



Power-to-X

The Path towards a Sustainable Future



Kasso
Integrated PV and
e-methanol
facility
Denmark

About European Energy



Svindbæk
32 MW
Denmark

The European Energy Business Model

Screening

We screen our markets for relevant locations for solar, wind and Power-to-X-facilities, using our bespoke GIS-based IT-tools as well as our local knowledge and network. Based on a careful screening of environmental and technical concerns as well as a mapping of key stakeholders, we enter into a cooperation with the landowners to secure the land for development.



Development

During development we secure the grid and work to obtain the necessary permits. We conduct environmental studies and discuss mitigation measures with key stakeholders. Technical specifications may be adjusted, and hybrid and storage solutions are considered as part of the optimisation of the project. When land, grid and all necessary permits are secured, the project is ready-to-build.



Engineering & procurement

Our design and engineering expertise ensures the strong operational performance of our projects. Our procurement team selects suppliers on the basis of thorough evaluation and closely monitors their delivery. We perform quality management of all our engineering and procurement processes



Construction

With rights and permits secured, we continue with procurement, power offtake and financing, before we initiate construction of a project. We have a strong track record for managing contractors and suppliers on-site and, as the final construction step, connect the projects to the grid and produce Power-to-X solutions.



Power Purchase Agreements

Power Purchase Agreements are long-term, fixed-price energy supply contracts. These agreements ensure that we have offtakers for our renewable energy projects. The agreements are often made prior to the construction of a project.



Financing

Funding is raised at both parent company and project level. We have a treasury and project financing team that designs and optimises the Group's capital structure, parent funding, liquidity and financial risk management.



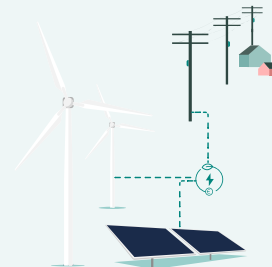
Project sales

We assess each project individually and take risk-and-reward profiles into consideration. In some cases, we divest the projects to long-term investors. In these cases, we often continue to manage the assets for the investors, to optimise production output and minimise operating costs.



Power sales

In some cases, it is advantageous for us to retain ownership of a project for a period of time, and sell the renewable power as an independent power producer, or to use the power for production of Power-to-X solutions.



Asset management & operations

We have in-house expertise in the technical, commercial and financial aspects of managing our projects. We also deliver operational services for solar plants, including scheduled preventive maintenance, corrective maintenance, technical support and plant monitoring.



