



Task 44 Flexible Bioenergy and System Integration: Best Practices

Liquid Wind and Övik Energi - The first eFuel facility

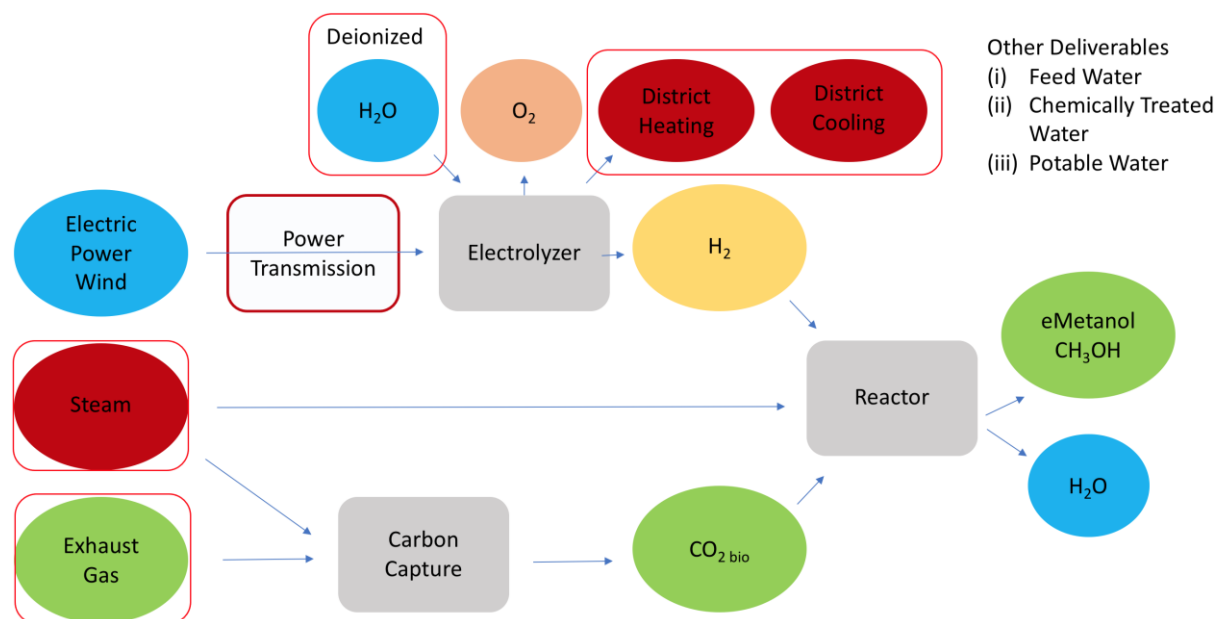
April 2022

Örnsköldsvik, Sweden

LIQUID WIND AND ÖVIK ENERGI - THE FIRST E-FUEL FACILITY

Övik Energi will partner with Liquid Wind to provide CO₂ for the first commercial-scale eFuel facility. Biogenic CO₂ emissions from the energy facility will be captured and combined with renewable hydrogen to form liquid carbon neutral fuel. The fuel will be used by the marine industry to enable carbon neutral shipping. The site is located on the north east coast of Sweden, where Liquid Wind will also have access to the low-cost renewable electricity needed to produce the eFuel.

The following schema sums up the process.



Liquid Wind and Övik Energi project (Source: Övik Energi Presentation at the Advanced Biofuel Conference in Stockholm, 2021)

Base information	
Link for more information	https://www.liquidwind.se/news/ovikenergi
Contact person, email	Thomas Nilsson, tn@liquidwin Kristina Säfsten, kristina.safsten@ovikenergi.se
Location	Örnsköldsvik, Sweden
Owner/Operator	Liquid Wind
Technology supplier	Liquid Wind
Construction year	2024
Status	Commercial Plant
Feedstock	Biogenic CO ₂ emissions
Products	eMethanol
Avoided emissions per year	100 000 tonnes of CO ₂ /year (100 kton/a)
Type of flexibility provided	CO ₂ from biomass-fired CHP facility will be captured and combined with renewable hydrogen to produce e-methanol
Characteristics of the plant	
Load/Input	
Bio-CO ₂	70 000 tonnes/year (70 kton/a)
Hydrogen	10 000 tonnes/year (10 kton/a)
Load/Energy	
Electric power (wind)	550 GWh/a (70-85 MW)
Process Steam	140 GWh/a
Waste heat	380 GWh/a
Output	
E-methanol	50 000 tonnes/year (50 kton/a)
Investment cost of the plant (€/USD)	1 500 million EUR

Technical and Commercial Details

- Övik Energi and Liquid Wind will now work closely to efficiently integrate their operations. Liquid Wind's facility will be constructed on Övik Energi's Hörneborgsverket site, minimizing the distance of transportation for shared resources.
- Using efficient carbon capture technology and solvents, Liquid Wind will capture and concentrate CO₂ from Övik Energi's emissions.
- In the Liquid Wind facility, green hydrogen will be produced from renewable electricity and water. This hydrogen will then be combined with the captured CO₂ in a reactor to form methanol.

- The two facilities will also exchange steam and waste heat to maximise resources and efficiency.
- eMethanol is a versatile chemical, being broadly produced from fossil fuels. Övik Energi and Liquid Wind will replace this main source by renewable materials.
- Renewable methanol provides scalable alternative to traditional fuels, providing an alternative to replace biofuels for transport and industries.

Market Opportunities

- Liquid Wind has a strong Consortium¹ which will supply technology and expertise for the production of eMethanol. Together they will plan the technology integration and design the facility in close collaboration with Övik Energi. The total investment is approximately 1500 million EUR, and the goal is to make the investment decision in early 2022.
- The eMethanol that will be produced is expected to be used for shipping and Liquid Wind is in advanced discussions with a leading shipping company that plans to use it to fuel a new ship. With a construction time of approximately 2 years, the eMethanol will likely be available from early 2024, just in time for the new vessels to be operational.
- In addition to that, eMethanol has reduced climate impacts in comparison to traditional fuels, being easy to store, utilise and transport. This fuel dissolves rapidly, also having low marine toxicity.
- According to Håkan Vedberg - the strategic Business Development Director from Övik Energi, the positive aspects related to climate change are a side effect that were not considered as main issues by the partnership with Liquid Wind, in the beginning.

Lessons Learned

- Matching product portfolio and strategic platform is an efficient way to build a partnership among companies.

Challenges

- This project has several challenges to be addressed, such as (i) technical complexity and interdependencies, (ii) environmental permits and safety issues, (iii) political risks, (iv) the using of waste heat and (v) a time frame of more than 20 years, also according to Vedberg.

¹ This Consortium was settled in the beginning of 2020. It was led by Liquid Wind, aiming to establish commercial-scale renewable fuel facilities and composed by Axpo Nordic, COWI, Carbon Clean Solutions, Haldor Topsoe, Nel Hydrogen, and Siemens. It will combine their expertise and technology to produce liquid, carbon-neutral renewable eMethanol fuel using captured carbon dioxide and green hydrogen from renewable electricity. Contributing companies are also Alfa Laval, Uniper and Worley. In January 2022, Ørsted acquired 45 percent of Liquid Wind, and at the same time, plans for further facilities around Sweden were presented.

Övik Energi's facility in Örnsköldsvik, Sweden



Övik Energi's production facility that will supply CO₂ for eFuel (Source: Övik Energi)