
GREEN_

GREEN BRAZILIAN INDUSTRY
SUSTAINABLE INITIATIVES

SUMMARY

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INSTITUTO Amazônia+21

SESI SENAI
FOR THE FUTURE OF WORK

CNI
Brazilian National Confederation of Industry
THE FUTURE OF INDUSTRY

GREEN HYDROGEN EXPORT DEVELOPMENT CENTER AT THE PORT OF SUAPE

OBJECTIVE

The objective of this project is to support the export of green hydrogen by Brazilian companies through the establishment of a dedicated export development center and associated infrastructure at the port of Suape. The center is intended to facilitate business and test innovative business hypotheses, thereby contributing to national efforts to transition to a low-carbon economy

DESCRIPTION

The project will involve the conception and establishment of an Export Development Center dedicated to green hydrogen and related products at the port of Suape, near Recife, a large city in Brazil's Northeastern Region. The center will also comprise support infrastructure for research, testing, and experimentation that is essential for the development of innovative technologies, products, and services. When

fully operational, the center will be a reference for Brazilian producers of green hydrogen and related products looking to expand their sales and exports to international markets.
Export support services will include:

- Market research: information about potential export markets, including market size, buyer preferences, and regulatory requirements.
- Trade promotion: identification of potential buyers and distributors in international markets through trade missions, matchmaking events, and other networking opportunities.
- Export training and education: training and education on the export process, including export regulations, logistics, and financing.
- Export financing: support in accessing financing and credit facilities to support export activities, including export credit insurance and export loans.
- Export counseling and guidance: one-on-one counseling and guidance on the export process, including assistance with export planning, strategy development, and export documentation.

The TechHub Center's technological infrastructure and equipment will allow:

- The production of green hydrogen through solar-powered electrolysis.
- The compression of hydrogen and its storage in high-pressure cylinders.
- The conversion of hydrogen to ammonia or urea.

The production of green hydrogen will be audited and certified.

KEY ACTIVITIES

1. Establish the green hydrogen export development center, including the hiring of staff, acquisition of equipment and software, and development of operational policies and procedures.
2. Conduct market research to identify potential export markets for green hydrogen and related products, and to understand the regulatory requirements and market dynamics in each market.
3. Develop marketing and promotional materials to support the export of green hydrogen and related products, including case studies, and online content.
4. Conduct trade promotion activities, such as trade missions, webinars, and networking events, to connect businesses involved in the green hydrogen value chain with potential buyers and partners in international markets.
5. Develop and deliver training and education programs to help businesses involved in the green hydrogen value chain understand the export process, including export regulations, logistics, and financing.
6. Establish partnerships with key stakeholders, including government agencies, industry associations, and international organizations, to support the development of a green hydrogen industry in Brazil.

EXPECTED OUTCOMES

1. Increased exports of green hydrogen and related products from Brazil to international markets.
2. Increased investment in the development and production of green hydrogen and related products in Brazil.
3. Creation of new green jobs and economic growth in the Recife area through the development and expansion of a green hydrogen industry.
4. Improved environmental outcomes through the increased adoption of green hydrogen as a clean energy source in international markets.

COSTS	Project costs are estimated at USD 200 million. A detailed budget will be developed during the planning phase of the project.
TIMELINE	The project is currently in its design phase, more precisely in infrastructure design. A site has been chosen and purchased, site works are ongoing, currently at land leveling. Utilities (water, sewage, and power lines) are expected to be connected soon. The project has a projected lifetime of 30 years.
PARTNERS ALREADY COMMITTED	• The Port of Suape. • TERMOP, a maker of electrical equipment. • CTG Brasil, Brazil's subsidiary of the China Three Gorges Corporation, a large Chinese state-owned power company. • Parque Tecnológico Itaipu-Brasil (PTI-BR), an innovation ecosystem comprising learning institutions, companies and government organizations working to provide solutions to development challenges. • Federation of Industries of the State of Pernambuco (FIEPE). • The Network of SENAI Innovation Institutes.
INVESTMENT OPPORTUNITIES	1.Joint ventures with Brazilian companies 2.Customized project finance schemes 3.Joint research and development initiatives 4.Technology transfer support to explore the potential of hydrogen production in Brazil
KEY BENEFITS	The export development center will be a valuable resource for businesses looking to expand their

sales and exports to international markets. By providing a range of services and resources, export development centers can help businesses navigate the complexities of the export process and maximize their chances of success in international markets.