European Energy is built on four pillars

Solar
power



Onshore
wind



Offshore
wind



Downstream
technologies





Facts about European Energy



18

We have offices in 18 different countries



29

We have development activities in 29 countries



635

We are more than 635 employees working at European Energy



10

We have developed operational wind parks in 10 different countries



10

We have developed operational solar parks in 10 different countries

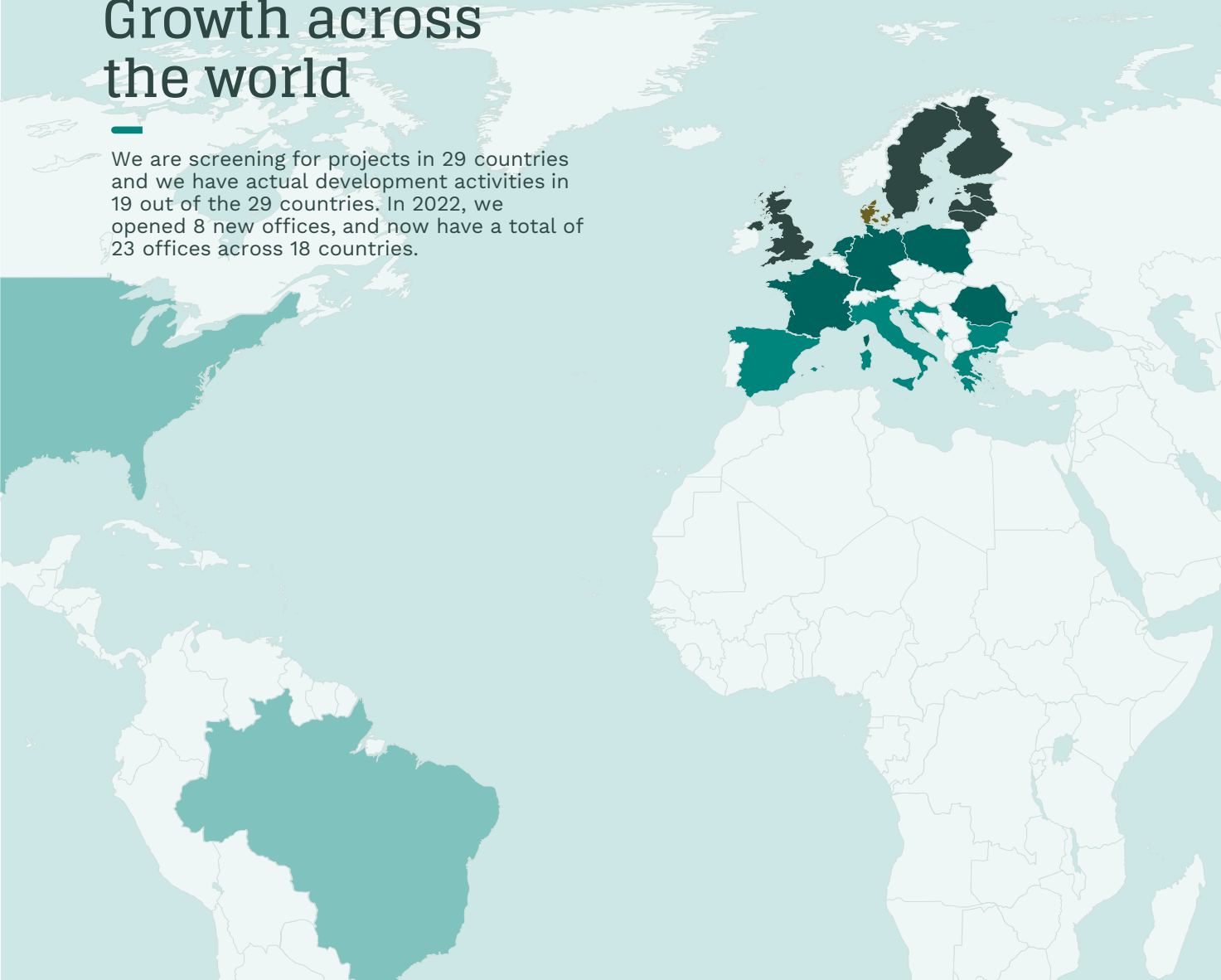


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We are constructing two Power-to-X plant in Denmark

Growth across the world

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.



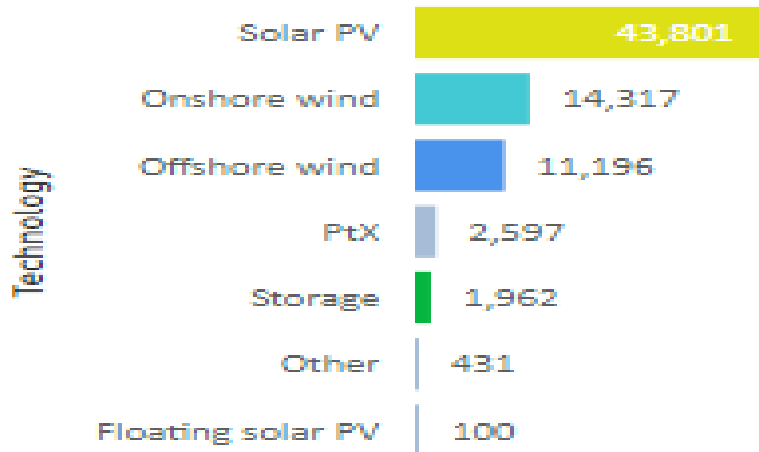
Home market

	Development solar/wind	Construction solar/wind	Operational wind activities	Operational solar activities	Offices
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.

