Norsk e-Fuel

Building a CCU Industry in Norway

2023

Ida Marie Larsen | Manager Funding and R&D

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Norsk e-Fuel in brief

- Developing plants for e-Fuel production from water, CO_2 and renewable power
- Answer the growing international need for SAF
- Enable transition towards renewable aviation


Synthetic renewable aviation fuels
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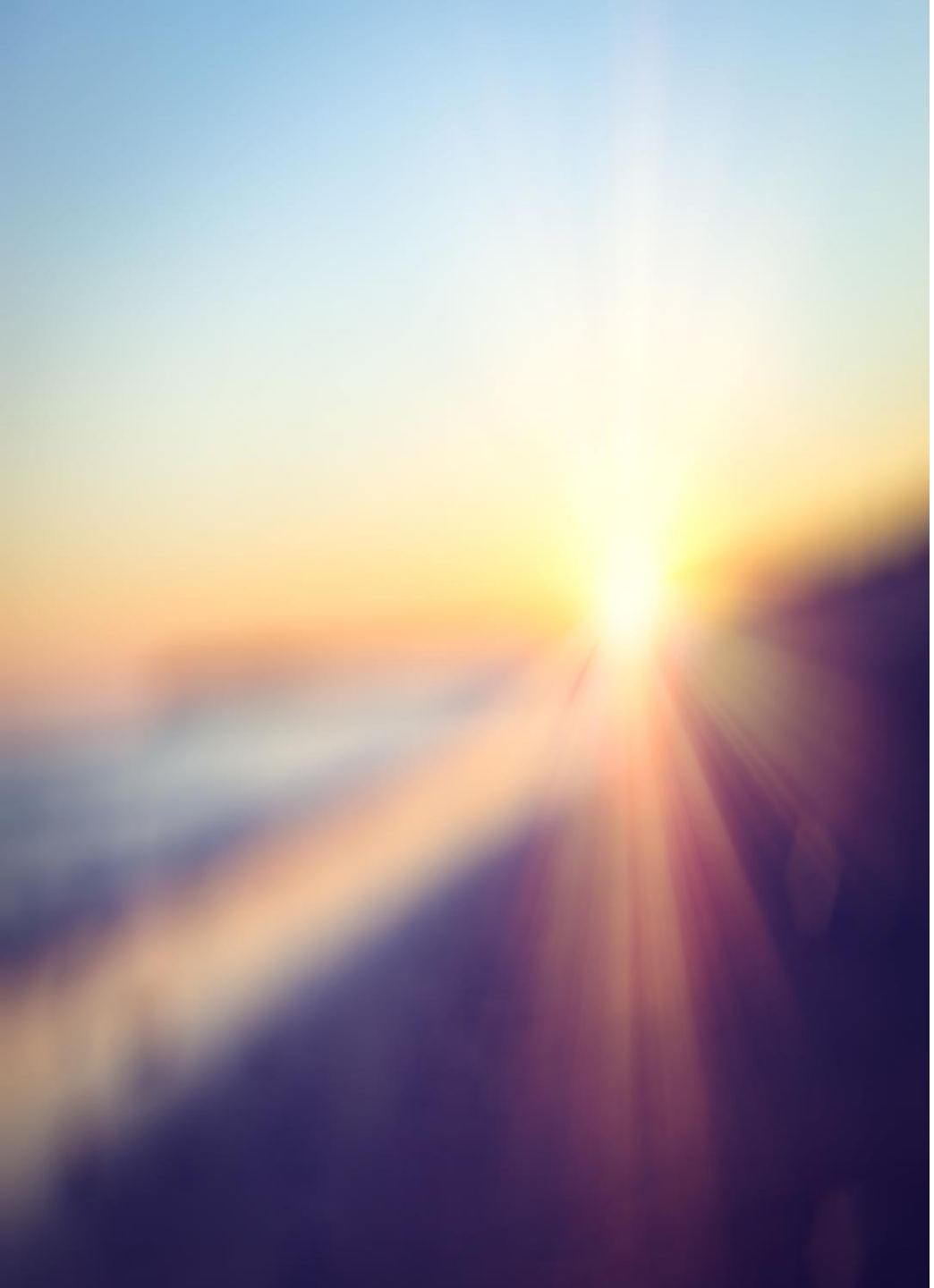

SAF needed to achieve climate goals

The aviation industry today

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

Transitioning to battery and hydrogen powered aircrafts will take several decades[1]

SAF is a key solution where large emission reductions can be achieved fast

The EU is currently implementing regulations supporting market scale-up and roll-out of SAF

1 weforum 2023

Defining sustainability

What is SAF?

