RESPOND

COP27

Sharm El-Sheikh

Prince Sultan Bin Abdulaziz International Prize for Water

Recognizing Innovation

Winners for the 10th Award (2022)

Creativity Prize

1) The team led by Thalappil Pradeep (Indian Institute of Technology, Madras, India)
for the creation and successful deployment of environmentally friendly "water positive" nanoscale materials for the affordable, sustainable and rapid removal of arsenic from drinking water. Team members include Avula Anil Kumar, Chennu Sudhakar, Sritama Mukherjee, Anshup, and Mohan Udhaya Sankar.


Dr. Thalappil Pradeep

2) The team led by Dionysios D. Dionysiou (University of Cincinnati, USA)
for the development of innovative advanced oxidation technologies and nanotechnologies for environmental applications, particularly in the removal and monitoring of emerging contaminants. Team members include Wael H.M. Abdelraheem, Abdulaziz Al-Anazi, Jiong Gao, Ying Huang, and Vasileia Vogiazi.


Dr. Dionysios D. Dionysiou

Surface Water Prize

Dennis D. Baldocchi (University of California Berkeley, USA)
for the development and implementation of effective models to understand, evaluate and predict evapotranspiration and water-use efficiency in various environments under climate change conditions.


Dr. Dennis D. Baldocchi

Groundwater Prize

Linda M. Abriola (Brown University, USA)
for pioneering research on toxic Dense Non-Aqueous Phase Liquids (DNAPLs) in groundwater, ranging from the simulation of their fate to effective methods for cleaning contaminated sites.


Dr. Linda M. Abriola

Alternative Water Resources Prize

The team of Menachem Elimelech (Yale University, USA) and Chinedum Osuji (University of Pennsylvania, USA)
for wide-ranging advances in nanostructured materials for next-generation water purification, focusing on implementation issues like manufacturing, sustainability, self-assembly, and biofouling.


Dr. Menachem Elimelech


Dr. Chinedum Osuji

Water Management and Protection Prize

The team led by Matthew McCabe (KAUST, Thuwal, Saudi Arabia)
for employing CubeSat constellations in the sustainable management and security of linked water-food systems, along with estimates of agricultural water use at unprecedented spatial and temporal resolutions and with global coverage. Team members include Bruno Aragon (KAUST) and Rasmus Houborg (Planet Labs, USA).


Dr. Matthew McCabe

Invitation for Nominations

11th Award (2024)

Nominations open online until 31 December 2023

www.psipw.org e-mail: info@psipw.org

COP27 PRESIDENCY VISION FOR UNITED NATIONS CLIMATE CHANGE CONFERENCE

The COP27 agenda emphasizes action across the board on climate change by continuing to reduce emissions and address climate change adaptation aiming at saving lives and livelihoods.

It reiterates a just and managed transition to a more sustainable economy to ensure no one is left behind.

Its vision is for an implementation COP that focuses on how the world pays for the estimated $USD125 trillion bill to tackle climate change by 2050 (according to the IEA).

Egypt's COP27 Presidency set out its vision for the 2022 United Nations Climate Change Conference. The aim is to make COP27 an "implementation COP" by urging action across prior agreements through all areas of climate change need, with a focus on protecting people from the immediate impacts of climate change, ensuring no one is left behind.

Speaking from Cairo, on 28 September, about the vision for COP27, **H.E. Sameh Shoukry, Egyptian Minister of Foreign Affairs and COP27 President-Designate**, said:

> **"We must accelerate climate action on all fronts including mitigation, adaptation and finance in addition to adopting more ambitious mitigation measures to keep the 1.5c within reach. There can be no room for delay in the fulfilment of climate pledges or backtracking on hard earned gains in the global fight against climate change. We must work together for implementation. We need to act, and act now, to save lives and livelihoods.**

Speaking at the COP27 Global Press Briefing, **Amb. Wael Aboulmagd, Special Representative of the COP27 President,** said:

> **"We cannot underplay the threat that humanity is facing due to climate change; 4% of global economic output could be lost by 2050 due to climate change and 5 million people die every year because of temperature extremes… which will only get worse as temperatures increase. The cross-cutting issue is always going to be finance. How are we going to pay for this? We cannot continue along an extremely adversarial trajectory. We need to find creative ways to come up with finance.**
>
> **Most importantly we need all stakeholders on board… if we are to save lives and livelihoods and if we are to transform global economies from, an unsustainable model that's been followed for more than two centuries, to a sustainable low emission one that takes care of impoverished people and those suffering from the negative impacts of climate change.**

The focus on a just and managed transition to a new sustainable economic model was highlighted as critical to progress at COP27. The Paris Agreement recognised that nations have combined but differentiated responsibilities due to their historical greenhouse gas emissions. This puts the responsibility on developed nations to help developing nations with appropriate finance to make the transition to a more sustainable economy over time. The COP27 Presidency points to the need to first meet current financial commitments, with the $100 billion finance goal and the doubling of global adaptation finance and take global ambition on finance further if we are to deliver effective climate action.

To drive home its vision, the COP27 Presidency launched "**Act Now**", a film which highlights the real and present danger of climate change, its man-made origins and its man-made solutions. It aims to encourage global decision makers to avoid backtracking and to follow through on pledges by impressing on them the need to act now, "because there is no extra time" and come together for implementation at COP27 in Sharm El Sheikh.

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Published by: Responding to Climate Change Ltd
Thirleby Road, London, SW1P 1HG
+ 44 (0) 207 799 2222 | www.rtcc.org
Publisher: James Ramsey
Outreach: Nicole Serrij

RESPOND MAGAZINE
Editor: Shaine Redden
Design & Production: Jo Hare
Finance: Shaine Redden

Printed by Urban Design and Print on recycled stock with vegetable based inks. www.urbanprinting.co.uk

WHY WE NEED BLOCKCHAIN TO SAVE THE PLANET

By Luis Felipe Adaime, CEO, MOSS

The current system for the issuance of environmental assets, like carbon credits, is excessively slow and expensive: blockchain could bring the efficiency we urgently need to save our planet.

In a recent statement, Greenpeace announced that “bitcoin is fuelling the climate crisis” and suggesting that a change in its code would solve the problem. That might be a bit extreme: Bitcoin mining emits 114 million tons per year, or 0.15% of global emissions (in comparison with 1.4 billion for our annual use of the Internet). Emissions for Bitcoin mining are arguably minimal on a per asset basis, and offsetting them is a minimal cost of 0.05% per asset. Furthermore, “Proof of stake” blockchain systems, like Celo and Polygon, emit 99% less than Ethereum.

So, having established that the emissions or environmental impact of blockchain are minimal, let’s discuss why its use is instead key for saving the planet.

THE GLOBAL ENVIRONMENTAL SERVICE SYSTEM IS STILL ARCHAIC, ANALOGUE, MANUAL AND INEFFICIENT

The environmental services sector is one of the very few that has not yet been disrupted by technology. Let’s look at the issuance and verification of avoided deforestation carbon credits, for example. Global registries define a protocol (a list of requirements) based on scientific work, and charge a fee per carbon credit generated so as to finance its operations.

Forest owners or conservation project proponents hire a consulting firm, called a certification company, that will assist in the preparation of a document called the “PDD” (project design document). The PDD must include several analyses on the area’s characteristics, like biodiversity and water fall, but most importantly it includes the projections for the avoided emissions that are generated from protecting that specific area.

The concept is based on the fact that half of a tree is made of carbon atoms, thus, when one protects a forest, one is protecting a huge inventory of carbon and avoiding emissions. When one burns a tree, the carbon atoms in that tree’s cellulose molecules are released to the atmosphere as CO2, CH4 (methane) and other pollutant gas. This protection work is a relevant solution to the world’s Greenhouse gas emissions: experts estimate that **20% of the world’s emissions comes from us slashing and burning our forests**. So, if we stop burning our forests, we will cut the world’s emissions by one fifth. If people are paid via the sale of carbon credits, they will make money from conservation and will be aligned with saving the worlds forests.

THE WORLD’S LARGEST COTTAGE INDUSTRY?

The challenge is that the bulk of the analysis is still done by hand on worksheets. The establishment of the baseline, or the benchmark for comparison of the forest’s protection work, is often subjective and varies widely from case to case. In many cases, forest engineers visit the project many times prior to finishing their analysis. They often measure tree trunks with metric tape.

Once the PDD is finished, it is audited (manually) by a previously authorized auditing company, and then finally, the document is, once again, submitted for (manual) verification by the registry. All this manual work leads to a slow process and very high costs: it takes 3 years and more than US$ 700 thousand to certify an area, independently of the area’s size (it costs the same for 1 hectare or for 1 million hectares.)

Now, this process has not changed much in the past 20 years. And the efficiency that blockchain brings to this procedure described above is monumental. For starters, the global registries have 3 functions: (1) they establish the protocol (2) they verify the data and certify the carbon credit process (3) they manage the database and charge a (hefty) fee for registration of the transactions.

For starters, the last part is completely replaceable by blockchain. That is one of the main reasons for the creation of blockchain: registering transactions in a secure, transparent, cheap way. There is absolutely no reason for established registries to be wearing that hat of running an off-chain database. Currently, the system is based on

Moss

Based in Brazil, Moss is a one-stop shop for carbon transactions: a project developer and a platform that provides carbon credit offset transactions to individuals and companies of any size. Their carbon credits, tokens and flows are audited and certified by the world's largest companies, including Armanino, Perkins Coie and Python. More than 300 companies use Moss's custom solutions for offsetting.

MOSS

Connect with Moss.Earth:
Website, Instagram, Discord, Twitter

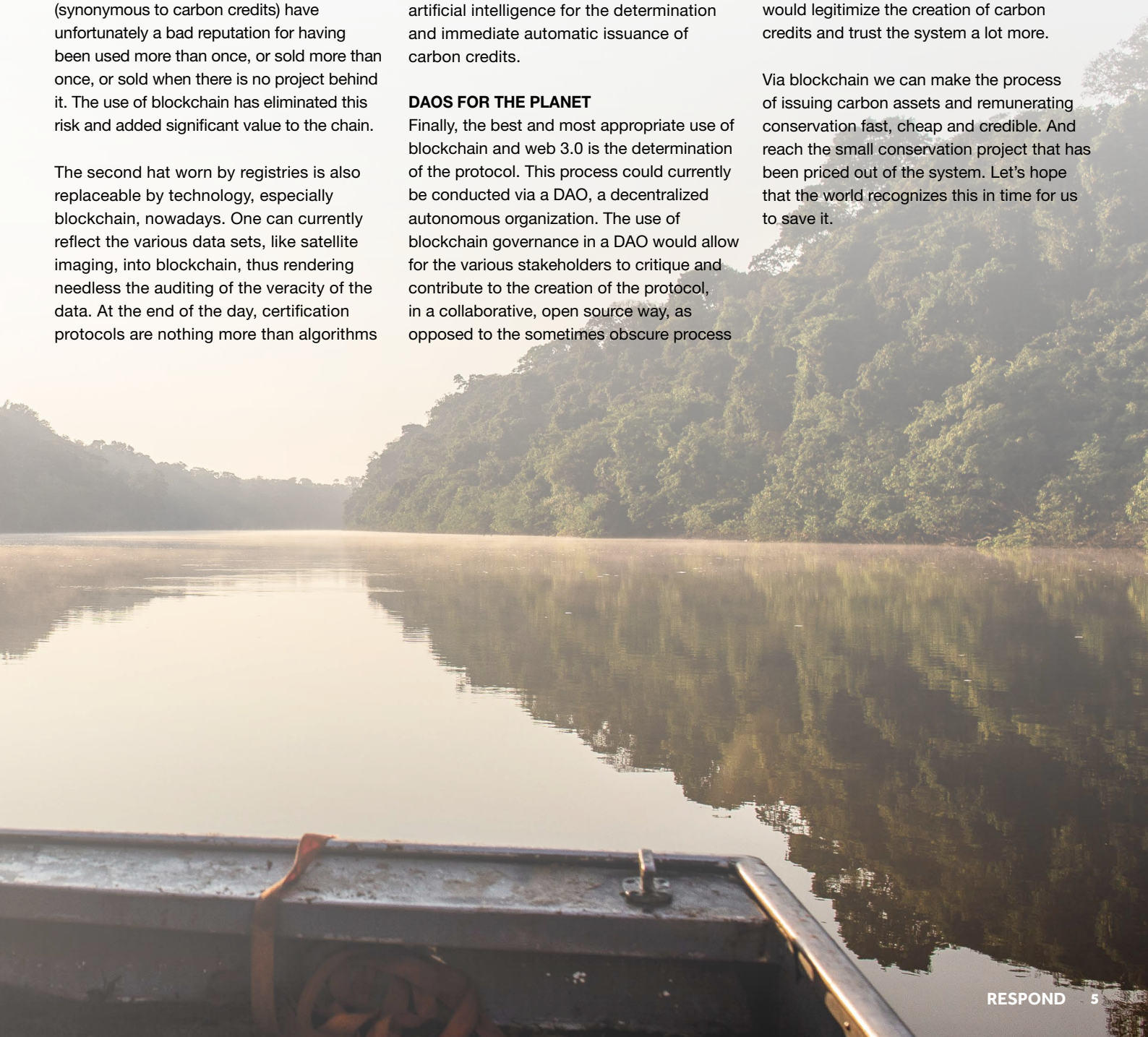
the credibility and trust of these registries for running the databases. But, since they use outdated technology, they are prone to human error, hacker attacks, power failures, etc. Blockchain allows for permissionless and anonymous, decentralized management of such information and transactions. And, best of all, it eliminates the risk of "double spending." Historically, carbon offsets (synonymous to carbon credits) have unfortunately a bad reputation for having been used more than once, or sold more than once, or sold when there is no project behind it. The use of blockchain has eliminated this risk and added significant value to the chain.

The second hat worn by registries is also replaceable by technology, especially blockchain, nowadays. One can currently reflect the various data sets, like satellite imaging, into blockchain, thus rendering needless the auditing of the veracity of the data. At the end of the day, certification protocols are nothing more than algorithms (a set of rules) in which one inputs data on one side and gets potential carbon credits as outputs on the other side. Currently, especially in our era of artificial intelligence, optical character recognition and automation via coding, none of this work of certifying processes and protocols needs to be done by hand. In fact, many institutions have begun using digital databases and artificial intelligence for the determination and immediate automatic issuance of carbon credits.

DAOS FOR THE PLANET

Finally, the best and most appropriate use of blockchain and web 3.0 is the determination of the protocol. This process could currently be conducted via a DAO, a decentralized autonomous organization. The use of blockchain governance in a DAO would allow for the various stakeholders to critique and contribute to the creation of the protocol, in a collaborative, open source way, as opposed to the sometimes obscure process used by the incumbent players. Many people and the media wrongly criticize carbon credits because they don't understand the protocol for issuance. If we had the process of establishing the rules for issuance open to all, in a public way, with the advantage of dynamic governance, instead of meetings behind closed doors by committees elected in political or unclear ways, we probably would legitimize the creation of carbon credits and trust the system a lot more.

