PtX becoming real

Topics

- Short about EE
- Ongoing projects
- Site tour
- Next projects

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Global presence

We are screening for projects in 29 countries and we have actual development activities in 19 out of the 29 countries. In 2022, we opened 8 new offices, and now have a total of 23 offices across 18 countries.

Solar power

Onshore wind

Offshore wind

Downstream technologies

	Development solar/wind	Construction solar/wind	Operational wind activities	Operational solar activities	Offices
Home market					
Denmark	■	■	■	■	■
Northern Europe					
Finland	■				
Sweden	■	■	■	■	■
Latvia	■				■
Lithuania	■	■			■
UK	■	■	■	■	■
Estonia					■
Central Europe					
Germany	■	■	■	■	■
Poland	■	■	■		■
Romania	■				■
France	■				
Netherlands	■	■	■		■
Southern Europe					
Italy	■	■	■	■	■
Spain	■			■	■
Greece	■				■
Bulgaria	■		■		■
Croatia					■
Montenegro	■				
Rest of the world					
Brazil	■	■		■	■
Australia	■				■
US	■				□

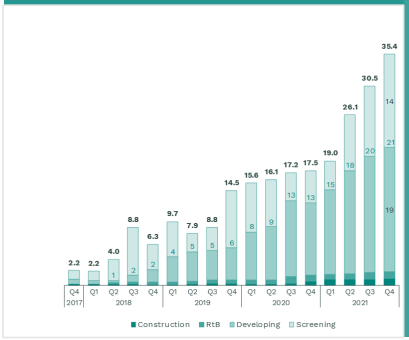
*Operational activities include power generation and asset management.
We only undertake asset management in markets where we generate power.

Cover the complete value chain

Access to renewable energy | **Expert technical knowledge** | **Practical experience**

Wind & Solar power

- Since 2004, EE has installed purchased more than 3 GW of wind and solar plants
- In 2023, EE hope to install almost as much new green energy as we did in the previous 18 years
- Pipeline of more than 30GW renewable energy plants in development



Development

- In-house project development and management of project pipeline, economic optimization and prioritization of projects. This includes
  - Evaluation of sites
  - Initial layout planning
  - Stakeholder engagement
  - Public funding
  - Permitting
  - Grid connection
  - Commercial agreements on off-take and supply
- Currently, the PtX-pipeline include projects in +10 countries.

Technology

- In-house team of process engineers designing current and future plants
- Strategic companies acquired to promote vertical integration of Power-to-X within the organization, e.g.
  - Acquisition of Reintegrate in 2021 (methanol synthesis)
  - Acquisition of Ammongas in 2022 (carbon capture and cleaning technology)

REintegrate

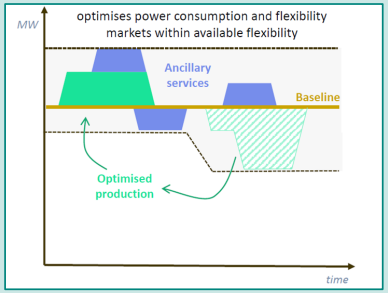
Ammongas

EPC

- Hands-on experience in engineering, procure-ment and construction of Power-to-X plants
  - Contruction of world's largest e-methanol plant in Kassø with COD 2024
  - Construction of green hydrogen plant in Måde with COD 2023

O&M

- In-house operation and maintenance organization to run plants in operation
- In-house developed production scheduler for minimizing production costs and maximizing revenue



