting and omission of data, allowing proper comparison between inventories.

Inventories may also be validated by a third party, through the ISO system, in order to prove that the appropriate management system generates true, fair and reliable data on climate change, and this guarantee statement provides credibility to one's declarations of GHG and assertion that they are free from errors, omissions and misstatements.

It is understood that the reality of each company, institution or community is unique and must be considered by its manager. Thus, this Technical Note was made available with the purpose of making its content a facilitator in the decision-making process of what best applies to the particularities of each sector, institution, company, or community, helping clarify which methodologies and tools will best reflect the data in its GHG inventory in a relevant, comprehensive, concise, transparent, and accurate manner.

Finally, the content of this Technical Note is expected to facilitate the submission of GHG information to São Paulo Environmental Agreement.

ACORDO AMBIENTAL SÃO PAULO

QUESTIONS AND ANSWERS

ABOUT GREENHOUSE GASES (GHG) AND GHG INVENTORY FOR THE SÃO PAULO ENVIRONMENTAL AGREEMENT

1. In the terms of Agreement to the São Paulo Environmental Agreement it is expected the submission of information about metric tons of current emissions, possibilities of reductions, sequestering and/or avoided greenhouse gas (GHG) emissions. How is this information collected?

Through a greenhouse gas (GHG) inventory, which is a tool used to understand, quantify, and manage these emissions. By using the right tool, it is also possible to map the sources of GHG emissions from an activity, process, organization, economic sector, city, state, or even a country. For more information, it is advised to refer to the Technical Note 01 – Quantification and Reporting of Greenhouse Gas Emissions.Link: Nota-Tecnica-01-Quantificacao-e-Relato-de-E-missoes-de-Gases-de-Efeito-Estufa.pdf (cetesb.sp.gov.br) Accessed in May 2021,

2. Will companies that adhere to the Agreement present and send their annual greenhouse gas inventory to the coordination of the São Paulo Environmental Agreement under the responsibility of CETESB?

Yes, from the second semester of 2021 onwards, it will be requested that companies present the information relative to the Greenhouse Gas (GHG) inventory from the previous year, through a form (under elaboration) that will be submitted to the São Paulo Environmental Agreement.

To submit the GHG inventory, what will the deadline and the periodicity be?

Period for data: from January to December of the previous year. Deadline for the reporting: until August of the following year.

4. For the elaboration of the Greenhouse Gasses inventory, will the São Paulo Environmental Agreement recommend any type of tool for the calculations and factors of emission?

There are several tools in the market, with calculations bases defined, e.g., GHG Protocol, IPCC, ABNT 14064, among other similar ones. To better understand each tool, we recommend referring to the Technical Note. Regarding emission factors, the Technical Note can also be consulted. Access link: Nota-Tecnica-01-Quantificacao-e-Relato-de-Emissoes-de-Gases-de-Efeito-Estufa.pdf (cetesb.sp.gov.br) Accessed in: May 2021.

5. If we opt for a tool called 'GHG Protocol' to elaborate the GHG inventory, should we make the inventory considering Scope 1 and Scope 2, or Scope 1, 2, and 3?

In the framework of the São Paulo Environmental Agreement, it is expected the submission of scope 1 and 2. Scope 3 is optional, but its inclusion is incentivized.

6. Will we have to identify the emissions for worker's commutes?

The aforementioned item is contemplated in scope 3, of which the inclusion is optional. However, it can be interesting to include this scope, to know the extent of the emissions at one's premises or entity, thus defining if these emissions are included will be up to the adherent to the São Paulo Environmental Agreement.

7. Should the vehicle fleet that transports parts/inputs (upstream), be included in the inventory?

If the fleet belongs to or is rented by the company, it is considered scope 1 and should be in the inventory. If the service of moving the parts/inputs is outsourced, it is considered scope 3, reporting is optional. However, São Paulo Environmental Agreement encourages that scope 3 be incorporated, as means for a company to know how the GHG emission is within its supply chain.

8. Regarding the vehicles that transport the end-products (downstream) to the centers of distribution or clients, do these have to be included in the inventory?

If the fleet belongs to or is rented by the company it is considered scope 1, therefore, the reporting is required to adherents to the Agreement. If the service of transport of end-products is outsourced, it is considered scope 3, of which the reporting is optional.

9. We are a multinational company; can we use the emission factors adopted by our headquarters?

It is recommended to use the local or regional emission, but specific emission factors can be evaluated subsequently by the Working Group (WG) Tools from the ENVIRONMENTAL CHAMBER OF CLIMATE CHANGE, as well as the calculation methodology.

10. Will we have access to the information of other companies, the 'successful cases' for reducing Greenhouse Gas and environmental improvements?

The successful cases with best practices of low-carbon and environmental improvements submitted by the adherents to the São Paulo Environmental Agreement will be available for consultation on CETESB's website. Link: https://cetesb.sp.gov.br/acordo-ambiental-sao-paulo/ accessed in: May 2021.