Via blockchain we can make the process of issuing carbon assets and remunerating conservation fast, cheap and credible. And reach the small conservation project that has been priced out of the system. Let's hope that the world recognizes this in time for us to save it.



REFORESTATION TO TACKLE CLIMATE CHANGE

More frequent and intense droughts, storms, heat waves, rising sea levels, melting glaciers and warming oceans are all key indicators of climate change.

Such changing conditions put our agriculture, health, water supply and more at risk. This can directly harm animals, destroy the places they live and wreak havoc on people's livelihoods and communities. As climate change worsens, dangerous weather events are becoming more frequent or severe.

Desertification, or loss of fertile, productive soil, is a problem which is exacerbating climate change, as the diminishing number of trees on the planet is worsening the greenhouse effect. One solution to this is reforestation. Despite its drawbacks, it is still an option for re-greening thousands of hectares.

Life on Earth could not survive without forests. Forests and oceans are the lungs of the planet and have a crucial role in the fight against climate change because they absorb 20 billion tonnes of CO2 per year.

Almost a third of the planet is covered by forests, that is equivalent to 40.6 billion hectares. These enormous forested areas are essential to our survival: the water we drink, the food we eat and the air we breathe. However, we are destroying our very source of life: humankind is cutting down 13 million hectares of forest each year.

Our overexploitation of natural resources, by cutting down trees and building ever-larger cities, is the main human cause of desertification, but there are others that are not related to it. These activities are causing irregular rainfall and seasonal drought, soil erosion and impoverishment, and forest fires caused by climate change. In light of this situation, reforestation has become one of the most effective strategies for turning this trend around.

REFORESTATION, GOALS AND BENEFITS

Reforestation consists of replanting deforested areas to restore forests destroyed in the recent past. The destruction of large forests, which are essential to absorb CO2, produce oxygen and palliate climate change, make it necessary to plant huge numbers of new trees with the ultimate aim of saving ecosystems from destruction and protecting the planet from damage.

Restore lost biodiversity

Our forests are home to more than 80% of the species that live on Earth. According to *The State of the World's Forests 2020* (FAO) they house more than 60,000 species of tree, 80% of amphibians, 75% of birds and 68% of mammals. Their destruction and disappearance is driving hundreds of species to extinction despite the efforts of conservationists.

Reduce the amount of carbon dioxide in the air

Human beings' activities cause annual emissions of around 40 Gt CO2. Half of these gases end up in the atmosphere where they contribute to global warming, and the other half is absorbed by forests and oceans. Reforestation is crucial for our very survival: our forests are carbon sinks and essential for stopping climate change. Without them, the average temperature of the planet will continue to increase, and so will sea levels. Glaciers and polar ice caps will keep melting among other climate effects.

Reverse soil erosion and restore water basins

The trees in the forest hold back the wind and rainfall, protecting the soil from erosion. Eroded, infertile soil is no good for farming and is at risk of landslides and flash flooding. Reforestation is a remedy to this situation, which is also being made worse by indiscriminate tree felling, preserving soil fertility with deep roots. Water basins also come back to life when they recover their nutrients.

Protecting human health

Deforestation and its effect on the environment not only deprive people of essential nutrients, but are also the main sources of transmission of emerging infectious diseases, including COVID-19. A total of 75% of these diseases (including bird flu, ebola and monkey-pox) are transmitted from wildlife to people. Forest degradation without optimal reforestation increases human exposure to zoonotic diseases.

The importance and value of Earth's ecosystems is so clear that caring for and respecting them is part of AMEA Power's strategy towards the UN Sustainable Development Goals (SDG). Specifically, **SDG15: Life in terrestrial ecosystems protect, restore and promote their sustainable use.**

"Forests are more than just trees, effective barriers to prevent flooding, increase biodiversity, filter air pollution, improve water and soil quality, benefit local communities and they are the ultimate carbon capture and storage machines.

At AMEA Power, we are working in line with UN Sustainable Development Goals across all our Project Portfolio in order to promote deforestation-free supply chains and reforestation projects as well as to prevent escalation on biodiversity and climate crisis".

Vito Saluto – Head ESG

HOW AMEA CARRY OUT REFORESTATION AND AFFORESTATION PLANS

To reforest a piece of land spoilt by indiscriminate felling, fires or deforested by climate change, it is necessary to prepare a proper plan. Reforestation needs to be sustainable, in other words, it is not just a question of planting trees. Let's take a look at some of aspects to be considered.

Site study

As a first step, AMEA Power analyses the lands and the conditions of the area surrounding its projects: from the soil — depth, texture, fertility to the climate — dry or wet season (there must be moisture) and the type of local fauna and flora that live in the ecosystem. It's important to map the local livestock activities, in order to reduce any negative aspects since reforestation / afforestation, if not properly studied, might inhibit from entering certain sites. This impact can be reduced by allowing the graziers to graze in some other lands and organising the paths that they can take. Hydrology and erosion are among the issues that must be included in the site study.

Stakeholder Engagement

An important section of the plan is obviously the stakeholder engagement. AMEA Power identify the stakeholders with a stake in the provisioning, regulating and cultural ecosystem services of forests, to distinguish their characteristics, and to examine their relationships towards each other on different levels. This also includes engagement with local communities, taking into account their priorities and preferences to select native tree species for reforestation.

Select plant species

AMEA Power ensure always to plant local native species, and depending on the case might also include fast-growing species that are compatible with the soil and climate. It is important to have good quality forest germplasm, and ideally the nursery of origin should be no more than 100 kilometres away. The manner and time at which the trees are transported is also important to avoid the heat of the sun and strong wind.

Choose a planting method

First prepare the soil, it's important to select the right tools and opt for the least invasive technique. Tree height and coverage of each new plant must be considered so that they do not interfere with each other. The plantation does not end with the forest germplasm, but must also include a follow-up plan.

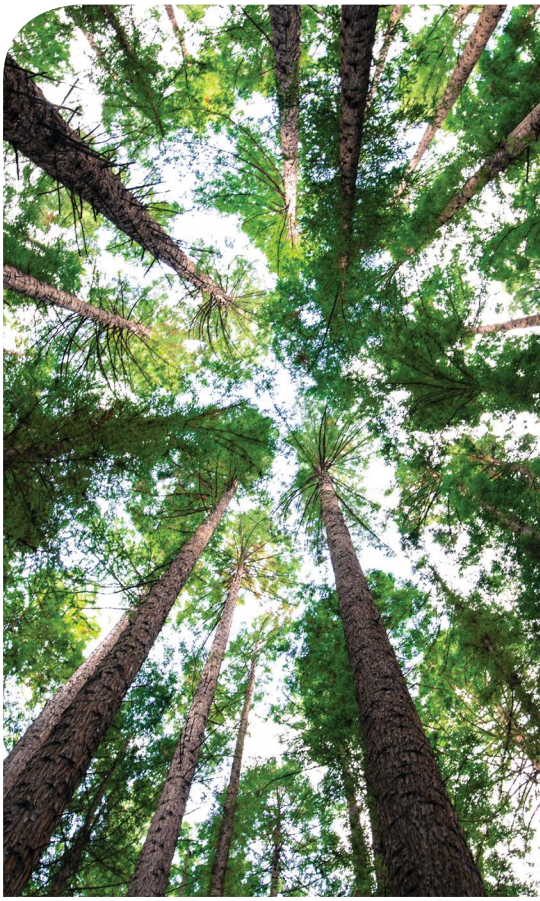
Establish a protection and monitoring plan

The follow-up plan must specify how to protect the reforested area from threats of disease, infestation, fire and illegal logging, among others. Maintenance and assessment are essential to secure the reforestation.

KEY PRINCIPLES

On implementing its reforestation and afforestation programmes, AMEA Power follow some key principles:

- ✔ Recognize that the benefits of conservation and restoration go far beyond environmental outcomes and are both business critical and urgent
- ✔ Always develop and implement projects in partnership, working with diverse stakeholder groups including NGOs, universities, governments and local communities
- ✔ Build and maintain collaborative relationships with local communities beyond the obligations linked to any compensation process
- ✔ Stay focused on results in terms of climate, nature and social benefits, not on activities completed
- ✔ Invest in monitoring methods and tools to protect forests from illegal logging and improve the effectiveness of conservation activities.



WHAT AMEA POWER IS DOING

AMEA Power is evolving from an avoided deforestation strategy to a more proactive approach that incorporates forest restoration and conservation within and across its projects. While avoiding deforestation remains a critical priority, AMEA Power is focusing on conservation and restoration efforts linked to an "offsetting" approach. The company works with Project Stakeholders to grow trees in the project's immediate vicinity or in nearby landscapes through agroforestry initiatives or forest restoration projects.

AMEA Power has currently spent over 250,000 USD on reforestation and afforestation programmes, planting over 10,000 trees across its projects in Burkina Faso and Togo. These trees will provide vital ecosystem services, including shade and improved soil health, while supporting AMEA Power to build resilience to key risks of its operations, as well as to support the local community livelihood, and contribute to the climate change mitigation.

CLIMATE LITIGATION IN BRAZIL, A PROMISING NEW ERA

By Alice de Siqueira Khouri, Lucas Ribeiro Lima
and Vivian Marcondes de Oliveira

In recent years, the Brazilian government has demonstrated a total lack of commitment to climate action and has misled the NDC update.[1]

As a result of this inaction climate litigation has emerged as one of society's greatest tools to fill the gaps towards sustainability. And the tides are slowly turning.[2]

Following the recent UN General Assembly's decision that access to a clean and healthy environment is a universal human right,[3] last July, the Brazilian Federal Supreme Court ("STF") delivered a similarly historic decision.[4] The decision is a major milestone as it recognized the intrinsic relationship between human rights and climate change, determining the federal government's obligation to honour its international commitments and protect the human right to a healthy and thriving environment.

In short, the STF argued that environmental law treaties constitute a variety of human rights treaties and, therefore, hold supranational status. By this argument, the Court understood that the government's inefficiency to correctly allocate the Climate Fund[5] resources, used to tackle climate change, was unconstitutional.

With this decision, Brazilian citizens now have additional legal mechanisms to pursue their fundamental right to a healthy environment, which intrinsically means a government actively within the climate agenda – whether they like or not. This is certainly an important step towards climate action.

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DRIVING ACTIVITIES FOR CLIMATE ACTION IN BRAZIL

By Maria João Pereira Rolim and Rodrigo Sluminsky

What needs to be done to boost decarbonization.

Given its biodiversity, and the fact that it harbours the largest forest in the world, Brazil has always been an important player in the climate agenda. Additionally, the connection of Brazil's indigenous ancestry with its contemporary culture, its enormous capacity for renewable energy, food production, and abundance of natural resources makes the country increasingly relevant in the fight against climate change.

When it comes to carbon footprint, Brazil accounts for less than 1.5% of global carbon emissions, and aims to halve its emissions by 2030. Only a fraction of the nation's electricity comes from fossil fuels, and more than half of the territory is still covered by native forests. Nevertheless, this is not enough. It is essential to emphasize Brazil's role in the climate agenda.

Brazil boasts exponential growth in disruptive energy systems, with a focus towards energy efficiency and renewable energy production. In the last ten years, solar and wind energy have grown from virtually nothing to constituting a fifth of the energy mix. Despite skyrocket growth there is only one small concentrated solar plant in operation in Brazil and no offshore wind energy projects to date. Clean energy infrastructure can lead to leadership in green hydrogen production at very competitive costs. There is additionally, a vast potential to be explored in electrification, distributed generation, and new technologies.

Brazil could formally establish the largest carbon reserve in the world and guarantee enormous conservation of biodiversity. Recently, the Brazilian government approved a bill that remunerates the preservation of protected areas – which may be used also to establish a voluntary carbon market. Currently 2,300 areas have been protected under this bill. Yet, these measures are insufficient and far more will be needed to reverse the deforestation curve in Brazil.

Low carbon agriculture can establish a new way of exploiting natural resources and help halt deforestation. Brazil is responsible for feeding roughly 10% of the world population. All this potential must be viewed with enormous responsibility. There is full capacity to combine sustainable practices with responsible agriculture. Not only using the best practices available in terms of crops, but also recovering degraded areas and promoting integration with forests.

Finally, we are close to establishing a regulated carbon market to boost all these activities.

Along with the financial flows, this seems to be a great incentive for another big move by Brazil towards sustainability. All stakeholders must be on this journey together. Brazil cannot fail to fulfill its role in the decarbonization of the world economy.

IT SECTOR, THE ROLE OF THE CIO AND AN ENERGY LEADERSHIP OPPORTUNITY FOR BRAZIL

How technology industry leaders in Brazil and the world can accelerate the transition to a low carbon economy.

The global debate on energy transition gained intensity in 2022. A new military conflict in Europe – the war between Russia and Ukraine – had a strong impact on the world supply of oil and natural gas, increasing the sense of urgency of nations to develop their own energy sources.

The moment is unique, but not unique in history. Major armed conflicts often result in innovation in the energy field. It was so in the 19th century, in the naval battles fought in the northern hemisphere, when steamboats took the place of sail ships. In World War I (1914-1918), horse driven and coal-powered vehicles were overpowered by tanks with diesel engines. In World War II (1939-1945), atomic development ended up becoming the basis for generating nuclear energy.

The current conflict in Eastern Europe has led the world's great powers to intensify planning and investments in order to establish a new, cleaner, power grid, sustainable and non-reliant on oil which historically is sensitive to geopolitical instability.

NATIONS AND COMPANIES

More than ever, we have seen **governments highly mobilized** to leverage clean energy production. In August, US President Joe Biden approved a hefty $370 billion package to finance the country's energy transition and mitigate the effects of climate change on American cities.[1] Two months earlier, the European Commission launched REPower EU, a programme that foresees, among other measures, the investment of $300 billion in technological innovation and production of renewable energy.[2]

In the private sector, new business models have been created that are increasingly focused on sustainability. This paradigm shift reflects the companies' search for greater alignment with the ESG (Environment, Social and Governance) agenda, given that this alliance directly reflects on the financial cost of these companies and meets the growing expectations of their stakeholders by including regard for the environment as a transforming agent of the organisation.

According to J.P. Morgan, in 2021, **more than $500 billion was raised by investment funds dedicated to sustainable investments**. The volume raised was 55% higher than in the previous year.[3]

STRATEGIC CIO

As the economy becomes more digital, there is a growing need around the world for infrastructure that can capture, store, process and send data.

