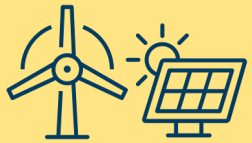
Pre-feasibility study: Brazil Green e-Fuel Export Corridor

Açu to Antwerp-Bruges

November 2025

Brazil has great e-fuel production fundamentals and can competitively produce significant e-fuel volumes

Production fundamentals



Firm and affordable renewable energy resources

- Brazil is a renewable energy leader with a **largely renewable grid** (~90%)[1]:

2nd country for **hydropower**	4th country for onshore **wind**	8th country for **solar**

- PPAs are available at a competitive price, around **35 USD/MWh.**

Access to low-cost electrolyzer imports

- Brazil and China have 50+ years of diplomatic relations and are **trade partners**[5].
- Potential for **suspended import taxes**[6] through Brazil's tax benefit regime.
- Low-cost electrolyzers could be imported from China around **600-700 USD/kW, including EPC.**

Biogenic carbon resources

- Multiple industries in Brazil release biogenic carbon, which can be captured and used in producing **carbon containing e-fuels**, such as **e-methanol**.
- Brazil is ranked:

3rd for **bioenergy** [1]	2nd for **ethanol** production[2]	3rd in **pulp for paper**[3]

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Sources:
1. IRENA Country Rankings, 2022; Ember Energy 2024
2. IEA Biofuel production
3. FAO, 2022
4. Port of Açu; Oliveira Costa Souza Rosa, et al. 2017
5. Brazil Agency, 2024
6. "Hydrogen Legal Framework is Published" (Demarest, 2024)

Port of Açu is already a significant industrial hub in Brazil and is primed to support the development of significant e-fuel projects

Port of Açu has attributes that make it a strategic e-fuel hub....

- One of Latin America's largest deepwater and private port-industrial complex.
- Direct shipping route to key e-fuel offtake markets, especially Europe.
- 3.5 GW grid capacity available to power new industrial and hydrogen projects.
- Abundant local resources, including water, biomass for biogenic CO_2 synthesis.

...and it is already preparing to handle e-fuel exports.

- Licensed Green Hydrogen Hub (1M m²) by the INEA with a second hub under licensing (+4.5M m²) to enable large-scale industrial growth.
- Shared-use infrastructure under development, providing accelerated and cost-effective port infrastructure.
- Liquids Terminal (TLA) under construction for ammonia and e-fuel exports.

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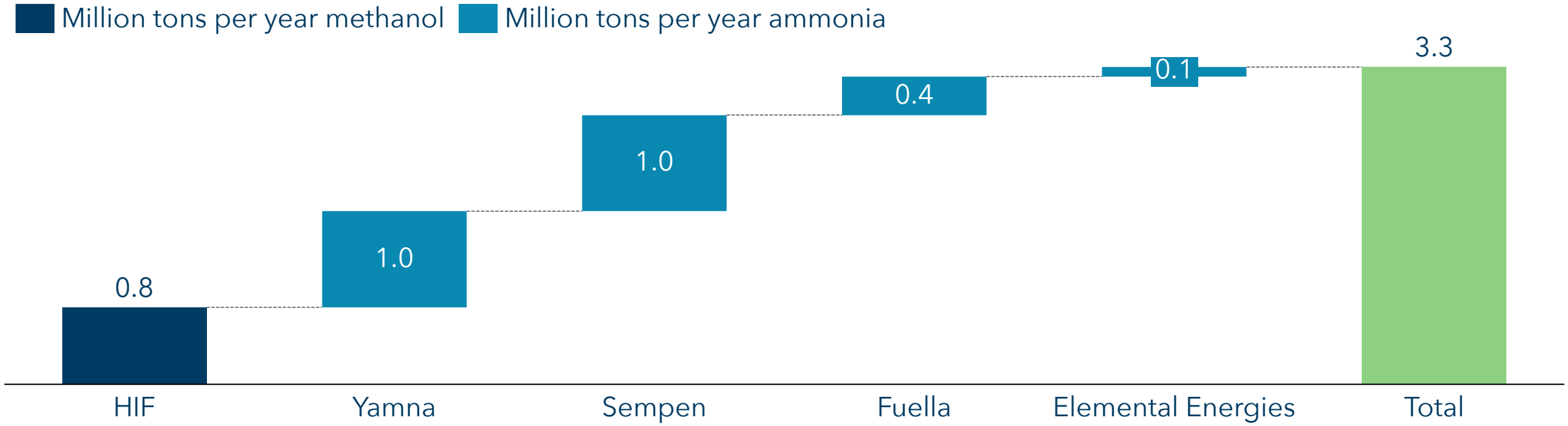
Source: Prumo Logistics

