



THE BRAZILIAN SAF HUB: CAPITALIZING ON INLAND ARBITRAGE FOR MENA ENERGY SECURITY

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Executive Summary

The Imperative

As global civil aviation faces uncompromising decarbonization mandates (CORSIA, EU RED III), securing large-scale, low-Carbon Intensity (CI) lipid feedstocks has become the industry's most critical bottleneck. Refiners in the Middle East and North Africa (MENA) require a steady supply of compliant feedstocks that are structurally insulated from deforestation risks and geopolitical volatility.

The Solution: A Strategic Sourcing Hub in Brazil

This project establishes a highly defensible, asset-light supply chain originating 200,000 metric tons per year of degummed soybean oil from Brazil—representing a targeted 6.6% market share of the regional processing capacity. By isolating procurement exclusively to the mature agricultural hubs of Paraná (PR) and São Paulo (SP), the operation instantly guarantees bulletproof ESG traceability. Situated thousands of kilometers from the Amazon biome, this strategy eliminates deforestation embargo risks and fast-tracks premium European sustainability certifications (RTRS/ProTerra).

The Dual-Sourcing Business Model

To maximize financial margins while ensuring volume security, the operation utilizes a sophisticated Dual-Sourcing framework managed by a central QFC Trading Hub and a Brazilian subsidiary:

- **Macro-Origination (FOB):** Securing baseline volume directly from Tier-1 global trading houses at premium port terminals for rapid MENA deployment.
- **Micro-Origination (EXW/FCA):** The core profit engine. By absorbing the logistical friction of inland flexitank operations, the company procures directly from a mapped network of 24 mid-sized regional crushers. This captures a historical inland discount (approx. -USD 40.00/ton) that effectively subsidizes transoceanic container freight, unlocking a highly lucrative structural arbitrage.

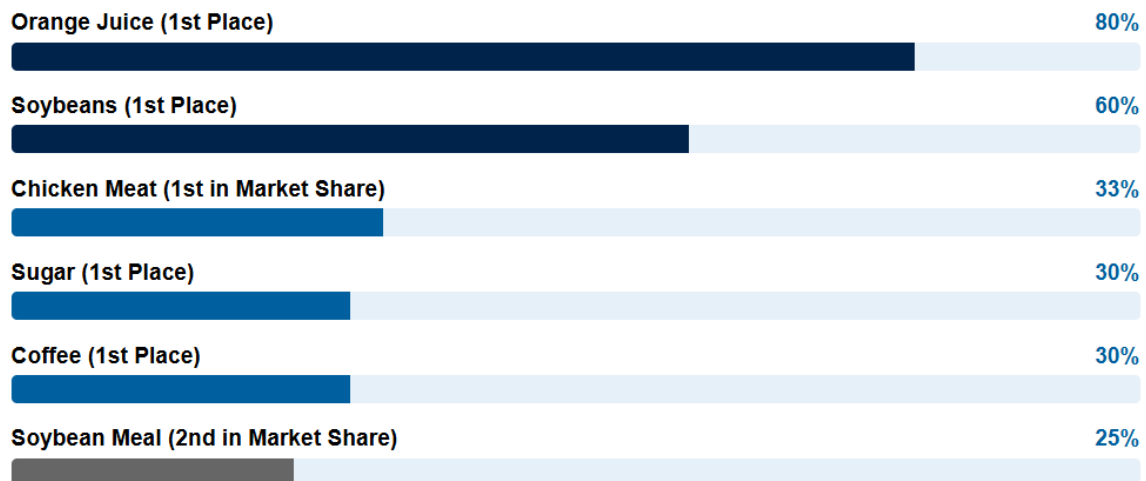
The Outlook Driven by an agile, outsourced logistical control tower (3PL/4PL) and rigorous CBOT/FX financial hedging, the company bypasses the saturated port environments dominated by legacy agribusiness giants. The result is a resilient, premium decarbonization asset pipeline perfectly timed to fuel the next generation of sustainable aviation.

1. Brazil as a Global Agricultural Powerhouse

Supported by strong agricultural research institutions and continuous technological innovation, Brazilian agribusiness is characterized by high efficiency and global leadership. Brazil is responsible for feeding over 1 billion people globally, which equates to providing 1 in every 5 meals served in the world.

a) Leadership in Global Exports

Consolidated data from organizations such as FAO, USDA, CONAB, and ABIOVE demonstrate Brazilian dominance:



b) Evolution and Yield (1970 - 2025)

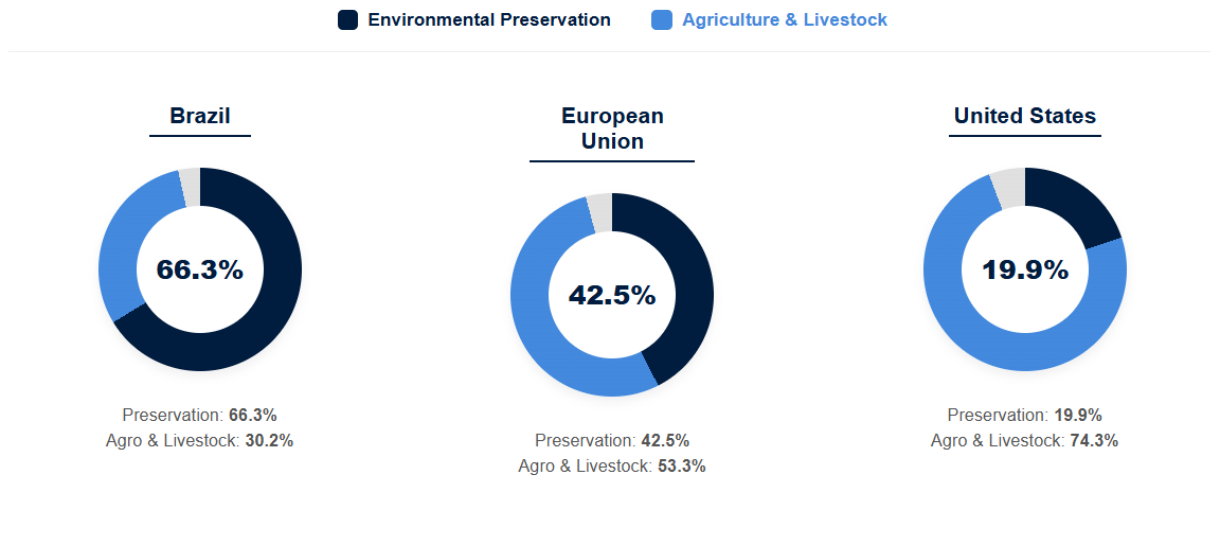
The historical evolution demonstrates growth fundamentally driven by science and technology:

- **Soybeans:** The planted area evolved from 1.3 to 47.6 million hectares, with production growing from 1.5 to 171.5 million metric tons. Yield tripled from 1,100 to 3,600 kg/ha, driven by tropicalization (EMBRAPA), the no-till farming system, and biotechnology (GMOs).
- **Sugarcane and Corn:** Sugarcane production jumped from 79.7 to 690.1 million metric tons, while corn grew from 14.2 to 119.2 million metric tons, leveraged by the Pró-Álcool program and the "Safrinha" (second crop) revolution.