The expansion of the Internet of Things (IoT), which is related to smart and network-connected sensors that are essential for the development of Industry 4.0, is an example of this increase in demand. It is estimated that 14.4 billion of these devices are in use,[4] with the industry expected to generate $2.46 trillion by 2029.[5]

Cloud computing is also on the rise, with investments of $1.3 trillion by 2025.[6] Edge computing, important for reducing latency,* generated $176 billion in 2022.[7] Data centres, on the other hand, supply a billion-dollar market: $288.7 billion by 2027.[8] Finally, the spread of 5G, critical to the creation of new businesses and technologies, is expected to inject between $1.5 trillion and $1.9 trillion into the global economy by 2025 – and $13.2 trillion in 2035.[9]

The consequence of all this scaling up of the global ICT infrastructure is the equivalent increase in the consumption of energy and resources necessary to sustain this ecosystem.

According to researcher Anders S. G. Andrae, in his article *New Perspectives on Internet Electricity Use in 2030*,[10] the IT and telecommunications sectors consumed **7%** of all electricity produced in the world in

2020. This big demand helped to collect, process, analyze and store **64.2 zettabytes** of data generated in the world that year, according to a report by the International Data Corporation (IDC).[11]

The irreversible expansion of digital technology in the economy – and as a way over human life as a whole – will continue to promote exponential growth in data generation: **175 zettabytes by 2025**, according to IDC itself.[12] More processing, more machines, more electrical consumption.

Faced with the challenge of balancing high performance and business innovation with the ESG agenda of organisations – the **CIO (Chief Information Officer)** must necessarily consider, in their technological development *roadmap* the energy consumption element of the infrastructure that supports their digital operations.

At green4T, we have successfully implemented **an energy efficiency pathway** with our customers in Brazil and other Latin American countries that can reduce electricity consumption by up to 60% in *near edge, far edge* and at the data processing centre *core* – elements of the fast-growing digital infrastructure ecosystem due to the growing need for low-latency.* This pathway involves the adoption of a multidisciplinary action plan (MAP) in the physical (hardware) and logical (software) fields of these data processing environments.

Once consolidated, this pathway results in a more positive relationship between the minimum energy expenditure required for data processing and the energy actually spent by the *near edge, far edge* or data centre as a whole. This calculation is called **PUE (Power Usage Effectiveness)**, with indexes ranging from 1 to 3 – where 1 would be considered perfectly efficient and 3 would be considered highly inefficient (the infrastructure absorbs 3x more energy from the *grid* than would be possible in a total efficiency scenario).


Eduardo Marini, CEO, green4T

The green4T team produced a study that makes this energy optimization opportunity more tangible for the general public. Just imagine that the average PUE of data centres in Brazil is 2.40, which corresponds to 15.4 TWh of electricity used per year. If the Brazilian index were reduced to 1.67, comparable to the global average PUE of 1.70, the reduction in energy consumption – 4.7 TWh – would be equivalent to the annual electricity consumption of 2.4 million Brazilian families.

IN THE IDEAL WORLD

The next step in building a low environmental impact digital economy is the adoption of clean energy to supply technology parks.

This demand is already driving new markets, such as *"green data centres"*, for example: data centres with high investment in innovation that use clean and/or renewable sources to supply the energy consumption demanded by computers. This segment has grown at double digits worldwide, with revenue expected to reach $181.9 billion by 2026, according to research provided by the Mordor Intelligence agency.[13]

Another resource increasingly used by technology players is the PPA (Power Purchase Agreement), a long-term commercial agreement for the purchase of renewable energy at a fixed price, carried out between *clean energy* suppliers and large-scale energy consumers. According

THE IT AND TELECOMMS SECTORS CONSUMED 7% OF ALL ELECTRICITY PRODUCED IN THE WORLD IN 2020

to Bloomberg NEF's most recent Corporate Energy Market Outlook,[14] companies around the world set a record for this type of contract in 2020, acquiring 23.7 gigawatts of "green electricity".

However, as Anders S. G. Andrae suggests in his aforementioned essay, there is a dilemma to be faced: on how to bring renewable energy sources closer to large data processing centres, today mostly located in "low cost" energy regions but not necessarily "clean"? The answer may be in Brazil.

Due to its privileged geographic and climatic condition, Brazil is at the centre of the global energy disruption, and, thanks to its immense territorial extension, it could become an important data centre hub in the future.

In 2021, according to a survey by the country's Ministry of Mines and Energy, the Brazilian energy matrix had 44.7% of renewable supply, produced by hydroelectric plants, wind farms, biomass and photovoltaic plants. This percentage is three times higher than the global average and four times higher than that observed in the >>

Organization for Economic Cooperation and Development (OECD) countries.[15]

Aeolic energy is an example of Brazilian energy potential. The current installed capacity produces 21,500 MW/year, from 795 onshore wind farms with more than 9,000 wind turbines in operation. By the end of 2022, according to official data from the Brazilian government, an increase of 2.9 thousand MW of this type of energy is expected in the Brazilian matrix.[16] A report by the Global Wind Energy Council, in May, indicates that Brazil was the third country that most expanded the production of aeolic energy in 2021, only behind China and the United States.[17] In the world ranking, the country is in sixth place among the largest producers of aeolic energy.

Another highly available energy source in the country is photovoltaic. For comparison purposes, it is worth noting the data from the Global Solar Atlas (2020), from the World Bank,[18] on the average incidence of daily solar radiation over the territory of Brazil[19] and Germany: [20]

BRAZIL	Maximum of 6.17 kWh/m² Minimum of 4.31 kWh/m²
GERMANY	Maximum of 3.34 kWh/m² Minimum of 2.76 kWh/m²

This means that, in one day, the place with the least sunshine in Brazil receives more sunlight than any German city. Seasonal

and influenced by geography, Brazilian photovoltaic capacity is quite flexible and can have peaks in energy generation. On April 25 this year, the installed solar network produced 5.8% of all the electricity demand for that date.[21]

According to the International Energy Agency (IEA), aeolic and solar energy together could account for close to 70% of all global production by 2050 – they amounted to only 9% in 2020 – if nations actually work hard to develop these clean energy sources.[22]

Given this scenario, it is clear that the necessary energy transition of the world economy – with evident positive effects on the planet's climate agenda – also involves the industry and technology leaders, as well as the production of renewable energy. A context that places Brazil in a privileged position for both circumstances.

More than just a wish, processing zettabytes of data with *net zero* carbon is a responsibility that must be shared by all sectors: public or private, collective or individual. A journey common to all that requires planning, technical knowledge, agility and assertiveness, so that the digitization that drives our creativity and innovation is also an ally of the global climate agenda.

(*) Latency is the time interval that a data packet takes to travel from the original server to its destination.

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ENERGY OF THE FUTURE, TODAY!

PACTO ENERGIA

www.pactoenergia.com.br

Pacto Energia presents solutions for reducing consumption and energy costs for its customers.

Pacto Energia Group is a business group that has been operating in the Brazilian electric sector for more than 6 decades, in the areas of generation, transmission, commercialization and distribution of electric energy, it has in its portfolio more than 14 GW of projects/power plants from renewable energy. In the area of energy distribution, it stands out for being the first energy distributor in the world to have its 100% electric fleet, fully charged by renewable electricity from its own power plants.

WIND

Pacto Energia invests in wind power sources, specifically in the state of Rio Grande do Norte. The global wind energy market has recently reached a point that puts it on the path of large-scale development, and Pacto Energia is proud to be part of this.

Brazil's wind potential is huge, with some of the best winds on the planet. The northeast coast is the region with the highest quality of wind resources, and harnessing the strength of the wind provides a renewable way to ensure energy for a country that generates more than 70% of its electricity from hydroelectric plants.

HYDROELECTRIC

Pacto Energia invests in hydroelectric sources specifically in CGHs, which are plants with installed capacities from 5 MW to 30 MW.

Some of the advantages that encourage investment in CGHs and SHPs in Brazil are:

- Affordable cost
- Facilities offered by legislation
- Availability of efficient technologies

SOLAR

In order to encourage the development of this technology and always looking to the future, Pacto Energia is a pioneer in Brazil and has been developing several photovoltaic solar parks in the states of Ceará, Paraíba, Rio Grande do Norte, Piauí, Maranhão and Minas Gerais.

Solar radiation, along with other secondary power resources such as wind and wave energy, hydroelectricity and biomass, account for much of the renewable energy available on earth. Only a tiny fraction of available solar energy is currently used.

WHERE TECHNOLOGIES AND IDEAS FOR CARBON ZERO FUTURE MEET

ZERO SUMMIT

www.zerosummit.com

ZERO SUMMIT: people and companies will come together to discuss the zero carbon future.

This year ZERO SUMMIT will be hosted at the Mabu resort, Iguacu Falls, Brazil from November 03-04. It will be the first Latin America conference focused on technologies and ideas for a carbon free future. We believe that the world will only be able to achieve a better and more sustainable future through innovation and information with technology.

Our mission is to bring public and private sector leaders together who share, and believe in, our proposal to generate maximum impact on individuals, industry and governments.

The first ZERO SUMMIT was attended by experts, leaders, entrepreneurs, influencers, brands and partners in November 2020, in São Paulo, integrating Ibirapuera Park into a live, online and free broadcast for everyone. With a mobile broadcast structure, live interviews were conducted and special reports recorded in São Paulo, London and New York. The event spanned 3 days, included more than 48 participants, 18 hours of content, over 40 different brands and 40,000 views.

VALE: SUSTAINABLE MINING

Founded in Brazil 80 years ago, Vale is a metals and mining company, driven by the purpose to improve lives and transform the future, together.

Vale's ambitions, which include leadership in sustainable mining and in the creation of shared value, are guideposts to a holistic approach on decarbonization to mitigate climate change. The company's strategy incorporates the stewardship of nature and biodiversity, a drive to innovation and partnerships, respect for local communities and indigenous peoples, and ensuring that it acts as a catalyst for sustainable economic development on a local scale.

In 2020, Vale announced the goal of cutting its net scopes 1 and 2 greenhouse gas (GHG) emissions to zero by 2050 and reducing its scope 3 emissions by 15% up to 2035. Progress is underway: in 2021, it achieved a 24% reduction in scopes 1 and 2 emissions compared to 2017 and a 15% reduction in scope 3 emissions compared to 2018. In 2021, Vale derived 89% of its electricity from renewable sources on a global scale, and in Brazil alone the percentage is higher at 99%, with Vale entering 2023 at essentially 100% electricity in Brazil derived from renewable sources.

DECARBONIZATION

In 2021, a range of innovation tests were carried out with an emphasis on the use of bio-oil, biochar and additives to reduce energy consumption in Vale's pelletizing plants. A standout in the new technology of its iron-based products is the Vale Briquette: a cold-agglomeration process which uses less energy, reduces particulates emissions, and helps steelmaking end-users reduce up to 10% of the GHG emissions from their process.

In shipping, Vale is spearheading pilot programmes for the use of both rotor sails on ships to provide supplementary force, as well as air lubrification along vessel hulls to reduce surface friction. These emerging technologies, now in pilot testing, can achieve up to 8% improvements in efficiency, equivalent to up to 3,400 tCO2e per ship, per annum.

ELECTRIFICATION OF ASSETS

Vale's strategy to convert its logistics from combustion fuel-based to electric includes the operation of a battery-powered locomotive at the southern port of Tubarão in Vitória, Brazil. For 2022, in addition to an electric locomotive on the Vitória-Minas Railroad, a second zero-emissions locomotive will start operating at the northern port of São Luís. Also in 2022, battery-powered trucks will be used in Brazil and Indonesia and trolley-assist

Vale
Celebrating 80 years since its inception in 1942, Vale ranks among the largest mining and metals companies in the world, with activities in approximately 30 countries. It is driven by a single purpose, to improve life and transform the future, together.

VALE

www.vale.com

Planting seedlings for reforestation.

systems will be implemented in Vale's Carajás mining complex.

CASCADING REDUCTIONS
In 2021, Vale signed MOUs with steelmaking customers, including Ternium in Brazil, the Chinese company Baowu and the Korean POSCO, seeking solutions for decarbonization in steel production. These solutions will leverage Vale's unique product portfolio, such as high-quality iron ore, metallic "green briquettes" and alternative steel production routes, among others. These agreements reinforce the essential role of partnerships with clients, for Vale to achieve its scope 3 reduction targets.

AMAZON: PROTECTION AND BIOECONOMY
Present in the Amazon for almost 40 years, Vale has strived to safeguard this biome that is so important to Brazil and the world. In the last decade, it invested more than R$1 billion in conservation, research, territorial development and cultural incentive actions.

It supports the maintenance of six Conservation Units located in the Mosaico de Carajás, in Pará, an area of approximately 800,000 hectares, equivalent to two and a half times the city of Cairo, Egypt. In 2019, Vale committed to the restoration of 100,000 hectares of degraded land and to the protection of an additional 400,000 hectares of standing forests in Brazil by 2030.

The company is also at the forefront of harnessing technology and partnerships to help fight illegal deforestation in the Amazon. PrevisIA – a platform that uses AI to provide predictive information on regions at highest risk of deforestation and forest fires – was conceptualized and developed by the Amazon Institute of People and the Environment (Imazon), in partnership with the Vale Fund and Microsoft. The Vale Institute of Technology – Sustainable Development (ITV-DS), maintained by Vale, for its part has invested US$ 141 million over the past six years, resulting in support for 154 Research & Development projects.

THE SUSTAINABILITY AGENDA OF AN INDUSTRY LEADER

Les Eaux Minérales d'Oulmès has been pioneering the water industry in Morocco since 1933, with strong leading brands, and a relentless focus towards generating shared value for its stakeholders, fostering employment and investing in sustainable development.

The company's integrated management and operational systems meet the highest worldwide standards in terms of employee safety, product quality, environment, food safety and CSR, thus being granted various international accreditations and awards (the Environmental Management System ISO 14001:2015, the 2021 VigeoEiris CSR Top Performer, the CSR label from the General Confederation of Moroccan Enterprises). In 2013, Les Eaux Minérales d'Oulmès joined the UN Global Compact network, to promote sustainable and socially responsible policies, and report on their implementation, hence embedding the 2030 SDGs in its core strategy. It was also one of the first African companies to join the Paris Agreement "Net Zero Emission" pledge towards energy neutrality.

CONTINUOUS ENHANCEMENT OF WATER STEWARDSHIP

Les Eaux Minérales d'Oulmès has developed a sustainable approach to its manufacturing processes with a central focus on water stewardship. It has optimized the collection of natural mineral water, making sure extractions are always lower than the volume nature can provide each year. In addition, the company has invested in new-generation machines that combine blowing and withdrawal processes, resulting in significant water and energy savings.

