

Image: Macaúba (Shutterstock)



Blueprint INOCAS and S.Oleum

Advisory Program on Financing Structuring
Task Force 2: Innovative Pilot Transactions

October 2025

REALIZATION

Nature Investment Lab (NIL)

SECRETARIAT

Climate Ventures

EXECUTION

Impacta

REALIZATION



SECRETARIAT



EXECUTION



About the Nature Investment Lab

The **Nature Investment Lab (NIL)** is a collaborative, innovation-focused initiative designed to **unlock investments in Nature-based Solutions (NbS)**. NIL works to understand disruptive businesses and to develop and test **innovative financial models**, bridging capital with those driving restoration, sustainable use of natural resources, and ecosystem regeneration.

Its purpose is to **close the gap between investors and innovative businesses focused on restoration, bioeconomy, and regenerative agriculture**, by structuring mechanisms that enable impact-driven enterprises to access capital and scale their solutions.

As part of this effort, NIL launched a **public call** to identify and support companies distinguished by their work in Nature-based Solutions, with the potential to contribute both to the country's economic development and to the achievement of emission reduction and carbon removal targets established in Brazil's NDC.

These companies received **technical assistance in financial structuring**, aiming to make their projects viable and to **develop replicable and scalable solutions** that can benefit the broader nature investment ecosystem.



Table of Contents

Introduction	06
Macaúba	08
INOCAS	10
Business Model	10
INOCAS' Differentiator: Pioneering Macaúba Cultivation with Sustainable Solutions for Bioactives and Landscape Restoration	11
Verra Certification	13
INOCAS's Current Scenario and Future Vision	15
The Financing Journey	15
Financial Instruments to Enable Expansion	17
Strategic Recommendations: Exploring Funding Sources through Development Finance	20
Risk Map	21
NIL's Contribution to INOCAS	23
Lessons for the Ecosystem	24
S.Oleum	25
Business Model	25
S.Oleum's Differentiator	27
S.Oleum's Current Scenario and Future Vision	28
The Financing Journey	28
Strategic Recommendations: Combining Complementary Instruments Across Phases	30

Revenue and Value Generation Outlook: Economic Projection of the S.Oleum RDS Project	32
Risk Map	34
NIL's Contribution to S.Oleum	36
Lessons for the Ecosystem	37
Lessons for the Macaúba Sector	38



Introduction

Launched in 1975, the National Alcohol Program (Proálcool) positioned Brazil as one of the world's leaders in the production and consumption of biofuels—particularly sugarcane ethanol. Over five decades, this trajectory has consolidated Brazil's biofuel policy as one of the most mature and integrated in the world, making a decisive contribution to the energy transition and serving as a global benchmark.

With the approval of the National Program for Sustainable Aviation Fuel (ProbioQAV), Brazil is now poised to become one of the main producers of **Sustainable Aviation Fuel (SAF)**, leveraging its vast biomass resources and biofuel expertise to meet the growing demand from this sector—and, in the future, also from the international maritime sector.

In this context, the Nature Investment Lab (NIL) selected **two ventures—INOCAS and S.Oleum**—that are developing the macaúba value chain, a fruit that holds enormous potential for biofuel production. Macaúba stands out for not competing with food crops and for its exceptionally high productivity—yielding up to ten times more oil per hectare than soybeans, as illustrated in Figure 1.

Figure 1: Macaúba Productivity in Brazil Compared to Other Oilseed Crops

	TON/HA	PALM	CANOLA	SUNFLOWER	SOYBEN	HECTARES ^{1,2}
Macaúba	9.0	2.37x	11.25x	12.86x	15x	127,777.8
African Palm	3.8		4.75x	4,000-6,000	6.33x	302,631.6
Canola	0.8	0.21x		3,500-4,500	1.33x	1,437,500
Sunflower	0.7	0.18x	1.14x		1.17x	1,642,857.1
Soybean	0.6	0.16x	0.86x	3,500-4,500		1,916,666.7

1 Land area required to supply a biorefinery producing 20,000 barrels per day (current industry standard)

2 Annual consumption: 1,150,000 tons of oil

Source: adapted from S.Oleum (2025)

Throughout this process, the Nature Investment Lab (NIL) focused on understanding the challenges surrounding the development of the macaúba value chain. The main challenge lies in understanding the plant's behavior across different biomes and domesticating its seeds until they reach their ideal genetic point of resilience and productivity.

Positioning macaúba as a national strategy is a strategic bet. The plant has significant potential for biofuel production, offering higher productivity, lower land-use pressure, and good performance in engines, among other advantages.

However, it is still not possible to accurately determine field productivity (in kg per plant per year). Reported values range from 20 to 220 kg per plant per year, with a long maturation cycle. Few production factors influencing productivity are currently known.

INOCAS focuses on factors related to planting, land use, and irrigation, while S.Oleum emphasizes genetic control and cloning. In their respective strategies and business models, **both approaches are valid and need visibility and support to strengthen the ecosystem through shared learnings**. Both companies engage with other players in the sector, academia, and key stakeholders in the value chain. However, it appears equally important to foster greater integration among actors and national development strategies.

Macaúba

Macaúba (*Acrocomia aculeata*) is a palm species native to Brazil, found throughout most of the country—particularly in the Cerrado, Atlantic Forest, and Caatinga biomes.

This palm has high economic potential, standing out for its high oil yield per hectare without interfering with the food supply chain. In addition, macaúba produces valuable by-products used in the cosmetics, pharmaceutical, and animal feed industries, making it an important alternative for diversifying both the rural economy and the national energy matrix.

Figure 2: Productivity and Income — total and by fruit components — generated per hectare of Macaúba



Source: adapted from INOCAS (2025)

Figure 3: The diversity of macaúba applications across different industry segments

	 BIOENERGY	 SUSTAINABLE FOOD	 BIOCHEMICALS	 BIOMATERIALS
 PRODUCT	• Energy generation from biomass • 2G ethanol • Biofuels and advanced biofuels (HVO & SAF) • Renewable hydrogen • Power-to-X & e-Fuels	• Non-GMO • Healthy and nutritious proteins, fibers, and grains • Low-fat oils and fats • Animal feed • Plant-based products	• Solvents and surfactants • Olefins • Bio-sanitizers and bioprotectants • Pharmaceuticals • Cosmetics • Biofertilizers and slow-release agrochemicals	• Bioplastics • Biomedical materials • Biocomposites • Biopolymers • Wood
 MARKET DRIVERS	The rising standard of living in a growing global population will likely continue to drive energy demand. However, more than 80% of the world's total energy consumption still comes from fossil fuels.	There is a major gap between the amount of food we produce today and what will be needed to feed everyone by 2050. At the same time, there is an urgent need to reduce GHG emissions from agriculture and prevent further deforestation.	The chemical industry is considered a "hard-to-abate" sector, where decarbonization alternatives are technically challenging. Its transition toward net-zero emissions remains relatively unexplored.	The industrial sector still depends heavily on fossil-based materials, and achieving net-zero will be impossible without developing renewable alternatives to fossil-based materials.

Source: adapted from S.Oleum (2025)

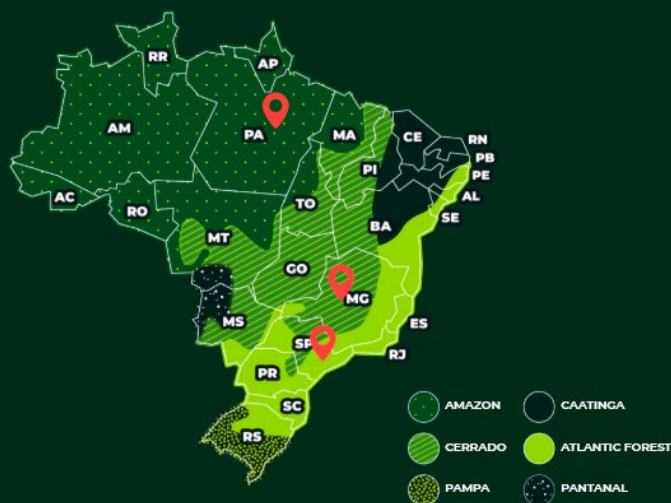
INOCAS

Business Model

Since 2014, INOCAS has been a pioneer in developing the macaúba production chain. Its business model focuses on providing a sustainable alternative to soybean and palm oils by cultivating macaúba in Agroforestry Systems (AFS) and Crop-Livestock-Forest Integration (CLFI) models. The approach also integrates local communities into sustainable agro-industrial production, combining income generation with ecological restoration.