The TechHub Center will offer individual investors opportunities to invest in carefully chosen green hydrogen projects, and in the center itself as an autonomous entity. It will also provide a platform to showcase technologies for the production of hydrogen, ammonia and urea, and for testing production upscaling technologies as well. Investors will also benefit from accessing the community of practice in green hydrogen and related technologies.
Knowledge is money, and knowledge transfer is also a form of investment. Universities and research centers are encouraged to partner, with a view to testing new technologies and conducting applied and market-oriented research.

REGIONAL BIOREFINERIES IN THE BRAZILIAN AMAZON

OBJECTIVE	The objective is to establish a network of biorefineries in the Brazilian Amazon Region to convert biomass into value-added products, including fuels, chemicals, and materials, and to promote the development of a circular bioeconomy in the region.
DESCRIPTION	This project will involve the establishment of a network of biorefineries in the Brazilian Amazon Region that will use locally produced biomass as feedstock to produce a range of value-added products, including biofuels. The network will be designed to promote the development of a circular bioeconomy

in the region, by reducing dependence on fossil fuels, creating new economic opportunities for rural communities, and reducing waste. The proposed biorefineries will be compounded with small laboratories installed in containers, equipped to provide an environment for research, development, and testing of new biomass-based products.

The project, initially planned to start on a pilot scale in Codajás, in the State of Amazonas, is at the stage of consultation with local companies.

KEY ACTIVITIES

1. Conduct market studies to assess market size, market niches, products in demand, and the availability of raw materials, in addition to exploring possible locations for biorefinery facilities.
2. Develop a comprehensive business plan for the establishment of a network of biorefineries in the Brazilian Amazon Region, including the identification of potential investors, partners, and customers.
3. Select the locations for the biorefineries and design the facilities, including the selection of applicable technologies and equipment.
4. Establish partnerships with local communities, companies, and other biomass suppliers to secure a reliable supply of feedstock for the biorefineries.
5. Develop and implement training and education programs biorefinery workers and partner feedstock suppliers.
6. Promote the network of biorefineries to potential customers and investors, and develop a marketing strategy to guide the export of value-added products.

EXPECTED OUTCOMES	Increased production of value-added products from biomass in the Brazilian Amazon Region including biofuels, bio-based chemicals, and bio-based materials Creation of new green jobs and economic growth in the Brazilian Amazon Region through the strengthening of a biorefinery industry. Reduction in greenhouse gas emissions and waste through the production of value-added products from biomass. Increased diversification of local economies through the development of a circular bioeconomy in the Brazilian Amazon Region.
COSTS	Project costs are estimated at USD 60 million. A detailed budget will be developed during the planning phase of the project.
TIMELINE	The project is at the stage of consultation with local companies. Its expected duration is three years.
PARTNERS ALREADY COMMITTED	• SENAI Innovation Institutes. • The São Paulo Research Foundation (in Portuguese Fundação de Amparo à Pesquisa do Estado de São Paulo, FAPESP), a public foundation located in São Paulo that provides research grants. • The Vale Technology Institute (Instituto de Tecnologia Vale, ITV), a private nonprofit science, technology and innovation institution maintained by Vale S.A., a large Brazilian mining multinational corporation. • Natura, a Brazilian global personal care cosmetics group. • ABIHPEC, the Brazilian association of personal hygiene and cosmetics industry.

- Braskem, a Brazilian petrochemical company headquartered in São Paulo.
- GranBio, a Brazilian industrial biotechnology company.
- Suzano, a Brazilian producer of paper and pulp.
- BASF, a large European multinational chemical company.