EE Pipeline in numbers by the end of 2023

MW by Technology

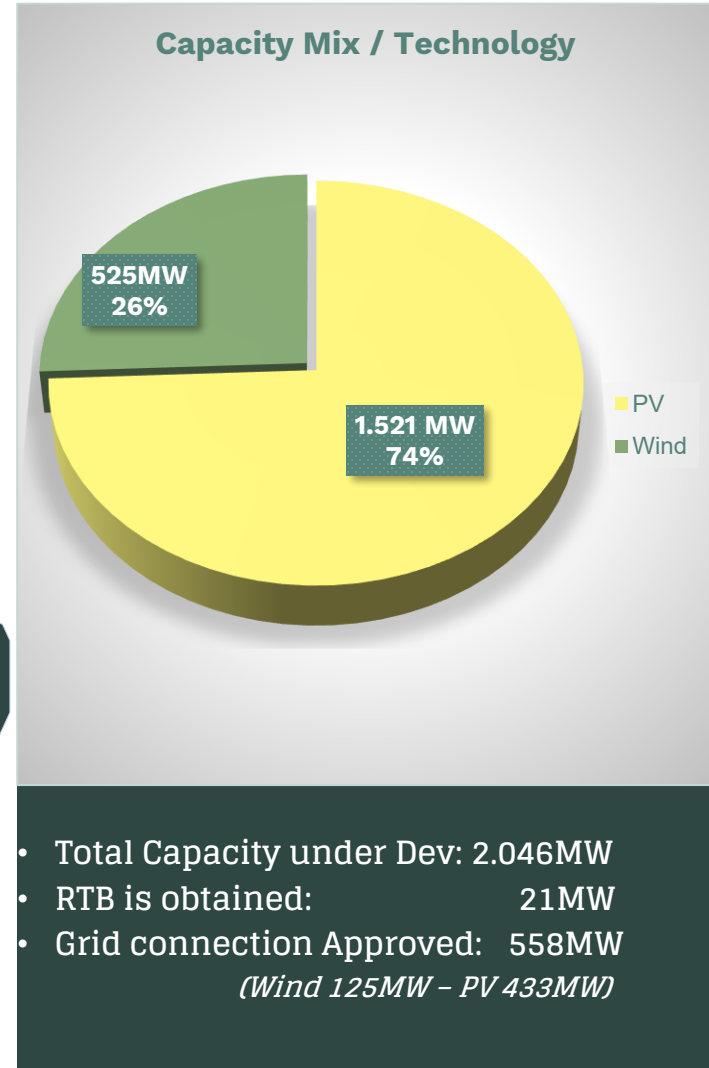


During 2023, European Energy continued its efforts to grow its project development activities, including greenfield development, partnering and acquisitions of ready-to-build assets. We are predominantly active in OECD countries, with a core focus on low-risk markets in Europe, but we are also present in Brazil, the US and Australia.

Project development activities are ongoing in 19 countries and we have established local offices in 18 countries (up from 12 at end-2021), as a broad geographical reach and a local presence are key enablers for securing new projects and to diversify country-specific risk.

Since 2018, a key focus has been to grow and mature our project pipeline, as this is considered to be a key value driver to ensure continued stable earnings growth.