INOCAS's main area of operation is located in the Amazon biome, in the municipalities of Tracuateua and Bragança, in northeastern Pará—about 200 km from the state capital. The company maintains a centralized operational model, with 1,200 hectares planted across 10 farms, as well as seedling nurseries and processing infrastructure.

Image 1: Location of INOCAS's operations



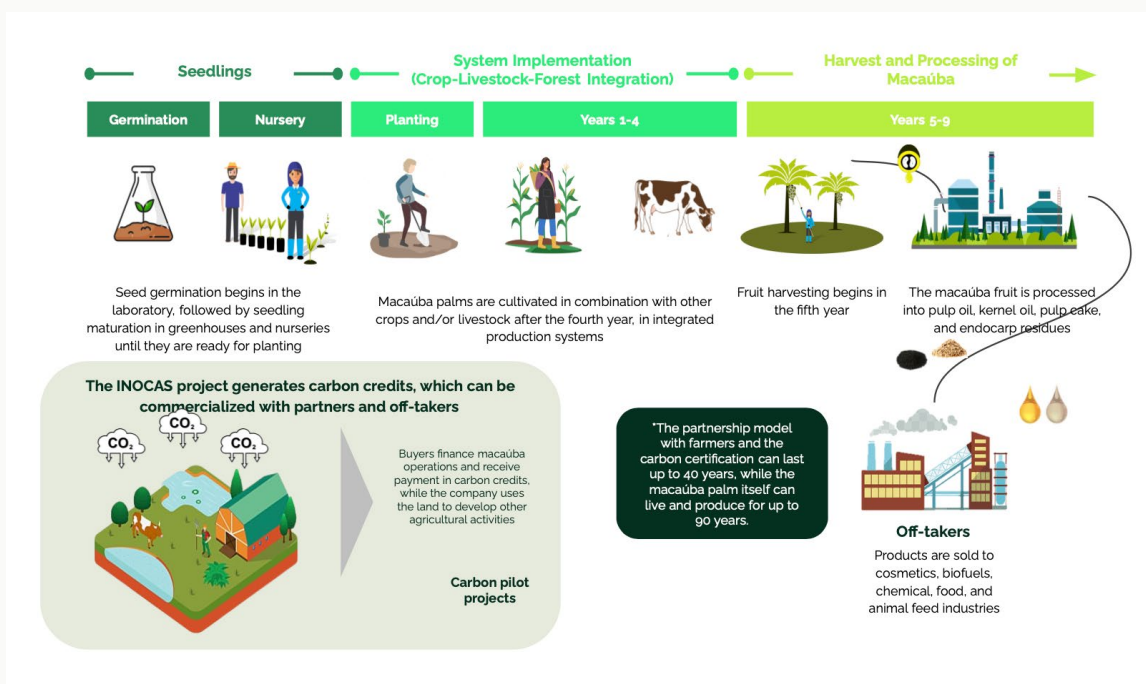
Source: authors (2025)

INOCAS' Differentiator: Pioneering Macaúba Cultivation with Sustainable Solutions for Bioactives and Landscape Restoration

INOCAS positions itself in the vegetable oil and Nature-based Solutions (NbS) markets with a strong competitive edge built on its R&D expertise, sustainable business model, and operational adaptability.

The company operates through a vertical integration model, covering the entire value chain — from research and development (R&D), seed germination, planting, and management, to the commercialization of vegetable oils (pulp and kernel oils), pressed cakes, by-products, and carbon credits.

Figure 4: INOCAS Model for Developing the Macaúba Production Chain



Source: adapted from INOCAS (2025)

Its main differentiator lies in the use of macaúba within an efficient and sustainable production model. The palm is planted on degraded pastures, intercropped with agricultural crops and, later on, livestock (Crop-Livestock-Forest Integration – CLFI). During the first three to four years, while the palms are still young and small, the system operates as an agroforestry model, including short-cycle crops such as cassava, corn, beans, banana, and watermelon. This intercropping revenue strategy is crucial to

strengthen the business model, as it reduces the capital required from investors, given that macaúba only begins to produce significant fruit yields from the seventh year onward. From the fourth year, livestock can be reintroduced in a silvopastoral system, or the agroforestry model can be maintained with perennial crops such as coffee or cocoa.

Figure 5: INOCAS Model for Implementing Agroforestry Systems (AFS) and Crop-Livestock-Forest Integration (CLFI) in Macaúba Production



Source: adapted from INOCAS (2025)

INOCAS possesses deep technical expertise in the vertical integration of the macaúba value chain, having accumulated more than 12 years of R&D, through which it has developed unique know-how in germination and cultivation of this native Brazilian palm.

The team has also demonstrated strong adaptability, shifting its strategic focus to the Amazon region and adopting a more centralized operational model, resulting in greater planting efficiency. In addition to its expertise in macaúba production, INOCAS has experience managing a complex value chain with industrial activities, including an in-house oil mill developed in its Minas Gerais hub.

The company's business model is guided by sustainability principles and aims to deliver disruptive solutions for implementing Nature-based Solutions (NbS) within the macaúba production chain. By prioritizing agro-silvopastoral systems and planting on degraded pastures, the company contributes to soil regeneration, increased water infiltration, and improved carbon balance.

Intercropped macaúba planting avoids competition with food crops, unlike soy or palm oil, while offering superior productive efficiency compared to these other oilseeds. At full operational capacity, expected productivity reaches 25 tons of fruit per hectare per year, yielding 3,500 to 4,500 liters of oil per hectare per year.

Figure 6: INOCAS's Impact Ambition

Indicator	2025	2030 Target
 Restored area under management	1.000ha	10,000ha
 Families involved	100+	1,500+
 Estimated VCUs per year	50,000 tCO ₂	+ 2.0 million tCO ₂

Source: adapted from INOCAS (2025)

The model also creates formal employment, promotes the social reintegration of inmates from the APAC prison system through seed extraction activities, and establishes partnerships with family farmers to diversify and increase farm productivity.

INOCAS has been awarded and recognized by several national and international institutions:

- 1st Place in the Global Competition promoted by the World Bank (2011)
- Winner of the 2nd Climate Ventures “Good Businesses for the Climate” Call (2019)
- 1st Place in the World Championship for Forest Sustainability Projects (2014)
- Awarded by the 20x20 Initiative – Project of the Year (2014)
- Brazil–Germany Innovation Award (2015)
- 1st Place in the Brazil SDG Strategy Award (2022)
- Highlight in the Agroforestry Challenge (Fundo Vale, Reserva Natural Vale, and Troposlab) (2020)



Verra Certification



In addition to the regenerative benefits of macaúba cultivation, INOCAS's operations are carbon-neutral, maintaining a highly positive carbon balance: each ton of oil produced sequesters 2.3 tons of CO₂ equivalent. Independent studies conducted by Imaflora and Ecosecurities indicate that the INOCAS macaúba ICLFS model sequesters between 16 and 21 tons of carbon per hectare per year, with an average of 11 tons/ha/year eligible for commercialization.