The Port of Açu's high potential as an e-fuel export hub has generated interest from multiple e-fuel producers

Announced projects in 2024/25 at the Port of Açu and their planned e-fuel capacity by 2035, *in MTPA*



Out of these volumes, **~200 KTPA of methanol** and **~400 KTPA of ammonia** are projected to **come online by 2030.**

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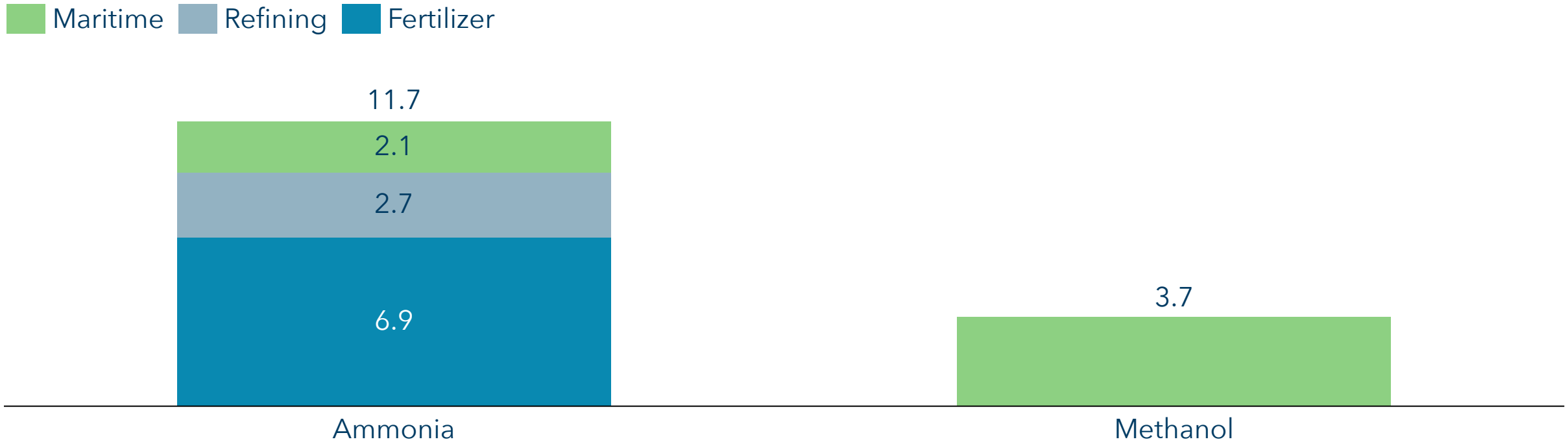
Notes: As with any global e-fuel project, not all volume may materialize. Project details subject to change.
Source: Company announcements and Prumo Logistics.

Competitive e-fuel projects face offtake uncertainty; e-fuel exports to Europe can de-risk and accelerate production scale-up

2035 E-fuel demand by sector in Europe, *million tons per year ammonia or methanol*



The **Port of Antwerp-Bruges** hosts **major industrial activity** across all these sectors and is EU's second largest **bunkering hub** and EU's largest **petrochemical cluster**.

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Notes: For simplicity, all refining and fertilizer demand is assumed to be met with ammonia. Refining and fertilizer demand is based on EU RED III RFNBO 2035 mandates. EU maritime demand is based on current bunkering volume, fuel demand forecasts, and IMO's striving 2030 target of 10% by energy replaced by ZNZ. The 10% target is assumed to be fulfilled with 65% methanol and 35% ammonia. **Source:** RMI analysis

A green e-fuel export corridor can deliver to EU's growing market, and initiate e-fuel exports and bunkering at Port of Açu

Port of Açu and Port of Antwerp-Bruges Corridor

	E-Methanol Export	E-Ammonia Export
Assumed E-fuel available for export in 2030	200,000 metric tons of methanol annually	400,000 metric tons of ammonia annually
E-fuel required as shipping fuel[1]	10,500 metric tons of methanol annually	37,800 metric tons of ammonia annually
Avoided emissions by using e-shipping fuel	18,600 tons of avoided CO_2e/year	62,500 tons of avoided CO_2e/year

1. Assuming all available e-fuel is exported via one 50K DWT chemical tankers for methanol, and two 30 K DWT liquefied gas tankers for ammonia.