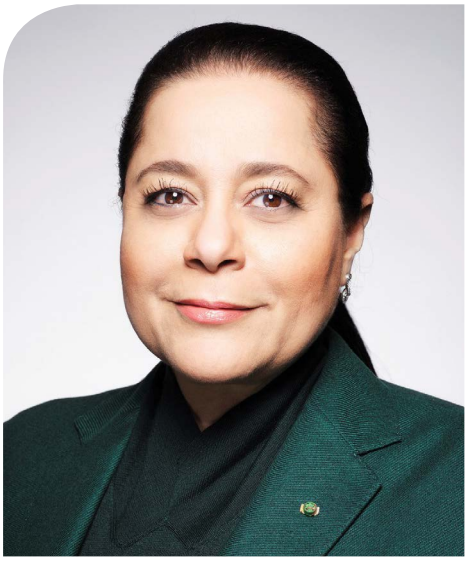
Furthermore, Les Eaux Minérales d'Oulmès has launched the "Morocco Water Race" with Enactus, an innovative social entrepreneurship programme that sponsors young entrepreneurs to identify ground-breaking sustainable solutions on water issues, with a major impact on a national and African scale.

A STRONG COMMITMENT TO ACHIEVING NET ZERO CO2 EMISSIONS BY 2050

Les Eaux Minérales d'Oulmès aims to drive SDG-related metrics for the beverage industry and has adopted an early approach to waste management.

For instance, in 2013, Les Eaux Minérales d'Oulmès innovated with the launch of a "green bottle," produced with 30% plant-based plastic. It has also implemented an Eco–Conception programme to progressively reduce the weight of its plastic bottles and caps, resulting in the reduction of 15% of its annual PET consumption.

Downstream the process, solid waste is selectively separated so that relevant partners can dispose of recyclable items or reusable waste. And on a societal level, the company has created a cooperative that recycles wooden pallets, creating jobs for more than 120 families of the Oulmès region.



Mrs. Miriem Bensalah-Chaqroun, the company's Vice-President, asserts in its mission statement:

> ***"We have been aware for several years of our economic, social and environmental impact. By placing social and human capital and the preservation of the environment at the core of our strategy and commitments, we are pursuing our mission to be part of a sustainable and civic approach to business."***

Les Eaux Minérales d'Oulmès has carried out several projects planting carob trees and lavender to offset GHG emissions near the production sites in Tarmilate in Oulmès Province, North-West Morocco. Beyond the positive impact of these plantations on the environment, local associations benefit from the additional income generated by the harvests.

Les Eaux Minérales d'Oulmès

Les Eaux Minérales d'Oulmès is a Moroccan company, leader in the water bottling industry. It is listed on the stock exchange, generating a turnover of $1.7M (2021). It is a subsidiary of the Holmarcom Group which also operates in sub-Saharan Africa. The company is dedicated to healthy hydration and refreshment through its emblematic brands of still and sparkling mineral waters. Les Eaux Minérales d'Oulmès has been continuously innovating to offer superior quality products according to strict international standards. The company has been certified 'Best Place to Work in Morocco in 2021'. The group is committed to driving a sustainable and responsible growth and reducing its environmental footprint. Les Eaux Minérales d'Oulmès is a member of the United Nations "Global Compact" and reports each year on the progress made in terms of contributing to the global objectives of sustainable development.

LES EAUX MINERALES D'OULMES

www.oulmes.ma

Regarding its carbon footprint, Les Eaux Minérales d'Oulmès aims to reduce it by half by 2030 and to achieve carbon neutrality by 2050. It has initiated several measures in alignment with the Paris climate agreement and the GHG Mitigation objectives set by Morocco and has also endorsed the Business Ambition for 1.5°C pledge.

Walking the talk in terms of energy efficiency, Les Eaux Minérales d'Oulmès has invested in high performance technologies to reach energy efficiency. It has been among the first companies worldwide and locally to integrate new stretch film machines, thereby allowing a considerable decrease in the use of plastic and its energy impact.

The company is also progressing on its digitalisation journey, with an industrial 4.0 plant as a milestone towards clean transformation.

Lean management, continuous progress in technology, energy efficiency and renewable energy drive the company's focus towards sustainability. Driven by strong commitments and concrete initiatives along its value chain, Les Eaux Minérales d'Oulmès is among the companies leading the industry's sustainable future.

SUSTAINABLE FASHION

Founded in 1965, Lojas Renner S.A. is one of the largest fashion and lifestyle companies in Brazil. It is respected for its work on sustainability and has made this part of its core values since 2013.

Lojas Renner has more than 640 stores in Brazil, Uruguay and Argentina, based on the brands: Renner; Camicado; Youcom; Ashua Curve & Plus Size; Repassa and Realize CFI.

We have pioneered various ESG initiatives in Brazilian retail and the market in general, including: 1st Corporation of Brazil: a post-consumption reverse logistics programme; EcoEstilo: Our first cycle of public commitments and the Re Jeans collection: the first circularity-based store in Brazil. In 2021, we completed our first cycle of public commitments to sustainability. We have set new targets for 2030 to ensure our sustainability strategy continues to develop over the coming years, for our business, our partners, for the environment and for our employees.

RESULTS FROM THE 2016 – 2021 CYCLE: RESPONSIBLE FASHION

2021 marked the conclusion of our first strategic cycle for *Responsible Fashion*, which contained some priorities to improve sustainable management between 2016 and 2021, in order to minimize the relevant social and environmental risks within our supply chain and to create value for our target audiences, society and the environment.

ENERGY

We developed a partnership to drive up the use of renewable energy in the supply chain. Currently, 19% of suppliers use clean energy.

Our corporate energy consumption is now entirely from low-impact renewable sources, which surpasses by 25% the initial target of 75%. This also includes energy efficiencies from our own operations and logistics, activities such as: purchasing electricity from the free market; renewable energy certificates, such as the I-REC (International REC) Standard, which we achieved for all stores and solar farms; and a wind farm.

Our low-impact renewable energy initiatives helped us to meet our greenhouse gas emissions target. We achieved a 35.5% absolute reduction in CO2 compared to the 2017 inventory (the initial goal was 20%). In 2021, we managed to reduce fuel consumption (diesel) by 25% for our road use, thanks to efficiency initiatives on vehicle occupancy and better refuelling routes.

PRODUCTS

With regard to suppliers, we have managed to commit all of Lojas Renner's global retail chain to obtaining social and environmental certificates, encouraged them to adopt best practices, meeting more than those on our compliance checklist. We also monitored and audited, and encouraged training on environmental matters through the Renner University for suppliers.

We have increased our range of more sustainable products, and have successfully achieved our target of having more than 81.3% less harmful products, 99.15% from responsible cotton, including cotton sourced from:

- Ecologically farmed cotton from the north of Minas Gerais, produced by women, with support from the Lojas Renner Institute.
- Denim products, made from responsible cotton and sneakers produced from denim, collected through the customers' reverse logistics programme.

PRODUCTION

We also investigated processes that could have less impact, and we optimized production in the supply chain.

WATER: We have developed our own internal methodology to measure our Water Footprint. This allows us to calculate water consumption for production in real time and categorizes the results into three levels of consumption: low, medium and high. 40% of all the jeans delivered to Renner are manufactured and finished using a low level of water consumption, which has saved at least 300 million litres of water taken from water bodies.

WASTE: We help suppliers manage their activities to minimize the amount of waste generated and we encourage them to develop a reverse chain to collect and recycle waste, so it can be reused in production.

SAFETY WITH CHEMICALS: We provide a Renner booklet to our suppliers, based on Brazilian and international standards, which has guidance on how to deal with toxic chemical substances appropriately, and we have been carrying out training and technical inspections to assist them.

GHG EMISSIONS: We have designed a data management system to calculate the greenhouse gas emissions from suppliers' factories, and we have implemented a pilot project, with suppliers, to offset the impact of all scope 1 and 2 emissions, in order to achieve "neutral manufacturing".

LOJAS RENNER S.A.

RENNER CAMICADO YOUCOM realize repassa

www.lojasrennersa.com.br

WASTE WATER: 52% of the laundries in the denim production chain use water recirculation methods in their manufacturing process.

SUSTAINABILITY CHALLENGES FOR 2030 AND CLIMATE CHANGE
Our journey does not stop here. Our strategy for the next few years will be based on three principles:

Human Relations based on Diversity: We want to create relationships based on humanity and diversity, to ensure that every individual is able to realize their full potential.

Influencing Through Connections: We will increase the impact of our connections, working with our suppliers and partners to answer the challenges in this sector.

Climate, Circularity and Renewable Solutions: We want to increase the development of a circular, renewable and low carbon business, stimulating and enabling our customers to make conscious choices.

In 2021, we submitted our emissions reduction target for Scope 1, 2 and 3 for 2030 to the Science Based Targets Initiative (SBTi). This was approved, and we also launched our Net Zero 2050 commitment.

Reduce absolute Scope 1 and 2 emissions by 46.2% – this goal is in line with the environmental target of 1.5°C – and to reduce emissions from the components for goods and services we buy (clothing and footwear) by 75%, by means of:

The Value Chain:
- Transition our supply chain to use renewable, low impact energy.
- Better energy efficiency in the Supply Chain.

RAW MATERIAL
- Consolidate and increase our use of raw materials with a lower impact.

This breaks down overall into Three New Commitments:
- To incorporate principles of circularity in the development of products, services and business models.
- To invest in the development of circular textile raw materials and regenerative, guaranteeing 100% of the main raw materials more sustainable.
- To achieve 100% traceability of cotton products and advance in the traceability of other textile raw materials.

OPERATIONS
- Continue using low impact renewable energy.
- Use more efficient equipment and cooling fluids that have less GWP.
- Encourage continuous improvements in the efficiency of logistics.

Lojas Renner S.A. has set ambitious, science-based targets to ensure our activities consistently promote fashion that is more responsible. This new sustainability cycle will allow us to make further progress on this subject, redefine our initiatives and provide increasingly innovative and sustainable solutions for people and the planet. After all, they both go hand in hand.

INVESTING IN SUSTAINABLE WASTE MANAGEMENT IN EMERGING MARKETS

There is an urgent need to make the lifecycle of plastics more circular.

According to the OECD, global plastic use has quadrupled in 30 years, mainly driven by growth in emerging markets. They estimate that only 9% of global plastic waste is recycled, 19% is incinerated, 22% is mismanaged and 50% ends up in landfill.

The global demand for effective plastic recycling is growing because of legislative changes, consumer companies' voluntary recycling commitments, consumer demand and environmental activism for recycled products.

In emerging markets, the plastic recycling industry is typically dominated by an informal sector that is small, has limited expertise and produces recycled plastics of lower quality. There is therefore an opportunity to formalise the sector through the investment in expertise and technology to improve the quality and quantity of recycled plastics.

GREEN LOANS HELP BOLSTER SUSTAINABLE PRACTICES

Financial institutions and the private sector can work together to accelerate the development of a circular economy in emerging markets. Earlier this year, the International Finance Corporation (IFC) provided Averda – one of the largest privately owned integrated waste management companies in the Middle East and Africa – with a $30 million loan to accelerate the company's sustainable waste management projects in emerging markets. The loan marks the IFC's first investment in the private waste management sector in Africa and the Middle East.

Averda

Averda is the leading waste management company in the emerging world, operating in Africa, the Middle East and South Asia. The company provides a wide range of waste management and recycling services to over 60,000 clients - large and small - across the private and public sectors.

www.averda.com

AVERDA TO BUILD PLASTIC RECYCLING FACILITIES

This loan, along with Averda's expertise and relationships in the waste management sector in emerging markets, is helping Averda build plastic recycling facilities in three target countries – South Africa, Oman and Morocco. The South African facility will be in operation by the end of the year and will process an estimated 12,000 tonnes of plastic in its first year. The Oman facility is under design and expected to open at the end of 2023. Averda is currently in the process of a feasibility study for opening a plastic recycling facility in Morocco. When fully operational, these facilities will each recycle up to 45,000 tons of plastic a year.

The plastic processed at these facilities will be turned into High Density Polyethylene (HDPE) and Low-Density Polyethylene (LDPE) pellets. The pellets will then be sold to industries for reuse as secondary raw materials. Once heated, HDPE pellets can be turned into plastic products that are chemical resistant and/or strong, such as shampoo or bleach bottles, outdoor plastic furniture, recycling bins or plastic piping. LDPE pellets are largely used in the manufacture of thin plastics, such as plastic bags or lids for bottles.

Building the local recycling capacity, through investments in technology, is key to developing a circular economy in emerging markets. Averda, with the help of the IFC loan, is able to promote and deliver plastic recycling services in key markets where it operates.

COULD AFRICAN VALUES BE THE ANSWER TO CLIMATE CHANGE?

By Aliyu Mohammed Ali, CEO & Co-Founder, Ehfaaz

Growing up in the Boko Haram affected region of Nigeria, we were taught to value everything, and the concept of waste just didn't exist.

As a kid growing up in the small town of Gombe, when my pair of jeans became too faded or torn, my mother simply took a pair of scissors and turned them into shorts that I could use to continue playing football in my neighbourhood. When those shorts wore out, she turned them into rags for mopping the kitchen floor. My grandmother always encouraged us to eat only what we could finish, and if there were any leftovers, we would send them to the less fortunate. The same things happened in our schools and my friends' homes. It was just the way things were…

Fast forward 20 years, living in Dubai, where sustainability and climate change are at the core of the discussions in schools, workplaces and government initiatives. This topic was fascinating for my friend and business partner, Muhammad Danbappa, and I. With my extensive experience within multinational companies and startups, coupled with my partner's expertise in waste management, we identified gaps and opportunities in the region to innovate and provide solutions to the current waste management system.

Current waste management practices are confined to the collection and transportation of waste with limited implementation of waste-to-value methods. This leads to a vast untapped opportunity in waste recycling. The intent in the region to move towards recycling is clearly visible, through the advent of master plans being announced, focusing on waste and promoting scientific and waste-to-value techniques such as secured landfills with gas capture, waste to energy plants, composting and recycling. Here is the irony though, UAE and the Middle East, like many parts of the world, are running out of space to dump their waste. We knew something had to be done beyond landfilling, burning and the other ad-hoc solutions out there.

Ehfaaz is a waste renewable service company. Our mission is to provide the UAE (and the broader region) with practical economical, innovative and sustainable alternatives to landfill and incineration. Our aim is to educate the general public about the importance of recycling and its positive impact. Air quality for instance, is a major problem in the region. Waste that is not properly managed will worsen the situation.

When we hear the word recycling, we think about plastics, aluminium cans and paper. These recyclables are a small fraction of the items that we deal with on a daily basis. According to the United States Environmental Protection Agency (EPA), 70% of the waste that is generated can be recycled. Unfortunately, only about 30% is recycled today.

AS GLOBAL CITIZENS, WE DECIDED TO GIVE BACK TO THIS SOCIETY THAT HAS GIVEN A LOT TO US.

That is why at Ehfaaz, we are focused on giving used resources a new life – food waste turned into compost in 24 hours, recycled/reprocessed soap made from old ones, car wash made from expired laundry liquid and cosmetics liquid, ethanol made from expired beverages and upcycling unrecyclable materials. We support Fast-Moving Consumer Goods (FMCG) brands with their zero waste to landfill initiatives, brand protection and ending the need for incineration.