2. Environmental Guardian: Sustainability and Land Use

The Brazilian legal framework combines high agricultural productivity with strict environmental preservation. Brazilian grain production has grown by over 500% in the last 40 years, while land use increased by only 100%. Currently, Brazil actively preserves over 60% of its native vegetation.

a) International Land Use Comparison



b) The Brazilian Forestry Code

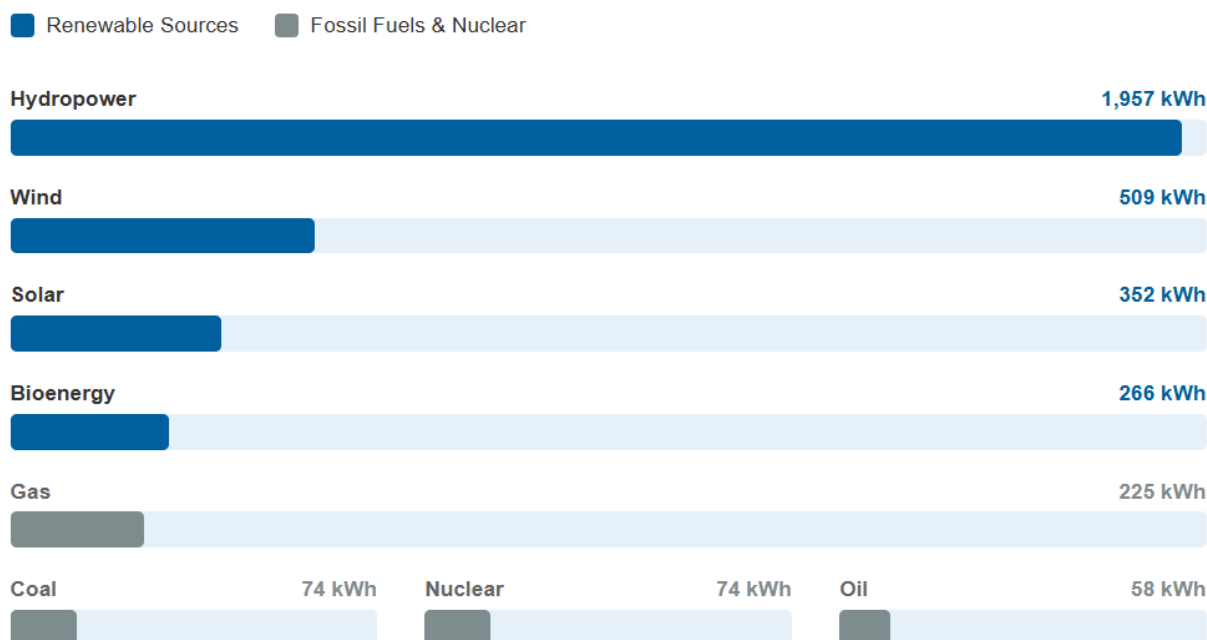
Environmental legislation requires rural properties to maintain strict Legal Reserve areas:

- **Amazon Biome (Forests):** 80% preservation requirement, allowing only 20% for commercial use.
- **Cerrado (within the Legal Amazon):** Minimum preservation of 35%.
- **Other Biomes (Atlantic Forest, Pampa, etc.):** Legal requirement of 20% preservation.

3. Energy Transition and Biofuels

Brazil has the second cleanest energy matrix in the world proportionally, trailing only Norway, with renewable sources accounting for 87.3% of power generation.

Renewables account for 87.3%, Fossil Fuels for 10.6%, and Nuclear for 2.1% of the energy mix.



a) The Biodiesel Revolution

- **The Math of Crushing:** To extract the 190 kg (19%) of degummed oil from a ton of soybeans, the industry utilizes hexane extraction. This process also generates about 775 kg of soybean meal (77.5%) and 15 kg of hulls (1.5%), which are directed to the animal feed market, alongside an approximate 2% moisture loss.
- **Chemical Process:** During the second stage (transesterification), the soybean oil undergoes a reaction with 10% methanol to reduce its viscosity. This ensures the complete conversion of the oil mass into biodiesel for the fuel market and results in a 10% surplus of glycerin directed to the pharmaceutical and chemical industries.
- **Corporate Advancements and Targets:** The leap to the B20 mandate by 2030 will require national biodiesel production to increase by 4.5 billion liters. Anticipating this demand, companies like Grupo Potencial are executing massive expansions: a \$1.2 billion (R\$ 6 billion) investment plan at their Lapa (PR) complex aims to achieve an annual production of 1.7 billion liters of biodiesel by 2032.

b) Corn Ethanol

- **The Math of Conversion:** Each processed ton of corn undergoes grinding and enzymatic hydrolysis to convert starch into sugars. The fermentation of these sugars yields approximately 33% mass in ethanol (330 kg or about 400 to 420 liters) and releases about 32% (320 kg) of CO₂, which is often captured or vented. Drying the solid residues generates 300 kg of DDGS (30% mass yield) for animal nutrition, while corn oil extraction yields 1.6% (16 kg) directed toward the biodiesel or edible markets.
- **Infrastructure Growth:** The productive landscape currently houses 25 operating corn ethanol biorefineries. The expansion is aggressive: there are 16 additional biorefineries with

construction authorization and another 16 announced projects. It is estimated that USD 2.6 billion is currently invested in the biorefineries under construction.

- **Industry Giants:** Inpasa, the second-largest global grain ethanol producer, plans to operate 10 biorefineries by 2027 and has already invested over R\$ 15 billion in Brazil. The company's first plant in Sinop (MT) has consolidated its position as the world's largest ethanol biorefinery, boasting a production capacity of 2 billion liters.

4. Sustainable Aviation Fuel (SAF) in Brazil

Supported by the "Fuel of the Future Law" (Law No. 14,993/2024), Brazil officially transitions into a regulated SAF market through the newly established ProBioQAV program. Brazil is uniquely positioned to lead the global SAF market due to its abundant and diverse feedstock supply, which readily supports both major technological pathways.

a) Market Demand and Production Targets

Based on national projections by the Energy Research Office (EPE), overall jet fuel demand in Brazil will steadily grow from approximately 7.5 billion liters in 2026 to 11.0 billion liters by 2037. To meet the progressive emission reduction targets—which scale from 1% emissions cut in 2027 to a mandatory 10% cut in 2037—the required SAF volume must ramp up exponentially from roughly 100 million liters to 1.5 billion liters within this decade.

b) The HEFA Route (Hydroprocessed Esters and Fatty Acids)

This pathway converts lipid-rich feedstocks, such as vegetable oils and animal fats, into sustainable aviation fuel.

- **Feedstock Availability:** The HEFA route relies on soybean oil, palm oil, macaúba oil, and carinata oil. These inputs demonstrate widespread regional availability across the country, with varying concentrations depending on the specific crop.
- **The Industrial Process:**
 1. **Pre-treatment (Cleaning):** The raw oil is first purified to remove impurities.
 2. **Hydrodeoxygenation:** Oxygen is completely removed from the chemical structure through a high-temperature hydrogen reaction.
 3. **Isomerization (Cold Adjust):** The molecular structure is adjusted to guarantee that the fuel remains stable and avoids freezing at the extreme temperatures experienced in high-altitude aviation conditions.

c) The ATJ Route (Alcohol-to-Jet)

This pathway utilizes alcohols to create jet fuel, capitalizing on Brazil's massive, pre-existing biofuel infrastructure.