Source: RMI analysis

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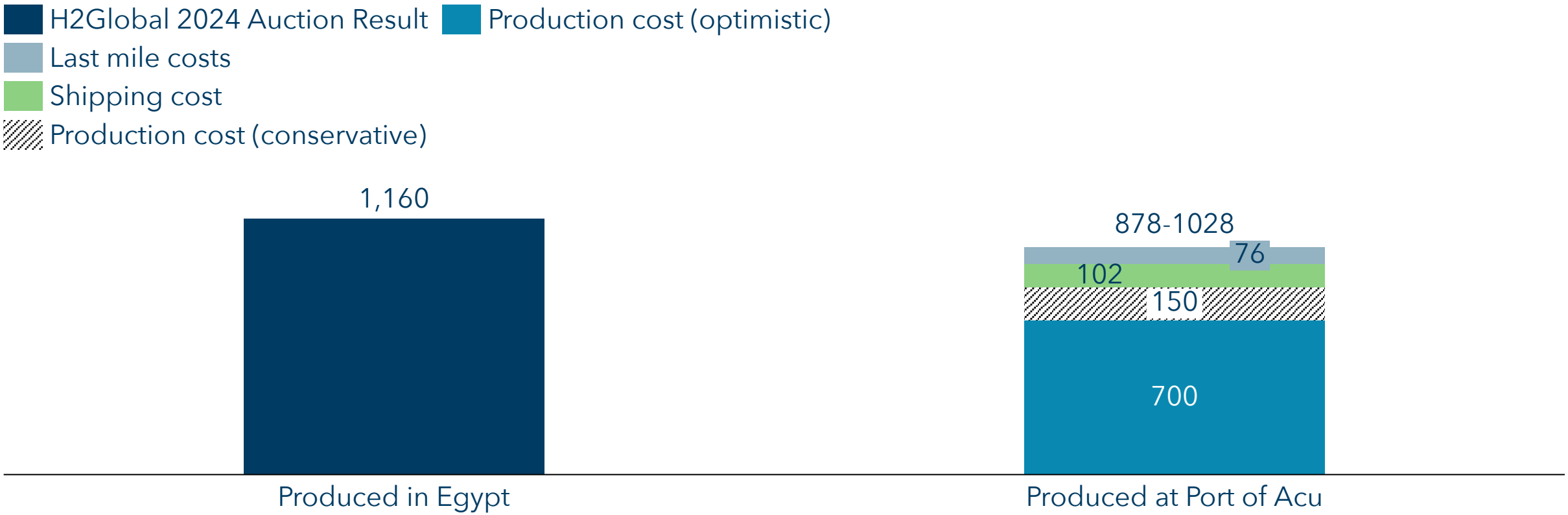
Delivered e-fuel from a green corridor between the Port of Açu and Port of Antwerp-Bruges is competitive