For those brand owners who want to find a permanent and compliant solution for

EHFAAZ RECYCLING

www.ehfaaz.ae

their end-of-life inventories, our service is a recycling solution that helps lower costs through warehouse space optimization, while still protecting the image of their brands. Unlike the options of re-exporting the items to the country of origin as per customs regulations, burning, or dumping in landfill, which is harmful to the environment, costly, and no longer practical, our solution is cost- and time-saving, as well as fully supported by the authorities.

We are taking all these measures to ensure we reduce how much of this "waste" is dumped in landfill or incinerated, by trying to give it a new life.

We live in Dubai after all; a city that is built to make the impossible possible, and we are succeeding. This is a city full of talent from diverse cultures and nationalities with immense potential. We consider ourselves privileged coming from African roots where the idea of waste is different from what it is here. As global citizens, we decided to give back to this society that has given a lot to us.

Today, Ehfaaz has a growing client base of over 100 international brands and has processed millions of kilograms of waste across 20 different waste streams.

OUR AIM IS TO EDUCATE THE GENERAL PUBLIC ABOUT THE IMPORTANCE OF RECYCLING AND ITS POSITIVE IMPACT. AIR QUALITY FOR INSTANCE, IS A MAJOR PROBLEM IN THE REGION. WASTE THAT IS NOT PROPERLY MANAGED WILL WORSEN THE SITUATION.

Aliyu Mohammed Ali, CEO & Co-Founder, Ehfaaz

DATA DRIVEN DECISION: PUBLIC POLICY FRAMEWORK

Environmental, social and economic management must be guided by data-based decision.

The concept of Data Driven Decision is essential for the adoption of participatory management, as it is based on the real analysis of the functioning of the Administration, based on evidence.

SOLUTIONS FOR DEVELOPMENT AND ENVIRONMENTAL MANAGEMENT

Environmental monitoring and enforcement activities can make very rich use of these solutions, as is the case of the monitoring of fires and deforestation:

- **IPAAM** – Amazonas Environmental Protection Institute has tools for monitoring, allowing data consumption from different sources.
- **IBAMA – PAMGIA** (Geospatial environmental information analysis and monitoring platform) brings to the public entity the capacity to plan, prevent and fight environmental crimes at the Brazilian territory specially in the Amazon Forest.

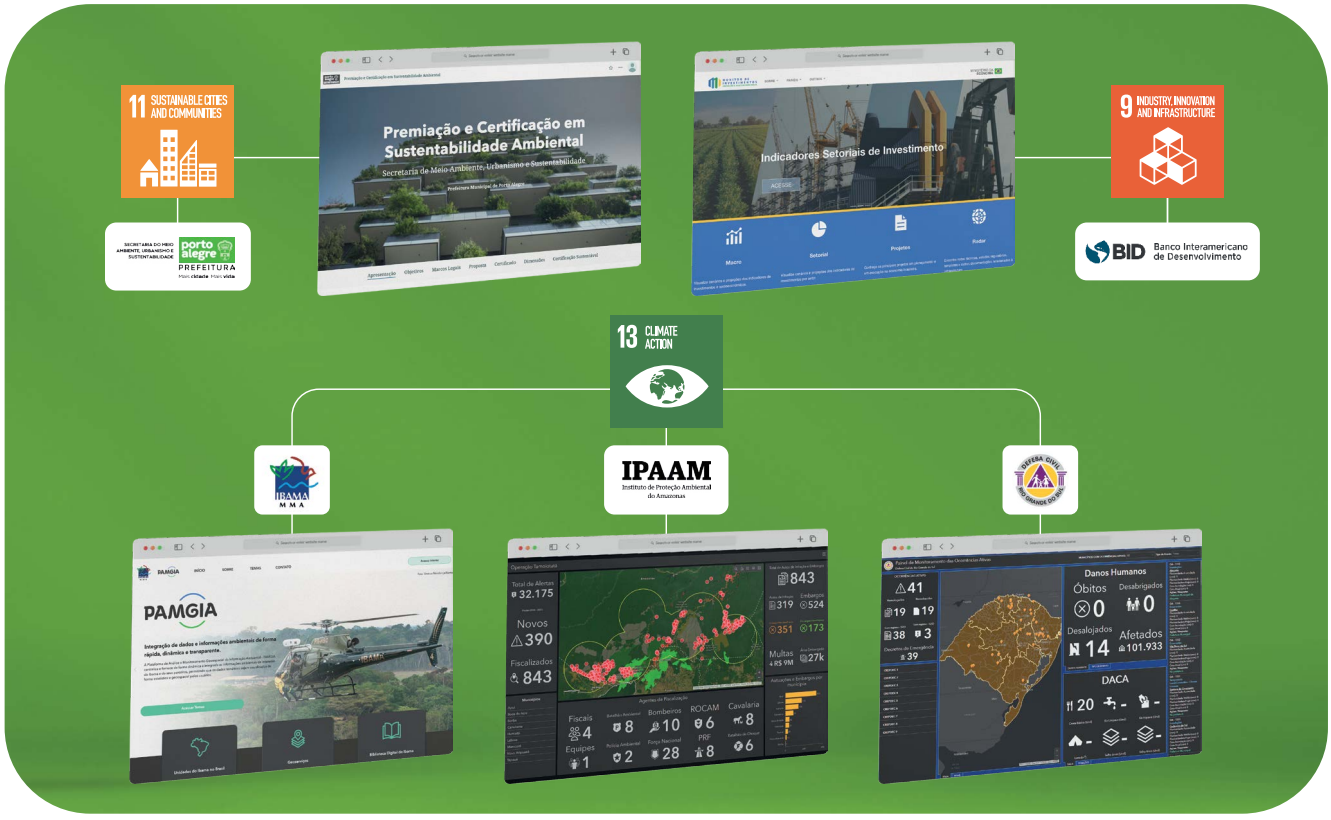
Through its expertise, Codex has developed projects in a disruptive proposal of a framework for data-based public policies. Based on this definition, it is possible to establish the creation of policies, guidelines and concepts for data-driven decision making in line with the Spatial Data Infrastructure (SDI) and data governance. The framework was adopted in the development of the Spatial Data Infrastructure of IAT – Water and Land Institute of Paraná State, which will be the main source of information for environmental action and decision making.

The Investment Monitor is another data-driven decision tool. It is a platform conceived by the Inter-American Development Bank and the Ministry of Economy that integrates data from different sources, provides information on the historical investment series, expansion plans, regulation and the portfolio of infrastructure investments. It includes a sustainability assessment tool, that aims to indicate the level of maturity of Brazilian infrastructure projects and to promote continuous improvement of the adoption of best practices for sustainable infrastructure.

SUSTAINABLE DEVELOPMENT

Geotechnology is a great ally of sustainable development, as it makes it possible to create a high standard in the management of spatial data of a government agency or a private company, expanding the possibilities of using information, both for the manager and for the public at large. Codex projects actively contribute to the achievement of all 17 Sustainable Development Goals with more than 180 projects in the last 3 years.

The State System for Integrated Risk and Disaster Management (SEGIRD) is an innovative initiative of the Rio Grande do Sul State Civil Defense, promoting the



codex.com.br

Codex

Codex is a services company, specialized in strategic solutions, data governance and digital platforms for sustainable development. These solutions involve managing the natural environment, cities and infrastructure, implementing data-driven public policies and building a green economy supported by spatial location.

engagement of the private sector and the entire population, improving the provision of its services to society and reducing the response time to disasters.

The solutions can also be used by local and federal governments to improve economic development, urban planning, environmental licensing and monitoring, sustainable investments, among other countless possibilities. The Teresina City is an example, as it uses data to create a Climate Action Plan and an Observatory of Sustainable Development Goals, very important tools to this city that has many challenges to manage global warming effects. We can also mention the City of Porto Alegre, which plans to launch an Environmental Sustainability Certification, measuring water and clean energy consumption, direct greenhouse gases emissions and reduction/recycling of solid waste.

TIME TO GIVE ENERGY EFFICIENCY MEASURES THE GREEN LIGHT

As the world gathers in Sharm El-Sheik, our focus now is on action. Countries' implementation plans, and how successfully they are executed, will determine whether we can keep a 1.5C warming scenario alive.

It's clear that some will be more prepared than others. And in this pivotal year, we cannot afford to leave anyone behind. That means finding financial solutions to assist developing countries, which are in many cases paying the highest price for our careless past, and it means bringing all players along on the journey, including economies that currently thrive on fossil fuels.

BRIGHT SOLUTIONS

To make a 1.5C ambition viable, our first and best measure is energy efficiency. And in our built environment, big changes are immensely achievable. Upgrading conventional light points to LED, replacing standard streetlights with connected streetlights and smart poles, putting the lighting system under smart management: changes such as these are much faster and less invasive than changes to HVAC and water systems. Not that buildings' renovations shouldn't include these energy-saving techniques—they should—but the switch to managed, connected LED can increase energy efficiency, lower costs and reduce carbon emissions now.

LEDs typically produce useful light at least 15 times longer and consume up to 80% less energy than their conventional counterparts. The longer life of LEDs drives savings all along the product lifecycle: savings on materials when manufacturing lighting products that last much longer, savings on installation costs for systems that will run for 10 years or more, savings on maintenance and replacement costs with light points that don't fail or burn out, and significantly reducing the electricity demand during operations.

In the 27 EU member states, a shift of all the light points that are still conventional to LEDs, could annually reduce CO2 emissions by 50.9 million tons and save 189 TWh. Annual cost savings would be €65,1 billion and could even increase due to the rapidly increasing energy prices. The saved electricity can be made instantly available to support the electrification of heating and transport and is equivalent to the amount of electricity that can operate 47.2 million air-base heat pumps or the annual recharging of 55.5 million electric cars.

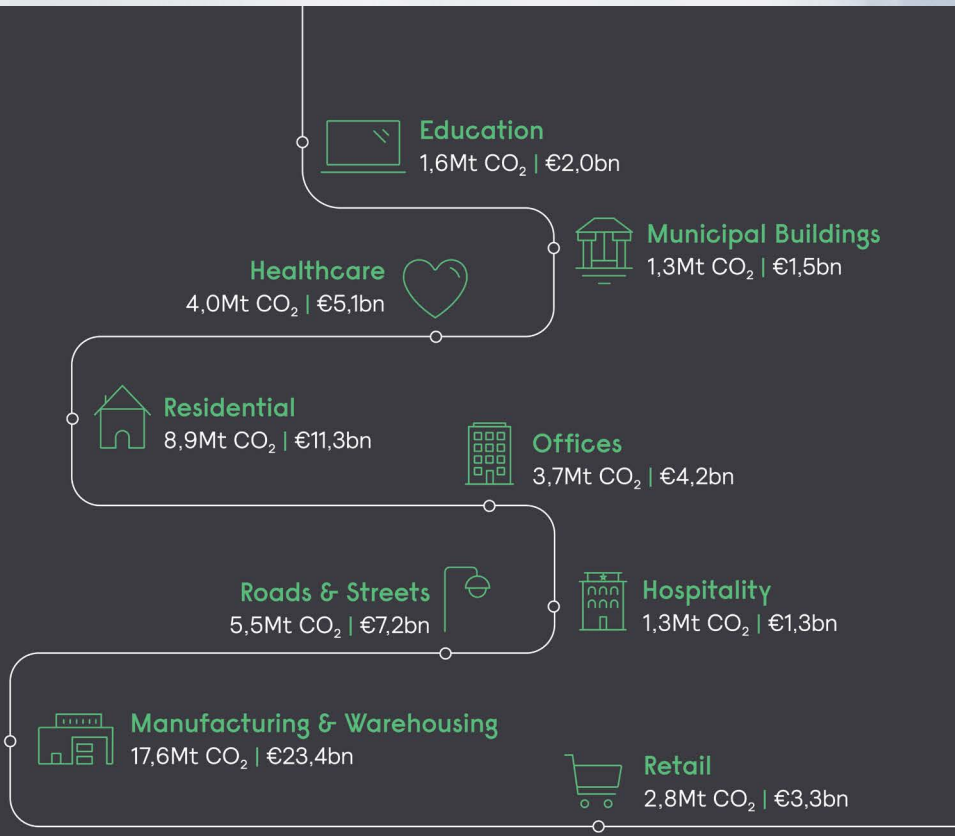
The U.S. Energy Information Administration (EIA) estimates that energy savings from LED lighting will top 569 TWh annually by 2035, equal to the annual output of more than 92 power plants (1,000 MW) in the US alone.

The advantages of shifting to LED lighting doesn't stop there. Connected lighting systems can help people lead smarter, happier and healthier lives, while having far

signify

Lighting is the quickest path to a greener and smarter world

Switching all of the light points in EU27 to LED could annually reduce emissions by 51 million tonnes of CO_2, saving €65 billion in energy costs.



The diagram represents a selection of light points' applications in the EU27 countries. Data presented here is a simulation within the framework of the Europe Green Switch conventional light point conversion model, which is a program run by Signify to help its customers accelerate the switch to energy-efficient lighting products, systems and services. All figures and data presented here are illustrative and based on forecasts and assumptions.

Price of Electricity non-Households (€/kWh) = 0,335.
Price of Electricity Households (€/kWh) 0,355.

less impact on the planet than conventional lighting. That can surely benefit all.

AN INCLUSIVE TRANSITION

Africa is home to a number of countries that are acutely vulnerable to the impacts of climate change. Ironically, these countries contribute very little to the problem. An estimated 600 million people don't have access to electricity. Leapfrogging generations of technology to build a solar- and LED-based lighting infrastructure makes eminent sense.

Solar lighting for streetlights can help take pressure off the grid, either alone or as a component of hybrid peak-shaving solutions where built-in batteries are charged throughout the day and then used during peak hours.

The opportunity is enormous. Replacing the EU27's entire stock of 56 million streetlights with hybrid-solar lamps would reduce carbon emissions by 12 Mt per year, an amount equivalent to the absorption capacity of a forest half the size of Belgium. It would also free up the grid to enable the recharging of 7.3 million electric vehicles for a whole year.

The technology is ready and the costs are low. With a united ambition and a renewed commitment to action, we can focus now on making big changes where it matters most.

SIMPLE ORGANIC AND THE MISSION TO DEMOCRATIZE SUSTAINABLE BEAUTY

Simple Organic, born to be a positive impact brand from the harvesting of our raw materials, to the disposal of our packaging after use, cares about making the process as sustainable as possible.

The largest sustainable beauty brand in Brazil, with more than 80 stock keeping units, present in more than 1,000 drugstores, the first and largest franchise network in the segment in Latin America, the first brand to be acquired by a large group of investors, growth of 20 times in the last 24 months and the most significant digital presence in the segment. Is it possible to do all that without losing its purpose? It might seem unattainable, but the answer is yes – because we dream of changing the consumption habits in the beauty industry. Talking about sustainability is not a trend for us; it's an urgency.