Recently, the company had its Project Development Document (PDD) for carbon credit certification approved by Verra, a leading global certifier. Project 4137¹: Macaúba Productive Second Floor is a Verified Carbon Standard (VCS) AFOLU (Agriculture, Forestry, and Other Land Use) project, and its PDD — developed by Ecosecurities and registered with Verra — demonstrates that the macaúba cultivation model is an effective carbon sequestration system. This certification allows INOCAS to use carbon credits as collateral for agricultural loans and enables revenue pre-financing, with returns linked to the issuance of VCUs (Verified Carbon Units).

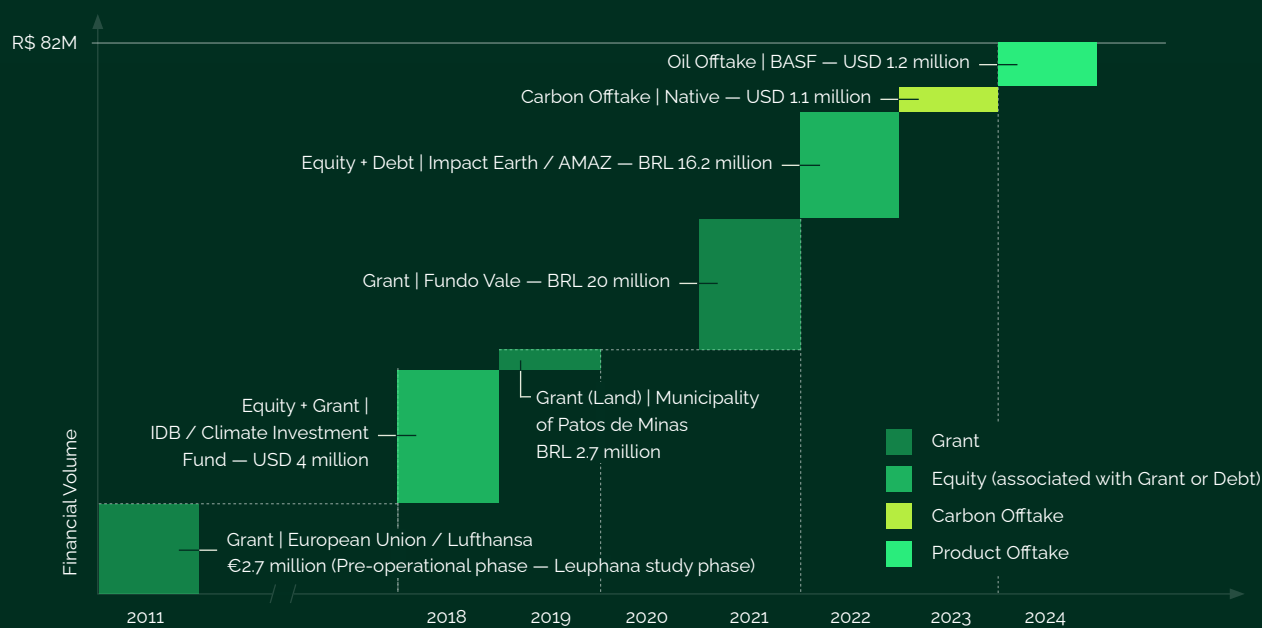
¹ More information about Project 4137 is available [here](#).

INOCAS's Current Scenario and Future Vision

The Financing Journey

INOCAS's operations began with a grant secured in 2011. In 2018 and 2019, the company received additional grants structured to include equity participation and the donation of assets (land to enable its initial operations). Building on this foundation, INOCAS developed its fundraising strategy through off-take agreements — both for products (such as macaúba oil and seeds) and for carbon credits. In 2022, the company received a new round of funding in the form of a grant and debt instrument, which was used to expand its operations. The company's financing journey and total amounts raised are illustrated in Chart 1.

Chart 1: INOCAS's Funding History



Source: authors (2025)

The INOCAS Amazon Hub is the central axis of the company's growth and consolidation strategy. This operation marks INOCAS's transition toward a vertically integrated, sustainable, and financially innovative production model, leveraging the socio-environmental and economic potential of the Amazon biome. The goal for the hub is to reach 10,000 productive hectares by 2030, with an additional 50,000 hectares available for long-term leasing (contracts of up to 40 years).

The production strategy combines short-term profitability with the gradual maturation of macaúba, balancing sustainability and economic return. To generate early cash flow, the company cultivates cassava (300 ha in PoC and 500 ha in production) and is also testing corn, banana, and watermelon. These intercropped crops help reduce the need for intensive capital during the project's early years. The first commercial macaúba harvest in Pará is expected in 2028, when the plantations reach full productive maturity.

INOCAS Amazônia adopts an inclusive territorial development model, focused on job creation, land regularization, and the empowerment of family farming. The company is the largest formal employer in Tracuateua, with 70 direct employees, contributing significantly to the strengthening of the local economy. INOCAS maintains long-term (40-year) contracts with family farmers, integrating them into the macaúba production system and associated intercropped crops. In addition, the company collaborates with the municipal governments of Tracuateua, Bragança, and Capanema to support land titling and regularization, ensuring legal security and enabling the expansion of new production areas.

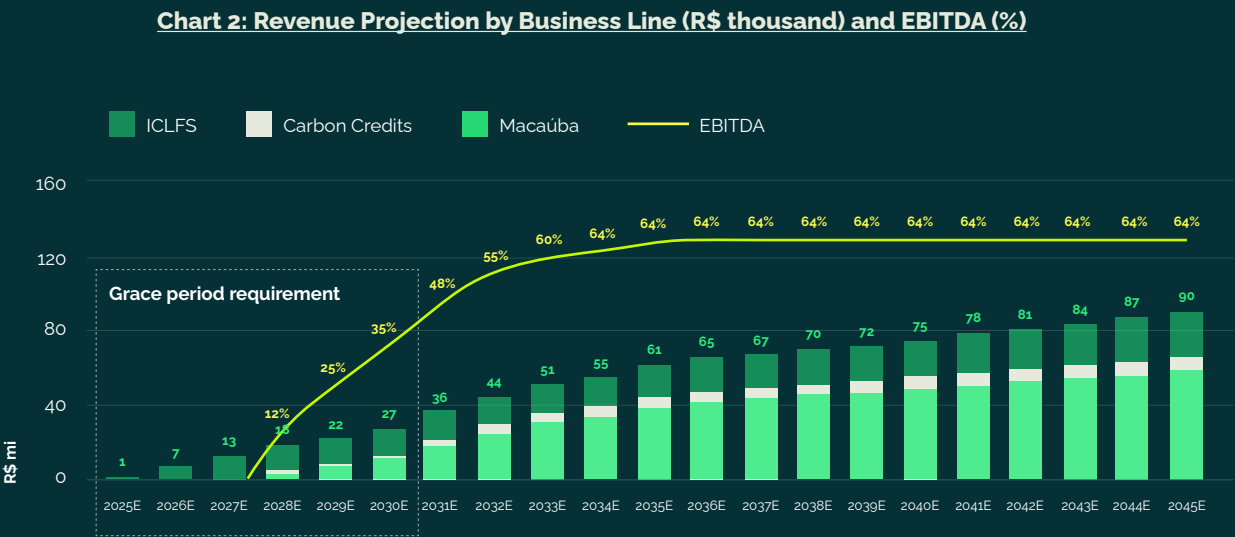
The development of a local industrial structure is essential to consolidate the macaúba value chain and maximize regional value addition. INOCAS has been negotiating with local government authorities to enable the installation of an industrial plant for macaúba oil extraction, including a product processing laboratory. Because macaúba pulp oil must be processed within 10 days after harvest, local industrialization becomes a strategic necessity. The proximity to the ports of Belém and São Luís offers a logistical advantage for export operations.