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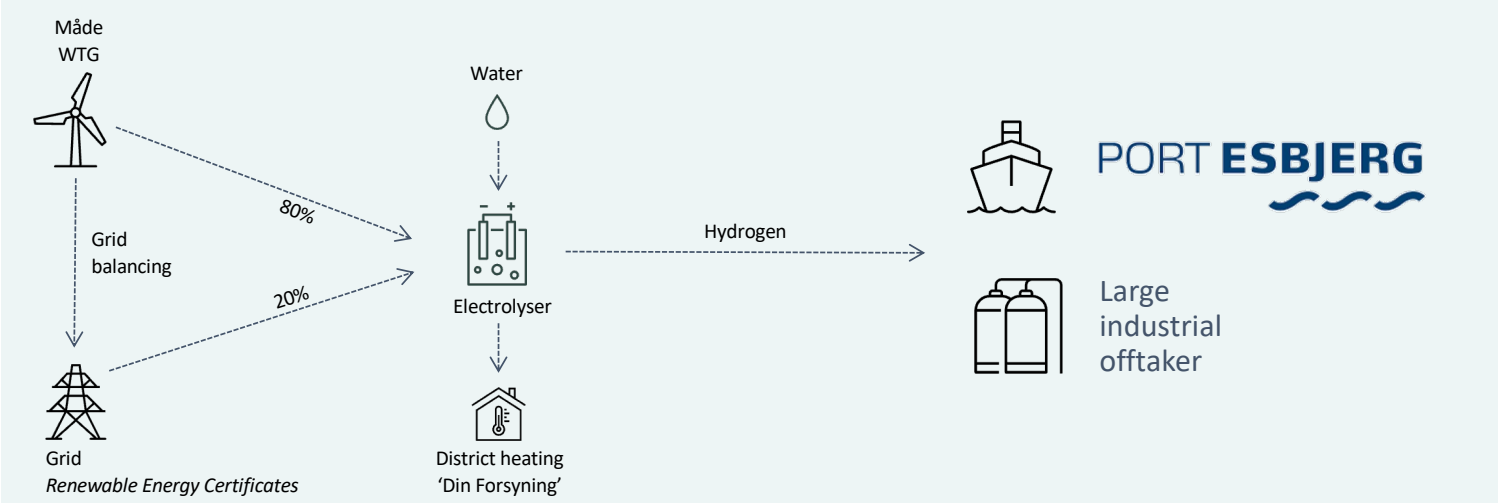
Hydrogen plant in Måde, Denmark

Input (consumption)	
Water	~6.570 tons
Electricity	~42 GWh

Output (production)	
Hydrogen	~730 tons
Excess heat	~6 GWh



Sector coupling

Power supply

Power sourced from co-located wind turbines and from the grid → robust and cost-optimal power supply

Grid Balancing

12 MW electrolysis from up to 3 different types of unites → flexible operation with the ability to provide grid balancing services

Excess heat

Excess heat to supply approx. 300 average households

Utilization

Green hydrogen plant will be used to provide shore-power to vessels and for industrial use

Milestones

- ✓ Final Investment Decision
- ✓ All permits secured
- ✓ Offtake agreements signed for green hydrogen
- ✓ Plant detailed design completed
- ✓ Construction initiated and on-track
- ❑ First hydrogen 2023

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In construction with COD in Q2 ‘24

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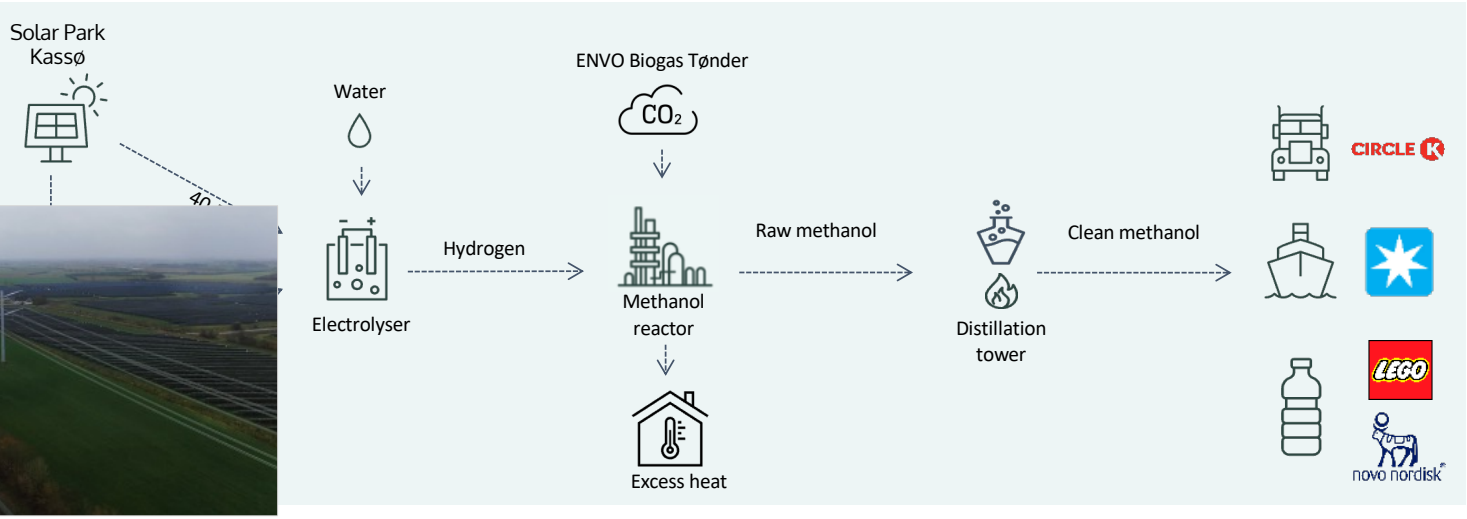
e-Methanol plant in Kassø, Denmark

