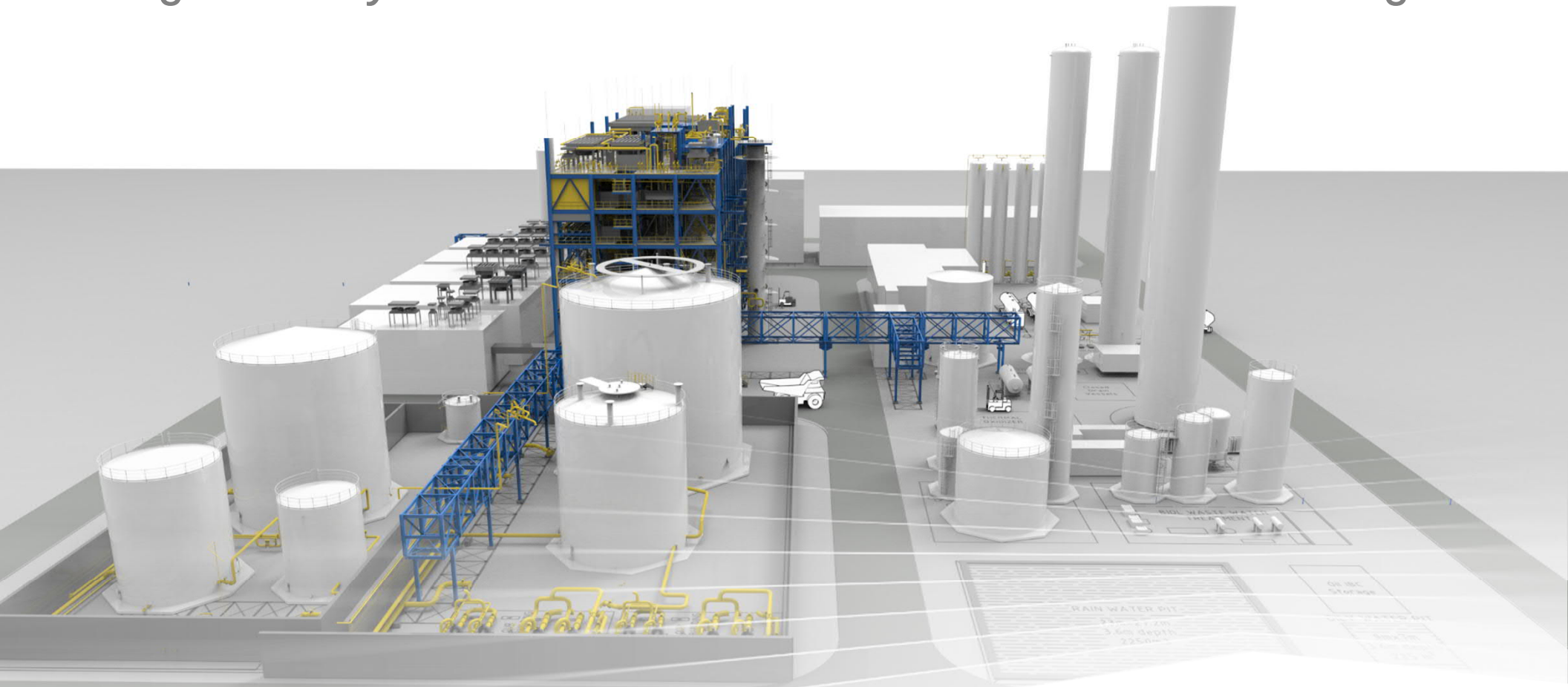


Paving the way to e-SAF FID: Market review and challenges



University of Luxembourg 13.07.2026

SMS  **group**

Today's Journey

- Why e-SAF is essential?
- How Europe is building the e-SAF market ?
- Why projects are still not reaching FID?
- How do we move forward?