INVESTMENT OPPORTUNITIES

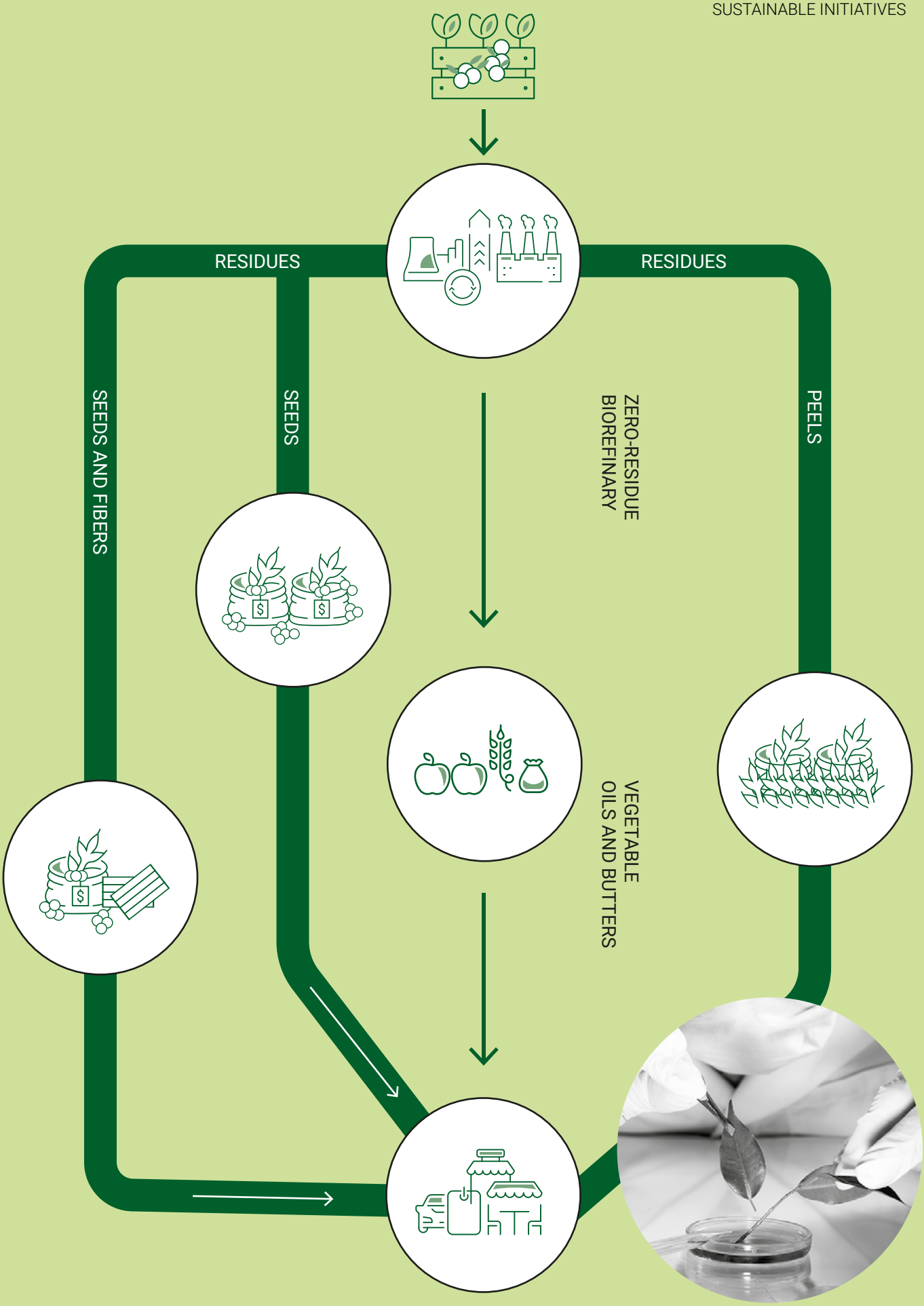
1. Joint ventures with Brazilian companies.
2. Technology transfer support to identify the additional options of economically viable use of biomass.
3. Joint research and development initiatives.
4. Customized project finance schemes.

KEY BENEFITS

The establishment of a network of biorefineries in the Brazilian Amazon Region will leverage the development of a circular bioeconomy in the region contribute to achieving global climate goals, with potential earnings in the carbon market. The project will play an important role in reducing waste, creating new economic opportunities, and promoting the production of value-added products from biomass.

Besides profit opportunities arising from new products and services to be marketed, the project also offers benefits related to its ESG nature, the potential to demonstrate the economic viability of converting waste biomass to marketable products on a large scale, and the opening of new business opportunities in the green economy.