Input (consumption)	
Water	~90.000 tons
Electricity	~360-380 GWh
Biogenic CO_2	~45.000 tons

Output (production)
Hydrogen
Raw methanol
Clean methanol
Excess heat

How we produce e-methanol in Kassø



Sector coupling

Power supply

Power sourced from own 304MW solar farm and from the grid → robust and cost-optimal power supply

Grid Balancing

52 MW PEM electrolyser from Siemens Energy capable of fast ramp times → flexible operation with the ability to provide grid balancing services

Excess heat

Excess heat produced from production process delivered to the district heating grid to supply approx. 2500 households

Utilization

E-methanol from the plant Is shipped out from Port of Ensted to be used across three different sector for the benefit of the green transition

Milestones

- ✓ Final Investment Decision
- ✓ All permits secured
- ✓ Offtake agreements signed for e-methanol
- ✓ Methanol plant detailed design completed
- ✓ Construction initiated and on-track
- ❑ First methanol, COD 2024

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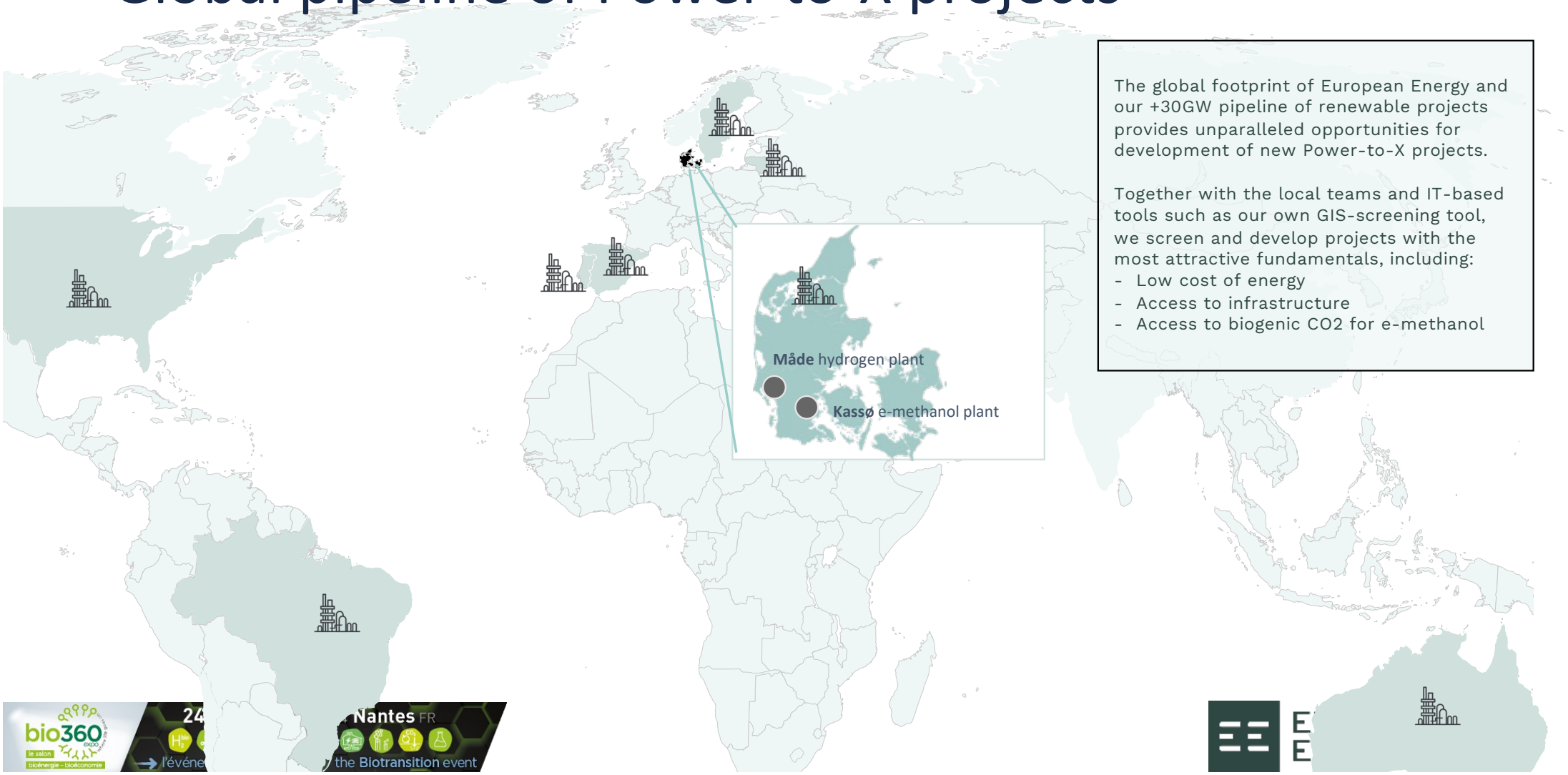
E-Methanol Plant, Kassø, Åbenrå, Denmark