Financial Instruments to Enable Expansion

The recent economic and financial assessment of INOCAS Amazônia, conducted by UHY Bendoraytes (as of April 30, 2025), consolidated the company's economic value based on a scenario involving the implementation of 1,200 hectares under long-term production and a real discount rate of 17.9% per year. This assessment confirms the economic feasibility of the project, while also highlighting **the need for additional capital to sustain growth and fully implement the business plan**—particularly during the critical years between 2025 and 2030, when cash flow remains negative due to initial investments.

Chart 2² presents the projected evolution of consolidated revenue and EBITDA margin over time. The projection indicates an initial grace period (2025–2030), followed by strong growth beginning in 2028, when operations start generating consistent results. EBITDA stabilizes around 64% from 2033 onward, reflecting the operational efficiency of the agro-industrial model and the combination of the company's three main revenue streams: CLFI systems, carbon credits, and macaúba oil production.



Source: authors (2025)

² For more information, access [here](#).

The strategic challenge lies in structuring a hybrid financing platform that combines green debt instruments, patient capital, and blended finance mechanisms to ensure liquidity while maintaining a competitive cost of capital.

The INOCAS Amazônia fundraising structure must balance socio-environmental impact and financial returns, positioning the project as a regenerative asset eligible for financing. The following guidelines define the design of the financial architecture:



Equity (own capital)

The core instrument to support the growth and consolidation of INOCAS Amazônia. The equity fundraising strategy focuses on attracting patient capital and strengthening the subsidiary's governance structure. Equity investment is essential to finance the implementation of agroforestry systems, sustain the macaúba maturation cycle, and reduce dependency on debt, given the project's capital-intensive and long-term investment profile.

This mechanism is also crucial for improving market risk perception and attracting strategic investors committed to both environmental impact and sustainable financial returns. Equity also serves as a leverage base for complementary instruments—such as blended finance, agricultural debt, and carbon off-take agreements—thereby facilitating access to credit. Given the growing investor interest in sustainable assets in the Amazon, equity has become a structuring mechanism to unlock capital, expand operations, and position INOCAS as a leading reference in large-scale regenerative agroforestry.



Product and Carbon Off-Take Agreements

These are structured financial mechanisms that allow revenue anticipation and the creation of long-term guarantees, essential given macaúba's long production cycle. INOCAS seeks product off-take contracts as instruments for cash flow stability and risk mitigation, providing access to capital before reaching full productive maturity. Regarding carbon credits, the company has a Verra-certified project, with a registered PDD estimating an average sequestration rate of 11 tCO₂e/ha/year. These VCUs (Verified Carbon Units) can be used as collateral for agricultural debt and green financing instruments.



Development Capital

Access to development instruments and subsidized credit lines is crucial to enable INOCAS's expansion and consolidation, especially considering the high capital expenditure (CAPEX) and long maturation cycle of macaúba plantations.

INOCAS Amazônia positions itself as one of the first scalable regenerative investment vehicles in the Amazon, combining financial profitability, positive environmental impact, and social inclusion. The company integrates productive biological assets, certified carbon credits, and a replicable agroindustrial model, establishing itself as a green transition case with global capitalization potential.



Strategic Recommendations: Exploring Funding Sources Through Development Finance

It is recommended that the company prioritize fundraising through public mechanisms that support innovation and sustainability, with emphasis on:

1. FINEP Financing Lines: The Funding Authority for Studies and Projects (FINEP) represents a strategic opportunity to support the industrial and technological structuring of INOCAS, particularly within the Amazon Hub. The FINEP Industrial Financing Call for the Amazon, with a minimum funding amount of R\$ 2 million, could enable the construction of the company's pilot plant in the region, especially considering the potential for partnerships with local municipalities for land allocation. Securing subsidized capital through FINEP is recommended to reduce dependence on commercial debt and philanthropic resources, while simultaneously expanding infrastructure and innovation capacity.

2. ANP R&D Investment Clause: Another recommended opportunity is accessing the Research, Development, and Innovation (R&D&I) Investment Clause from the National Agency of Petroleum, Natural Gas, and Biofuels (ANP). This clause requires oil and gas companies to allocate a portion of their investments to R&D&I projects, creating opportunities for strategic partnerships with bioenergy ventures. INOCAS's business model, focused on the production of sustainable biofuels, is fully aligned with ANP's guidelines and with public decarbonization policies such as RenovaBio and the National Biojet Fuel Program (Law No. 14.248/2021). Petrobras, as the largest contributor under this clause, represents a priority partner for engagement. INOCAS projects may be submitted through the **official ANP channel (Sigitec platform).¹

The integration of FINEP credit lines with ANP R&D&I resources could create an appropriate financial arrangement, combining public, private, and catalytic capital. This model would enable INOCAS to accelerate the development of its industrial plant and quality laboratories in Pará, reduce financial risks and expand access to credit guarantees, and enhance the environmental and social returns of projects within the Amazon Hub.

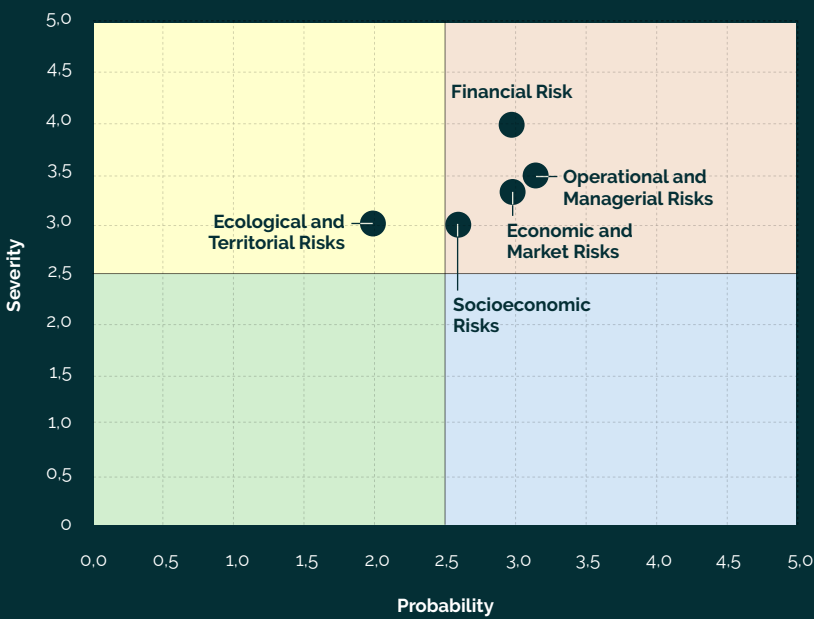
³ Access [here](#).

Risk Map

The risk map is a visual tool that categorizes and quantifies different types of risks — Ecological and Territorial, Socioeconomic, Economic and Market, Operational and Management, and Financial — in terms of their Severity (Impact) and Probability of occurrence. The Severity scale measures the potential impact of each risk, ranging from 1 (Insignificant), representing minimal impact that can be absorbed by day-to-day operations, to 5 (Very High), representing an existential impact that threatens business continuity. Meanwhile, the Probability scale assesses the likelihood of occurrence, ranging from 1 (Very Low) — such as climatic stability or balanced capital structure — to 5 (Very High), as in the case of an extreme weather event or imminent cash crisis.

Risks are plotted on a 2x2 matrix (with a threshold of 2.5) to determine the strategic priority for mitigation: critical risks (high severity and high probability) require immediate attention, while residual risks (low severity and low probability) can be accepted with periodic monitoring. This tool serves as a central element in investor assessments, highlighting the most direct threats to the company's viability and business plan.

Chart 3: INOCAS Risk Map



The table below summarizes the main risks assessed and the ongoing actions adopted by INOCAS to mitigate the potential negative effects of these risks.