When talking about the beauty industry, we are talking about one of the most polluting industries – one that produces the most packaging (mainly plastic) without any responsibility post-consumption. In addition, most beauty products are formulated with ingredients that are harmful to the environment, from their extraction process to the production chain, showing that the industry must change. Those changes are complex and essential to show consumers how to reduce the impact of their consumption while proving to the financial market that it is possible to have profit with positive impact companies. Simple Organic was born five years ago in this challenging scenario, and it has been building a new chapter in the Brazilian beauty market—a positive and inspiring movement.

As one of the largest sustainable beauty companies, we were born digital (DNVB); we created a strong community supported by Millennials and Gen Zs, who believe in and support companies that fight for a better future. Patrícia Lima created the brand from a desire to leave a positive legacy for her daughter's generation and future generations. With a career built in the fashion industry, Patrícia decided to change paths when she became a mother and understood that it was necessary to act (and fast) for the future. Through her expertise in fashion, she realized there was no sustainable beauty in the segment.

As a result, Simple Organic launched in 2017 on the catwalk of the biggest fashion week in Latin America, São Paulo Fashion Week. That was the first significant movement for sustainable beauty in Brazil, taking the concept to a large audience and drawing media attention to the urgency of changing consumer habits. The same pioneering attitude occurred in 2021, at NY Fashion Week, when the brand's internationalisation began. This year, it was repeated at Milan Fashion Week, sponsoring more than 20 Brazilian sustainable fashion designers/brands.

Talking about sustainable beauty is very broad and complex; it all starts with the formulation and understanding of the importance of the production chain of each ingredient. Valuing organic production in a country with a significant movement to approve the use of pesticides by the government is hugely challenging. As a result, we have a vast list of more than 2,700 prohibited and vetoed ingredients in our formulas, as well as the use of raw material of animal origin, not accepted at Simple Organic, a 100% vegan and cruelty-free brand certified by PETA.

And as a Brazilian brand, which values and preserves nature, we have a source of great ingredients in the Amazon Forest. We work not only respecting Brazilian biodiversity, but we go further, supporting social projects, working with our extractive communities. For example, we help the community of Anajás, located at Ilha de Marajó, where some of the organic vegetable oils used in our formulas come from; through our partnership with the Beracca Institute, we built the biological sewage treatment system for the community. We also helped structure the extractivists' office with the purchase of computers. In the same way that we understand the production chain needs to be verified and valued, we

SIMPLE ORGANIC

simpleorganic.com.br

believe that consumer education, through information transparency, is fundamental for changing their behaviour. The numbers of the Social Biodiversity Valuation Program were released recently, showing that for every 100kg of Andiroba oil consumed, we have 108 collectors involved, and 487 people from the extractive community benefited. And so it is with our entire certified organic line of vegetable oils.

It is essential to talk about the full impact of a brand, from product development to post-consumption, through the points of sale. Our entire production chain is carbon neutral, as are all our 28 physical stores and administrative headquarters. We certify the impact of 100% of the volume of packaging materials through clearing/recycling, and we also carry out reverse logistics in all our stores. We developed the Simple Bag, a bag that imitates plastic but is Zero Waste. Made with water-soluble ingredients, when the liquid residue from the dissolved bag arrives at the sewage treatment plant, it will be consumed by microorganisms. It will transform into carbon dioxide and water without the formation of microplastics. If not adequately discarded by the consumer, eventually reaching the oceans, it will dissolve more slowly, becoming food for fish and other animals.

We operate within the Green Beauty and Blue Beauty concept, both necessary and essential for the sustainable beauty movement. Blue beauty is a concept inside clean beauty, which takes care of the oceans with formulas that do not harm marine life and strict packaging policies post-consumption. We developed our waterless line with concentrated formula, seeking to reduce the amount of water in its production by 80% and the use of plastic packaging, with shampoos, soaps and conditioners in bars. While toothpaste and mouthwashes have 30% and 90% water in their compositions, we launched oral tablets to replace toothpaste – the Taste tablet formulation has no water. When we talk about the oceans, the biggest concern is the impact of sunscreens on marine life, especially corals. In the last 30 years, 50% of the world's corals have disappeared. Some factors, such as plastic in the oceans and sunscreens containing Oxybenzone and Octinoxate, can alter the coral reef's immune system, contributing to its bleaching. In addition, climate change increases the temperature of seawater and stresses the coral reefs, which expel the multicolored microscopic algae that feed them. We develop formulas free of ingredients such as Oxybenzone, Octinoxate, Homosalate, Octocrylene and Avobenzone to protect sea life and the oceans. We replace them with safe filters for the body and the planet, making the formulas "Reef Friendly".

It is gratifying to see that in five years in the market, we contributed to this new moment of awareness, conquering a vast community of people who believe in the same ideals and purpose as us. Being acquired by a publicly traded company helped us show the financial market that it is possible to be profitable and sustainable. We believe this pioneering movement will open doors for more clean beauty brands; the more we can replace traditional products with conscious brands, the better it will be for the planet. After all, Simple Organic is not a skincare brand; it's a MOVEMENT – because there is no beauty without sustainability.

SHOPPING CENTRES: COMMUNITIES' LINK TO SUSTAINABILITY

Ethical and social responsibility are the bridges between the local community and the future.

Aliansce Sonae supports the communities where its shopping centres are located, integrating people and businesses into environments that offer unique experiences and contribute to local growth. The company's developments are more than shopping centres – they are spaces that play a fundamental social and environmental role in Brazil, a country of continental dimensions facing serious structural challenges.

For Aliansce Sonae, the largest shopping centre administrator in Brazil, ESG is a strategic pillar of the business. The company is a social and environmental protagonist, with more than 35 million visitors passing through its hallways every month, giving ample opportunity for impact and change.

BUILDING THE FUTURE

Aliansce Sonae shopping centres are meeting points for Brazilians and all their cultural diversity. They are private spaces for public use, which contribute to the development of the communities due to their ability to promote connections and drive transformations.

In Brazil, they work as social hubs, anticipating trends to delight consumers – our operations are based on the concept of **shopping centres of the future**, creating alternatives to support a sustainable lifestyle with a long-term focus.

COMMITMENTS

Sustainability is an opportunity to make a difference for all our stakeholders: employees, customers, partners, retailers and suppliers. In 2021 alone, the company implemented more than 900 social projects, benefiting two million people.

As a signatory to the **UN Global Compact**, Aliansce Sonae is committed to environmental, human rights, labour and anti-corruption issues.

Its **Diversity and Inclusion** agenda highlights respect as the basis of all interactions. The company's journey encompasses literacy, awareness and engagement efforts to support the theme. It also has an Affinity Group of employees who are ambassadors of Diversity and Inclusion, and regularly conducts a *People Census* – with the results used as feedback to improve our strategy.

To contribute to racial equity, Aliansce Sonae is part of the Movement for Racial Equity (**Mover**), a coalition of 47 companies committed to creating 10,000 leadership positions for black people by 2030.

On the environmental front, almost 80% of the energy consumed by our shopping centres comes from renewable sources and the company has several energy efficiency projects and initiatives, such as replacing conventional light bulbs with LEDs and using highly efficient motors throughout the properties.

Alternative water sources are also managed efficiently. The company has wastewater treatment plants in some shopping centres, in order to aid possible reuse of water.

Lastly, our shopping centres select waste for collection and seek solutions that allow the reusing, recycling and composting of materials. In 2021, one of Aliansce Sonae's

Aliansce Sonae

Aliansce Sonae is Brazil's largest shopping centre administrator, involved in planning and construction through financial, commercial, legal and operational management. It has a diversified portfolio throughout the country, comprised of 26 proprietary and 13 management only, bringing the total to 39 managed shopping centres.

ALIANSCE SONAE

www.alianscesonae.com.br

malls became the first zero waste shopping centre, meaning that it sent zero waste to landfills, an achievement that serves as inspiration.

Recently, Aliansce Sonae has partnered with **BeGreen**, the largest urban farm in Latin America, which installs greenhouses within companies and shopping centres in large urban spaces. Without using pesticides, the system reduces water consumption by up to 90%, minimizing the negative environmental impact of food production. In being close to consumers, these farms also decrease pollution caused by standard transportation formats and ensure a food waste index of less than 1%.

With these and other efforts, we envision the construction of more efficient shopping centres that promote the **responsible use of all resources**.

Manauara shopping centre

ALIANSCE SONAE IN NUMBERS

111,000
direct and indirect employees

Present in all **5** regions of Brazil

39 shopping centres

35 million visitors every month

2 million people benefited from the company's social projects in **2021**

LACES GROUP: REDUCING CLIMATE IMPACT WITH A BEAUTY ECOSYSTEM

Getting to the roots of how a Brazilian business in the beauty sector revolutionised the sustainability vision.

Founded in 1987, LACES Group, led by its founder Cris Dios, has its history drawn from respecting the business needs and its responsibility for the planet. For 35 years the group has grown up with a series of ESG practices, including helping the native people of the Xingu, in the Amazon. Today it is the protagonist of the clean beauty concept in the Brazilian market, with initiatives such as Carbon Limited, one of its own companies that specialises in the voluntary carbon market. Slow Beauty, the first conscious consumerism e-commerce company in the country, is a highlight, where brands and products are resold, taking into account social and environmental values. The group also has 9 shops, 15 licensed beauty salons, its own production line, low chemical and with organically certified ingredients, as well as 3 own brands with over 100 products available in 600 sales points. The emergence of specific ecosystems in business is, nowadays, a contemporary management practice. However, not a lot is said about the balance of synergy found in these company structures. LACES Group has evolved the concept of suppliers being stakeholders and partners creating a synergy of values. In practice, this means an acceleration of the integrated sustainability process. These initiatives economically develop the market and promote a new economy based on environmental preservation, as well as fair trade. Here are the main initiatives responsible for maximizing this balance:

CARBON COMPENSATION

The group neutralises and compensates, since 2014, the emission of gases that cause the greenhouse effect – one of the main causes of global warming – in all its activities (generated waste, electric energy, transportation, amongst others). In 2021, it acquired Carbon Limited, a consulting business specialised in the voluntary carbon market, responsible for the acquisition of credit via reforestation. Today, LACES neutralises its footprint, as well as its suppliers and collaborators, and was the first and only salon to publish the fact that regular salons emit around 250kg of CO2 per chair.

PACKAGING AND PRODUCTS

With its own production of the group brands, its factory has been endorsed since 2008 with an “organic” certificate. It utilises reverse logistics to map out and track the flow of products, their packaging and other materials so they can be disposed of or recycled accordingly. All packaging of all products is made of recycled material and uses Go Green resin, making the plastic biodegradable within 5 years, in contrast with the 200 years of the traditional type of plastic.

ENERGY MATRIX AND HYDRIC FOOTPRINT

In the hair salons of LACES Group, power efficiency is prioritised via a clean energy matrix, using solar energy and tube light, reducing the need for bulbs during the daytime. A water treatment station with physiochemical process and reverse

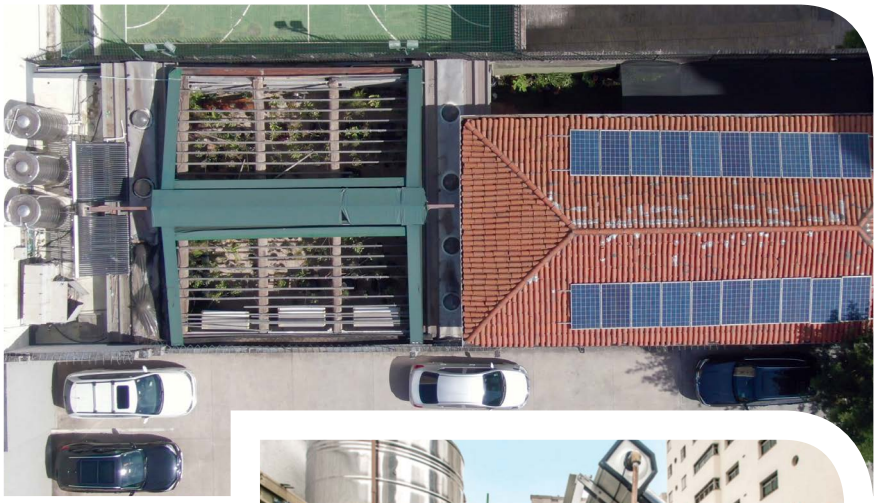
osmosis purifies the water and allows, as a result, hair washing with rainwater, as well as enabling its reuse to clean other spaces in the premises. To heat the water in its matrix, it uses photo-thermal plates together with a smart boiler, in a tank where it is possible to hold up to 1,000 litres of water. For all that, Laces was recognised in 2022 by a major Brazilian publisher as the most sustainable salon in the country.

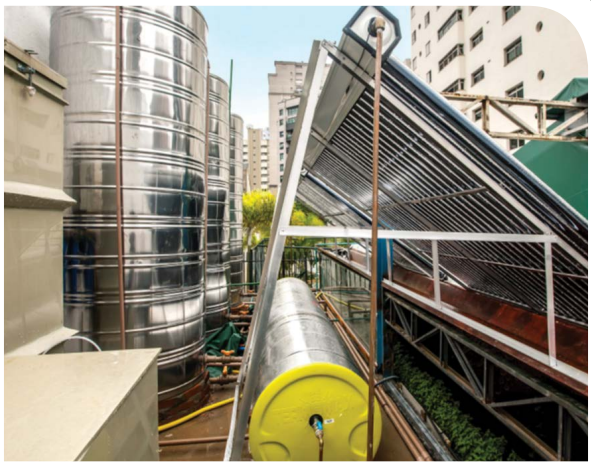
USE OF ALUMINIUM

Laces has been using the highlighting tool Roller Mèches since 2006 – specific for doing hair lowlights or highlights in a reusable form – rather than using foils which is common in conventional salons. By doing so, it has been possible to avoid the disposal of around 12.5 tons of aluminium in the environment. For highlight hair treatments, the city of São Paulo disposes, daily, in its 65,000 hair salons, 15 tons of hair foils.

The group also has a project of converting conventional salons into sustainable ones, called BIOMA. It aims to help over 500 salons in the next 5 years, with its expertise in products and business models available to small businesses all over Brazil, promoting an integrated and sustainable process with ESG methods – according to Itamar Cechetto, CEO of the group.

With over 60,000 bookings a year in its salons, the group perceives itself as an agent for local, regional and global change, providing healthy haircare and a complete ecosystem responsible for making sure the climate impact is reduced in the clean beauty market in Brazil and throughout the world.





TO SAVE OUR PLANET WE NEED ACTION TODAY

Contrary to fast-fashion, we prove that it is possible to make high quality durable fashion with low environmental impact.

The public debate about caring for the environment is not new. Previously covered by the term ecology, the theme has evolved into the holistic concept of sustainability. Now, we talk about ESG and how to connect the business' strategy to social, environmental and governance pillars. Likewise, lasting relationships with the planet, people and business are not contemporary issues for Grupo Malwee either. Since its founding in 1968, these concerns were already present in our DNA with our commitment to make ethical and sustainable fashion.