The Romanian RES under Development Pipeline Q3/2023

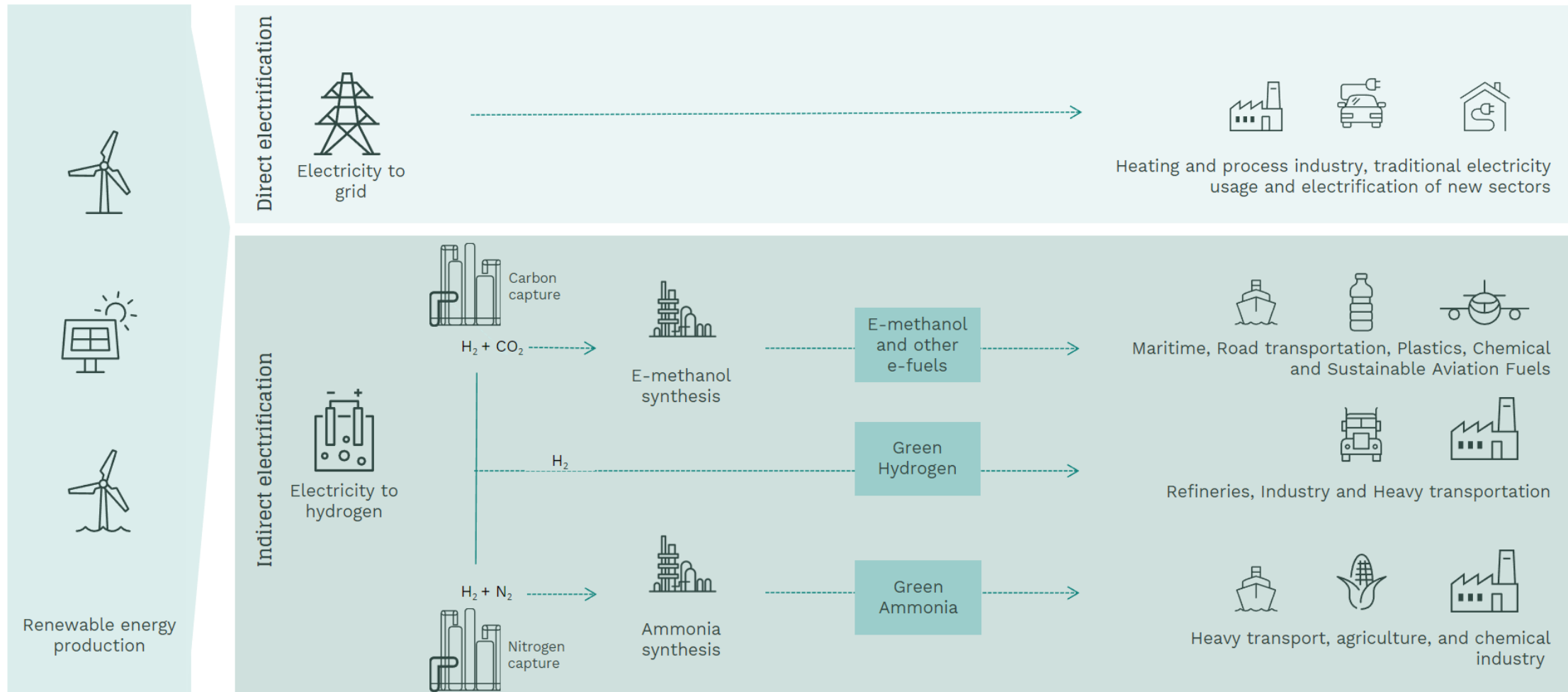


Power-to-X

European Energy's value
chain approach

What is Power-to-X and why do we need it?

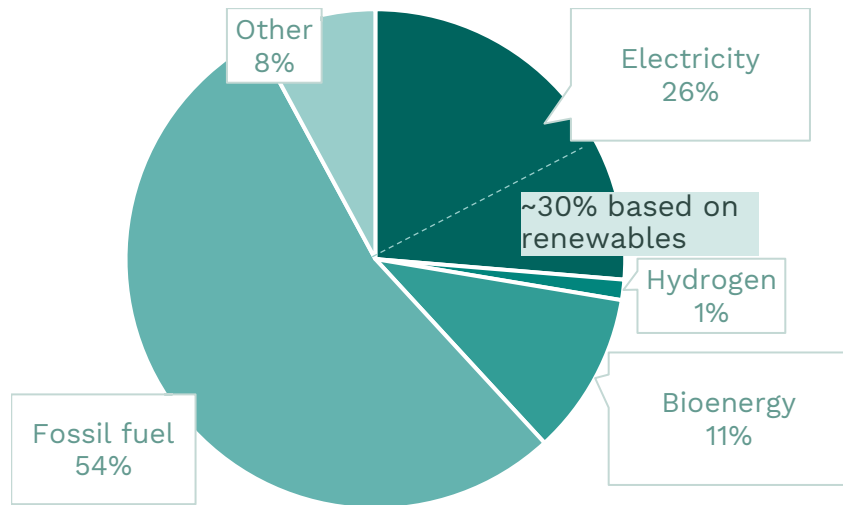
Indirect electrification through Power-to-X allows decarbonization of “hard-to-abate sectors” where direct electrification is not possible



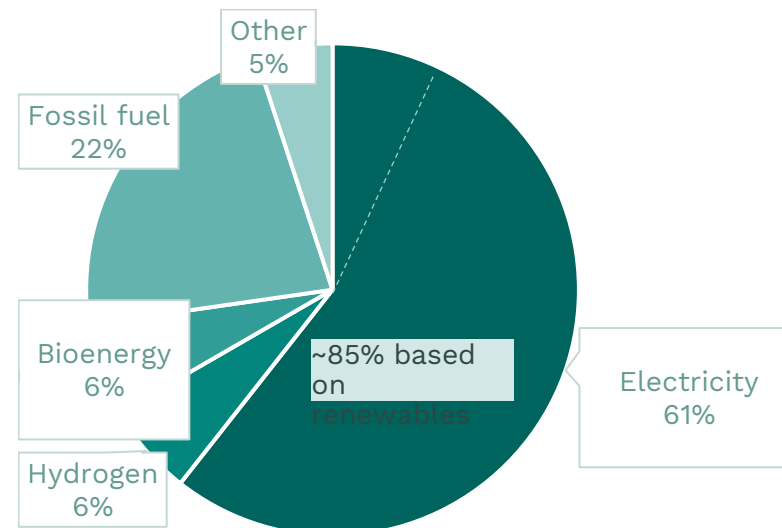
What is Power-to-X and why do we need it?