Animated by Kirt X Thomsen

Global pipeline of Power-to-X projects

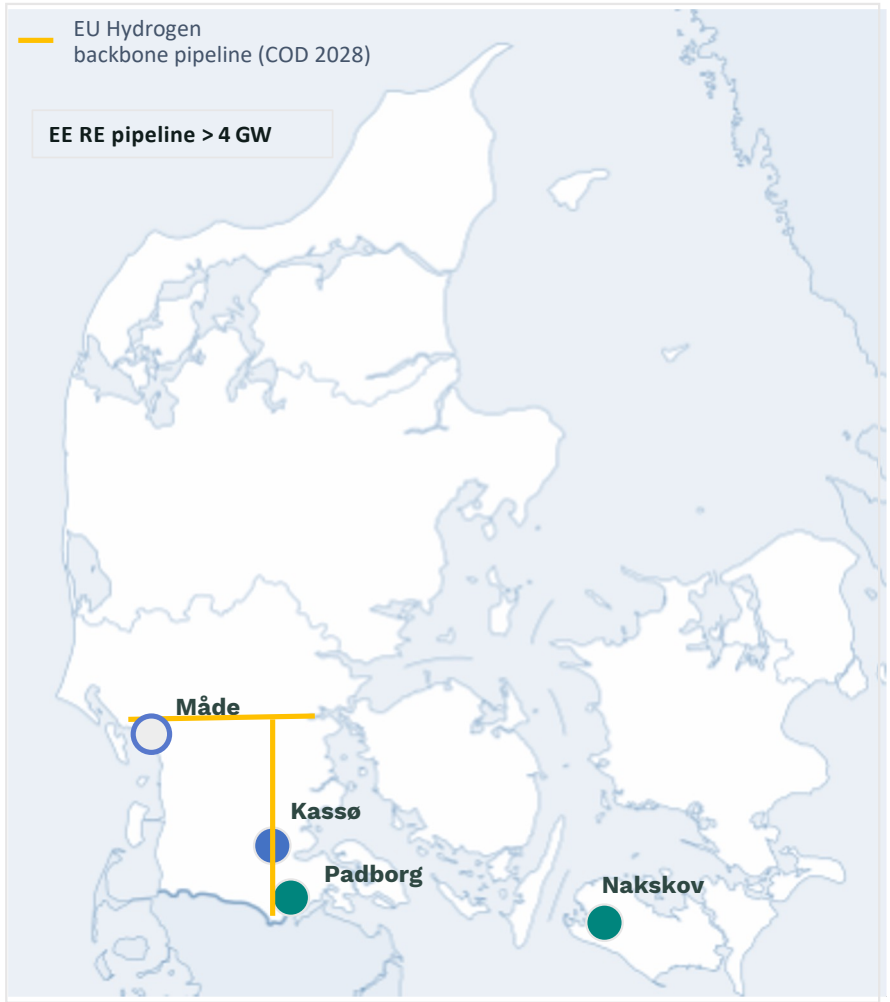


The global footprint of European Energy and our +30GW pipeline of renewable projects provides unparalleled opportunities for development of new Power-to-X projects.

Together with the local teams and IT-based tools such as our own GIS-screening tool, we screen and develop projects with the most attractive fundamentals, including:

- Low cost of energy
- Access to infrastructure
- Access to biogenic CO2 for e-methanol

Denmark portfolio



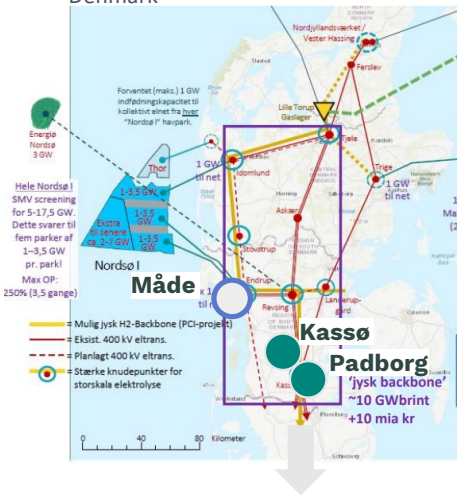
Market Strategic Rationale

1. Large pipeline of own RE-projects (wind and PV)
2. Biogenic CO2 supply from multiple producers
3. Favorable access to export ports with existing infrastructure and export capabilities / experience
4. Available transport options via truck
5. Support mechanisms available, e.g. DK PtX tender and EU hydrogen Bank
6. Proximity to German petrochemical industry

PtX feasibility status:

- Several potential PtX locations identified and being evaluated.
- Large pipeline of own RE generating assets in both DK price areas (DK1 and DK2)
- Biogenic CO2 and water sources available
- Denmark is world leading within biogas → low cost biogenic CO2 source