- **SAF – Sustainable Aviation Fuel**
- **Synthetic fuels and biofuels** are the two main paths within the SAF definition
- **Both types of fuels needed** to enable emission reduction within aviation
- **Definitions and production regulated** through RED II and ReFuelEU Aviation

Ready to start the renewable transition

Unique advantages of e-Fuels

8x more efficient use of land area
compared to biological alternatives

95 % lower water consumption
compared to biological alternatives

Clean combustion
No Sulphur content and reduced particle emissions

Zero cost for infrastructure
by using existing assets

Certified for use in aviation
up to 50 % drop-in according to ASTM D7566

Site identification and PtL feedstocks

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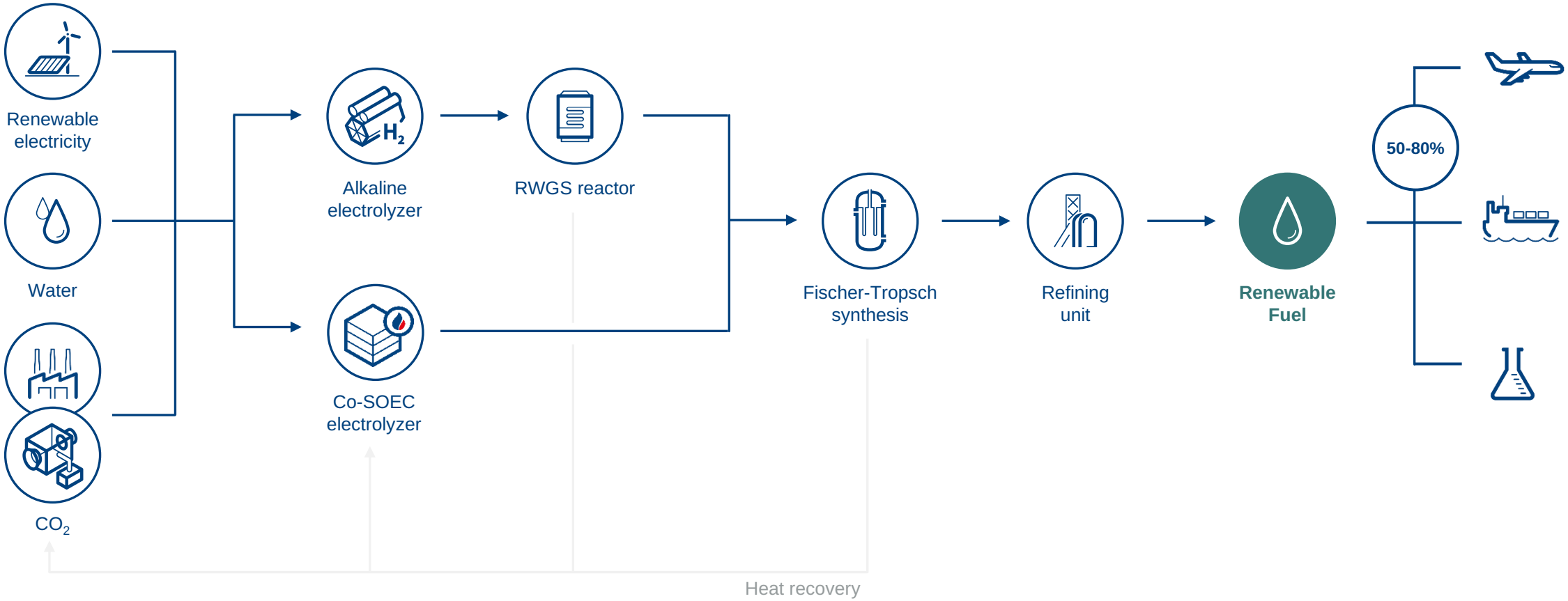
The Norsk e-Fuel Value Chain