We need to decarbonize our energy use through both direct and indirect electrification

Total energy consumption in 2020 of 380 mTJ

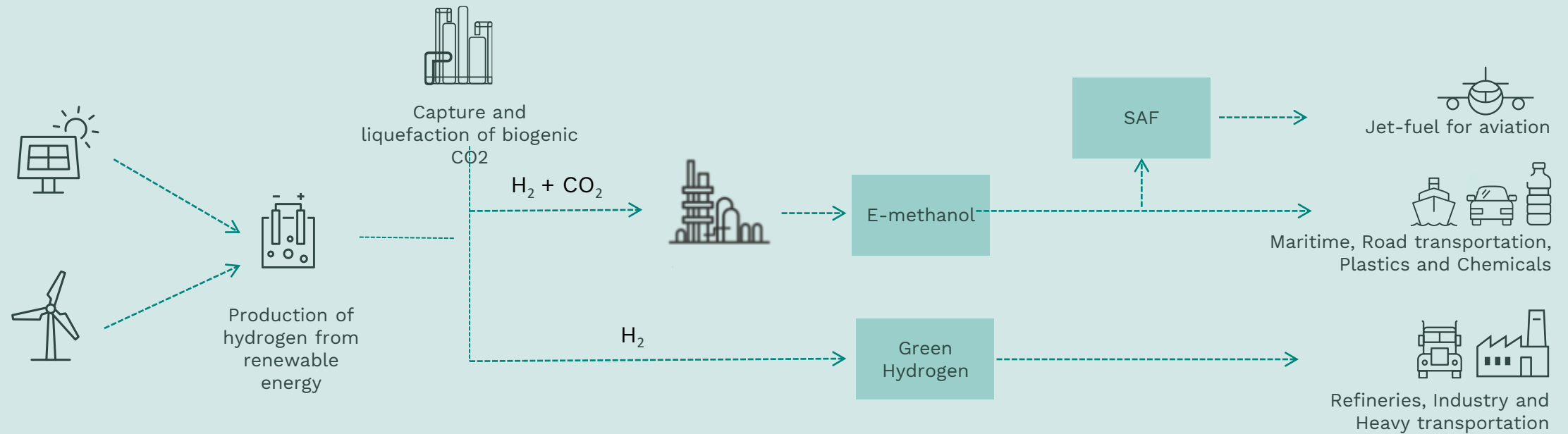


Total energy consumption in 2050 of 495 mTJ



- Global energy consumption expected to grow by ~ **30 %** in 2050
- Share of renewables is expected to reach ~**80-90%** in 2050
- This to be driven by doubling electrification and uptake of hydrogen to suppress fossil energy sources by **40%** in 2050
- Hydrogen in 2020 is based on fossil sources. In 2050 **90%** of the hydrogen is expected to be based on renewables.

Power-to-X in European Energy includes the entire value chain from power generation to end-product



Furthermore, Power-to-X provides synergies to the power grid and heating sector



Excess heat from Power-to-X production can be utilised as green district heating



Flexible production can balance the power grid as more renewable power enters the grid



Power-to-X plants can use electricity that would otherwise be curtailed or sold at negative prices



Biogenic CO₂ that would otherwise be vented is re-used and displaces fossil CO₂



Re-use of cleaned wastewater

Significant depth in each part of the value chain

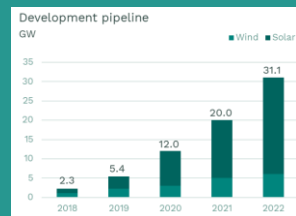
Access to renewable energy

Expert technical knowledge

Practical experience

Wind & Solar power

- Since 2004, European Energy has installed more than 3 GW of wind and solar plants
- In 2023 alone, European Energy has received permits to construct +1.5GW renewable energy
- 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
 - Securing feedstock
 - Stakeholder engagement
 - Public funding
 - Permitting
 - Grid connection
 - Offtake agreements
- Current PtX-pipeline include projects in +10 countries.

Technology

- In-house team of process engineers prepares basic for all plants
- Strategic acquisitions to acquire key competencies within methanol and CO₂, e.g.
 - Reintegrate in 2021 (methanol synthesis)
 - Ammongas in 2022 (carbon capture and cleaning technology)

REintegrate

Ammongas

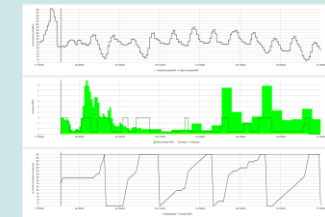
EPC

- Hands-on experience in engineering, procurement and construction of Power-to-X plants
 - Construction 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 total plant revenue