Table 1: Main Identified Risks and Mitigation Actions

AXIS	PERCEPTIONS OF POTENTIAL ASSOCIATED RISKS	ONGOING MITIGATION ACTIONS
Ecological and Territorial Risks	Presence of fire risk in the region; operation on already degraded lands, but with native forests nearby; land tenure risks in the region; low exposure to pests, and presence of Indigenous or traditional territories.	Individual and collective fire brigade actions in partnership with neighboring producers; expansion of water capture systems for irrigation and fire control; legal oversight of land deeds and ownership documentation.
Socioeconomic Risks	Region with numerous smallholder farmers lacking income alternatives; low education and HDI levels; limited availability of local labor; exposure to carbon regulation and approval processes under CORSIA (Sustainable Aviation Fuel – SAF).	Partnership programs with local governments to expand community-based macaúba cultivation, providing income opportunities; expansion of production to other municipalities (e.g., Uberaba); diversification of the product portfolio and business model anchored in established markets; strong coordination with local governments.
Economic and Market Risks	Fluctuation in commodity prices (e.g., biodiesel); exposure to cost of capital.	Business model resilience supported by food and animal feed markets; equity-based fundraising strategy; pursuit of low-interest capital sources.
Operational and Managerial Risks	Control of macaúba productivity; governance and corporate structure risks.	Strong monitoring of planting and productivity-related variables; operational focus on seedling quality and planting efficiency; robust governance and risk management processes; clear segregation between productive and non-productive operations; ongoing actions to implement pilot-plant infrastructure in neighboring municipalities through technical cooperation agreements.
Financial Risk	Runway and short-term investment needs; financial leverage; uncertainty in consumer markets (revenue).	Expansion of fundraising through development capital (ANP R&D&I Clause) and carbon and product off-take contracts; advanced negotiation rounds with investors; solid financial management; audited balance sheet.

Fonte: elaborado pelos autores (2025)

NIL's Contribution to INOCAS

The Nature Investment Lab (NIL) proposed a paradigm shift in INOCAS's growth plan: rather than pursuing full vertical integration of the macaúba value chain—from seed genetic development to oil production (for SAF)—NIL suggested that INOCAS focus its resources on the **accelerated expansion of planting areas**, a domain in which the company already excels and holds strong market leadership. This approach enables INOCAS to partner with complementary companies to build the complete macaúba production chain collaboratively.

This strategy prioritizes scale and logistical efficiency by first establishing a broad base of directly managed areas and, in a subsequent phase, promoting the integration and empowerment of family farmers as productive satellites. In doing so, the company can achieve accelerated growth, reduce unit costs, and enhance its attractiveness to investors, **creating a replicable and financially sustainable model for regional expansion**.

NIL also recommended adjustments to the financial model to unlock access to new sources of capital and strategic partners, with greater **emphasis on product off-take agreements and equity-based investment participation**. Additionally, NIL identified public funding opportunities, such as FINEP credit lines and the ANP R&D&I Investment Clause. Finally, NIL suggested maintaining focus on the agricultural and silvicultural operations already stabilized, while expanding into new areas within the Amazon and advancing the VCS Verra 4137 project, which has been validated and is currently under verification for carbon credit issuance.

Lessons for the Ecosystem

Since 2011, INOCAS has been a pioneer in developing the macaúba production chain. Its business model offers a sustainable alternative to soybean and palm oils by cultivating macaúba in agroforestry systems and Crop-Livestock-Forest Integration (CLFI) models. The approach also integrates local communities into sustainable agro-industrial production, combining income generation with ecological restoration.

The INOCAS case provides key contributions to the regenerative agriculture ecosystem and the bioeconomy value chains, particularly for those facing financing and consolidation challenges. The company demonstrates a scalable business model focused on its core competence—macaúba cultivation in the Amazon—prioritizing scale and logistical efficiency while establishing a broad base of managed areas. This initial focus attracts investors and reduces unit costs, representing a financially and operationally more sustainable strategy than full vertical integration.

The validation of the carbon project (VCS) by Verra, along with the structuring of a robust MRV system (Monitoring, Reporting, and Verification), establishes a concrete precedent for asset-backed environmental financing (carbon off-take), enabling access to new sources of capital beyond traditional mechanisms.

These are crucial elements for consolidating a regenerative and inclusive bioeconomy. At the same time, the redesign of the capital structure, focused on hybrid guarantees and risk segregation, sets governance standards that help mitigate reputational risks and unlock access to new structured financing for the sector.

During NIL's advisory period, important steps were incorporated into INOCAS's financing journey, including a stronger focus on accessing public funding mechanisms (such as FINEP and the ANP R&D&I Investment Clause) and on horizontal positioning within the value chain, emphasizing seedling production and planting.

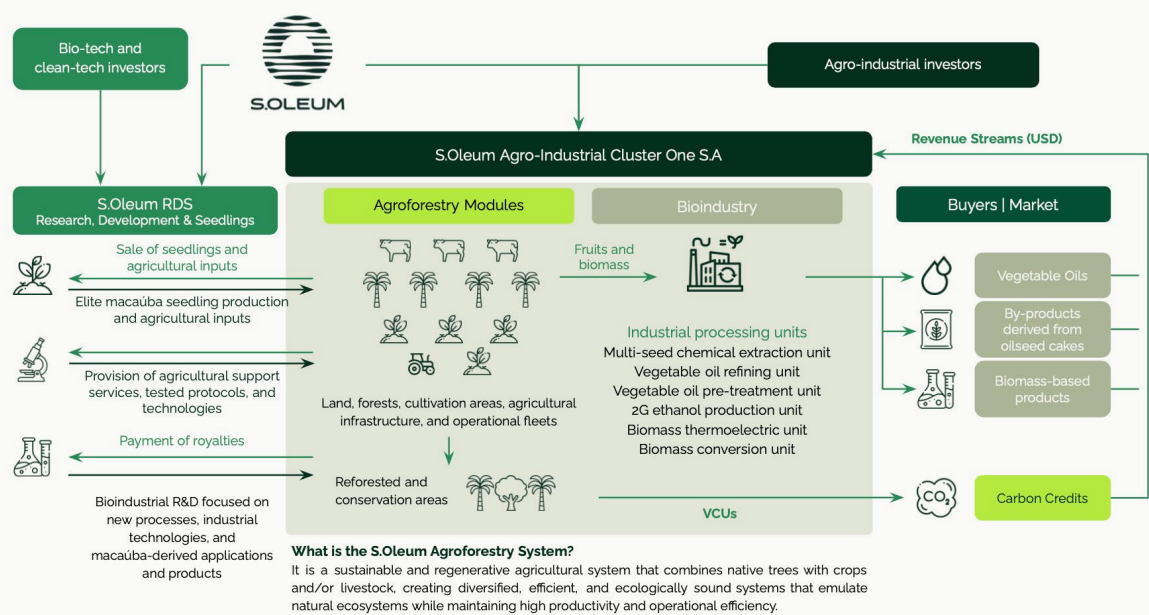
S.Oleum Business Model

S.Oleum is a company dedicated to producing sustainable raw materials with large-scale negative carbon intensity, aiming to transform the energy, chemical, and food industries through regenerative agroforestry systems.

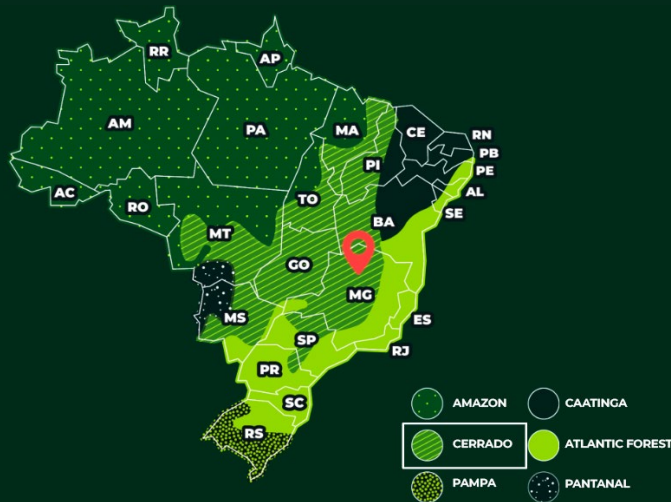
To develop the macaúba value chain—also known as the Brazilian yellow coconut—the company created S.Oleum RDS (Research, Development & Seedlings) in 2006. Based on a science- and technology-driven approach, and through consistent R&D investments in biotechnology, RDS has been exclusively dedicated to the domestication of macaúba, following the same path taken by other agricultural crops in the past until they reached their optimal performance.