Our first production plant will be located in Mosjøen

- Surplus of **renewable electricity at low prices**
- Availability of **industrial plots** with expansion opportunities
- **Industrial know-how** and established supplier environment
- Excellent **logistical connections**

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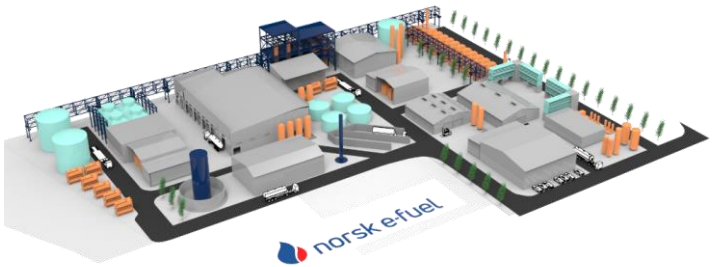
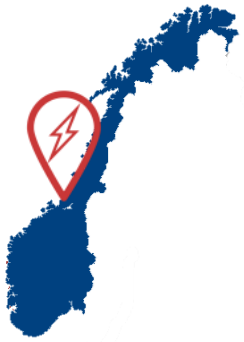
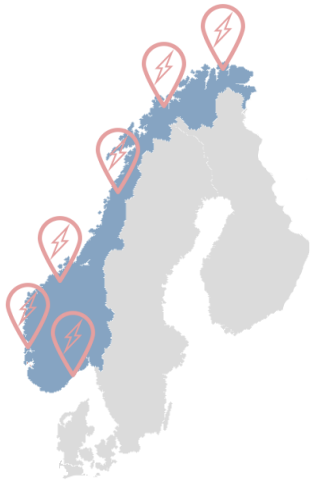
Upscaling of PtL for future needs – 140.000t yearly production by 2030

Scaling from Mosjøen to the world







Needs and production for Alpha:

Norsk e-Fuel Alpha
*up to **50 MLtr** e-fuel*

2026

Norsk e-Fuel Beta
*Scaling up to **100Mltr** e-fuel*

2027-2028

Norsk e-Fuel *Beta, Gamma ….*
x **100 Mltr** e-fuel plants

2029-2030

130kt p.a.

180 MW_el
(+/- 30% max capacity)

25000 – 35000 m²

5-15%
(DAC share CO2)

40 kt p.a.
(28 kt Jet)