- Dialogues with CO2 emitters ongoing
- Denmark has strategy to become CO2 hub for CCS and CCU.
- Permitting process well known and EE has good relationship with relevant authorities from project Kassø which successfully has achieved all permits
- Value chain logistics being evaluated
- Transmission analysis being conducted for specific PtX sites

EU hydrogen backbone planned in Denmark



EU hydrogen back bone connection to EU

Construction Hydrogen

Construction E-methanol

Development E-methanol

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The Danish hydrogen tender Oct 2023

- Auction for 10 year fixed price premium per unit of H2 produced
- Total subsidy amount: 1,25bn DKK
- Deadline for COD – 4 years from award, i.e. late 2027. Limited extension possibilities.
- Penalty if deadline is not met (10 % of subsidy)
- Contract is awarded after a 10 day stand-still period

Subsidy pr. GJ	Project	Location	Total support	Capacity (el)
40,0000 DKK/GJ	European Energy/ Vindtestcenter Måde K/S	Esbjerg	43.994.973 DKK	9 MW
46,0000 DKK/GJ	European Energy/ Padborg PtX ApS	Padborg	910.800.000 DKK	150 MW
67,0000 DKK/GJ	European Energy/ Kassø PtX Expansion ApS	Rødekro	81.879.549 DKK	10 MW