SMS Groups' role in the energy transition

SMS Group at a glance

+150 years

EXPERIENCED PARTNER

Family-owned business with 150 years history of leading technology



COMPANY SUCCESS

4.6 bn € order intake (2022)



WORLDWIDE

SMS group > 14,000 employees



FULL-LINER

For the entire metallurgical process chain

SMS group is the pioneer in global iron- and steelmaking. Our cutting-edge low-carbon technologies are transforming the industry. We make the green transition possible.

#turningmetalsgreen

With Paul Wurth's full integration into the SMS group, the Luxembourg site has become the research and development center for decarbonization and hydrogen technologies.

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From Steel decarbonization to aviation



Strega (EP), the world's first 100% hydrogen-based steel plant located in Boden, Northern Sweden

- › Based near Start-up of first plant: 2025
- › Capacity of phase 1: 2.5 million t/year, phase 2: 5 million t/year



thyssenkrupp Steel Duisburg (EPC): Natural gas/hydrogen based direct reduction

- › Start-up of first plant: Q4/2026
- › Capacity of 2.5 million metric tons of directly reduced iron



EasyMelt: First industrial demonstration plant in TATA STEEL, Jamshedpur (IN)

- › Engineering on going for syngas shaft injection & Torch Plasma at tuyere
- › Start-up of first phase : 2029



Norsk e-Fuel (EPC): Developer of commercial-scale e-SAF projects in the Nordics

- › FEED completion for Alby in 2027
- › Start-up of first plant: 2030
- › Capacity of 100 ktpy e-Fuel

Aviation challenge for «net zero» by 2050

SAF is the only scalable short to medium term solution

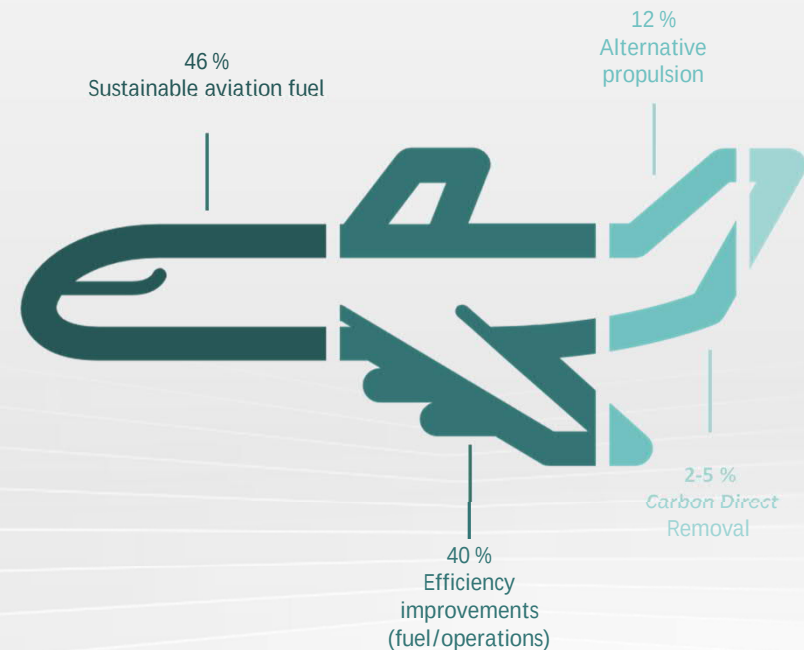
Aviation contributes 2,5% of the global GHG emissions and needs to reduce emission by ~3GT before 2050 to be in line with the Paris Agreement

Aviation is a hard-to-abate industry with limited available alternatives for propulsion

Difficult transition to battery and hydrogen solution for airplanes will take several decades (viable option for sort haul flights) and expected GHG Reduction from 10% to 15% by 2050

Sustainable Aviation Fuel (SAF)* is a key and sole solution able to achieve emission