Knowledge is money, and knowledge transfer is also a form of investment. Universities and research centers are encouraged to partner, with a view to testing new technologies and conducting applied and market-oriented research.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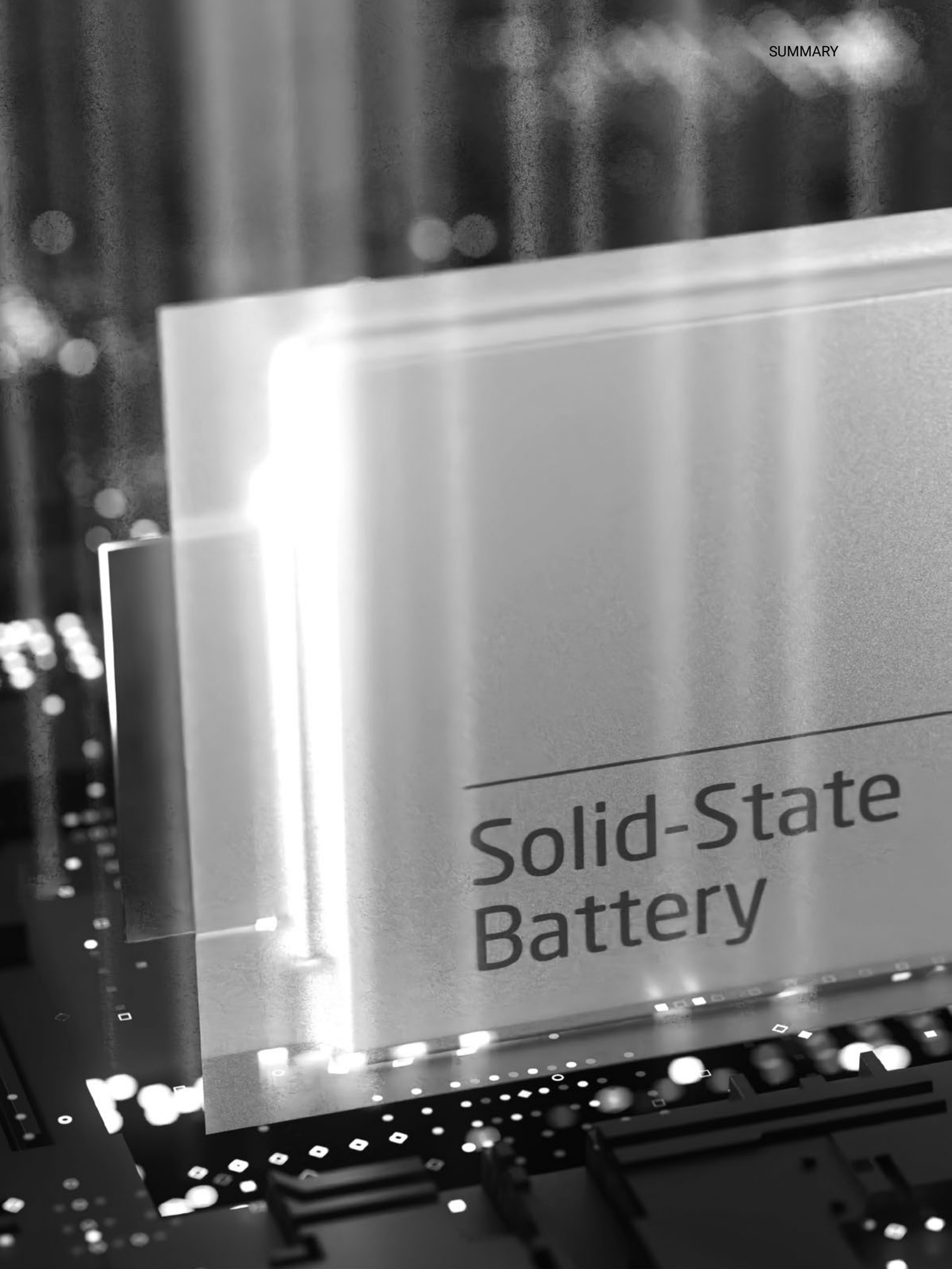

Solid-State
Battery

DEVELOPING A SUSTAINABLE SOLID-STATE BATTERY INDUSTRY IN BRAZIL

OBJECTIVE

The market for solid-state batteries is on the rise, and Brazil has all the right conditions to produce them, including minerals, technology, and know-how. The objective of this initiative is to design and produce a sustainable solid-state battery in Brazil, with a focus on lowering production costs, reducing greenhouse gas (GHG) emissions, avoiding the use of cobalt, and strengthening a sustainable supply chain in the context of a circular economy. The project will also aim to develop a value chain for the production of solid-state batteries in cooperation with other countries.