- **Feedstock Availability:** The ATJ route primarily utilizes sugarcane ethanol and corn ethanol. These feedstocks indicate high regional availability, specifically concentrated in the Midwest and Southeast regions of Brazil.
- **The Industrial Process:**
 1. **Dehydration:** The alcohol is dehydrated to produce ethylene gas.
 2. **Oligomerization (Chain Growth):** The process builds long carbon chains necessary for jet fuel.
 3. **Hydrogenation (Stabilization):** The molecules are finally stabilized, resulting in a 100% compatible "drop-in" Sustainable Aviation Fuel.

5. Sourcing Strategy: Focus on Paraná and São Paulo

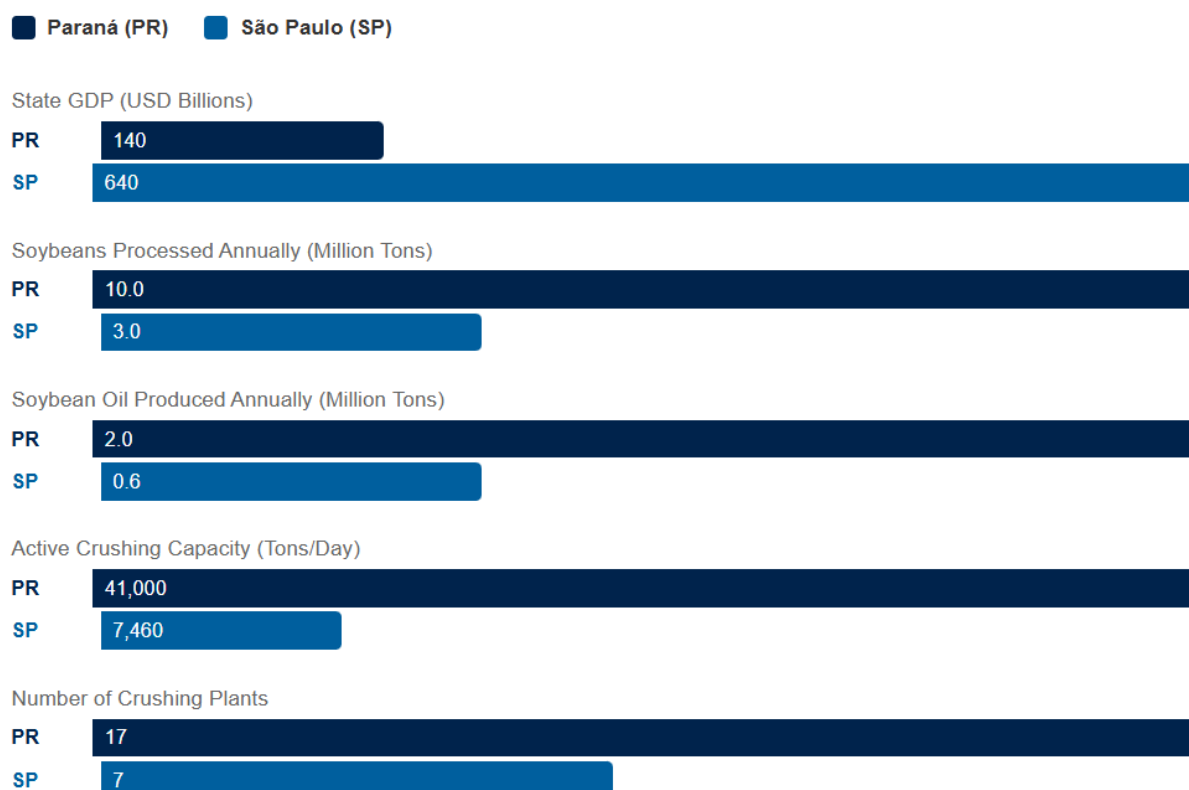
International standards such as ICAO, CORSIA, and EU RED II validate the sourcing strategy focused on the South/Southeast of Brazil.

a) Strategic Rationale

- **Competitive Feedstock:** Soybean oil offers the scalability of palm combined with the regulatory acceptance of canola, with cost advantages.
- **Zero Deforestation and Traceability:** Agricultural expansion (28 million hectares) will occur solely on degraded pastures. The distance of PR and SP from the Amazon shields the operation from embargoes and accelerates RTRS/ProTerra certifications.

b) Logistical and Productive Hubs

Comparative analysis of economic power and crushing infrastructure.



The proposed sourcing strategy strategically leverages the complementary strengths of Paraná and São Paulo to establish a highly scalable, zero-deforestation supply chain. While São Paulo provides unparalleled economic stability and logistical leverage as the region's financial powerhouse with a GDP of USD 640 billion, Paraná operates as the undisputed industrial engine of the operation. Despite its comparatively smaller economy, Paraná completely dominates the region's processing infrastructure, utilizing its 17 crushing plants and 41,000 tons/day capacity to process over three times the volume of soybeans compared to São Paulo. Together, this geographic synergy not only secures a cost-competitive feedstock output—yielding 2.0 million tons of soybean oil annually in Paraná alone—but also structurally insulates the operation from Amazonian deforestation risks, thereby streamlining compliance with stringent international sustainability frameworks like CORSIA and EU RED II.

6. Business Model and Logistics Analysis

Targeting a regional Total Addressable Market (TAM) of 24 crushers across Paraná and São Paulo that collectively produce approximately 3.0 million tons of soybean oil annually, the commercial strategy is designed to capture a 6.6% market share. This equates to an operational target of 200,000 metric tons per year. To achieve volume security while maximizing financial margins, the business model relies on a sophisticated Dual-Sourcing Strategy



This structure utilizes a central Trading hub in Qatar and a dedicated operational subsidiary in Brazil to balance large-scale spot purchases with granular, high-margin regional origination.

a) Macro-Origination: Foreign Trading (FOB Basis via Qatar)

The central QFC/QFZ Trading unit in Qatar acts as the primary vehicle for high-volume, lower-complexity acquisitions.

- **Supplier Profile:** Purchasing degummed soybean oil directly from Tier-1 global trading companies operating at the ports (e.g., ADM, Bunge, Cargill, and LDC).
- **Logistics & Freight:** The oil is loaded into Handy-size or Parcel tanker vessels with capacities ranging from 10,000 to 40,000 metric tons. The product is then shipped on a CNF/CIF basis directly to SAF industries in the MENA region.
- **Pricing Mechanics (Reference June 2026):** In this model, the FOB price is formed by the CBOT base price (e.g., USD 1,660.30/MT) plus the Paranaguá (PNG) port premium (e.g., USD 1.76/MT). Because it is bought FOB, fobbing costs are the responsibility of the exporter.
- **Delivered CIF Cost:** Adding marine insurance (0.3% of the FOB price, approx. USD 4.99/MT) and ocean freight for tankers (approx. USD 80.00/MT to Morocco or USD 105.00/MT to Egypt), the final CIF price lands between USD 1,747.05 and USD 1,772.05 per metric ton.

b) Micro-Origination: Brazilian Subsidiary (EXW/FCA Basis)

To capture greater value and bypass the port premiums charged by major trading houses, a QFC/QFZ subsidiary is established directly in Brazil.