*70% GHG emission reduction compared to fossil fuel



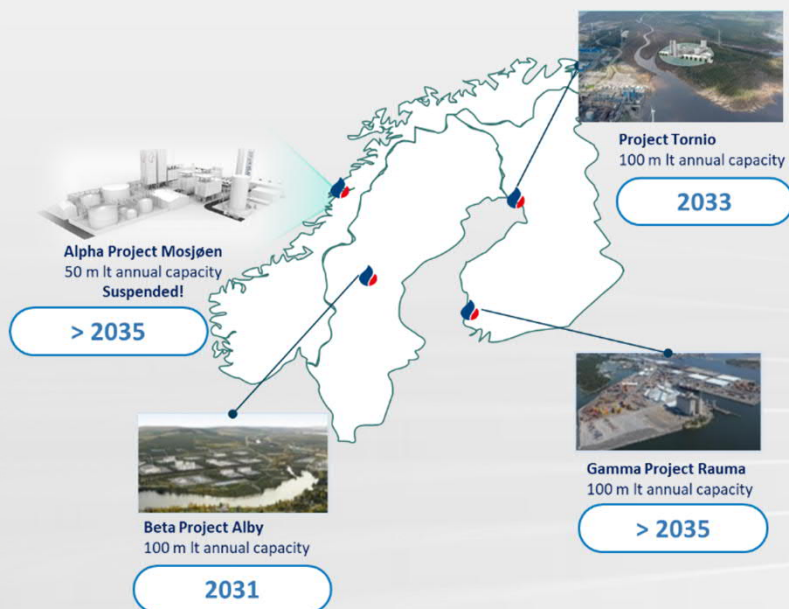
Sources: [EU 2021](#), [IEA 2021](#), [IEA, 2022](#)

SMS group investment in e-SAF

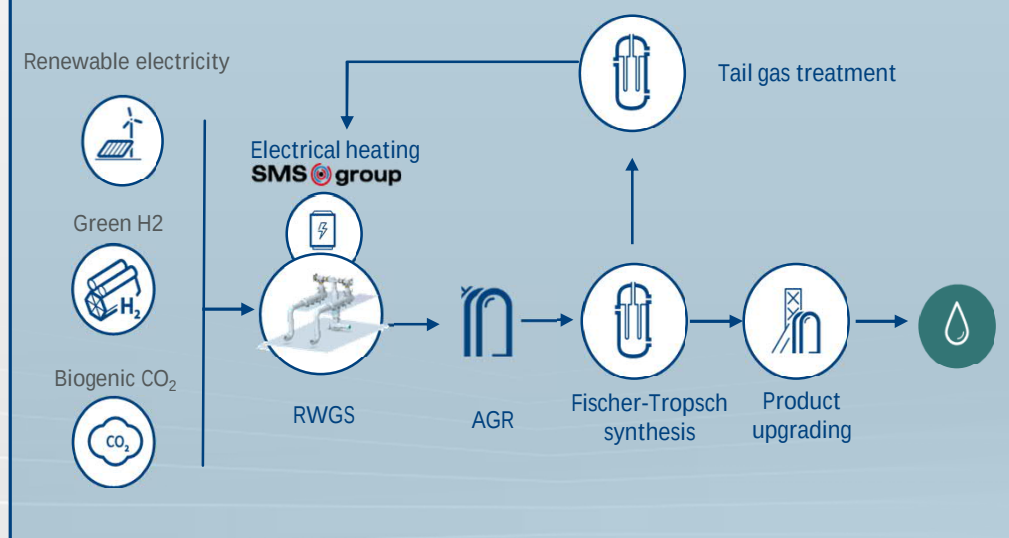
Developing technology is important, deploying it is even more important



- › e-SAF production via Fischer Tropsch pathway
- › Feedstock: Biogenic CO₂ & green H₂