Native to the Brazilian Cerrado, known for its resilience to harsh climatic conditions and the versatility of its oil across multiple industrial segments, macaúba stands out as the most promising alternative for the biodiesel and Sustainable Aviation Fuel (SAF) markets.

Figure 8: S.Oleum Business Model



Source: adapted from S.Oleum (2025)

Image 1: Location of S.Oleum's operations

Source: authors (2025)



S.Oleum is strategically located in João Pinheiro, in the northwest region of Minas Gerais, within the Cerrado Mineiro biome. This area is characterized by vast stretches of degraded pastures and low-fertility soils, where **macaúba demonstrates a remarkable adaptive capacity**, achieving high oil productivity compared to other crops.

The region has historically undergone land-use transitions, dominated by livestock (beef and dairy), agriculture (soy, corn, sugarcane), and silviculture. João Pinheiro stands out for having the largest eucalyptus plantation area in the state, ranking first nationwide in silviculture production value in 2021.

S.Oleum's business model, based on regenerative agroforestry systems, focuses on the use of degraded lands, contributing to the restoration of these ecosystems.

S.Oleum's Differentiator

Since its establishment about 17 years ago, S.Oleum has built and consolidated the thesis that the development potential of macaúba for biofuel applications is directly linked to the domestication and genetic improvement of its seeds—a path already taken by other agricultural crops (such as corn) until their large-scale production reached optimal performance levels.

Guided by a **science- and technology-based approach**, and **supported by continuous R&D investments in biotechnology**, S.Oleum created the RDS division, a laboratory dedicated exclusively to the domestication of macaúba.

In addition to its technical expertise in germination (overcoming the seed dormancy process), genetic control, and cloning, the company demonstrates effective use of FINEP funds and ANP's R&D&I Investment Clause resources, supported by a solid corporate structure and established governance. S.Oleum also leads a unique agro-industrial project with strong impact potential and technical-production feasibility, integrating silvopastoral systems, forest conservation, and biorefining.

S.Oleum stands as an emblematic case of institutional and financial innovation for large-scale regenerative projects, proving that it is possible to design sophisticated structures combining multiple financial instruments that integrate agroindustry, ecological restoration, and social impact.

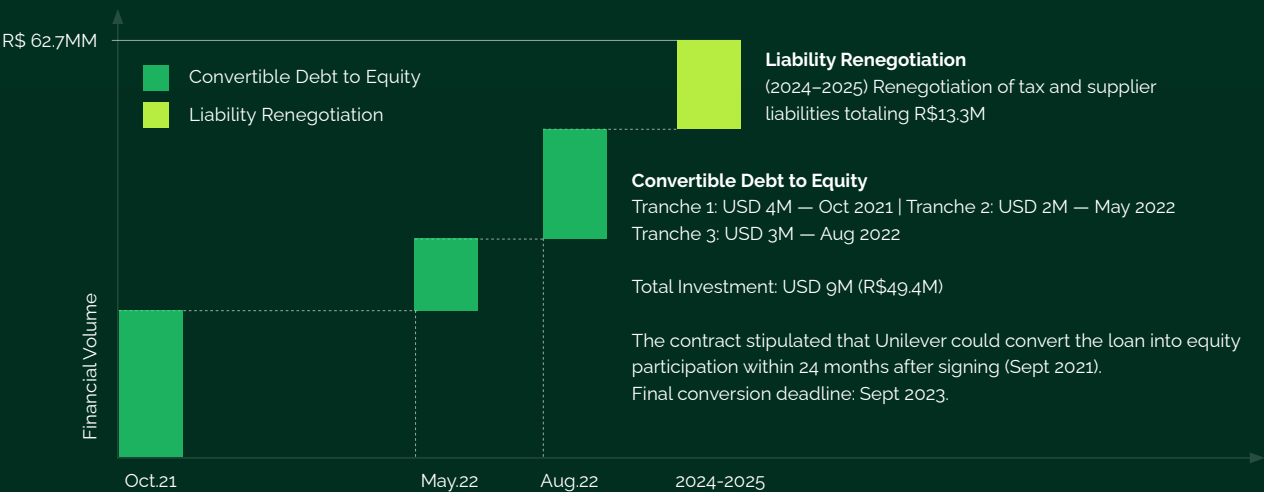
S.Oleum's Current Scenario and Future Vision

The Financing Journey

The S.Oleum business model has resulted in its primary asset: mastery of the macaúba domestication process, achieved through nearly R\$100 million in continuous R&D investment. Historically, S.Oleum has remained distant from impact- or climate-focused investors, ecosystems relatively new to the company, which has primarily developed through relationships with large corporations in the oil, gas, and food sectors.

Initially, the company secured USD 9 million (R\$49 million) through a convertible debt agreement with a major food industry player. While this capital injection enabled project implementation, the structure itself limited future fundraising opportunities. In recent years, S.Oleum has had to finance its operations through liability management, including the renegotiation of tax and supplier debts, as illustrated in Figure 9.

Figure 9: S.Oleum's Funding History



Source: authors (2025)

The fundraising plan aims to consolidate the implementation of S.Oleum RDS (the laboratory), enabling the regenerative production of high-yield macaúba seeds to serve both domestic and international markets.

To achieve this, the company has structured a **robust long-term financing model** in response to its current leveraged position (holding-level debt) and the absence of revenue until 2028. Key strengths supporting this plan include:

- 
 - Outstanding technical expertise in germination (breaking seed dormancy), genetic control, and cloning.
- 
 - Effective use of public funding mechanisms, including FINEP and the ANP R&D&I Investment Clause, totaling nearly R\$110 million (R\$30 million already invested over 17 years, R\$10 million recently secured, and R\$71 million in the final approval stage with the National Agency of Petroleum and Gas (ANP), both of the latter not yet disbursed).
- 
 - A consolidated corporate structure with established governance.
- 
 - A unique agro-industrial project combining impact, technical feasibility, and productive efficiency (silvopastoral systems, forest conservation, and biorefining).
- 
 - Significant progress in developing the industrial plant and managed plantation areas, supported by funds from the ANP R&D&I Clause.

The funds will be allocated to restructuring current debt and mitigating financial risks associated with the long initial non-productive cycle of the crop, ensuring sufficient capacity to transition toward a profitable and scalable operation. The investment will enable the expansion of nurseries, the automation of agricultural processes, and the implementation of an extraction and refining plant for vegetable oil production, as well as the generation of cellulosic ethanol, biochar, and bio-oil.

The project foresees a total fundraising target of R\$90 million by 2027 to sustain its growth strategy:

- **Short Term (2025):** Raise R\$40–60 million to refinance existing debt, maintain essential operations, and ensure the company's solvency.
- **Medium Term (2026–2027):** Raise R\$30–40 million to implement seedling nurseries, develop agro-industrial and logistical infrastructure for the cluster, and integrate the Petrobras R&D&I program.
- **Long-Term Expansion Plan (from 2028 onward):** Raise R\$400–500 million to expand productive areas, acquire land, and capitalize intellectual property to enable international monetization of the model.

To support its operations, S.Oleum received a convertible debt of R\$49.4 million, whose conversion period has already expired.