As part of one of the most polluting sectors on the planet – being responsible for 10% of greenhouse gas emissions and 20% of industrial water pollution – our sustainable essence has generated what we call an "organic in-house governance" in ESG, even before the term became popular.

One of our essence's main symbol is the Malwee Park, opened in 1978 in the city of Jaraguá do Sul, where the company's headquarters are located. The area has 1.5 million m², 35 thousand trees planted and is open for the entire community. In addition, for over 54 years we donated more than R$250 million to support health, education and environment projects.

HOW WE DO IT DIFFERENT

Our sustainability journey is changing the way fashion is made in Brazil and its production chain, based on the global recognition we've gained. In the last four years, we've been the most transparent Brazilian company, according to the Fashion Transparency Index.

In Latin America, we're pioneers in investing in technology to create the Malwee Jeans Lab, which reduced the water consumption from 100 liters to just 1 glass per piece produced. This dyeing process saves more than 7.6 million litres of water in the production of 127k pieces. Among our many initiatives we have a soy-based softener; collection with natural dye extracted from blackberries; and partnerships that encourage the practice of circular economy, like the one with Roupateca.

Our pioneering spirit allowed us to reach the mark of 92% of our pieces produced with sustainable methods and raw materials. Furthermore, we stand out as one of the

OUR SUSTAINABILITY JOURNEY IS CHANGING THE WAY FASHION IS MADE IN BRAZIL

Brazilian companies that emits the least carbon in production. In 2021, we've acquired 83% of renewable electricity through traceability certificates, guaranteeing our electricity consumption from wind sources and 80% of the total energy matrix from renewable sources.

We're also concerned with our value chain, which is why we evaluate our suppliers through a program that analyzes the risks of human and labour rights violations, quality, delivery and performance.

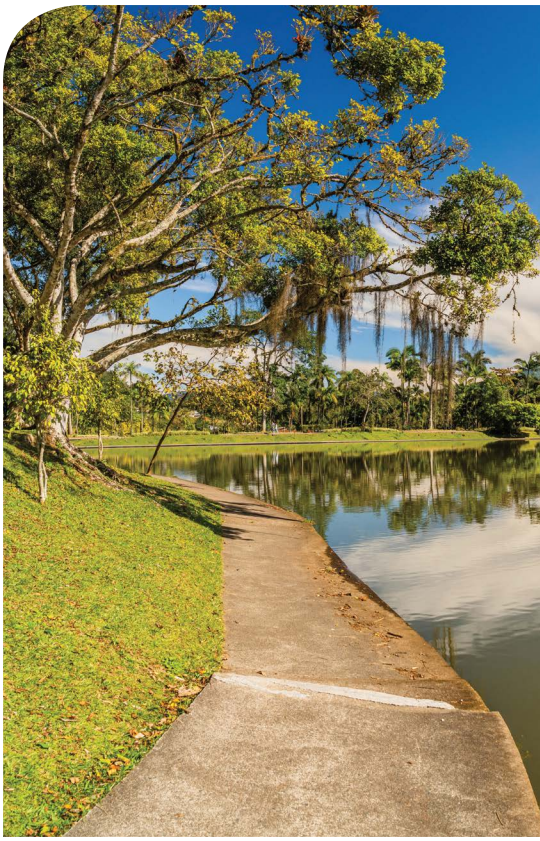
THE FUTURE CHALLENGE

Considering all the changes that the world has been experiencing and placing us as part of this ecosystem, we have launched our ESG Plan 2030, which presents even more ambitious sustainable goals for our business.

To reinforce the Malwee brand's "Endless Fashion" positioning, we have taken some impactful actions, such as the **DES.A.FIO Movement**. In partnership with Eurofios and the Brazilian Red Cross, we targeted the biggest challenge for fashion today: circularity. That's why we developed the first sweatshirt made with the 'thread of the future', an innovative raw material produced from post-consumer clothes that would be discarded in landfills – a pioneering product in the Brazilian fashion market.

Our Malwee Kids brand also launched the Criar collection, with pieces produced entirely reusing raw materials left over from previous seasons.

These, and many other examples show how our brands take our business' sustainable initiatives to our consumers, who are also the protagonists of this story. All this reaffirms our essence in building relationships that span generations, as we believe that the world needs people who, together, make the future now. After all, everything we do is meant to last, and to make the world last we need to start acting today!

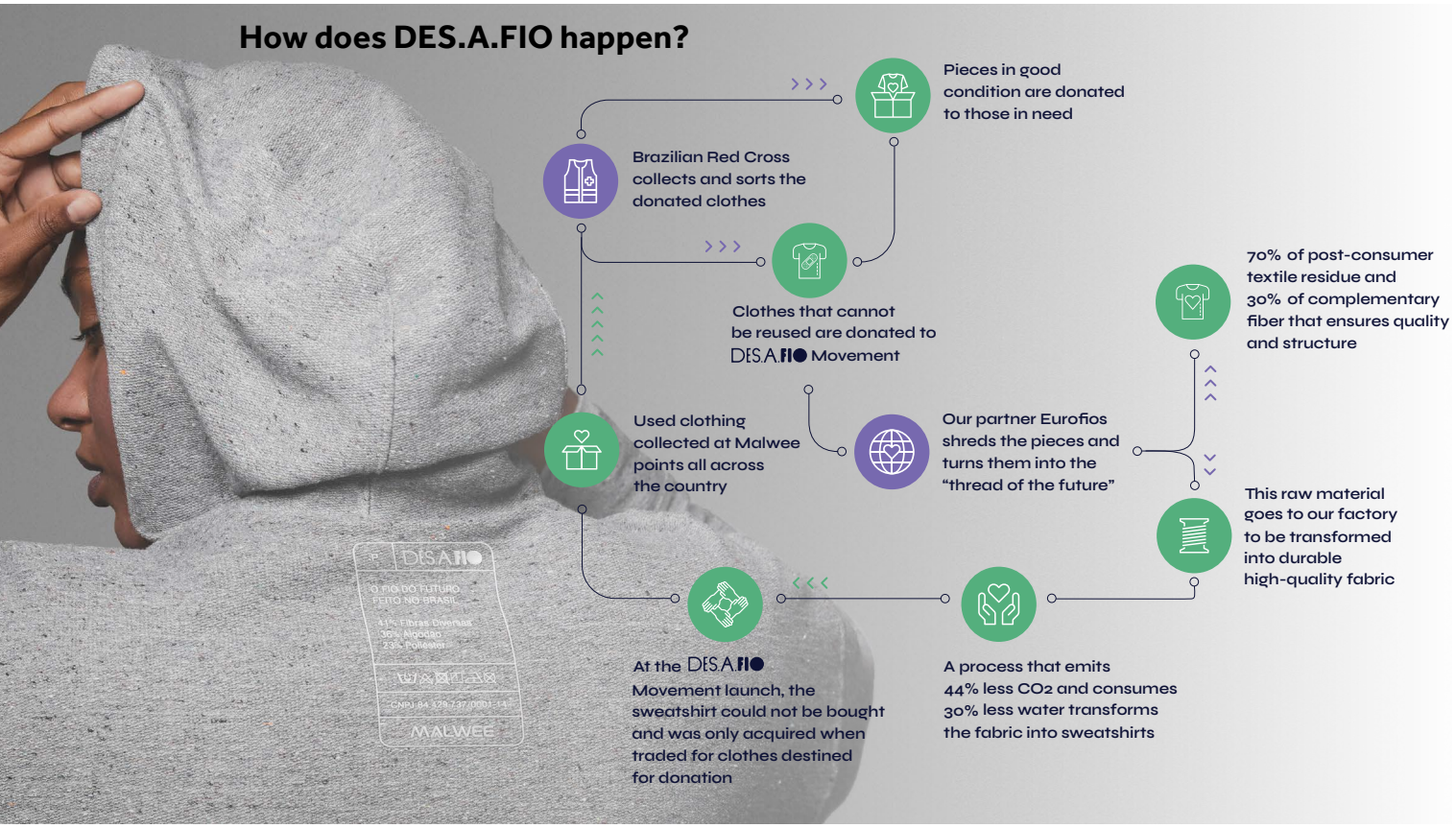


Grupo Malwee

Founded in 1968, Grupo Malwee is one of the main fashion companies in Brazil and one of the most modern in the world. It owns the brands Malwee, Malwee Kids, Carinhoso, Basico.com and Basicamente, has 3 factories, 4,200 employees and is present in more than 25,000 stores throughout Brazil.

GrupoMalwee

www.grupomalwee.com.br



PIONEERING A SUSTAINABLE FUTURE FOR PAINTS AND COATINGS. AKZONOBEL'S COMMITMENT TO PEOPLE. PLANET. PAINT.

By Pamela Phua, Product Management Director of AkzoNobel Decorative Paints, Vietnam

Human activity has left an indelible mark on the planet. While centuries of growth and advancement have come at a cost, we have the insights, knowledge and expertise, along with collective responsibility, to limit our negative environmental impact and contribute to a sustainable future for all.

Just as people, companies and industries have contributed to increased global warming and its resulting environmental impact, the same people, companies and industries can lead the change to a circular economy and a more harmonious coexistence with mother nature.

As a leader in our industry, AkzoNobel is committed to playing our part in pioneering a world of possibilities to bring surfaces to life while empowering people and minimizing our impact on the planet through the launch of People. Planet. Paint. Our approach to sustainable business.

A TRACK RECORD OF SUSTAINABILITY

Sustainability is one of our core values and is integrated in everything we do. Whether it's coatings that protect against bacteria, save energy usage or transform spaces through colour, we're experts in looking beyond the surface in order to bring them to life. Sustainability is integrated in everything we do, and it's been in our DNA since 1792.

Over the years we've invested in a broad range of sustainability initiatives and practices designed to reduce our impact on the planet. From being the first company to remove lead compounds from our products, to being the first in our industry to commit to the Science-based Targets Initiative that sets carbon emission reduction targets for scope 1, 2 & 3, we are determined to lead the way.

We believe that driving the sustainability agenda cannot be done by ourselves and this is why collaboration is important. It plays a key role to move things quicker. We engage and collaborate proactively with our stakeholders to identify opportunities to create shared value. Our key stakeholders, as reflected in People. Planet. Paint, are our customers, employees, suppliers and communities, as well as society, industry associations and investors.

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We've become a member in various associations and organisations, which align with our sustainability approach, namely, the World Green Building Council, United Nations Global Compact, Together for Sustainability, RE100, The Dutch Sustainable Growth Coalition, the Ocean CleanUp, SOS Children's Villages and more.

Our efforts have also been recognised by Sustainalytics (assessed as low risk, the best possible rating in our industry), EcoVadis (Platinum rating placing us in the top 1% of all companies studied), MSCI (AAA rating for six consecutive years), Vigeo Eiris (first in our industry), Corporate Knights Clean200 and more.

PEOPLE. PLANET. PAINT: THE KEY TO SUSTAINABILITY

People:

We act with integrity and respect human rights across our operations and value chain, embracing diversity and inclusion, to transform the communities in which we operate. It's about ensuring a safe and diverse work environment, developing our talented workforce, embracing our values and our approach to human rights. AkzoNobel supports the Universal Declaration on Human Rights, the UN Guiding Principles on Business and Human Rights, and the Declaration of Fundamental Principles and Rights at Work of the International Labour Organisation.

Through our *AkzoNobel Cares* and *Let's Colour* programmes we ran over 1,000 projects around the world and trained over 15,000 people in 2019. As an employer, AkzoNobel has been recognised as a Top Employer in multiple countries including the UK, China, Brazil, the US, France, the Netherlands, Sweden and Poland.

By 2025, AkzoNobel expects over 30% of the company's executives to be female and to have trained over 35,000 community members globally.

Planet:

Our Planet ambitions are tangible and will enable us to continue making an important contribution to addressing the sustainability challenges faced by our company, customers and broader society. As well as working to cut carbon emissions and reduce waste to minimize impact, we're also taking proactive steps to improve our ways of working to build better processes for the future.

For many years, we've been working to operate in a more sustainable way, and we continue to take steps to reduce our environmental impact through reformed value chains. We focus particularly on reducing energy use, carbon emissions, VOCs and waste, while increasing our use of renewable energy and materials.

Our aim is to reduce carbon emissions in our own operations by 50% by 2030 and by 42% across the whole value chain of a 2020 baseline, reduce energy consumption by 30% by 2030 and use 100% renewable electricity by 2030. We also have an ambition to produce zero non-reusable waste and to recycle wasted water at our most water intensive sites. These ambitions are not only achievable but we're on track to get there.

Lastly, we're always looking for new ways to drive sustainable innovation that brings tangible benefits, delivers a positive social and environmental impact, and enables our customers to reach their own sustainability goals. That's why we focus on developing our portfolio of paints and coatings with sustainability benefits in our value chain and offering our customers one of the largest >>

WE BELIEVE THAT DRIVING THE SUSTAINABILITY AGENDA CANNOT BE DONE BY OURSELVES AND THIS IS WHY COLLABORATION IS IMPORTANT. IT PLAYS A KEY ROLE TO MOVE THINGS QUICKER. WE ENGAGE AND COLLABORATE PROACTIVELY WITH OUR STAKEHOLDERS TO IDENTIFY OPPORTUNITIES TO CREATE SHARED VALUE.

portfolios of sustainable solutions in our industry.

Paint:
We are committed to creating impactful sustainable solutions that bring interior and exterior surfaces of life, while also empowering our customers to achieve their own sustainability objectives. From buildings to ships and everything in between, sustainable, high-performance paints and coatings are our lifeblood.

Currently, AkzoNobel generates approximately 40% of our revenue from sustainable solutions, which is the highest in the industry. However, it is not enough. AkzoNobel continues to focus on innovation and pioneering new products that have a sustainability benefit. By 2030, AkzoNobel aims sustainable solutions to make up more than 50% of the company's revenue.

A team of 3,000 scientists works closely with customers to develop innovative, sustainable solutions to real-world concerns and challenges. All sustainable solutions are developed with four innovation drivers in mind, productivity, asset protection, surface enhancement and environmental protection.

In order to measure the positive and negative sustainability characteristics of our product portfolio we have the developed our Sustainable Product Portfolio Assessment (SPPA) framework together with several leading chemical companies in the world and the WBCSD (World Business Council for Sustainable Development).

This SPPA framework takes a holistic view of product portfolio sustainability, with a focus on developing sustainability advantages that AkzoNobel can offer to customers. The SPPA was instrumental in developing a broad range of sustainable solutions (products and services) that deliver sustainability advantages downstream and now account for 40% of the company's portfolio. Prime examples are the Eco-premium solutions that offer clear sustainability benefits and outstrip competitors, leading to best-in-class designations.