Technology pathway under licence



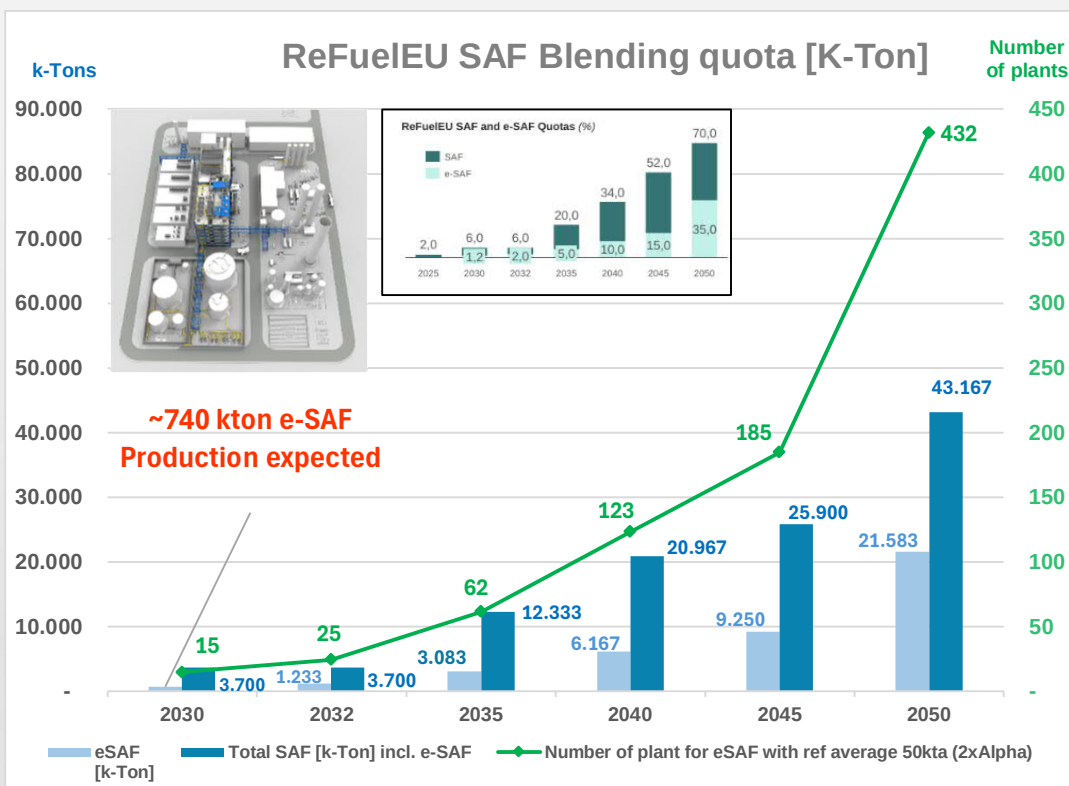
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e-SAF opportunity in Europe: from vision to projects