- **Supplier Profile:** Purchasing directly at the factory gate (EXW/FCA) from small and mid-sized crushers and regional cooperatives distributed across the interior of Paraná and São Paulo.
- **Logistics & Packaging:** This highly granular operation requires exporting the oil using Flexitanks installed inside standard 20-foot dry containers, with each unit holding exactly 20 metric tons of oil. The subsidiary manages the inland road freight from the crushing plant to the ports of Paranaguá or Santos.
- **Pricing Mechanics (Reference June 2026):** By originating inland, the subsidiary captures a significant EXW discount against the CBOT base price (typically a negative premium around -USD 40.00/MT). However, the subsidiary absorbs the Fobbing costs (approx. USD 2.50/MT) and local administrative fixed costs.
- **Delivered CIF Cost:** Container ocean freight behaves differently than tanker freight. Shipping Flexitanks costs approximately USD 169.00/MT to Morocco and USD 87.00/MT

to Egypt. Consequently, the final delivered CIF price ranges from USD 1,714.67 (highly competitive for Egypt) to USD 1,796.67 per metric ton.

c) Strategic Value of the Dual Model

While the EXW/FCA route involves a steeper logistical complexity—coordinating the movement of up to 10,000 individual containers annually to hit the 200,000-ton target—it fundamentally insulates the company from absolute reliance on the "Big Four" agribusiness giants. Furthermore, it creates a direct financial link with local farmers and regional cooperatives, guaranteeing stricter control over the ESG tracking mechanisms and zero-deforestation compliance required for SAF production.

7. SWOT Analysis

To systematically evaluate the viability and resilience of the proposed business model, a comprehensive SWOT analysis has been formulated. This strategic matrix assesses the internal capabilities of the dual-sourcing operation against the dynamic external environment of the global Sustainable Aviation Fuel (SAF) market and Brazilian agricultural logistics.

By cross-examining these critical factors, the organization can better leverage its unique geographical advantages, proactively mitigate complex logistical risks, and solidify its competitive positioning against established agribusiness players.

- **Strengths:** Dual sourcing strategy (FOB and EXW), access to the massive infrastructure of PR and SP, premium port logistics, and a strong ESG profile (no-till farming, zero deforestation emissions).
- **Weaknesses:** High logistical complexity in flexitank management, handling of multiple cascading costs (fobbing, insurance, freight), and the commercial challenge of market penetration among 24 local crushers.
- **Opportunities:** Ideal feedstock for SAF regulation (CORSIA/EU), traceability completely clear of the Amazon, supply from a geopolitically stable nation, and tactical alignment with refining hubs in the MENA region.
- **Threats:** Severe price and premium volatility in CBOT/Paranaguá, aggressive competition from global giants in FOB origination, and constraints in the supply of maritime container/tanker transport.

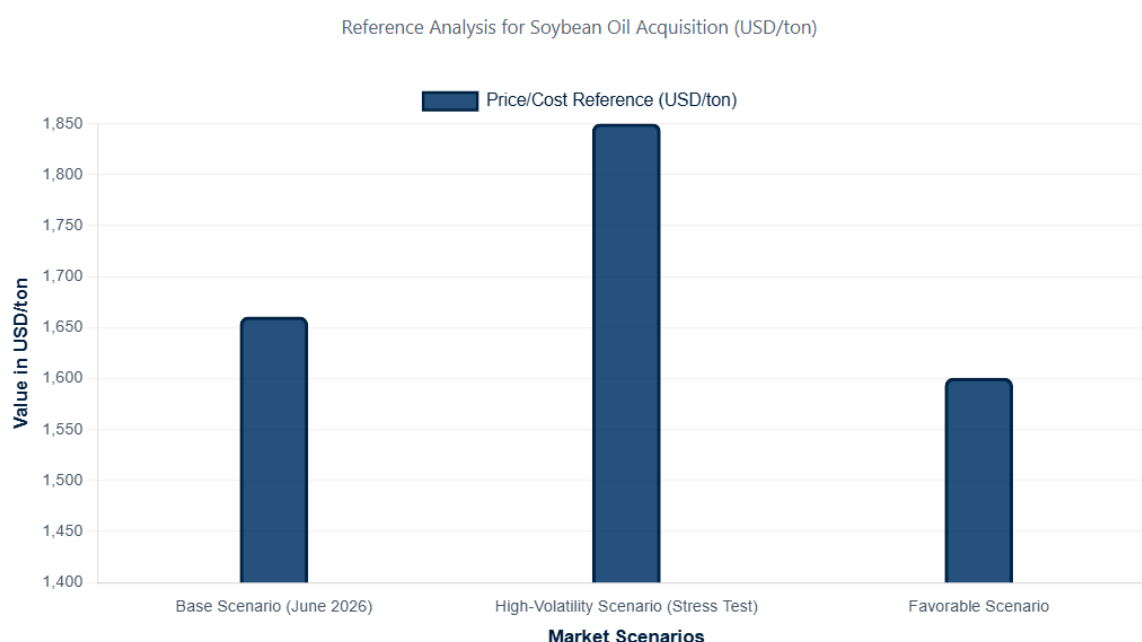
8. Financial Modeling and Scenario Planning

Operational feasibility depends heavily on the business model's resilience to macroeconomic market shocks. This is analyzed through statistical probabilities based on the Chicago Board of Trade (CBOT) futures and the Paranaguá port (PNG) basis premiums.

a) Stress Testing and Market Scenarios

To secure investments and project cash flows, the financial model accounts for three distinct market behaviors:

- **Base Scenario (Reference June 2026):** CBOT stabilized at approximately USD 1,660.30/ton with adequate regional supply premiums. Export margins to the MENA market comfortably absorb standard global ocean freight costs, which range from USD 80/ton (bulk tanker) to USD 169/ton (container flexitank).
- **High-Volatility Scenario (Stress Test):** Evaluates the impact of CBOT prices spiking above USD 1,800/ton paired with a tightening of Paranaguá premiums (due to competing Asian demand) and geopolitical disruptions pushing freight costs above USD 200/ton. Mitigation relies on shifting procurement volume rapidly from FOB to EXW to capture inland discounts and preserve margins.
- **Favorable Scenario:** Record Brazilian soybean crops lead to high domestic crushing margins, widening the negative EXW premium (e.g., reaching -USD 60.00/ton). This drastically lowers the acquisition cost for the Brazilian subsidiary and maximizes the QFC Trading net margins.



b) Total Cost of Ownership (TCO) Buildup

In the direct-from-factory (EXW/FCA) origination strategy, understanding the exact cost composition is critical for margin protection. The cascading pricing structure is mathematically modeled from the interior of Brazil to the destination ports in Qatar, Egypt, or Morocco:

- **1. Reference Price:** CBOT Front-Month Contract (Global Base).
- **2. Factory Gate Price:** CBOT + Regional EXW Premium (Historically offering a discount of around -USD 40.00/ton).

- **3. Free On Board (FAS/FOB) Cost:** Factory Price + Inland Road Freight (PR/SP to Santos/Paranaguá) + Fobbing/Customs Logistical Costs (approx. USD 2.50/ton) + Flexitank Packaging costs.
- **4. Final Delivered CIF Cost:** FOB Cost + Cargo Insurance (0.3% of total cargo value) + Container Ocean Freight (ranging from USD 87 to USD 169/ton depending on the MENA destination).

c) Hedging Strategy and Working Capital

To protect the modeled margins against daily operational fluctuations, the financial architecture utilizes robust risk-management mechanisms:

- **Commodity Price Risk:** Execution of CBOT futures and options contracts to lock in purchasing prices and protect the arbitrage spread between Brazilian origination costs and MENA off-take agreements.
- **Currency Risk (FX):** Since inland freight, fobbing, and local operational costs are paid in Brazilian Reals (BRL), while global revenue is generated in USD, the subsidiary actively employs Non-Deliverable Forwards (NDFs) to hedge against BRL/USD exchange rate volatility.
- **Cash Flow Cycle:** The model optimizes working capital by leveraging Letters of Credit (LC at sight) from MENA buyers to finance the upstream supply chain, accelerating liquidity and minimizing the need for heavy equity injections.