DESCRIPTION

This project will involve the development of a sustainable solid-state battery industry in Brazil, including the design and production of a solid-state battery that is environmentally friendly, cost-effective, and socially responsible. The project will include research and development, production scale-up, and the establishment of a sustainable supply chain for the production of solid-state batteries.

KEY ACTIVITIES

- Conduct market studies for solid-state batteries.
- Prepare a business plan.
- Conduct research and development work.
- Establish a pilot production line for the solid-state battery, and optimize the production process to reduce costs and increase efficiency.
- Scale up production, and establish partnerships with suppliers and manufacturers to develop a sustainable supply chain.
- Develop and implement a circular economy strategy for the production of the battery, including the use of recycled materials and the establishment of a closed-loop production process.
- Conduct outreach and communication activities to raise awareness of the benefits of sustainable solid-state batteries, and to promote the development of a value chain for the production of solid-state batteries in cooperation with other countries.

EXPECTED OUTCOMES

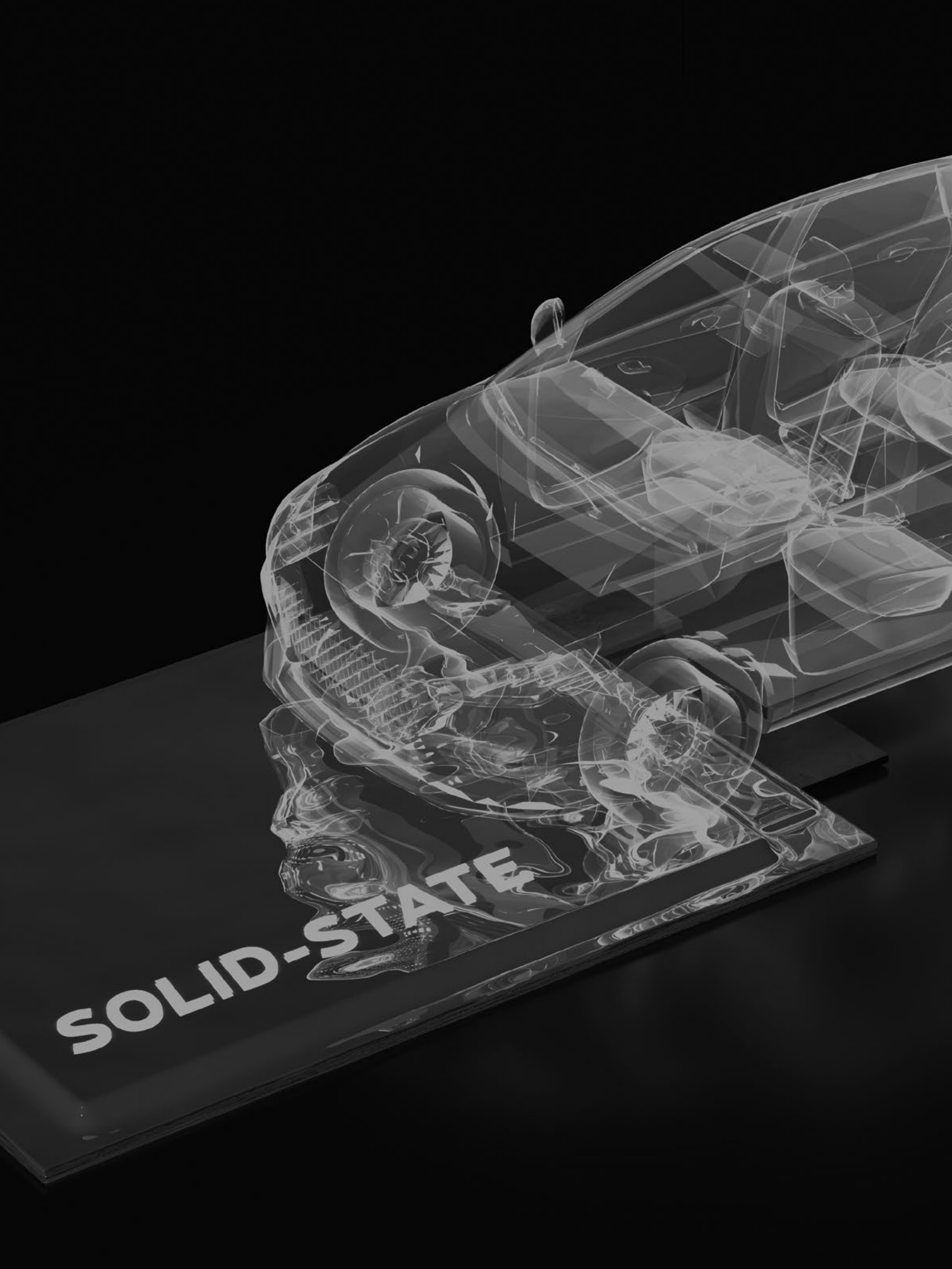
- Development of a solid-state battery industry in Brazil.
- Establishment of a sustainable supply chain for the production of solid-state batteries, with a focus on a circular economy and the use of recycled materials.
- Reduction in GHG emissions associated with the production of solid-state batteries, contributing to global climate goals.
- Creation of new jobs and economic growth in Brazil through the development of a sustainable solid-state battery industry.
- Development of partnerships with other countries to promote the development of a value chain for the production of solid-state batteries.

