delphy hydrogen storage

DELPHY USE CASES

HYDROGEN STORAGE FOR RELIABLE e-SAF PRODUCTION

Overview

The growing role of e-SAF in sustainable aviation

Electro-sustainable aviation fuels (e-SAF) are becoming central to aviation's sustainability transition. Produced from green hydrogen and captured CO_2, e-SAF enables deep decarbonization as airlines and airports aim to cut emissions.

The EU targets 1.2% of jet fuel demand from e-SAF by 2030 and up to 35% by 2050, driving major investment and innovation. Over 40 large-scale projects are underway, with nearly 3 million tons of annual capacity projected.

However, production costs remain higher than fossil fuels, and scaling requires significant land, complex permitting, and strict safety measures for hydrogen and CO_2 handling.

Advanced hydrogen storage solutions like Delphy can help overcome these challenges, ensuring reliable supply, reducing operational risks, and supporting aviation's path to substantial carbon reduction.

Key figures

1.2% – 35%
share of e-SAF in EU jet fuel demand, from 2030 to 2050

300M t/yr
global jet fuel demand

Up to 80%
lifecycle CO_2 emissions reduction with e-SAF

–5% H_2 cost
Delphy hydrogen storage cuts LCOH by 5% in a 300 MW e-SAF plant

10-20t
typical hydrogen storage capacity in Delphy e-fuel project offers across Europe

Challenges

Challenges to sustainable aviation

- **High production costs**
  Synthetic aviation fuels cost far more than fossil jet fuels, hindering adoption. Cutting CAPEX and OPEX and using grid arbitrage are key to viability.
- **Permitting and land use**
  World-scale e-SAF facilities require substantial land and must navigate complex permitting processes, which can delay project timelines and increase costs.
- **Continuous hydrogen supply**
  Large-scale e-SAF plants need steady hydrogen flow, but renewable electrolyzers are intermittent—making buffer storage vital for reliability and compliance.

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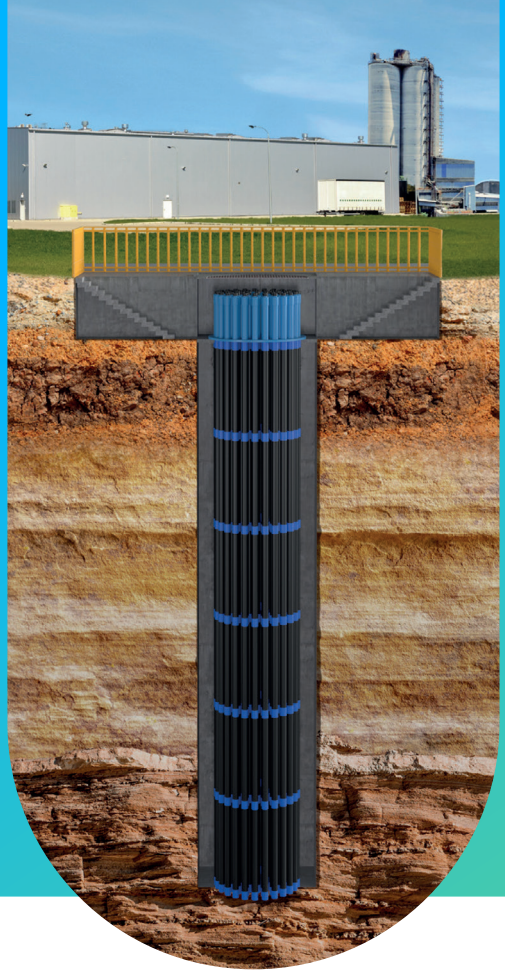

Delphy

A clean, scalable backup power source

A buffer hydrogen storage system is essential to ensure continuous e-SAF synthesis, compensating for grid fluctuations and renewable power intermittency. For example, a 245 tons-per-day e-SAF plant might require approximately 10-20 tons of buffer hydrogen storage to maintain stable operations. The Delphy hydrogen storage solution is specifically designed to address the unique challenges of e-SAF production by:

- **Cost Control & Flexible Growth:** Delphy's modular design enables phased deployment and capacity expansion, optimizing CAPEX and OPEX. Independent module maintenance minimizes downtime and boosts efficiency.
- **Land Use & Permitting:** Its underground vertical layout cuts footprint by up to 30x versus above-ground storage, easing permitting and freeing land for core operations.
- **Safety & Compliance:** Delphy's subsurface system integrates advanced safety features, halving safety perimeter compared to conventional designs and meeting strict international hydrogen standards.

Real-life case study

Bringing value to e-SAF projects

This compelling business case is based on a real, large-scale green hydrogen and e-fuel project, currently in pre-FEED stage, in a major industrial port zone, with a 300 MW electrolyzer and continuous hydrogen demand for e-SAF production.

E-SAF PLANT PARAMETERS

- E-SAF production capacity: 75 000t/y
- Electrolyzer Capacity: 300 MW (PEM)
- Annual H_2 Production: 44 000 tons
- Annual CO2 consumption: 325 000 t/y

DELPHY STORAGE CAPACITY: 10 TONS

TOTAL ANNUAL BENEFIT FROM DELPHY: €8M
primarily from electricity price arbitrage and outage avoidance.

PAYBACK PERIOD: ~2 YEARS

Market ready

Following a rigorous technology qualification process with **DNV** and **Bureau Veritas**, Delphy is fully certified and ready to support customers. Delphy is delivered as a turnkey hydrogen storage solution, backed by comprehensive lifetime service offerings to ensure reliability and performance.

"Being able to stockpile hydrogen with Delphy will enable us to implement a more flexible supply system."

ALEXIS MARTINEZ, CEO OF H2V

Interested in the Delphy hydrogen storage solution?

Vallourec's team of specialists can help with:

- *Technical consultations and system sizing*
- *Custom configuration development*
- *Detailed CAPEX/OPEX analysis*

Contact us at delphy@vallourec.com

SCAN THE QR CODE TO FIND OUT MORE ABOUT DELPHY

All figures in this business case are representative of a typical world-scale PtL (Power-to-Liquid) SAF plant. Annual savings and payback calculations are based on conservative assumptions for grid arbitrage, outage avoidance and peak sales, as modeled in real projects. Our team can support you in assessing optimal storage level and associated value.