Suitable CO_2 sources and the role of DAC

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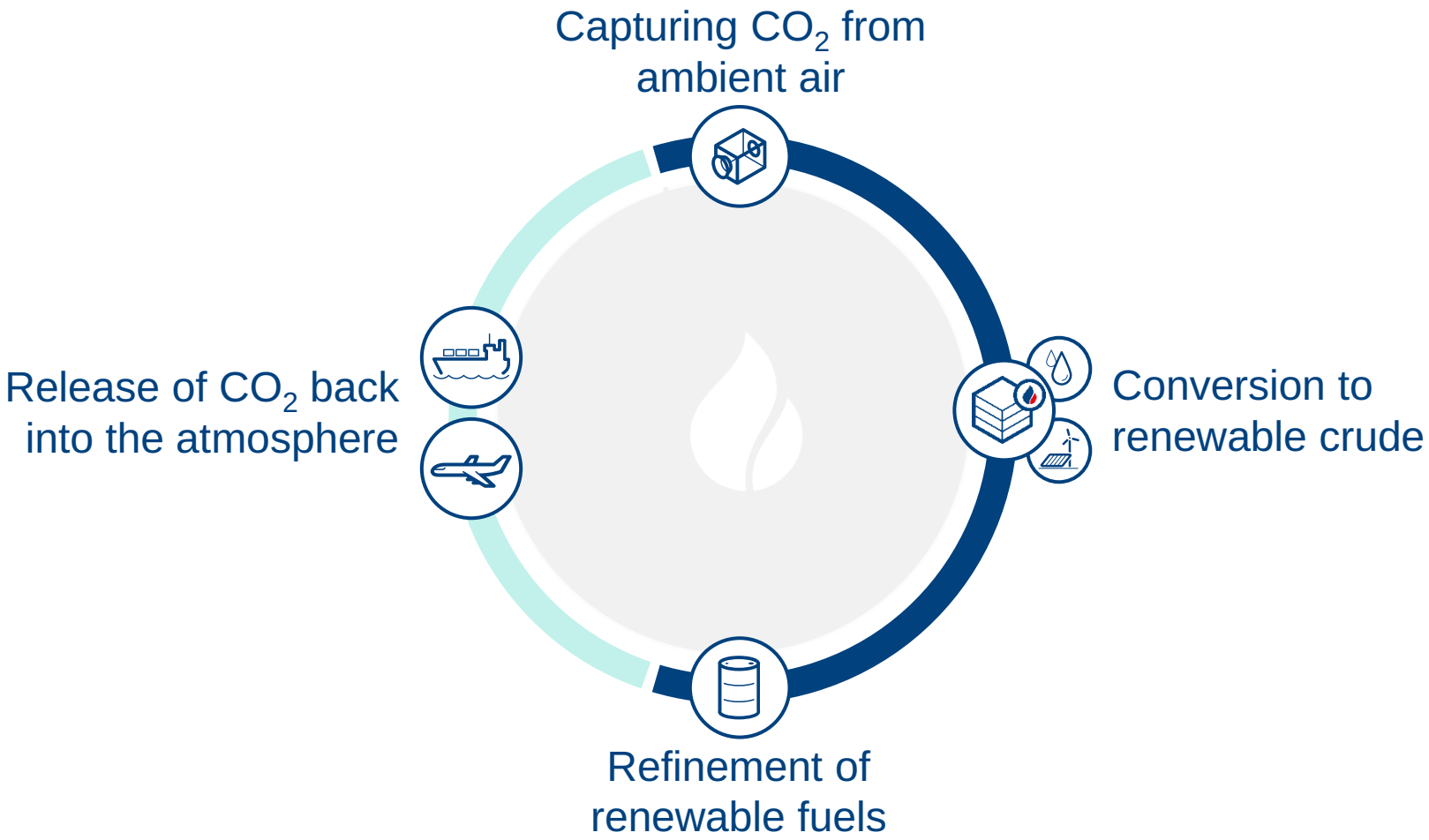
Our vision

A Circular Carbon Cycle



CO_2 as feedstock

Sources of CO_2

The EU has implemented strategies regarding which sources can be used where

Direct Air Capture are CO2 captured from ambient air

Biogenic CO_2 are emissions captured from biological sources and in natural carbon cycle

Fossil CO_2 are emissions connected to use of fossil fuel or certain industrial processes

Defining sustainability

The importance of CO_2 source

Requirements and regulations posed by the EU ensures a level playing field and provides framework for feedstock

We aim to use biogenic CO_2 to ensure the highest level of sustainability possible along the value chain through;

- Direct Air Capture (DAC)
- Biogenic industrial CO_2

End-users expect a transparent and clear focus on sustainability in all levels of the value chain

CO_2 value chains and transportation

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More than 190 years of experience combined

The Norsk e-Fuel consortium

Technology Leader Power-to-Liquid with **electrolysis technology** and world-wide patents: **Sunfire** enables power to fuel conversion with top efficiency.

Technology Leader **Direct Air Capture** of CO_2: Synergetic to Sunfire PtL process **Climeworks** enables CO_2 supply in remote areas with access to cheap electricity.

Leader System Integration and EPC: **Paul Wurth** has the resources to industrialize PtL and will offer performance guaranty for the PtL process.