COSTS	Project costs are estimated at USD 20 million. A detailed budget will be developed during the planning phase of the project.
TIMELINE	The project is currently in its design phase. The project has a projected lifetime of four years.
PARTNERS ALREADY COMMITTED	• SENAI Innovation Institute in Electrochemistry • The Federation of Industries of the State of Paraná (FIEP). • Companhia Brasileira de Metalurgia e Mineração (CBMM), a large Brazilian mining and metallurgy company. • WEG, a large Brazilian maker of electric equipment • Tupy, a large Brazilian company in the field of structural components. • BMW, a large German multinational manufacturer of luxury vehicles and motorcycles. • Companhia Brasileira de Lítio (Brazilian Lithium Company, CBL), a Brazilian company in the underground mining of lithium. • Volkswagen, a large German car maker.
INVESTMENT OPPORTUNITIES	1. Mention of participation in the endeavor. 2. Customized project financing schemes. 3. Technology transfer and development cooperation support. We are also looking for cooperation with universities, which can benefit from the possibility of testing new technologies and conducting applied and market-oriented research.

KEY BENEFITS

This project will play an important role in developing a sustainable solid-state battery industry, with a focus on cost-effectiveness, low GHG emissions, avoidance of cobalt, and social responsibility.

The electrical energy consumed in Brazil is 85 percent from renewable sources, mostly from dams, which means that any energy-intensive product made in Brazil is inherently greener than in many other countries. By establishing a sustainable supply chain and promoting the development of a value chain for the production of solid-state batteries, the project will contribute to the development of a circular economy and to climate change goals.


SOLID-STATE

CENTER FOR BIOECONOMICS AND CONSERVATION OF THE AMAZON (CBCA)

GENERAL OBJECTIVE	To create the first Bioeconomy and Conservation Center of the Amazon (CBCA), focused on research, technological diffusion, and knowledge about the recovery of the vegetation cover in the region.
SPECIFIC OBJECTIVES	1. Building laboratory facilities, lecture halls, and administrative and financial management for CBCA; 2. Developing technological showcases for the recovering of the vegetation cover from different methods and purposes; 3. Structuring forest businesses from the construction of a nursery and a biofactory; and 4. Developing scientific studies on the process of succession and recovery of the vegetation cover and economic viability.

DESCRIPTION

The Center for Bioeconomics and Conservation of the Amazon - CBCA is the result of an alliance between Santo Antonio Energia, the Rioterra Study Center, and the Amazon+21 Institute, dedicated to being a hub for structuring the forest chain for the recovery of degraded areas in the Southwest Amazon.

The installation site has an area of approximately 1000 hectares and is located about 30 km from the city of Porto Velho, on the banks of the Madeira River. Of these 1000 hectares, 300 have been deforested and degraded by extensive cattle ranching by the previous owners, and the rest is covered by fragments of regenerated forest.