9. Regulatory Deep Dive and Carbon Pricing

In the Sustainable Aviation Fuel (SAF) industry, the physical commodity (soybean oil) and its environmental attributes are inextricably linked. A feedstock's viability is not judged solely by its market price, but heavily by its regulatory compliance and its lifecycle emissions profile. Sourcing from the established agricultural hubs of Paraná and São Paulo transforms the soybean oil from a standard commodity into a premium decarbonization asset.

a) Carbon Intensity (CI Score) and Economic Premium

The fundamental metric of the SAF market is the Carbon Intensity (CI) score, which measures the greenhouse gas emissions associated with the fuel's entire lifecycle (from farming to combustion). The lower the CI score, the higher the financial premium the resulting SAF commands in global carbon markets.

- **Low-Carbon Agriculture:** Soybeans sourced from Paraná and São Paulo benefit widely from advanced agronomic practices, notably the no-till farming system. This technique preserves soil structure and turns the land into a carbon sink.
- **Input Efficiency:** Furthermore, Brazilian soybean production relies heavily on biological nitrogen fixation, ensuring zero fossil fertilizers are used in the cultivation process.
- **Energy Matrix:** The industrial crushing phase also benefits from the country's highly renewable grid, utilizing clean energy refining.
- **Value Creation:** According to methodologies established by EPE, GREET, and CORSIA, the combination of no-till farming, zero fossil fertilizers, and clean energy refining results in a remarkably low carbon footprint. This directly adds high SAF value, allowing refiners to generate more carbon credits per gallon of fuel produced.

b) Global Compliance and Bulletproof Traceability

Global aviation is governed by strict, overlapping environmental frameworks, primarily the EU's Renewable Energy Directive (RED II/III) and ICAO's CORSIA (Carbon Offsetting and Reduction Scheme for International Aviation). Both strictly penalize feedstocks associated with direct or indirect land-use change (ILUC).

- **Distance from the Amazon:** The strategy of sourcing exclusively from the southern and southeastern states of Paraná and São Paulo guarantees bulletproof traceability. The immense geographical distance from the Amazon biome intrinsically eliminates deforestation embargo risks.
- **Sustainable Expansion:** The Brazilian agricultural model ensures that future growth—estimated at 28 million hectares of expansion—will occur via degraded pasture conversion only, ensuring zero deforestation.
- **Fast-Tracking Certifications:** Because the supply chain is entirely shielded from high-risk environmental zones, the operation fast-tracks the acquisition of stringent European compliance seals, such as RTRS (Round Table on Responsible Soy) and ProTerra. This guarantees that the QFC/QFZ trading unit can seamlessly market the feedstock to the most heavily regulated SAF refineries globally.

10. Quantified Risk Matrix (Heatmap)

Operating within the Brazilian agribusiness sector involves significant inherent risks and uncertainties that must be systematically managed to ensure a stable, compliant feedstock supply for Sustainable Aviation Fuel (SAF) production. To provide clear visibility for stakeholders and investors, the operational, financial, and environmental vulnerabilities have been quantified into a Risk Heatmap. Each risk category is assigned a probability and financial impact rating, followed by an actionable mitigation strategy.

a) Market Risk: Price and Premium Volatility

- **Risk Profile:** High Probability / Critical Impact
- **Context:** The business is highly exposed to international commodity fluctuations, specifically the volatility of Chicago Board of Trade (CBOT) pricing and Paranaguá (PNG) port physical premiums. Unpredictable shifts in global supply and demand can rapidly compress the arbitrage margins between Brazilian origination and MENA destination ports.
- **Mitigation Strategy:** The primary defense is the dual-sourcing strategy, which grants the flexibility to seamlessly shift procurement volumes between purchasing FOB from major trading companies at the port or sourcing EXW/FCA directly from small-to-mid crushers inland. This dynamic allocation is strictly paired with advanced financial hedging on the Chicago futures market to lock in operational margins and neutralize sudden price swings.

b) Currency and Economic Risk: BRL/USD Fluctuation

- **Risk Profile:** High Probability / Moderate Impact
- **Context:** The operation is subject to significant economic risks, including exchange rate fluctuations (BRL/USD), credit risks, and localized inflationary pressures. Because inland origination costs—such as road freight, fobbing operations, and factory-gate oil purchases—are denominated in Brazilian Reais (BRL), any sudden devaluation or appreciation of the currency directly affects the final USD cost structure.
- **Mitigation Strategy:** The subsidiary's treasury implements a strict foreign exchange (FX) hedging policy. By executing Non-Deliverable Forward (NDF) operations at the exact moment an EXW supply contract is signed, the company locks in the currency conversion rate, effectively shielding the projected US Dollar margins from Brazilian macroeconomic turbulence.

c) ESG and Traceability Risk: Environmental Compliance

- **Risk Profile:** Low Probability / Critical Impact
- **Context:** The SAF market is heavily regulated, and feedstock must meet uncompromising sustainability criteria. The primary threat is the possibility of supply chain contamination by non-compliant indirect suppliers linked to deforestation, which could result in regulatory embargoes and the disqualification of the fuel under European or ICAO standards.
- **Mitigation Strategy:** Geographically, sourcing predominantly from Paraná and São Paulo provides a safe, structural distance from the Amazon biome, inherently eliminating severe embargo risks. To ensure complete transparency, the supply chain is monitored via continuous satellite auditing. This traceability framework is strictly tied to fast-tracking top-tier European certifications, specifically the RTRS (Round Table on Responsible Soy) and ProTerra standards, guaranteeing zero-deforestation compliance.

d) Climatic, Sovereign, and Logistical Risks

- **Risk Profile:** Moderate Probability / Moderate Impact

- **Context:** The supply chain faces vulnerability to adverse meteorological conditions and crop failures. Sovereign risks include potential changes in the political, fiscal, tax, and legal landscape of Brazil, which could affect export regulations. Additionally, the subsidiary faces significant logistical complexity, relying on the transport of oil using flexitanks inside 20-inch dry containers (20 MT per container), which requires precise handling, as well as dependence on ocean freight availability.
- **Mitigation Strategy:** Climatic risks are diluted by originating across a broad network of 24 crushers distributed throughout multiple distinct micro-regions in PR and SP. Logistical constraints are managed by securing long-term freight allocations with shipping lines and utilizing experienced logistics partners to handle the precise coordination required for flexitank operations. Legal and sovereign risks are continuously monitored by local counsel to preemptively adapt export and tax compliance structures.