European Regulatory Drivers : Application of the ReFuelEU Aviation

EU sub-mandates are generating a new exponentially growing market

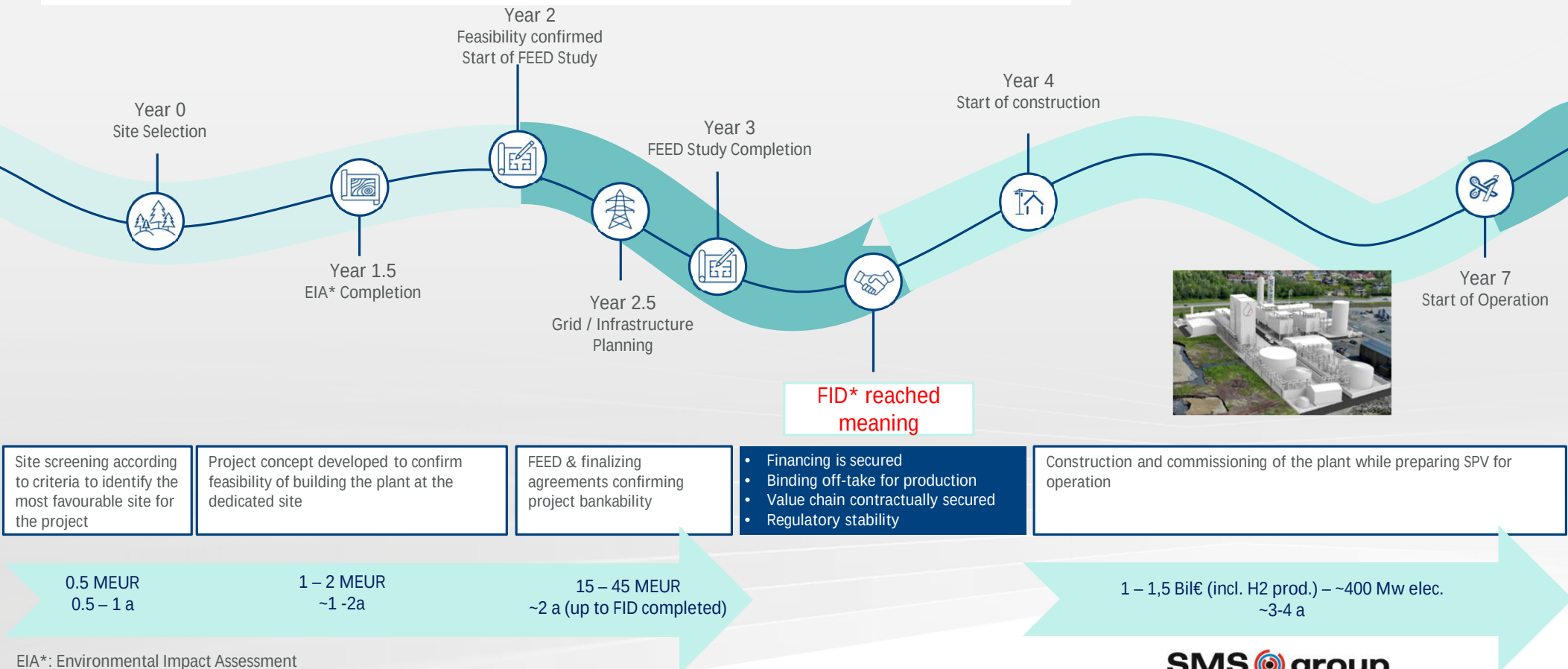


Europe Outlook:

- > e-SAF market is guaranteed by quotas (ReFuelEU Aviation) in association with dissuasive penalties.
- > To reach 2030 target, > 10plants producing 100MioL of e-Fuel should be built.
- > RWGS+FT and e-Methanol-to-Jet are the predominant e-SAF technology pathway currently under development across Europe
- > B€ market opportunity in Europe from 2030 to 2050 for plant implementation
- > Currently no FID was reached for any of efuel developer. Must be completed in within 2017 to meet EU target and be ready for 2030.

Project Development Timeline - DEVEX & CAPEX requirement

Significant risk money is required already in early development stages – FID pushes funding needs above € 1 bn





What still prevents FID?

Technological Challenges



First-of-a-Kind (FOAK) despite combination of de-risked units :

- Limited commercial reference
- EPC contractors reluctant to give performance guarantee



Complex process integration:

- High level of process control & Heat integration

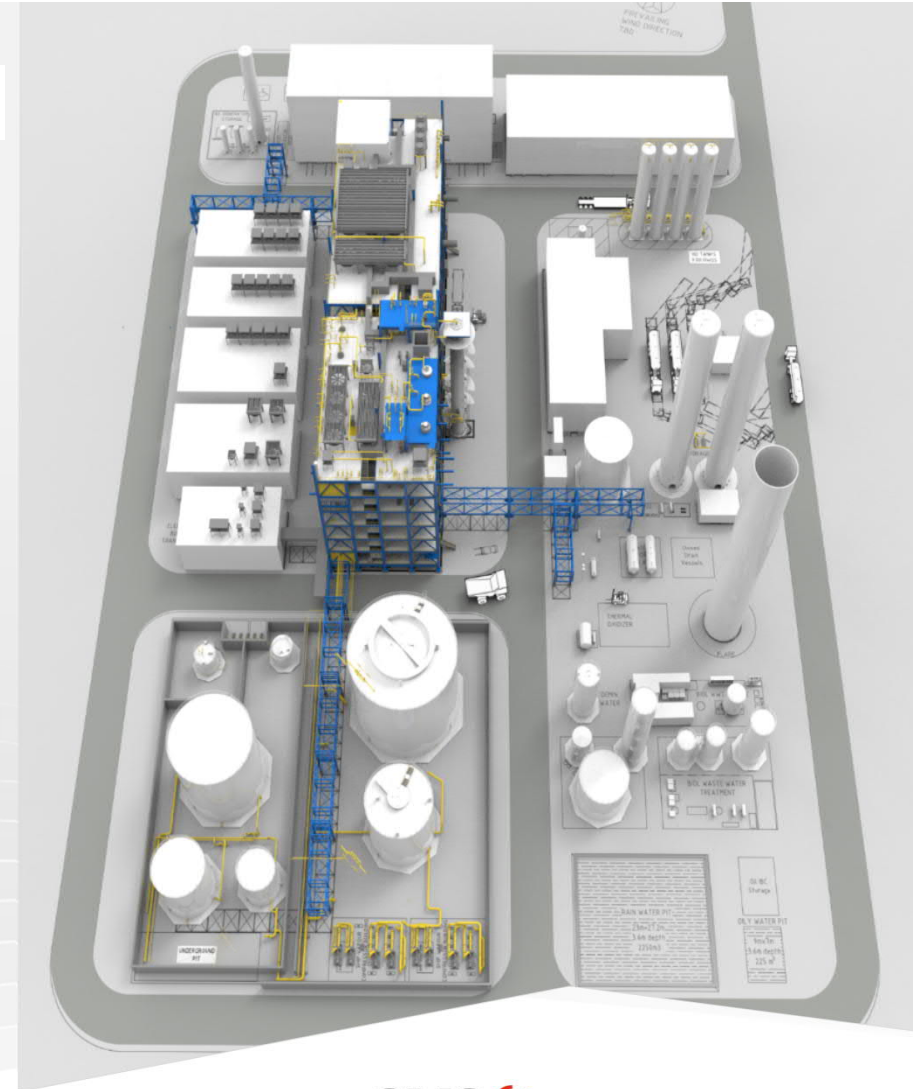


Developed electricity infrastructures with sufficient spare capacity, cheap, stable and green/low carbon electricity



Complex value chain integration

- More than 20 stakeholders involved
- Increase project on project risk



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Economic & Financing Challenges



High DEVEX requirement before reaching FID:

- > 30mio€ “at risk capital”
- Difficult to attract investor before major project milestones secured



Highly CAPEX project (over billion€)