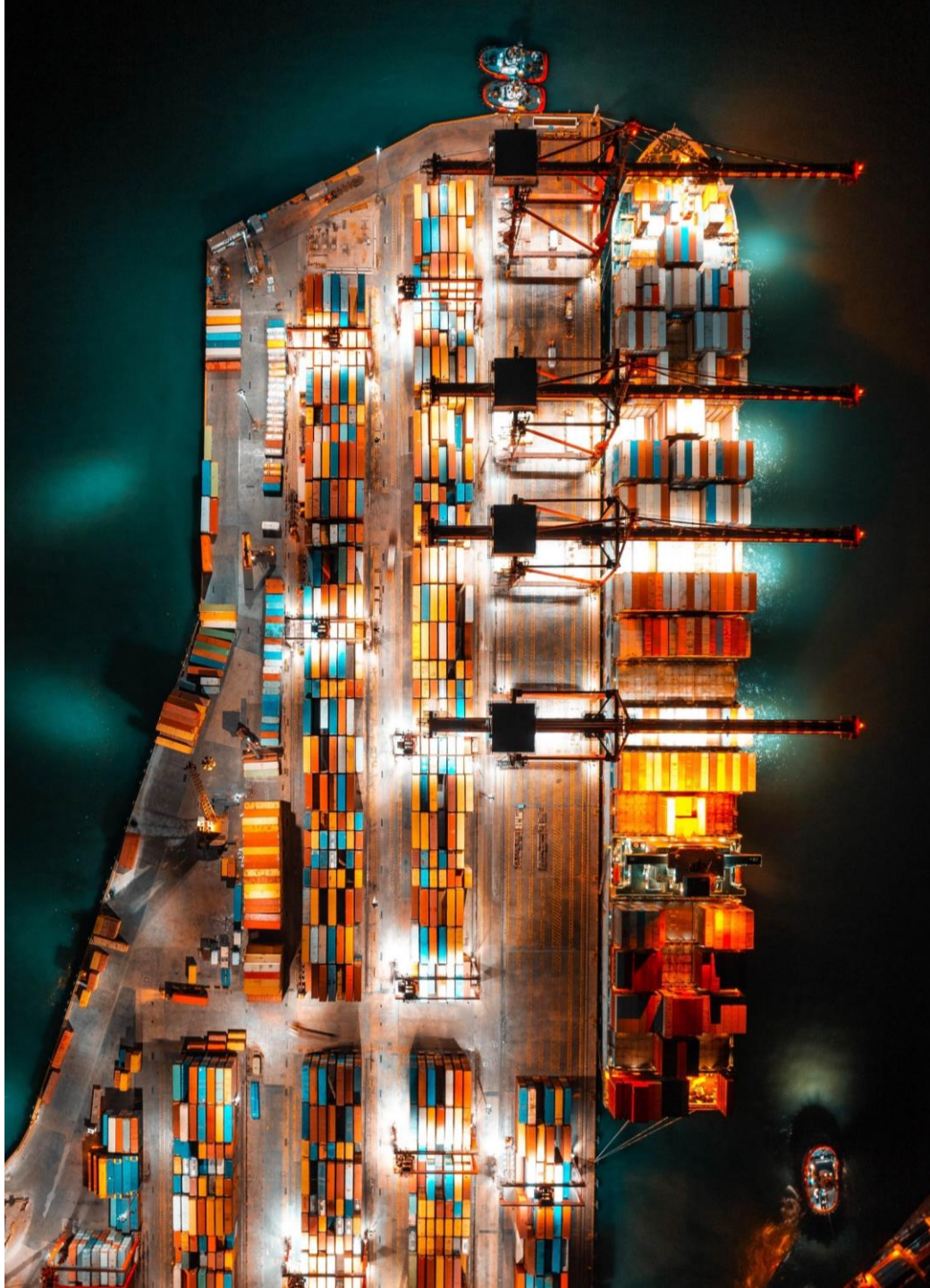
Norwegian family-owned company focusing of **sustainable investments**: **Valinor** makes early-stage investments in companies to enable solutions for tomorrow.

Lux-Airport is the aerodrome operator of Luxembourg Airport and has the network to **off takers** and insights into the aviation market.

Developing new value chains

CO_2 transportation

- Cost-competitive access to renewable power is a driver when identifying sites for e-Fuel production
- Sites are not necessarily co-located with capturable CO_2
- Mosjøen has excellent access to transport infrastructure such as harbor and railway in immediate vicinity
- We will utilize the logistical infrastructure to transport biogenic CO_2 to our site
- These types of CO_2 transport chains are not uncommon in the Scandinavian countries



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Norwegian has announced a landmark partnership with Norsk e-Fuel to build the world's first full scale e-Fuel plant in Mosjøen, Norway.


Thank you!
ilarsen@norsk-e-fuel.com
www.norsk-e-fuel.com