e) Macro-Regulatory Risk: Delay in Global SAF Mandates

- **Risk Profile:** Low Probability / Moderate Impact
- **Context:** Geopolitical shifts or energy crises in Europe/North America could temporarily delay the enforcement of SAF blending mandates, potentially collapsing the "green premium" of certified feedstocks.
- **Mitigation Strategy (The Hard Floor):** The underlying physical asset is premium degummed soybean oil. Should the SAF market face regulatory deceleration, the product inherently possesses a massive secondary safety net. The supply can be instantly pivoted and monetized in the traditional global food-grade market, the booming domestic Brazilian biodiesel sector (driven by the B20 mandate), or the international chemical industry, ensuring capital preservation and a hard floor on the asset's value.

f) Feedstock Independence: Soybean Market Liquidity vs. Carinata IP Bottlenecks

- **Risk Profile:** Low Probability (Mitigated by Sourcing Strategy) / Critical Impact
- **Context:** The global SAF market continuously explores alternative low-Carbon Intensity (CI) lipid sources, such as Carinata, to meet decarbonization targets. However, anchoring a billion-dollar refining operation on these emerging cover crops introduces severe structural vulnerabilities due to Intellectual Property (IP) monopolization. The commercial production, seed multiplication, and genetic patenting of Carinata are heavily dominated by a single corporate entity (Nuseed). This creates a dangerous "vendor lock-in" scenario. If the sole IP holder faces agricultural bottlenecks, alters pricing structures, or restricts regional seed distribution, the entire downstream aviation fuel supply chain could be paralyzed. Furthermore, the lack of an open, transparent market for proprietary crops prevents adequate financial risk management.
- **Mitigation Strategy** By strategically anchoring the business model in soybean oil, the operation entirely bypasses the risks of genetic monopolies and vendor lock-in. Soybeans represent a highly decentralized and globally liquid agricultural commodity. The genetic base in Brazil is diversified across multiple global agribusiness and research giants (such as Embrapa, Bayer, and Corteva), ensuring absolute security of seed supply for local farmers. Moreover, unlike proprietary cover crops bound by opaque, bilateral off-take agreements, soybean oil is transparently traded on the Chicago Board of Trade (CBOT). This guarantees immense market liquidity and allows the operational subsidiary to execute robust financial hedging to protect margins, while securing an immediately scalable, low-risk feedstock pipeline.

11. Go-to-Market, Competitive Positioning, and Rollout Roadmap

To successfully consolidate a 6.6% regional market share—equivalent to 200,000 tons of soybean oil annually—among the 24 target crushing plants in Paraná and São Paulo, the commercial matrix integrates a targeted procurement strategy with a differentiated market positioning. This approach bypasses direct competition with industry giants and establishes a clear, 12-month timeline for operational readiness.

a) Procurement Strategy and Geomonitoring

The procurement matrix will operate primarily through strategic partnerships, ensuring supply security while maintaining pricing flexibility.

- **Contractual Balance:** Sourcing will balance volume predictability through "Take-or-Pay" contracts tied to transparent CBOT pricing formulas, while reserving capital for opportunity allocations in the Spot market during favorable pricing windows.
- **Environmental Funnel:** Before any contract is signed, every prospective supplier will pass through a strict geomonitoring and compliance funnel. This ensures absolute zero overlap with conservation areas or deforested land, guaranteeing that the originated oil meets the stringent requirements for SAF production.

b) Competitive Positioning: The Regional "Blue Ocean"

The strategy intentionally pivots away from the saturated port environments to focus on inland origination, creating a highly defensible market position.

- **Avoiding the "Big Four":** While global trading giants like ADM, Bunge, Cargill, and LDC fiercely dominate the high-volume FOB port market, a lucrative "Blue Ocean" exists inland. The market of mid-sized crushers and regional cooperatives—such as Cocamar, C.Vale, and Agrária in PR, alongside Sina and ComGroup in SP—possesses massive productive capacity that is often underutilized for direct export.
- **The "Logistical Facilitator" Advantage:** The Brazilian subsidiary will differentiate itself by absorbing the operational friction that typically discourages these mid-sized players from exporting. By taking on the bureaucratic complexity of Flexitank installation, customs clearance, and inland road freight (the EXW/FCA model), the subsidiary provides a seamless, "factory-gate" solution. This removes operational hurdles for the local producers, building long-term commercial loyalty and securing premium origination pathways.

c) Implementation Roadmap (12 Months)

To reach the target run rate safely and efficiently, the rollout is structured across three deliberate execution phases:



- **Phase 1:** Structuring and Compliance (Months 1 to 3) Focuses on the legal incorporation of the primary Trading unit in Qatar and the Operational Subsidiary in Brazil. Simultaneously,

the team will execute the field mapping of the 24 target soybean crushers and initiate the socio-environmental compliance audits across Paraná and São Paulo.

- **Phase 2:** Commercial Agreements and Logistics (Months 4 to 6) Focuses on signing the structural Offtake agreements with local cooperatives and finalizing the financial architecture (hedging and trade finance). Operationally, this phase secures the vessel allocation contracts and locks in 20-foot container bookings with global shipping lines.
- **Phase 3:** Operational Ramp-Up (Months 7 to 12) Initiates with the execution of controlled test shipments via the ports of Santos and Paranaguá to validate the Flexitank logistics and customs workflows. Following successful tests, the operation will aggressively accelerate export volumes until reaching the required run rate to supply the SAF industries in the Middle East and North Africa.

d) Competitive Wargaming: Defending the "Blue Ocean"

A critical consideration is the threat of Tier-1 legacy giants (the "Big Four") noticing the lucrative EXW/FCA margins and attempting to verticalize their operations to compete for the 24 regional crushers. The business model defends its market share through three structural moats:

1. **Operational Friction Intolerance:** Legacy giants operate on economies of massive scale (supramax bulk vessels and dedicated rail). Granular, truck-by-truck coordination of 20-foot flexitank containers introduces a level of logistical friction that fundamentally conflicts with their high-volume, low-touch business models.
2. **Agile BPO Ecosystem:** The subsidiary's hyper-specialized network of local 3PL/4PL liquid-bulk operators creates a localized logistical monopoly that is difficult for corporate giants to replicate quickly without severe structural bloat.
3. **First-Mover Cooperative Loyalty:** By executing Phase 2 "Take-or-Pay" agreements and absorbing local bureaucratic burdens, the company locks in the supply of mid-sized cooperatives, creating high switching costs for suppliers and shutting out late-arriving competitors.

12. Governance and Operating Model

The corporate governance framework and daily operating model of the Brazilian subsidiary are designed around a highly responsive, "Asset-Light" philosophy. By intentionally minimizing heavy capital expenditures (CapEx) in physical assets such as truck fleets or private port terminals, the organization maximizes operational agility. This allows the company to rapidly scale volume up or down in response to market volatility, CBOT premium fluctuations, and SAF demand cycles.

a) Internal Organizational Structure (Lean FTE Matrix)

The internal headcount (Full-Time Equivalents - FTEs) will be kept deliberately lean, focusing exclusively on high-value strategic functions, relationship management, and risk oversight.