Within our SPPA framework, products are characterized as sustainable for their ability to bring sustainability benefits in one of the following areas:
- Health and well-being
- Reduced carbon and energy
- Less waste
- Longer-lasting performance
- Reduce, renew and reuse.

These sustainability criteria are embedded in our innovation programmes. Based on these criteria we focus on creating innovative paints and coatings to reduce fuel consumption, limit heat transfer, amplify light emission, and more, all with minimal VOCs, water-based products, and other carbon-reduction methods.

Waste reduction throughout the company's production cycle is also vital. Waste and water can be reused and recycled, including overspray. High-solid products help reduce packaging waste while powder coatings have a 99% reclamation efficiency rate. Of course, all of these goals must be reached while still ensuring the best possible performance and durability for customers.

Pamela Phua has been General Director of AkzoNobel Decorative Paints Vietnam since 2017. At the beginning of 2021, she was appointed to be Product Management Director, Decorative Paints – SESA, being instrumental in developing and maintaining a product portfolio that satisfies market demands and maximizes margins at competitive costs.

In her global capacity, Pamela implements the functional and production innovation strategy for exterior wall paint. She spearheads the RD&I functional excellence, standards and capability, and the efficient delivery of processes as the approved standards and processes across the globe.

Pamela's expertise and experience has been instrumental in the setting up of industry standards in Singapore. She is the President and Technical Chairperson for the Singapore Paint Industry Association and a management member in the Chemical Standards Council of Singapore.

With a special passion for sustainable development, Pamela is actively involved in projects to create inspiring living spaces for local communities and to promote green architecture trends. She is an author for the G7&G20 summit publication advocating green developments. She is also a keynote speaker in United Nation climate Change Conferences.

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CARBON-FREE LOGISTICS: electric vehicles already a reality in our business

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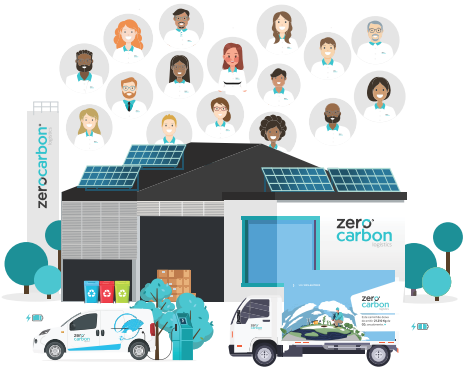
Faced with a scenario in which emissions from the transport sector are the main contributor to climate change, with approximately a quarter of CO2 emissions coming from the burning of fossil fuels, Zero Carbon Logistics considers carbon neutralization a priority in its operations.



100% OF SDGs ACHIEVED

By submitting the letter of adhesion to the UN Global Compact, Zero Carbon Logistics has committed to adhering to all 17 SDGs, with all ESG pillars aligned, always aiming to achieve a fairer and more sustainable world.

B SEAL IS A CONSEQUENCE OF OUR WAY OF DOING BUSINESS

We received B Seal certification, due to the numerous good practices focused on sustainability carried out within the company. It is an extremely rigorous certification, achieved by very few companies in Brazil (233) and 4,384 in the world. Obtaining the B certification for our business represents a great personal, institutional and legal commitment to make decisions considering the impact on the community and the environment, in the long term. Belonging to this global movement is synonymous with allying the strength of the market and the business purpose to the search for changes and solutions to social and environmental problems.

A BUSINESS THAT GENERATES VALUE FOR ALL

We are also certified by Capitalismo Consciente (a global movement that believes in a new way of living capitalism, through the generation of value for the whole environment) and by the Humanizadas survey as an example of management that accelerates the evolution of business awareness.

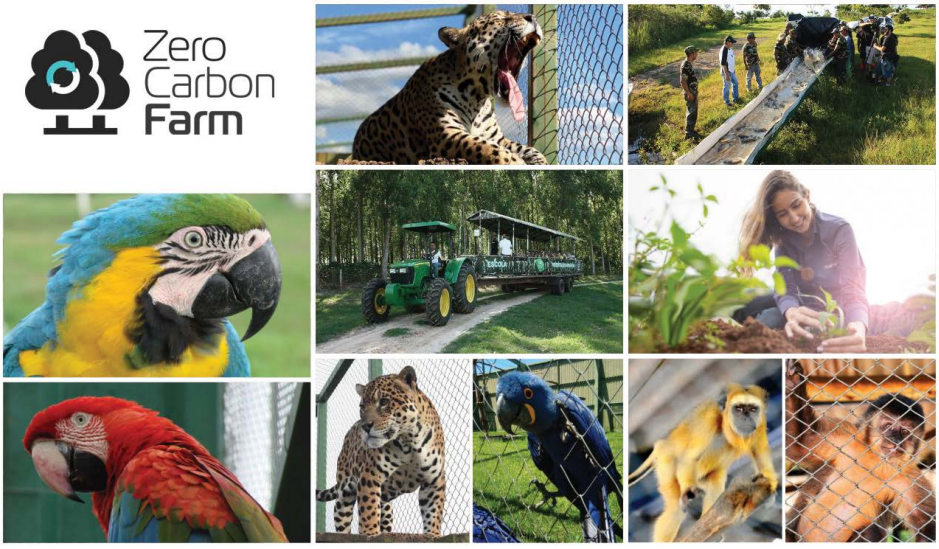
STRUCTURING AN ELECTRIC FLEET IS OUR FUTURE PRESENT

Today, our fleet already has 100% electric vehicles to allocate our load distribution operations, in addition to the continuous investment in more electric vehicles and equipment. Our goal is to increase our electric fleet, reaching 100% of electric vehicles and equipment. We designed an effective action plan to carry out the electrification of the fleet. To this end, we will make new purchases only of 100% electric and sustainable vehicles.

100% SUSTAINABLE UNIT

Our branch in Parauapebas – PA was built following the premises of the green seal and is an innovative self-sustainable project, with energy production through photovoltaic plates, biodigester and use of rainwater, among other good practices.

ZERO CARBON FARM: AN INNOVATIVE CARBON OFFSET PROJECT



The **Zero Carbon Farm** was created with the objective of meeting 100% of the UN SDGs, by neutralizing and offsetting 100% of the carbon in our logistics operations. We literally plant good ideas and reap their fruits. Today, this Zero Carbon Farm project has generated a total of 1,334,000,000 KgCO2e carbon credits. Located in the center-west of Brazil, Zero Carbon Farm has a total area of 46,540,666.30 m^2. There are 1,129 domesticated animals and birds of high genetics, in addition to 329 wild animals, which occupy a total area of 617 ha. To date, over 4,000 wild animals have been recovered, with an average recovery time between 3 and 6 months. The entire environment of the farm has more than 300,000 rotating seedlings of species native to the region. Annually, we create flora and fauna biodiversity corridors, with more than 1,500,000 native and fruit trees. In addition, we have a fish release project; native species were bred, raised and released in local rivers. Annually around 1,200,000 fish are released.

IT'S JUST THE BEGINNING

Today, we are already carbon neutral. In the future, Zero Carbon will continue to invest in innovative sustainable solutions, in addition to initiatives to neutralize 100% of the carbon of operations and have a 100% electric fleet. By meeting the UN's 17 SDGs, we generate social and environmental value for the world today and contribute to a more sustainable future. By 2030, our goal is to be a standard bearer in ESG worldwide.

SUSTAINABLE PORT DEVELOPMENT

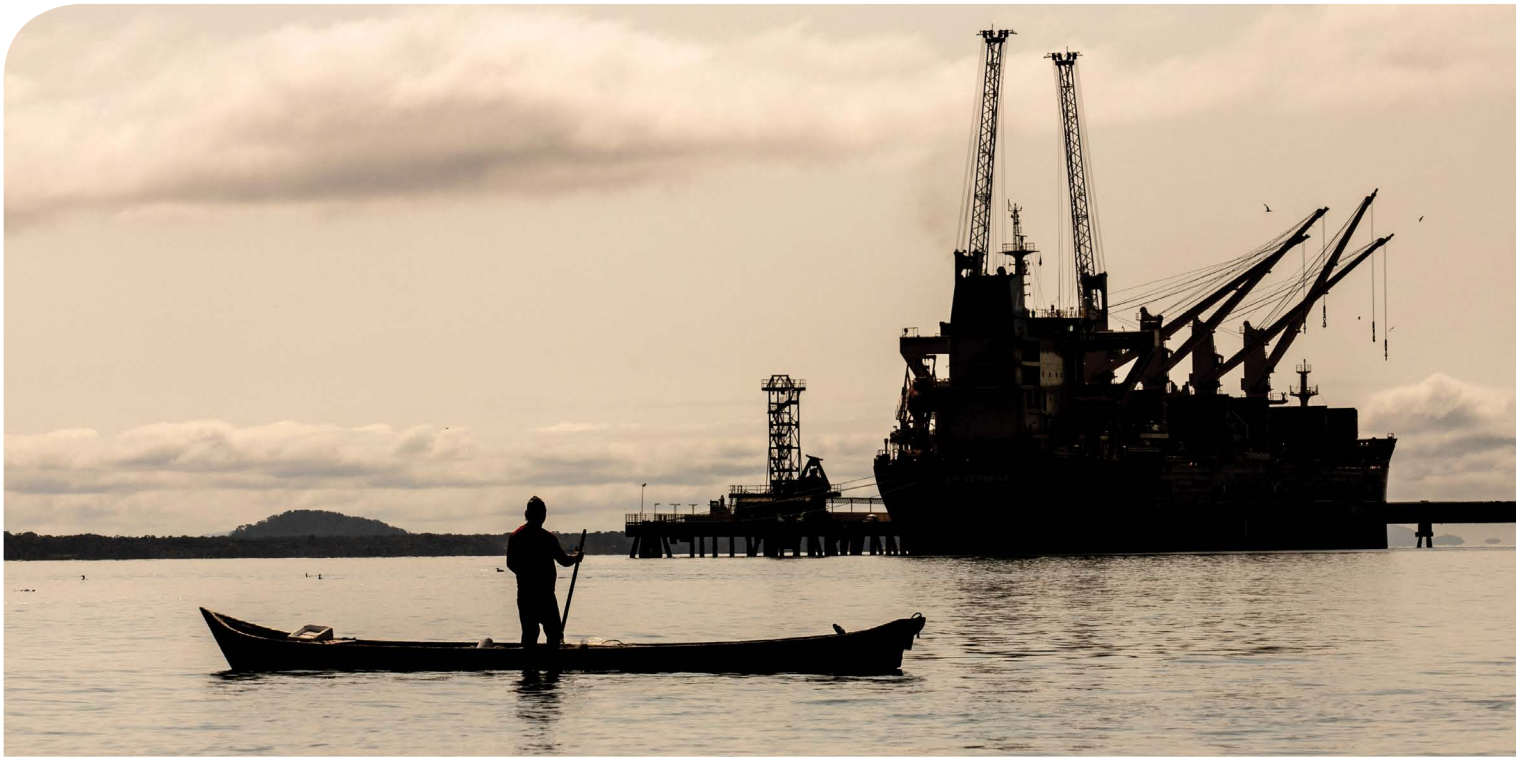
Found in the east of Paraná state, bordering the Atlantic Ocean, the Ports of Paraná are located in the middle of a very important and well protected biome, known as the Atlantic Rainforest.

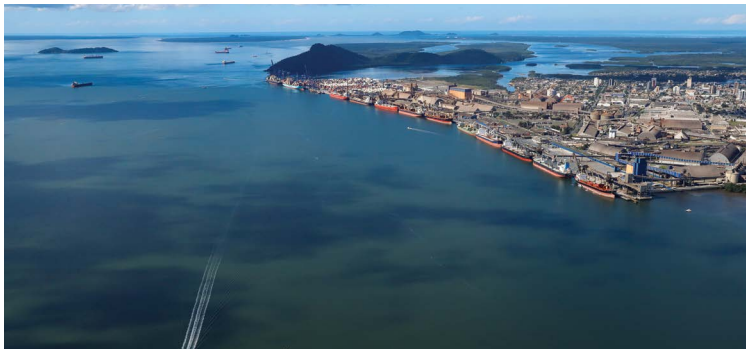
This biome has a huge natural richness and wide biodiversity that covers the largest part of the Brazilian coastline. That means we are inside the Mata Atlantica Biosphere Reserve, recognised by UNESCO. More specifically, the Ports of Paraná are part of the Paranaguá Estuarine Complex, one of the largest estuaries in Brazil.

Given its position in such an important environment, Ports of Paraná act to try to minimize the most negative effects that port activities have on its surroundings. The sustainable development of the state coast is the Ports of Paraná's main objective, taking into consideration the conservation of biodiversity and regional culture, trying to act according to the United Nations 17 Sustainable Development Goals.

The Ports of Paraná are the best port in Brazil in terms of environmental performance, the title was granted by the Brazilian Waterway Transportation Agency, given its concern and effective actions to reconcile economic development and environmental issues.

Ports of Paraná currently develop more than 40 environmental programmes focusing on environmental monitoring and conservation. Among the programmes developed are the frequent monitoring of the physical and biotic environments, reaching up to 600 km² within the Paranaguá Estuarine Complex. Physical environment programmes include





APPA

The Ports of Paraná are a port complex, composed of the ports of Paranaguá and Antonina. Strategically located in Brazil's southern region, the port terminals have the capacity to handle all types of cargo (grain, container, fluids) and can receive up to 24 ships at the same time, with static capacity of 4 million tons of grain.

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the monitoring of water quality, sediment, atmospheric emissions, terrestrial and underwater noise, plankton, benthos, ichthyofauna, birds, cetaceans and turtles, among others.

In addition, the Ports of Paraná develop programmes with the local communities that directly influence local enterprise, this includes training and workshops, such as permacultural classes, that focus on improving the environmental quality and life of the population. Furthermore, the Ports of Paraná are investing in rural infrastructure through the renovation and construction of small public piers in 13 island communities. In the training programmes, the Ports of Paraná have a *Degraded Areas Recovery Plan* of the watersheds that flow into the Paranaguá Estuarine Complex, which deal with the recovery of agricultural environments in rural areas around the bay, especially those located in areas of permanent preservation, through the use of agroforestry systems that use native plant species of commercial interest to the population.

Through these actions, the Ports of Paraná seek not only to encourage the recovery of degraded areas, but to do so in a sustainable manner that brings biodiversity to the region and also food sovereignty of the most vulnerable populations. The food plan involves native species, which also have recognised economic value. In addition, this plan aims to reduce the erosion of river banks and, consequently, the sedimentation of navigation channels, thus reducing the need for dredging events.

Considering the economic importance of the Ports of Paraná to Brazil and South America, the enterprise has projects to expand their port capacity in a sustainable way, by building new piers with modern systems that aim for greater process efficiency. Apart from its economic and environmental performance, the Ports of Paraná aim for the social development of the state's coastline, seeking integration and balance between communities, environment, culture and economy, with the entire port process.


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