Strategic Recommendations: Combining Complementary Instruments Across Phases

The financial strategy of S.Oleum combines complementary instruments, structured in phases, to mitigate risks, ensure liquidity during the initial stages, and enable the project's industrial and territorial scaling.

Table 1: Suggested Phasing for Project Implementation

PROJECT PHASE	PERIOD	STRATEGIC NEED	PRIORITY FINANCIAL INSTRUMENTS
I. Implementation and R&D	2025-2027	Financial stabilization, nursery expansion, and R&D	Debt reprofiling, Blended Finance, Guarantee Funds
II. Agro-Industry and Operationalization	2028-2030	Scaling agro-industrial operations and consolidating off-takes	FIDC, Green CRA, Off-take Contracts
III. Territorial Scaling	Post-2030	Replication, asset monetization, and global impact	Strategic Equity, Concessions, Intellectual Property Royalties

Source: authors (2025)

The main financial instruments to be considered by S.Oleum are:

Strategic Equity: Aimed at institutional investors and impact funds with a long-term vision. It finances the consolidation of the productive base, land acquisition, and the monetization of intangible assets, such as intellectual property and plant genetics.

Blended finance: Strategic allocation of philanthropic capital, impact investment, and conventional credit, reducing perceived risk among private investors. It is essential to support Petrobras's R&D&I program and sustain the agro-industrial pre-operational cycle.

FIDC and Green CRA: Securitization structures backed by future receivables—such as off-take contracts for vegetable oil and carbon credits—that enable access to capital market funding. These instruments are prioritized to finance the expansion of nurseries, agro-industrial infrastructure, and logistics operations within the João Pinheiro cluster.

Debt Structures: Focused on renegotiating existing liabilities, extending maturities, and adjusting financial conditions to rebalance cash flow and ensure short-term solvency. This stage aims to stabilize operations and lay the groundwork for larger-scale fundraising.

Guarantee Mechanisms: Risk mitigation and credit enhancement tools that provide partial guarantees to attract institutional capital and reduce sectoral risk perception.

Off-take Contracts for Products and Carbon: Pre-purchase agreements for vegetable oil and carbon credits, functioning as guaranteed cash flow and forming the basis for securitization operations and the issuance of thematic bonds.

Each financial instrument is anchored to value-generating assets within the business model:

- Equity will be backed by high-value assets such as the germplasm bank, commercial clones, and a pipeline of production and licensing partnerships.
- FIDC and CRAs will be structured based on off-take contracts for traceable vegetable oil and VCUs derived from agroforestry systems.
- Guarantee funds will safeguard against liquidity risks and climate uncertainties, facilitating credit access through multilateral banks.

This architecture seeks to align the project phases with investor risk appetite, mitigate structural risks, and maximize the economic, environmental, and social impact of the S.Oleum model.



Other Relevant Models

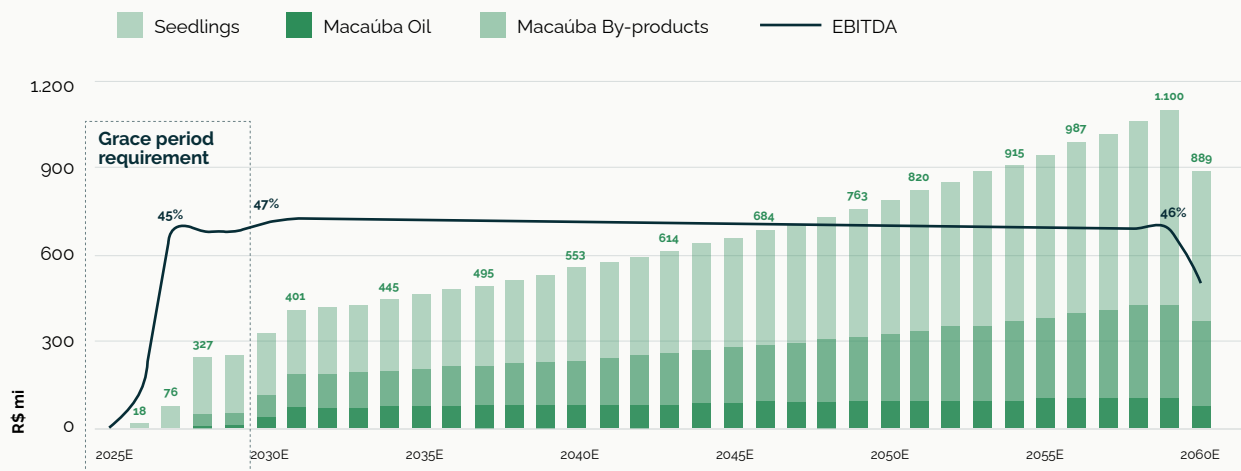
In addition to these financial structuring recommendations, during NIL's advisory process a unique opportunity was identified to expand macaúba production in the João Pinheiro region while simultaneously increasing income opportunities for local smallholder farmers. This potential emerged from in-person discussions between NIL, the municipal government, and the entrepreneur, which revealed that **community-based macaúba expansion on non-productive smallholder lands could unlock up to 45,000 hectares of available soil, generate income for 1,000 local producers, and, most importantly, reduce macaúba planting and maintenance costs by half.**

This opportunity will require new operational expertise, where S.Oleum's knowledge and mastery of macaúba domestication and cultivation must be transferred to local producers. Given the need for technical coordination and capacity building, this initiative is being further developed and expanded in collaboration with other ecosystem stakeholders.

Revenue and Value Generation Outlook: Economic Projection of the S.Oleum RDS Project

The following chart summarizes the expected evolution of revenue and EBITDA margin throughout the project's lifecycle, highlighting the revenue structure based on three main pillars: seedlings, macaúba by-products (cakes and meals), and vegetable oil.

Chart 3: Revenue and EBITDA Margin Projection



Source: authors (2025)

Financial Model Highlights:

- The project begins with a grace period between 2025 and 2028, during which cash generation remains limited (R\$18,000 to R\$245,000 per year), requiring intensive use of own capital, structured debt, or subsidies.
- From 2029 onward, revenue is expected to **grow progressively**, reaching R\$553 million in 2040E and exceeding R\$1.1 billion in 2059E, with EBITDA margins stabilizing between 45% and 47% throughout the project's lifecycle.
- The revenue mix is well diversified, comprising **cloned seedlings, pulp/kernel oils and by-products, and VCU** (carbon credit) sales as incremental income.
- The projected EBITDA peak reaches **R\$889 million** in 2059E, with a slight deceleration in 2060E, associated with the end of the productive life cycle of the initially planted areas.

This projection demonstrates the project's potential as a large-scale regenerative asset, offering a strong long-term return on capital and a profile well aligned with climate finance vehicles, institutional impact investors, and international bioeconomy programs.