Pipeline of + 30 GW worldwide

Different electrolyzer technologies tested at our sites

Our group company Ammongas supplies CO₂-capture equipment

We are constructing worlds largest e-methanol plant

We are constructing a hydrogen plant in Denmark

EE will prototype-test methanol-to-SAF production in 2024/25

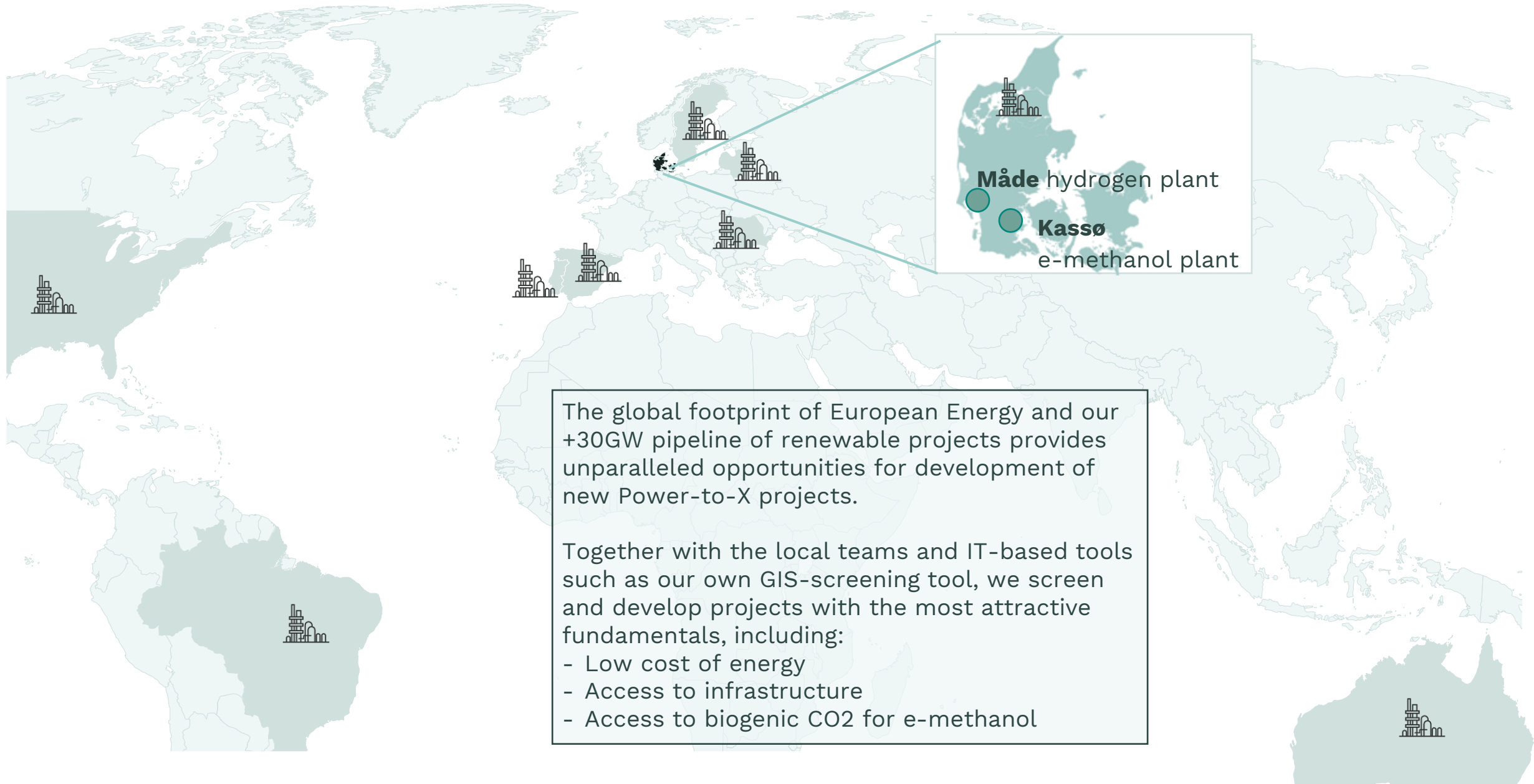
Power-to-X

Projects & Pipeline



EUROPEAN
ENERGY

Strong and growing 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.