The intention is, in the deforested area, to recover the 300 hectares and build the necessary facilities for the project's success, and in the area where there is forest or fragments, to assist regeneration and carry out matrices selection and georeferencing work, always, in both scenarios, including and training the surrounding community

MAIN ACTIVITIES

Over 25 years, the following activities will be carried out:

- Management and Construction: includes communication actions, architectural design, executive projects, pre-investment, resource mobilization, training programming, and start of works;
- Technological showcases: uses different methods (total planting, assisted natural regeneration, nucleation, etc.) and specific purposes (production or ecology) for technology transfer activities (courses) to

the surrounding communities. The technological showcases are dedicated built structures and will be developed by the project team and partners such as Embrapa, the Federal Universities of Rondonia and Parana, the Botanical Garden of New York, and the Federal Technical Institute of Rondonia. Among the actions to accomplish the activity are: studies about the physical environment, zoning, soil preparation, production, planting for area restoration and seedling monitoring, installation of clonal gardens, and area maintenance;

- Biofactory: In order to have the best plants in the nursery, a biofactory will also be installed, capable of improving the capture and fixation of genetic gain in the plants that will go to the nursery and free them from pests and pathogens (sanitary quality). The actions are: economic and financial feasibility studies, business plan design, resource mobilization, construction and maintenance;
- Nursery: The planned actions deal with the elaboration of the architectural/engineering plan, budgeting, construction, implementation, and maintenance;
- Marking of matrices and seed collection: includes actions of identification of primary/older areas, botanical study, marking and collection; and
- Assisted natural regeneration: analysis of the environment, identification of resiliencies, selection of methods, and implementation of assistance/ enrichment.

EXPECTED RESULTS

The project will structure the forest chain for the recovery of degraded areas in the Southwest Amazon, involving research, applied research, and development. Over the course of implementation, 300 hectares will be restored, another 700 hectares will receive regeneration

assistance. Also, in the surrounding area, other 3500 hectares will be restored.

For the restoration of the CBCA areas, the surrounding areas, and several other communities in the Southwest Amazon, a nursery with the production capacity of one million native seedlings per year will be implemented - The Amazon needs to restore 4 million hectares and there is a lack of seedlings.

1500 jobs will be generated, as well as fostering entrepreneurship, based on a training program that will allow for i) botanical identification, ii) seed collection, iii) nursery practices, iv) soil preparation, v) planting, vi) maintenance of degraded areas, and vii) environmental monitoring.

Finally, results related to the sustainable business agenda, such as forest and carbon management, will be noticed.

COSTS

The project costs are estimated at $20 million. A detailed budget will be developed during the planning phase of the project.

TIMELINE

The project started in 2022 and is scheduled for completion in 2047. It is a 25-year project.

In 2022, the development of the architectural project for the area, the analysis of the physical environment, zoning, production of seedlings, and preparation of the soil for planting took place - 400,000 seedlings were planted.

In 2023, the installation of the technological showcases will begin, through botanical identification, matrix marking, and seed collection, as well as the protection of areas that will regenerate naturally. Furthermore, efforts are

underway to identify investors to finance the forest restoration, construction of facilities, and funding until the financial sustainability of the initiative is achieved.

Between 2024 and 2047, works and activities for the operationalization of the technological showcases, nursery and biofactory will be carried out, as well as business modeling, environmental monitoring and maintenance of the structures.

PARTNERS ALREADY COMMITTED

- Governance:
  a. Santo Antonio Energia, which is a large Brazilian energy concessionaire and owner of the Santo Antonio Power Plant.
  b. Rioterra Study Center.
  c. Amazonia+21 Institute.

- Operational:
  a. Embrapa Rondonia;
  b. Federal Universities of Rondonia and Parana;
  c. New York Botanical Garden and;
  d. Federal Technical Institute of Rondonia.

INVESTMENT OPPORTUNITIES

- Being disclosed as a participant in the endeavor;
- Customized project financial schemes;
- Technology transfer and development cooperation support.

KEY BENEFITS

The establishment of the center will help closing the gap in the supply of seedlings and saplings for reforestation with native species in the Brazilian Amazon. In most reforestation projects resulting from legally binding agreements with the State aimed at complying with legal environmental requirements, there is a considerable potential market for seedlings; the

expected return on investment is accordingly high. The center will also play a key role in promoting bioeconomy in the region. These two lines of work, by themselves, hold the potential to create value in the carbon market, with important potential gains. On the long run, reforested areas can also be sustainably harvested for wood as part of an approved forest management plan, with substantial economic returns.

Besides profit opportunities arising from those products and services, the project also offers intangible benefits arising from its ESG nature, such as participation in the global effort towards sustainability.

Knowledge transfer is also a form of investment. Universities and research centers are encouraged to establish partnerships, looking forward to testing new technologies and carrying out applied and market-oriented research.

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