11. Will there be targets for those who adhere to the São Paulo Environmental Agreement?

Yes, each Agreement adherent will define their own targets of annual emission reductions and share this information with the coordination of the São Paulo Environmental Agreement. Since the annual reporting is done in tons of CO_2 per year, the reduction targets should be in the same unit, in tons/CO_2 per year.

12. What is the base year for targets defined by the entities of the Agreement?

It is recommended that the base year adopted for the calculation of targets be 2020, but if one's company only has the information relative to 2019, it can be accepted.

13. Is there any cost to adhere to the São Paulo Environmental Agreement?

No, and CETESB does not authorize third parties to charge admission fees for the Agreement.

14. Will CETESB sponsor or financially contribute with improvements for the reductions of emissions?

No, all the eventual costs to reach the targes will be incumbent upon the adherent company to the São Paulo Environmental Agreement.

15. Which gases are in the scope of a GHG inventory?

Carbon dioxide (CO_2), methane (CH_4), nitrogen oxide (N_2O), hydrofluorocarbons (HFCs), Perfluorinated compounds (PFCs), Sulfur hexafluoride (SF6), Nitrogen trifluoride (NF_3); Source: Spreadsheet "resumo" da ferramenta do Programa Brasileiro de GHG Protocol. Available at: https://eaesp.fgv.br/centros/centro-estudos-sustentabilidade/projetos/programa-brasileiro-ghg-protocol accessed in May 2021. Also refer to Technical Note 01 - QUANTIFICATION AND REPORTING OF GREENHOUSE GAS EMISSIONS, available on CETESB's website.

16. Can gases controlled by the Montreal Protocol be included in inventory or the target definition for emissions reductions?

Yes, tools as GHG protocol contemplate all gases related and revised annually. Gases controlled by the Montreal Protocol are chlorofluorocarbon (CFCs) hydrofluorocarbons (HFCs), halons, bromomethane, carbon tetrachloride (CTC), trichloroethane, and bromodifluoromethane (HBFCs). Source: Programa Brasileiro de Eliminação de HCFCs. Availabe at: http://www.protocolodemontreal.org.br/site/quem-somos/protocolo-de-montreal/substancias-controladas-pelo-protocolo-de-montreal accessed in May 2021.

17. How can we get more information about the São Paulo Environmental Agreement?

Refer to the Agreement website: https://cetesb.sp.gov.br/acordo-ambiental-sao-paulo/ accessed in May 2021. **Refer to the Technical Note website:** Nota-Tecnica-01-Quantificacao-e-Relato-de-Emissoes-de-Gases-de-Efeito-Estufa.pdf (cetesb.sp.gov.br) accessed in May 2021. E-mail address: acordo2030_cetesb@sp.gov.br

18. Will the company that adheres to the São Paulo Environmental Agreement have any benefit?

Yes, the company which adheres to the São Paulo Environmental Agreement will have the following benefits:

- The right to take part in the periodic meetings in the São Paulo Agreement, where items related to the agreement will be discussed and it will be presented successful cases which can be replicated in other companies.
- The adherent who takes part in the agreement meetings will be in touch directly with many companies (networking) and take part in technical discussions that enrich knowledge about climate change and best practices in this agenda.
- The adherent companies will contribute to the achievement of the Sustainable Development Goals (SDGs), especially SDG 13 – Actions Against Global Climate Change, SDG 17 – Partnerships for the Goals, and the Paris Agreement.
- The name/logo of the company will be cited on CETESB's website in the link to the São Paulo Environmental Agreement.
- Exposure of the company and their successful cases in meetings pertaining to the subject carried out by CETESB.
- Among other benefits.

Acknowledgements to the professionals who contributed to the elaboration of the text 'Questions and Answers' written to guide the adherents of the São Paulo Environmental Agreement. Elaboration: TOYOTA: Ayres Takashi Abe, Luana Cardoso, Marcos Vinicius Maceno. Collaboration: BENG ENGENHARIA: Francisco do Espírito Santo Filho; BLOCKc: Ricardo Esparta; CETESB: Ana Maria G. Schmid; Carlos Lacava, Clarice Aico Muramoto, Maria Cristina Poli, Daniel Huet, Josilene Ticianelli Vannuzini Ferrer, Solange Medeiros Miranda, Vivian Marrani de A Marques, José Contrera Lopes Neto; CHEMOURS: Joana Canozzi-Bercht; ECOSOLAR: Helena Barbosa ; ECOSUPORTE / ABRAVA / APAS: Thiago Pietrobon; FECOMERCIO SP: Cristiane Lima Cortez; FLSMIDTH: Aline Jordão Melo; INVEST SP: Jose Pedro Fittipaldi; GERDAU: Aricely Lamontanha; ROTTA E MORO SOCIEDADE DE ADVOGADOS: Fernanda Rotta; SAVIN, PAIVA ADVOGADOS: Heloisa Couto dos Santos, Camila Canesi Morino, Ruth Maria Cordido; VIRACOPOS: Lilian Pavani, Moisés Alves de Araújo Júnior.

Participation - Cases

Supported by

Organized by

ISBN 978-65-5577-044-5