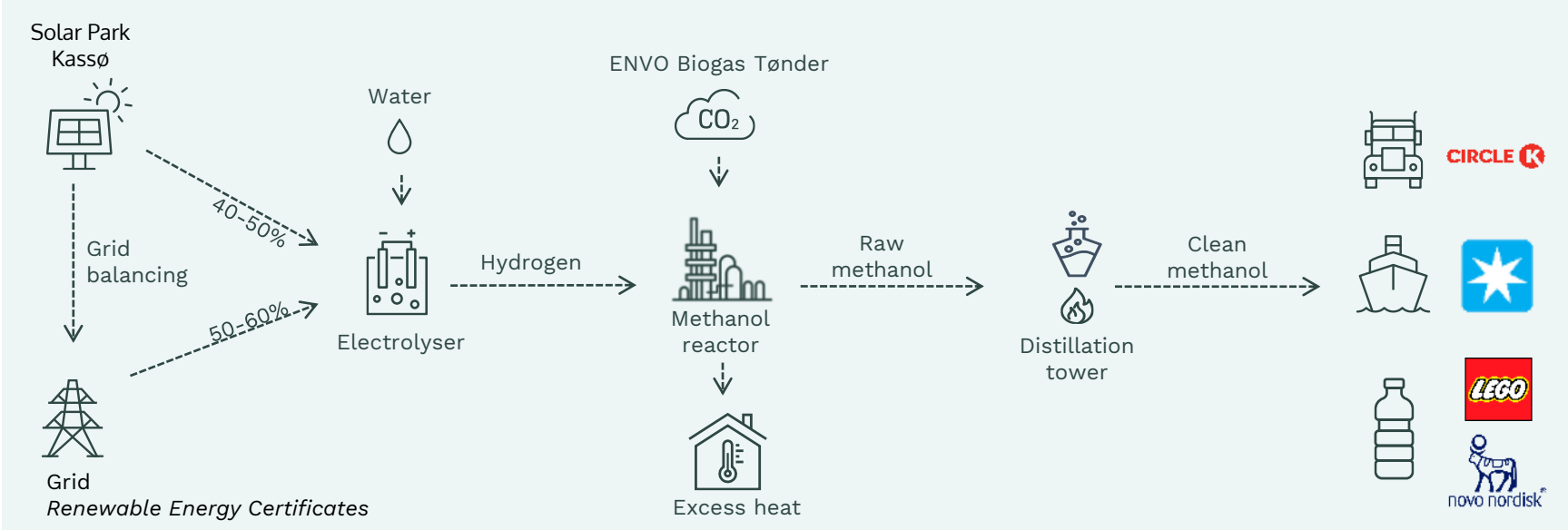
Together with the local teams and IT-based tools such as our own GIS-screening tool, we screen and develop projects with the most attractive fundamentals, including:

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

Our e-methanol plant in Kassø, Denmark

How we produce e-methanol in Kassø

Input (consumption)	
Water	~90.000 tons
Electricity	~360-380 GWh
Biogenic CO ₂	~45.000 tons
Output (production)	
Hydrogen	~6000 tons
Raw methanol	~50.000 tons
Clean methanol	~32.000 tons (nom. cap. 42.000)
Excess heat	~50 GWh



Sector coupling

<p>Power supply</p> <p>Power sourced from own 304MW solar farm and from the grid → robust and cost-optimal power supply</p>	<p>Grid Balancing</p> <p>52 MW PEM electrolyser from Siemens Energy capable of fast ramp times → flexible operation with the ability to provide grid balancing services</p>	<p>Excess heat</p> <p>Excess heat produced from production process delivered to the district heating grid to supply approx. 2500 households</p>	<p>Utilization</p> <p>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</p>
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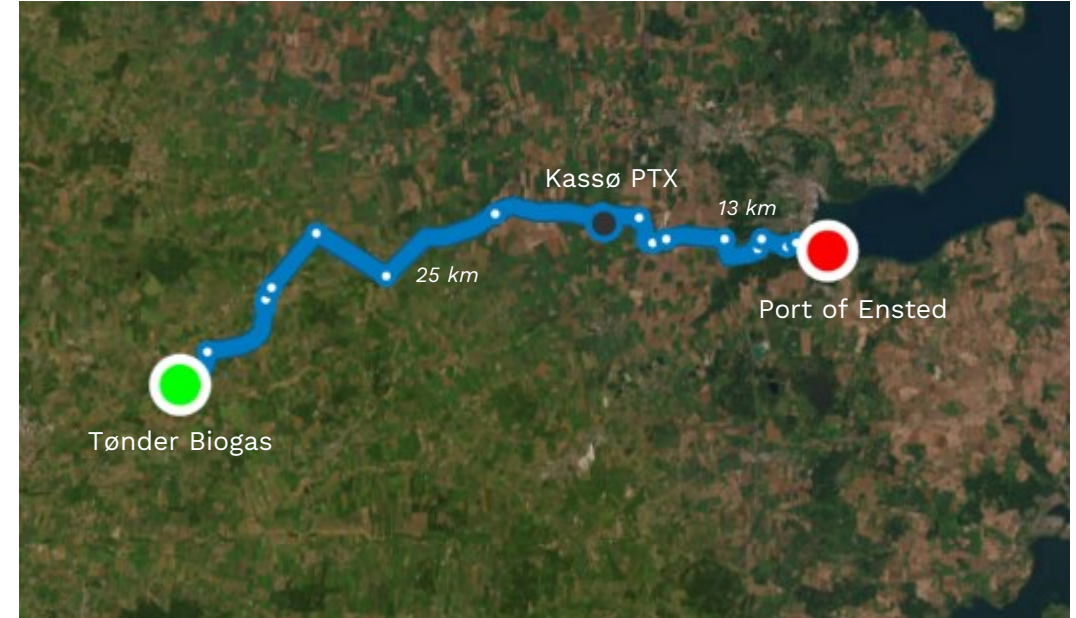
Milestones