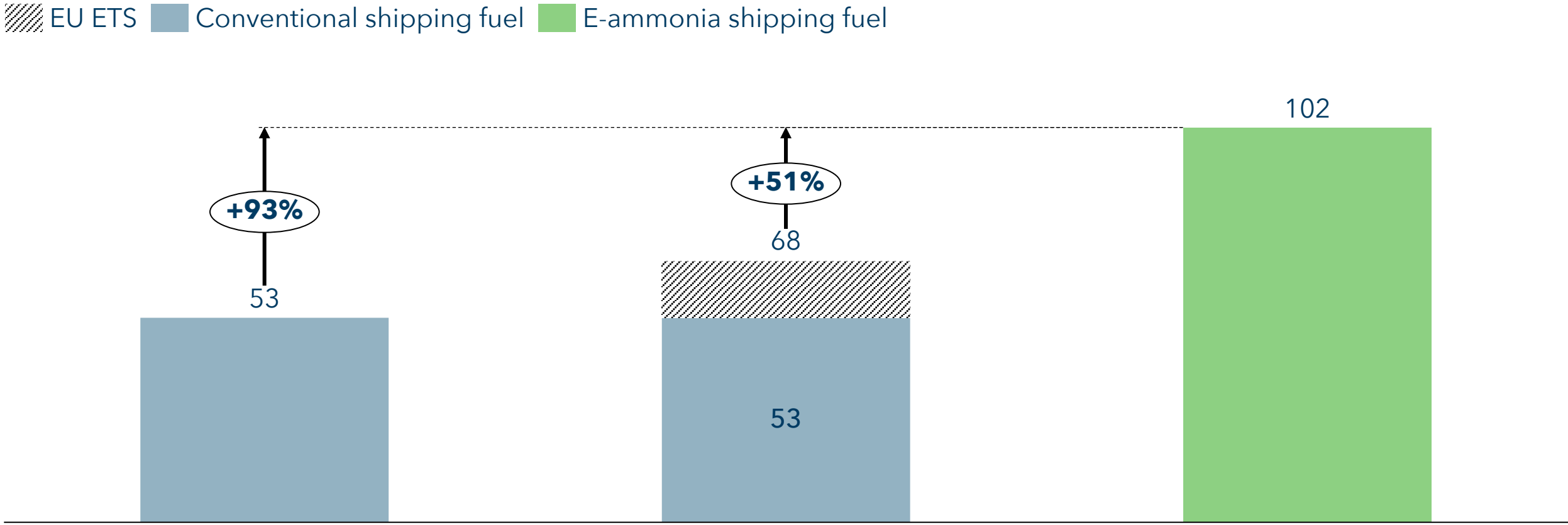
Compared to the first auction result for e-ammonia delivery in Northwest Europe, e-fuel from Port of Açu will be competitive, *USD/metric ton of delivered ammonia*



Notes: H2Global Auction result has been converted from EUROS to USD. Last mile costs include land transport, port infrastructure at both Port of Açu and Antwerp-Bruges, and storage for 400 KTPA e-ammonia.
Source: H2Global and RMI analysis.

The EU Emission Trade System (ETS) helps close part of the cost gap, but leaves a 51% green premium for use of e-ammonia by 2035

Impact of ETS on shipping fuel costs for the Port of Açu-Port of Antwerp-Bruges corridor,
USD/metric ton of delivered e-ammonia



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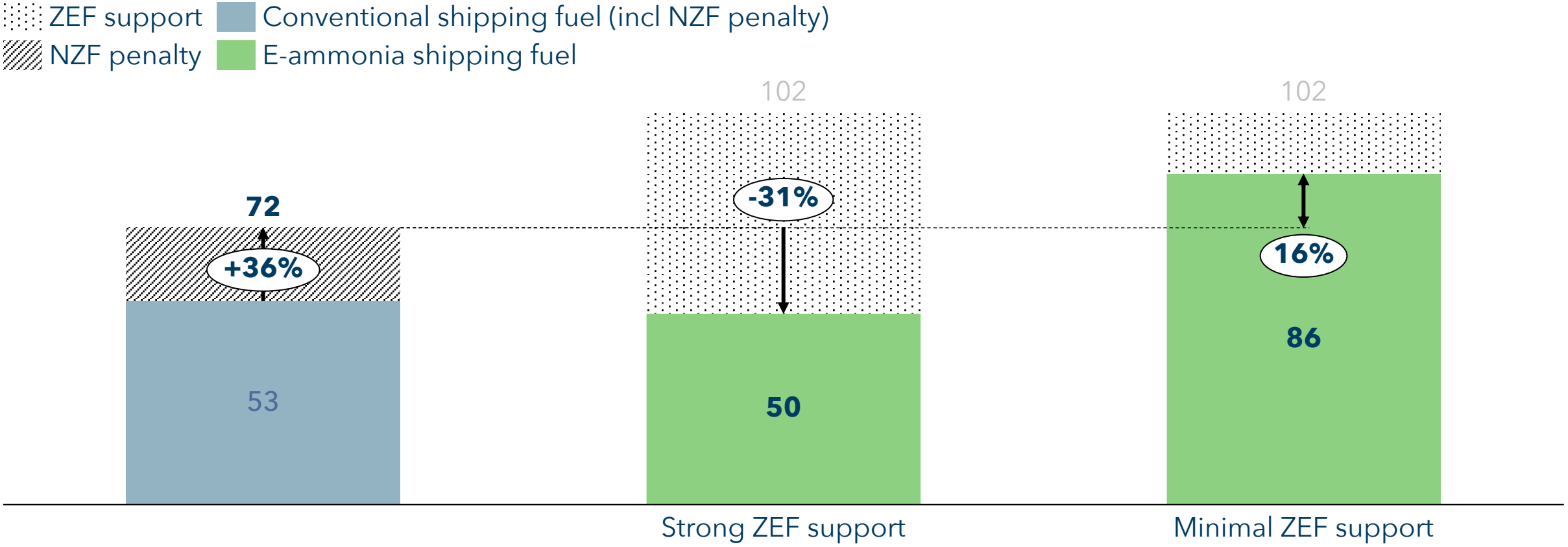
Source: RMI analysis