- **Executive Leadership:** A dedicated Country Manager will oversee the Brazilian operation, serving as the primary bridge between the local market and the QFC/QFZ Trading Hub in Qatar. This role is responsible for institutional relations, P&L management, and steering the strategic roadmap.
- **Origination and Procurement Desk:** A specialized commercial team tasked with managing relationships with the 24 target crushers and cooperatives across Paraná and São Paulo. They will execute the dynamic purchasing strategy, negotiate "Take-or-Pay" contracts, and monitor daily physical basis premiums (EXW/FCA).
- **Logistics Control Tower:** Rather than executing the physical transport, this team acts as a central intelligence unit. They will monitor cargo flow in real-time, coordinate scheduling between inland crushers and port terminals, and ensure seamless synchronization with vessel departure windows to avoid demurrage penalties.
- **ESG Compliance and Auditing:** A critical pillar for the SAF market. This team is responsible for managing the satellite geomonitoring tools, vetting supplier compliance against deforestation metrics, and coordinating with independent auditors to maintain RTRS and ProTerra certifications.

b) BPO and Strategic Logistics Outsourcing (3PL/4PL)

To maintain the Asset-Light structure, all physical movement, handling, and bureaucratic dispatching of the commodity will be outsourced through Business Process Outsourcing (BPO) agreements with certified, top-tier logistical partners.

- **Inland Freight Management:** The physical transport of the oil from the interior crushers to the port zones (Paranaguá and Santos) will be outsourced to specialized liquid-bulk trucking fleets and regional transport cooperatives.
- **Port Operations and Customs (Fobbing):** All bureaucratic customs clearance, tax compliance with the Brazilian Revenue Service (Receita Federal), and port authority coordination will be handled by highly experienced local customs brokers and maritime agencies.
- **Flexitank Installation and Surveying:** The highly technical process of outfitting 20-foot dry containers with Flexitanks will be managed by approved third-party vendors. Furthermore, independent international surveyors (such as SGS or Control Union) will be contracted to perform mandatory quality control, weight verification, and leak-prevention inspections at the time of loading, ensuring the absolute integrity of the food/fuel-grade oil.

c) Corporate Governance and Systems Integration

To ensure total transparency between the Brazilian subsidiary and the Qatari holding company, the operation will be governed by strict cross-border compliance protocols.

- **ERP and Data Visibility:** The local operation will integrate with a global ERP system, providing the Qatar headquarters with real-time dashboards detailing daily origination volumes, locked CBOT prices, FX hedging status, and container transit times.
- **Audit and Legal Compliance:** The subsidiary will operate under the strict guidelines of Brazilian corporate and tax law, supported by retained external legal counsel and 'Big Four' accounting firms to ensure audit-ready financial reporting and strict adherence to international anti-bribery and compliance frameworks.

13. Business Case and Key Performance Indicators (KPIs)

The investment thesis and business case for the dual-sourcing origination model rely on structural arbitrage: capturing the price disconnect between discounted inland feedstocks in Brazil and premium-priced green assets in the regulated MENA SAF market. To evaluate the execution of this strategy and ensure maximum accountability to stakeholders, corporate governance will guide the expansion using a comprehensive scorecard of quantified financial, operational, and sustainability metrics.

a) Financial Metrics and Margin Protection

Financial oversight focuses on maximizing net profitability per metric ton while eliminating macroeconomic exposures through systemic hedging.

- **Net Operating Margin (EBITDA per Ton):** This is the primary anchor of the business case. Governance will closely track the gross arbitrage spread—the difference between the final delivered CIF price in the Middle East and the total acquisition cost—minus local administrative costs. The target is to maintain a predictable dollar-denominated EBITDA margin per ton, insulated from localized price spikes.
- **FX Hedging Efficiency:** Because operational costs (such as inland trucking, port dispatch, and local salaries) are paid in Brazilian Reals (BRL), while procurement and revenues are tied to US Dollars (USD), tracking the tracking error of Non-Deliverable Forwards (NDFs) is critical. This KPI measures the percentage of local currency exposure successfully neutralized, ensuring that BRL volatility never erodes the projected business case margins.
- **Total Cost of Ownership (TCO) Variance:** Tracks real-time deviations from the baseline logistical costs (the budgeted USD 2.50/ton fobbing fee, standard maritime freight rates, and flexitank packaging costs). Any upward drift in port expenses or demurrage fees triggers immediate structural reviews of the 3PL/4PL service provider agreements.

b) Operational and Logistics Efficiency Metrics

Operational KPIs ensure that the asset-light supply chain maintains high velocity and velocity of capital, preventing bottlenecks at the factory gate or the port.

- **Logistical Cycle Time (Door-to-Vessel):** Measures the total elapsed hours from the exact moment a truck or container leaves the factory gate in the interior of Paraná or São Paulo to the moment it is cleared and loaded onto a vessel at the ports of Santos or Paranaguá. Minimizing this transit time directly accelerates the working capital cycle and reduces the need for continuous cash injections.
- **Volumetric Run-Rate Achievement:** Tracks the monthly and quarterly ramp-up toward the structural target of 200,000 metric tons per year. These metrics measure contract execution rates against the 24 target local crushers, signaling whether the commercial team needs to allocate more volume to the spot market or tighten Take-or-Pay volumes.
- **Asset Utilization and Demurrage Rates:** Monitors the efficiency of container bookings and bulk vessel loading. This KPI tracks the percentage of shipments executed without incurring port storage penalties or shipping line demurrage, directly reflecting the capability of the Logistics Control Tower.

c) Sustainability and Regulatory Compliance Metrics

In the global SAF market, a failure in sustainability compliance results in immediate financial write-offs, as the underlying commodity loses its green premium.

- **Carbon Intensity (CI) Score Verification:** Tracks the lifecycle greenhouse gas savings of the originated soybean oil against global standards (CORSIA/EU RED III). Governance mandates that 100% of shipments must undergo independent verifications to prove that the

farming methods (such as no-till practices and biological fixation) meet the low-carbon thresholds required by off-takers.

- **Supply Chain Traceability and Geo-Compliance:** Measures the percentage of suppliers completely vetted through satellite geofencing tools. The target is an absolute 100% compliance rate, meaning zero tons of oil enter the supply chain from farms overlapping with recently deforested land, indigenous territories, or environmental conservation units.
- **Certification Certification Rate (RTRS / ProTerra):** Monitors the volume of oil successfully certified under premier global sustainability seals. This KPI directly influences profitability, as certified sustainable feedstocks command a direct cash premium over non-certified alternatives in Western and MENA refining hubs.

14. Financial Valuation and Capital Allocation

The financial architecture of the Brazilian subsidiary is designed around an "Asset-Light" philosophy. By minimizing heavy Capital Expenditure (CapEx) in physical fleets or private terminals and relying on Business Process Outsourcing (BPO), the capital structure prioritizes high liquidity and rapid operational scaling.

Projected Financial Profile (5-Year Horizon) To support the operational ramp-up to the target of 200,000 MT/year by Month 12, the financial model evaluates the required initial capital injection against the projected yield of the structural arbitrage.

Financial Metric	Projected Target Range	Strategic Rationale
Initial Capital Requirement	USD 15.0M – USD 20.0M	Primarily allocated to Working Capital, trade finance structuring, initial FX/CBOT hedging margin accounts, and QFC/Brazil corporate setup. Minimal CapEx required.
Target IRR (Internal Rate of Return)	28% – 32%	Highly attractive yield driven by the low fixed-asset base and the consistent capture of the EXW/FCA interior pricing discount.
Estimated Payback Period	18 – 24 Months	Accelerated capital recovery powered by short Cash Conversion Cycles utilizing MENA buyer Letters of Credit (LCs at sight).
Target NPV (Net Present Value)	USD 45.0M – USD 55.0M	Calculated at a 12% discount rate over a 5-year period, assuming baseline CBOT stability and successful execution of the 6.6% market share capture.
<i>(Note: The above financial indicators are modeled projections for executive reference and are subject to final quantitative auditing during the Phase 1 Structuring period).</i>		

15. Data Storytelling and Executive Diagramming Guide

To bridge raw quantitative metrics with boardroom comprehension, the final presentation of this business case must employ high-impact data storytelling. Figures and charts should not merely display data; they must articulate a clear strategic narrative: that Brazil offers an unrivaled, ecologically compliant feedstock surplus, and that our dual-sourcing business model systematically de-risks the logistics required to deliver it to global SAF markets.