- ✓ 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

Our Danish e-methanol plant



Kassø PTX – Progress on a daily basis



January 2023



August 2023



CO₂-storage tanks



1st electrolyzer (out of 3)





Our Danish green hydrogen plant

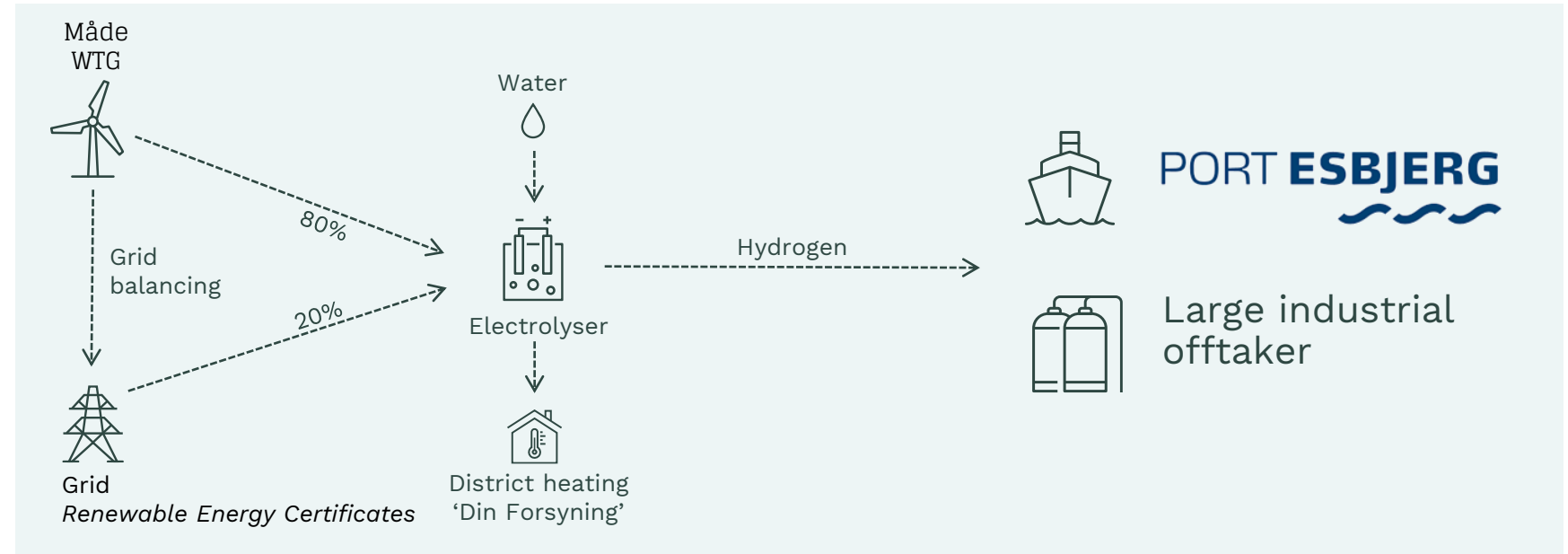


Our green hydrogen testing plant in Maade, Denmark

Input (consumption)	
Water	~6.570 tons
Electricity	~42 GWh
Output (production)	
Hydrogen	~730 tons
Excess heat	~6 GWh



How we produce hydrogen in Måde while testing three different electrolyzers from different suppliers



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

Måde PTX – Progress on a daily basis



February 2023



September 2023



Explosion wall



Transformer and electrical building

Thank you for listening!



<https://europeanenergy.com>