IMO's Net Zero Framework can significantly reduce the green premium of using e-shipping fuel and even lead to e-fuel being the lower cost option

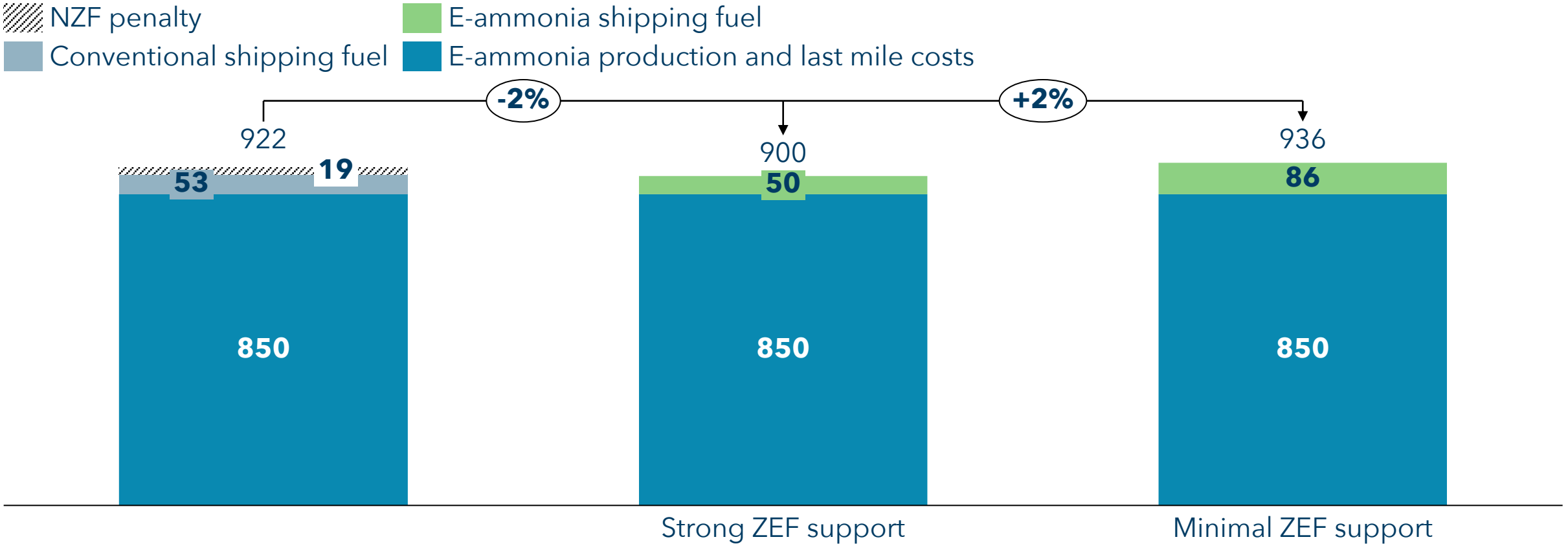
Impact of pending IMO policy on shipping fuel costs for the Port of Açu-Port of Antwerp-Bruges corridor,
USD/metric ton of delivered e-ammonia



Notes: The e-shipping fuel cost for delivered e-ammonia will vary depending on market conditions and the IMO framework's final design. Assumed 650 USD/metric ton VLSFO costs. Assumed ZEF-powered vessels utilize 10% by energy pilot fuel. Ammonia is transported on a 30 kt liquefied gas tanker. **Source:** RMI analysis