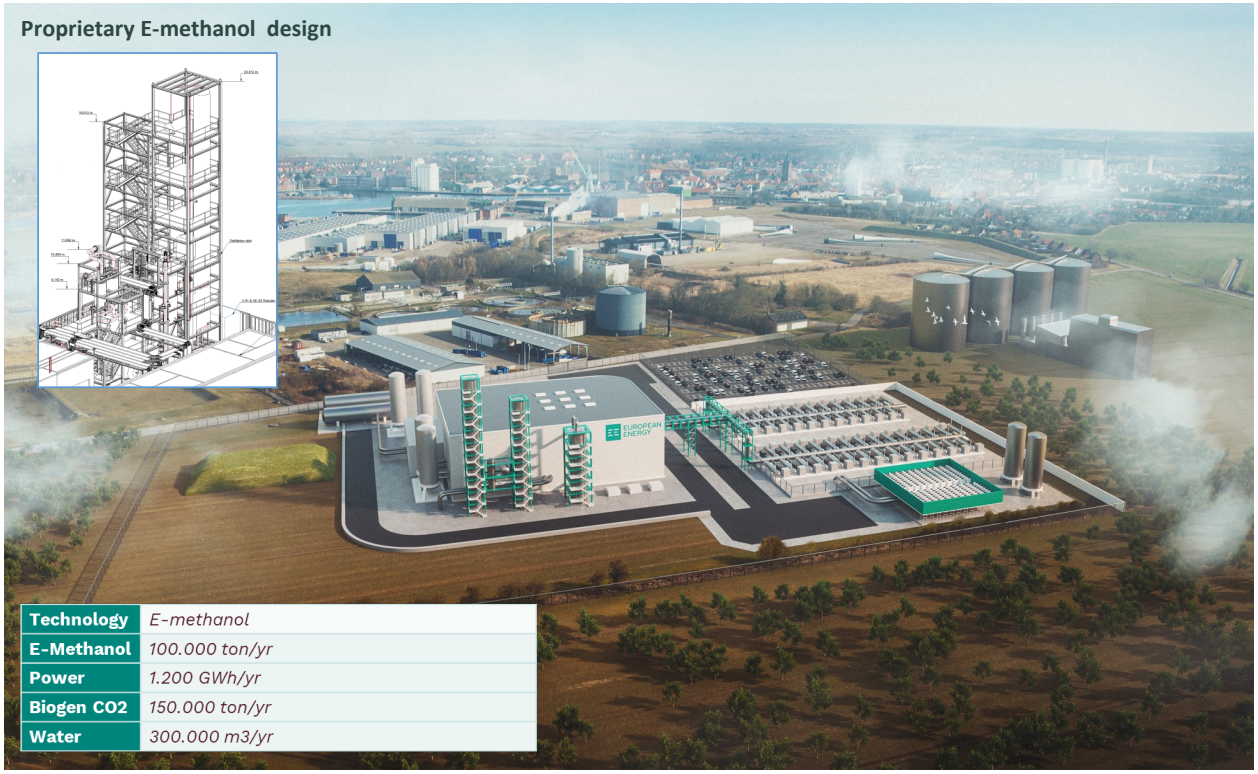
- EE's total subsidy amount **1.036.674.522 DKK**

Next E-methanol plant: 100.000 ton pr. year

E-Methanol Concept

- Standard design: 100.000 ton e-methanol per year.
- **Proprietary design** based on Kassø e-methanol plant (pt world largest under construction).
- Plant concept **tailored to production optimization** leveraging low power prices and availability of RE-sources → generating value
- Plant size designed for **key elements**:
  - ✓ Offtake demand volumes based on market dialogue.
  - ✓ Logistics handling for methanol infrastructures
  - ✓ Grid connection and capacity availability
  - ✓ CO2 & Power supply availability in relevant markets
  - ✓ Implementation speed enabling accelerated COD
  - ✓ Integration for grid balancing and heat export
- Plant concept designed for **future standard expansion**.

Proprietary E-methanol design



Technology	*E-methanol*
E-Methanol	*100.000 ton/yr*
Power	*1.200 GWh/yr*
Biogen CO2	*150.000 ton/yr*
Water	*300.000 m3/yr*

2021 Constructed

ReIntegrate e-methanol pilot plant

2024 Under construction

Kassø: 32.000 ton pa methanol plant

2027 Under development

Next: 100.000 ton e-methanol plant

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