The following three executive chart structures are mandated for the final graphic layout in the word processor or PDF builder, complete with their specific analytical objectives and data-buildup instructions.

a) Macro Sustainability Narrative: The Land Use Pie Chart

- **The Strategic Story:** Global buyers—particularly in the EU and North America—frequently hold a biased assumption that expanding Brazilian agribusiness inherently drives deforestation. This chart directly refutes that narrative by establishing a visual contrast between global conservation models. It frames Brazil not as an environmental risk, but as a global ecological leader.
- **Visual Architecture:** A clean, high-contrast pie chart or adjacent donut charts.
- **Data Composition:**
 - **Brazil's Native Preservation:** Highlight that a staggering 66.3% of the Brazilian territory is entirely dedicated to native vegetation preservation and conservation units.
 - **The Global Contrast:** Juxtapose this against the heavily altered landscapes of international competitors, where native preservation accounts for significantly lower baselines (e.g., Europe at roughly 25-30% and the Continental USA at approximately 34%).
- **The Executive Takeaway:** The visual must clearly signal that Brazil achieves its massive agricultural output through sheer vertical yield efficiency and the conversion of degraded pastures, completely insulated from native biomes.

b) Financial Arbitrage Narrative: The CIF Margin Waterfall Chart

- **The Strategic Story:** This diagram serves as the transparent financial proof of the business case. It demonstrates how our localized, inland procurement strategy (EXW/FCA) actively captures discounts that are entirely missed by global trading giants operating solely at the ports.
- **Visual Architecture:** A horizontal or vertical progressive Waterfall Chart (Bridge Chart), where green or blue bars represent positive value additions and red bars indicate structural discounts or cost outflows, culminating in a total "Final Delivered Price."
- **The Mathematical Buildup:**
 1. **Baseline Pillar:** Starts with the international benchmark—the CBOT Soybean Oil Front-Month Price (e.g., USD 1,660.30/ton).
 2. **The Inland Discount (Down Step):** A distinct downward bar representing the captured Regional EXW Premium discount (e.g., -USD 40.00/ton), demonstrating the primary arbitrage window.
 3. **Logistical Accumulations (Up Steps):** Successive progressive steps adding the exact cascading elements of the Total Cost of Ownership (TCO): Inland Trucking/Freights → Fobbing and Customs handling (USD 2.50/ton) → Flexitank physical packaging → Marine Cargo Insurance (0.3%).
 4. **The Transoceanic Leap (Up Step):** The final cost addition showing Ocean Freight (ranging from USD 87.00/ton to Egypt up to USD 169.00/ton to Morocco via container lines).
 5. **Final Landing Pillar:** The total accumulated CIF Destination Port Price.

- **The Executive Takeaway:** This bridge clearly illustrates to investors that the captured inland discount effectively subsidizes a massive portion of the transoceanic freight, preserving an unassailable net margin.

c) Physical Infrastructure Narrative: The Regional Logistical Map

- **The Strategic Story:** Sourcing from a continent-sized country like Brazil usually implies thousands of kilometers of risky inland transport. This physical asset map tells the exact opposite story for our specific target zone: it visually proves that our operation is hyper-concentrated in a compact, highly developed logistical corridor.
- **Visual Architecture:** A simplified, clean regional map focusing on the states of Paraná (PR) and São Paulo (SP), utilizing clear geometric overlays rather than cluttered topographical data.
- **Key Geographic Elements:**
 - **The Cluster Zone:** Shaded circular overlay highlighting the tight geographical radius of approximately 200 km where the 24 target crushing plants and agricultural cooperatives are clustered.
 - **The Flow Infrastructure:** Clean, bold lines tracing the highly efficient, high-capacity dual-lane highways and dedicated rail networks directly linking this crushing cluster to the Atlantic ocean.
 - **The Export Basins:** Distinct icons marking the two main export gateways: the Port of Paranaguá (the global capital of soybean oil shipping) and the Port of Santos (the largest container terminal in Latin America, perfectly suited for high-velocity Flexitank operations).
- **The Executive Takeaway:** The map leaves no doubt that the operation has structurally bypassed the severe, long-distance logistical bottlenecks of the Brazilian "Center-West" region, securing a swift, low-risk route to the sea.

Conclusion

The global civil aviation sector stands at an unprecedented structural crossroads. As decarbonization regulatory mandates tighten worldwide under the pressure of ICAO's CORSIA frameworks and the European Union's RED III directives, Sustainable Aviation Fuel (SAF) has transitioned from an optional environmental initiative into the absolute center of global aerospace survival. However, the commercial scaling of SAF is heavily bottlenecked by a single, critical variable: securing a massive, reliable, and geopolitically stable supply of lipid-rich feedstocks that possess absolute environmental traceability and a low Carbon Intensity (CI) score.

The comprehensive structural analysis detailed throughout this report confirms that the regional agricultural axis formed by the states of Paraná and São Paulo meets and exceeds every stringent requirement of this emerging global market. Combining an immense, highly developed industrial crushing infrastructure of nearly 50,000 tons per day of active capacity with a world-class, multi-modal port network—anchored by the specialized liquid bulk facilities of Paranaguá and the high-velocity container terminals of Santos—this region provides the ideal launchpad for a premium export supply chain. Crucially, because this entire agricultural ecosystem operates within established, centuries-old farming corridors in southern and southeastern Brazil, it is structurally, ecologically, and geographically independent of the Amazon biome. This completely insulates the operation from land-use change penalties and provides international off-takers with bulletproof compliance security.

Furthermore, the implementation of the dual-origination model serves as the primary financial and operational anchor of this business case. By balancing high-volume, low-complexity institutional acquisitions (FOB) from Tier-1 global trading houses for rapid volume baseline establishment with a hyper-localized, decentralized procurement strategy directly at the factory gate (EXW/FCA) of mid-sized crushers and regional cooperatives, the business effectively builds a diversified logistical lifeline. The EXW/FCA mechanism captures significant interior discounts that directly absorb the cascading costs of transoceanic container freight, shielding the corporate structure from the margin-compressing volatility of CBOT pricing and port basis premiums.

Ultimately, by leveraging the local operational subsidiary's specialized capabilities in managing granular Flexitank container logistics, absorbing localized bureaucratic friction for regional producers, and enforcing uncompromising satellite geofencing audits at the farm level, the project successfully de-risks the upstream supply chain. This highly responsive, asset-light architecture safely guarantees the acquisition of the targeted 200,000 metric tons per year, securing a defensive 6.6% regional market share. In doing so, it positions the central Foreign Trading unit as an indispensable, high-margin conduit of sustainable energy security, linking the agricultural abundance of Brazil to the rapidly growing refining hubs and airlines of the Middle East and North Africa.

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