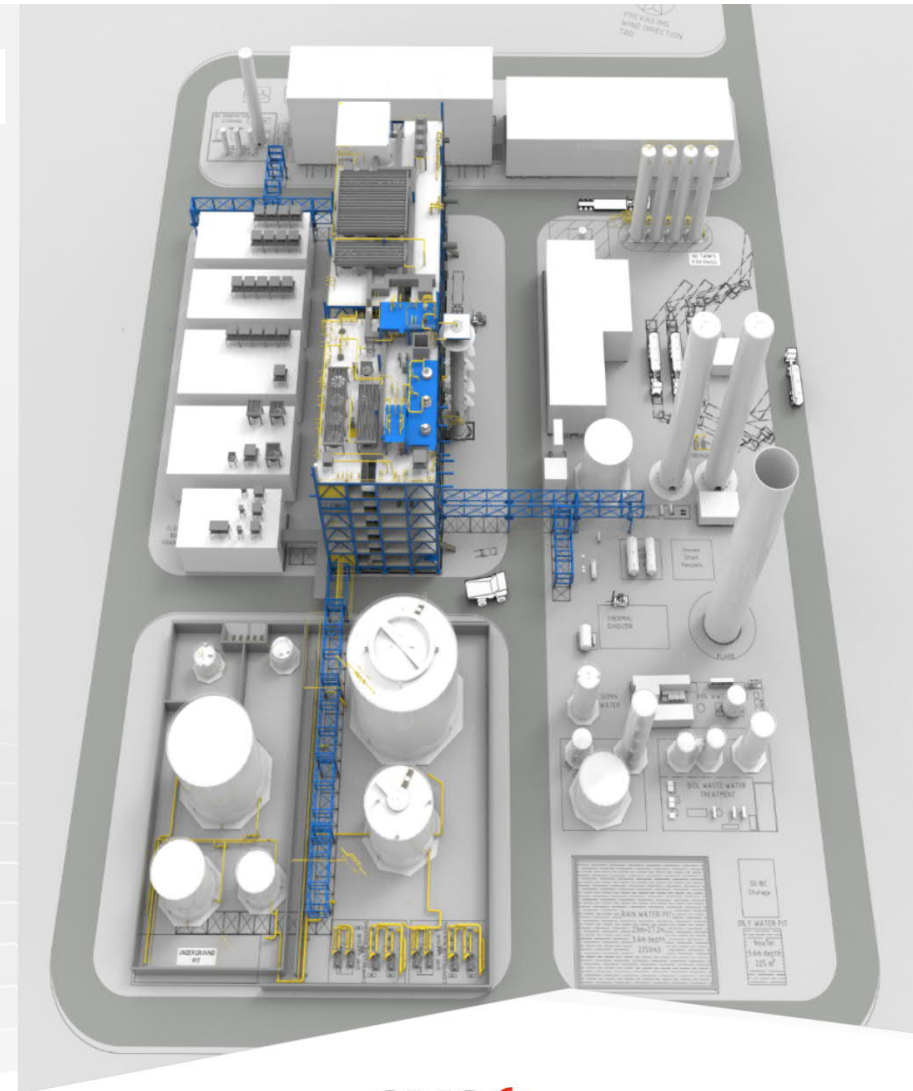


High production cost : Renewable electricity is the largest operating costs followed by sustainable CO2 and logistic



Revenue uncertainty :

- Limited long-term SAF price visibility
- Long-term offtake agreements difficult with aviation industry
- Aviation industry seen as volatile industry by banks



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Policy Challenges



Need for stable regulatory framework on long-term basis for 20y+ investment

- Consistent implementation of ReFuelEu Aviation across all Member States



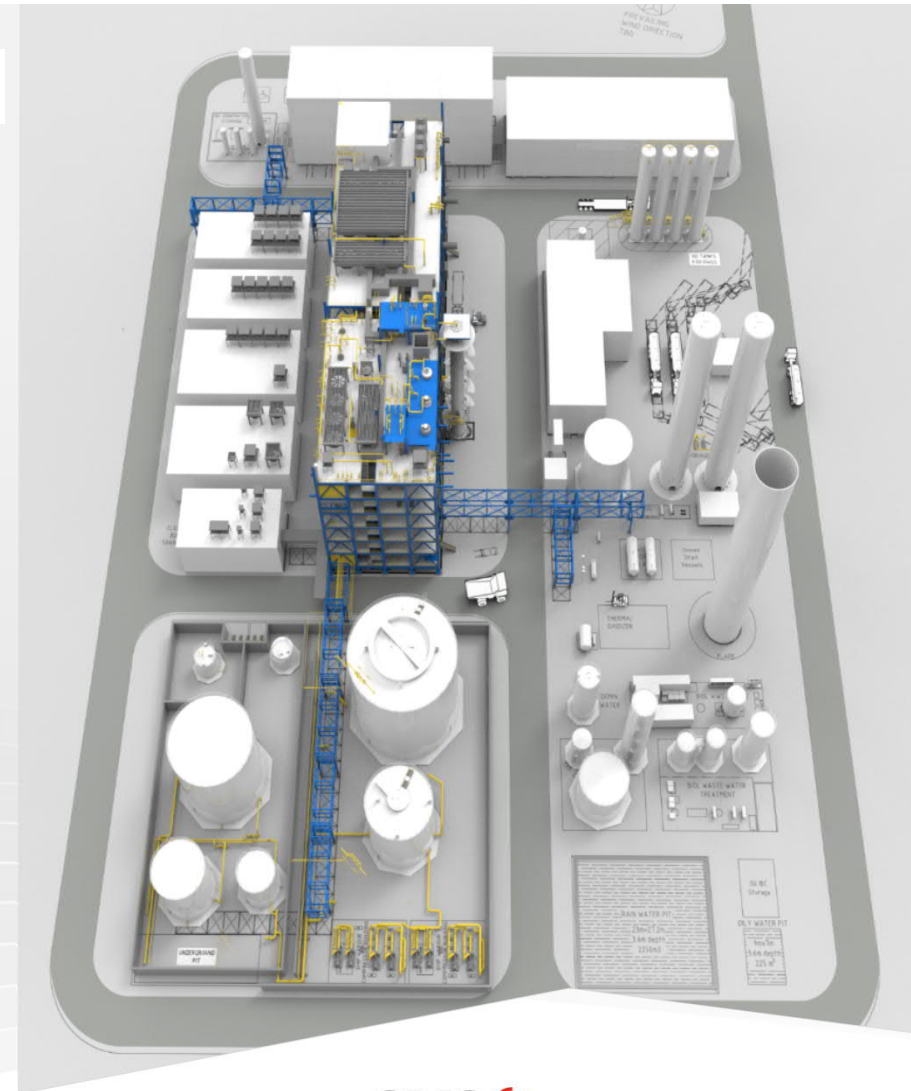
Need for stronger public support mechanisms:

- Investment grant & Contracts for differences are essential
- Support on early-stage projects (before FID)



Positive momentum from EU commission:

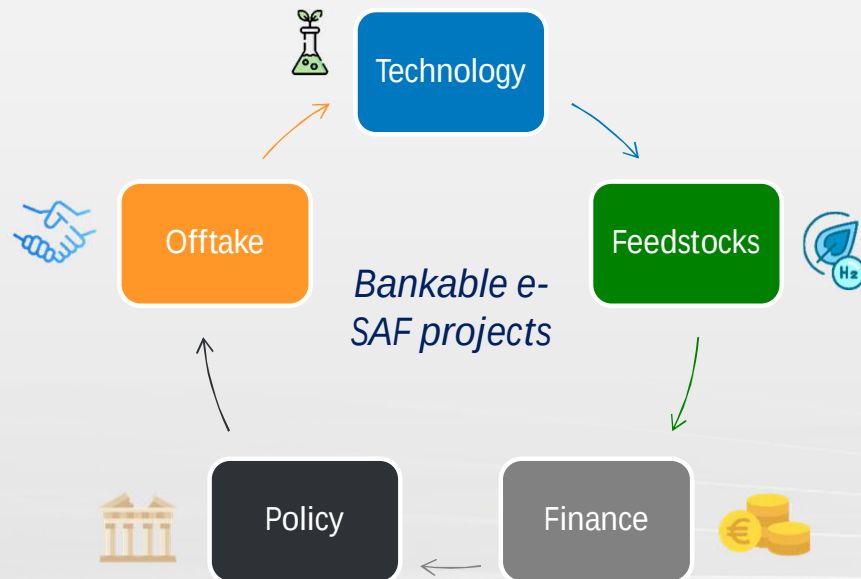
- AccelerateEU promotes the productions of EU SAF to strengthen EU energy independency
- Industrial Accelerator Act /Made in Europe aims to support EU clean tech & industry manufacturing
- European competitiveness Fund (2028-2034)
- Revision of RNFBO criteria to reduce constrains
- Early movers coalition to support market uptake



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Turning Ambition to Action

The technology is ready. The market is emerging.
The next priority is to **deploy the first bankable industrial projects**.



The energy transition requires **collective action**.
Public institutions & Public Financial institutions are key catalysts to bridge innovation and industrial deployment and **unlock the first bankable projects**.



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THANK YOU!

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