Under all scenarios, a premium on green shipping fuel has a minimal impact on the delivered cargo cost to Europe

Impact of IMO policy on shipping fuel costs for the Port of Acu-Port of Antwerp-Bruges corridor, *USD/metric ton of delivered e-ammonia*



Notes: Assumes 650 USD/metric ton VLSFO costs, 775 e-ammonia production cost, ZEF-powered vessels utilize 10% by energy pilot fuel, and ammonia is transported on a 30 kt liquefied gas tanker.
Source: RMI analysis

By being a first mover in e-fuels and green corridors, Brazil can capture socioeconomic benefits

Secure market share

- As e-fuel trade routes take shape, now is the critical window to **secure strategic partnerships** and **shape standards.**
- **Public** and **private capital** will be allocated to countries that show the most promise in **decarbonization** and **innovation.**

Diversify & increase fuel exports

Scaling e-fuel production and exports:

- **Increases trade revenue and volume,** potentially **generating billions of dollars**[1]
- **Diversifies fuel types** that Brazil produces and exports in an increasingly sustainable world

Use resources efficiently

- Relative to **biofuels**, e-fuel production requires **magnitudes less water and land**
- Less feedstock and production constraints result in **higher scalability potential**

Create jobs

- Exporting hydrogen and hydrogen-based products could create **thousands of skilled jobs** in Brazil[1]

1. Brazil's Ministry of Finance

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Brazil and the Port of Açu have a strong low-carbon hydrogen regulatory foundation and could lead in e-fuels

Supportive Green H2 Policy Pillars	Key Regulatory Achievements	Next Steps
Scale supply and demand	• 2030 goal: Become the world's most competitive low carbon H2 producer • 2035 goal: Create low carbon H2 hubs • Goal from PHBC: Promote low carbon H2 use in industrial sectors	• Advocate for the adoption of the IMO Net Zero Framework in 2026 and e-fuel rewards • Set sector-specific low-carbon H2 use goals, coupled with mandates or incentives
Improve project bankability	• Potential tax benefits from Brazil's REHIDRO • Tax credits, totaling R$ 18+ bn (3+ bn USD) to be allocated from 2028-2032	• Streamline and simplify processes for acquiring tax credits and benefits • Clarify the anticipated impact from tax credits and benefits

Establish certified and trusted operations	• The Brazilian H2 certification system (SBCH2) certifies the emissions in H2 production	• To ensure EU RFNBO compliance
		  • advocate for Brazil to count as one bidding zone
		  • while working on increasing solar and wind generation

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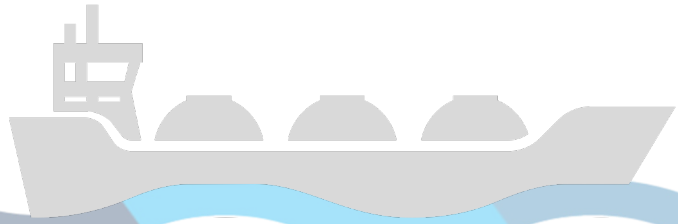
Sources: "New law establishes Low-Carbon Hydrogen Development Program in Brazil" (Mattos Filho, 2024); Hydrogen Legal Framework is Published" (Demarest, 2024); Brazil's Ministry of Finance; "Overview of Hydrogen in Brazil and Rio de Janeiro: Challenges and Next Steps" (Firjan, 2025); "Hydrogen Law, Regulations, & Strategy in Brazil" (CMS Law, 2024); Industry stakeholders.

Green e-fuel export corridors position Açu as an e-fuels leader while enabling efficient investments, collaboration, and scale



Global Challenges

- E-fuel production and supply chains are still developing.
- Cost gap between e-fuels and fossil fuels in hard-to-abate sectors.
- Offtake risk can reduce project bankability.

Açu's Opportunity

- Produce low-cost e-fuels due to great production fundamentals.
- Secure market share in the growing global e-fuel market.
- Diversify and increase exports.

International Catalysts

- IMO Net-Zero Framework can significantly reduce the cost gap.
- EU e-fuel demand hubs and auction mechanisms can support e-fuel offtake.

Next Steps

- Improve regulatory clarity on national goals, tax credits, and certification.
- Support international decarbonization and e-fuel incentives
- Support green e-fuel export corridor consortiums to enable risk-sharing.

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