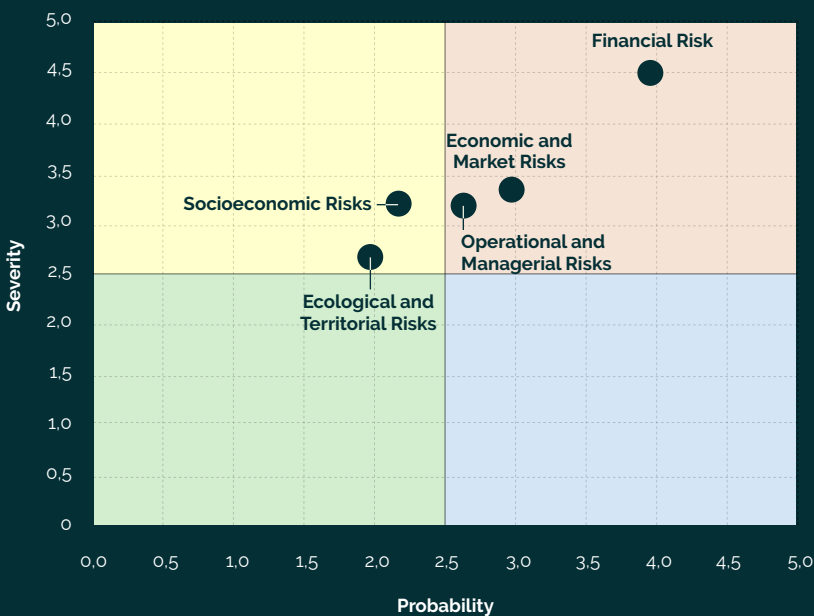
Image: Macaúba with two harvests (Source: S.Oleum)

Risk Map

The risk map is a visual tool that categorizes and quantifies different types of risks (Ecological and Territorial, Socioeconomic, Economic and Market, Operational and Managerial, and Financial) in terms of their Severity (Impact) and Probability of occurrence. The Severity scale measures the potential impact of the risk, ranging from 1 (Insignificant), with minimal impact easily absorbed by daily operations, to 5 (Very High), representing an existential impact that threatens business continuity. The Probability scale, in turn, assesses the likelihood of occurrence, ranging from 1 (Very Low) (such as climate stability or an adequately balanced capital structure) to 5 (Very High) (such as an extreme weather event or an imminent cash flow crisis).

Risks are positioned in a 2x2 matrix (based on a 2.5 threshold) to determine strategic mitigation priorities: critical risks (high severity and high probability) require immediate attention, while residual risks (low severity and low probability) can be accepted with periodic monitoring. This tool serves as a central element in investor assessment, identifying the most direct threats to the company's viability and business plan.

Chart 4: S.Oleum Risk Map



Source: authors (2025)

The table below summarizes the main risks assessed and the ongoing actions adopted by S.Oleum to mitigate the potential negative effects of these risks.

Table 2: Main Identified Risks and Mitigation Actions

AXIS	PERCEPTIONS OF POTENTIAL ASSOCIATED RISKS	ONGOING MITIGATION ACTIONS
Ecological and Territorial Risks	Presence of fire risk in the region; operation on already degraded lands; risk of crop loss caused by cattle and peccaries (trampling and feeding on macaúba leaves and stems); low exposure to pests; absence of Indigenous or traditional territories; no land tenure risks identified.	Individual and collective fire brigade actions in partnership with neighboring producers; expansion of water capture systems for irrigation and fire control; fencing of macaúba areas until trees reach four years of age; creation of natural fences by planting other crops that serve as food for wild animals (such as cassava).
Socioeconomic Risks	Region with numerous smallholder farmers lacking income alternatives, causing social pressure on the municipality; low availability of local labor; exposure to carbon regulation and the approval process of CORSIA (Sustainable Aviation Fuel – SAF).	Partnership programs with the local government to expand community-based macaúba cultivation, providing income opportunities; expansion of production to other municipalities (e.g., Uberaba); diversification of the product portfolio and business model anchored in existing markets.
Economic and Market Risks	Fluctuation in commodity prices (biodiesel); exposure to cost of capital.	Business model resilience supported by food, consumer goods, chemical, and animal feed markets; equity-based fundraising strategy.
Operational and Managerial Risks	Control of macaúba productivity; governance and corporate structure risks.	Strong control over genetics, cloning, and productivity-related variables; operational focus on seed and seedling production as a key solution within the value chain; certification of seed origin to ensure genetic family traceability; implementation of pilot plant infrastructure using development funds.
Financial Risk	Inflationary pressure on inputs; short-term investment needs (runway); financial leverage; uncertainty in consumer markets (revenue).	Expansion of fundraising through development capital (ANP R&D&I Clause); advanced negotiation rounds with multilateral banks; ongoing negotiation of product off-take contracts.

Source: authors (2025)

NIL's Contribution to S.Oleum

The Advisory's support to S.Oleum, given its focus on the financial consolidation of the laboratory as the company's main strategic asset, followed a different dynamic from that applied to other ventures.

Our role centered on assisting the entrepreneur in revisiting the company's fundraising journey to extract key learnings, reassess liabilities and financial projections, and structure a new strategic direction—which led to the focus on S.Oleum RDS (the laboratory), now fully adopted by the entrepreneur.

The Advisory also identified the opportunity for S.Oleum to establish a partnership or cooperation agreement with the João Pinheiro municipal government, integrating approximately 1,000 families currently living in agricultural settlements that remain partially productive throughout the year—a condition that places social pressure on local authorities during off-season periods.

The design of this arrangement envisions these families leasing their land (around 45,000 hectares) for macaúba cultivation, being trained in crop management, and thereby becoming integrated participants in the macaúba value chain.



Lessons for the Ecosystem

S.Oleum is a 17-year-old company dedicated to producing sustainable raw materials with negative carbon intensity at scale, aiming to transform the energy, chemical, and food industries through regenerative agroforestry systems. To develop the macaúba value chain—also known as the Brazilian yellow coconut—the company established S.Oleum RDS (Research, Development & Seedlings) in 2006.

Guided by a science- and technology-driven approach and continuous R&D investment in biotechnology, **RDS has been exclusively dedicated to the domestication of macaúba**—a process similar to that undergone by other agricultural crops in the past until they reached their full productive potential.

S.Oleum stands as an emblematic case of institutional and financial innovation applied to large-scale regenerative projects. The project demonstrates that it is possible to design sophisticated structures combining multiple financial instruments, integrating agroindustry, ecological restoration, and social impact.

The phased financing logic, the use of forest assets as collateral, and the creation of a modular financial model through SPVs (Special Purpose Vehicles) serve as a reference for pre-operational businesses, underscoring the importance of going beyond traditional modeling to establish viable pathways for complex yet transformative ventures.

During the NIL advisory period, S.Oleum made significant progress in equity fundraising rounds and negotiations with international multilateral banks, while also advancing in the structuring of its partnership with the João Pinheiro City Hall.

Lessons for the Macaúba Sector



Synergy Among Stakeholders Can Unlock New Opportunities for the Sector

It is essential to foster the collaboration of diverse stakeholders around common solutions. The creation of a project preparation facility for macaúba, aimed at balancing project bankability, maturity, and investor and lender risk appetite; governmental coordination and advocacy for macaúba-based projects with social impact potential; the establishment of forums and dialogue spaces with major companies in the oil and gas sector; and the expansion of opportunities through the ANP's R&D&I Investment Clause are just a few of the key and urgent measures that the NIL identifies as fundamental. Together, these actions would enable Brazil to position itself as a leading global producer of a scalable, sustainable solution with the potential to reach markets across all continents.



Visibility and Clarity of Macaúba Opportunities for Investors and Financiers

We understand that building investor and financier capacity to comprehend both the potential and risks of macaúba production, as well as the financial mechanisms specifically designed for the carbon market (offsetting and insetting), is the first step toward consolidating the sector.

INOCAS and S.Oleum, through their respective business trajectories and accumulated experience, collectively hold a unique genetic and intellectual asset related to macaúba—one that must be recognized, valued, and supported.



Seeking Government and National Development System Support to Strengthen the Sector

Brazil stands at an inflection point in the development of the macaúba value chain as a reliable, high-yield, non-food source for biofuel production. However, the development of any new agricultural segment requires strategic state involvement through robust public policies and targeted fiscal incentives.

Innovative, long-cycle crops like macaúba, which take several years to reach productive maturity, cannot thrive solely through market forces. It is essential to create an enabling environment for the development of this value chain.

In this context, fiscal incentives and public policies act as a “risk catalyst.” Brazil’s historical experience—whether with soybeans or eucalyptus—demonstrates that productivity leaps in strategic crops were made possible through governmental support mechanisms.

For macaúba, which offers a sustainable alternative for biofuels and land restoration, access to innovative financial mechanisms is vital—and these will only emerge once the necessary enabling conditions are intentionally established.



