

# Folketingets høring om Power-to-X

Hvilke perspektiver for Danmark?

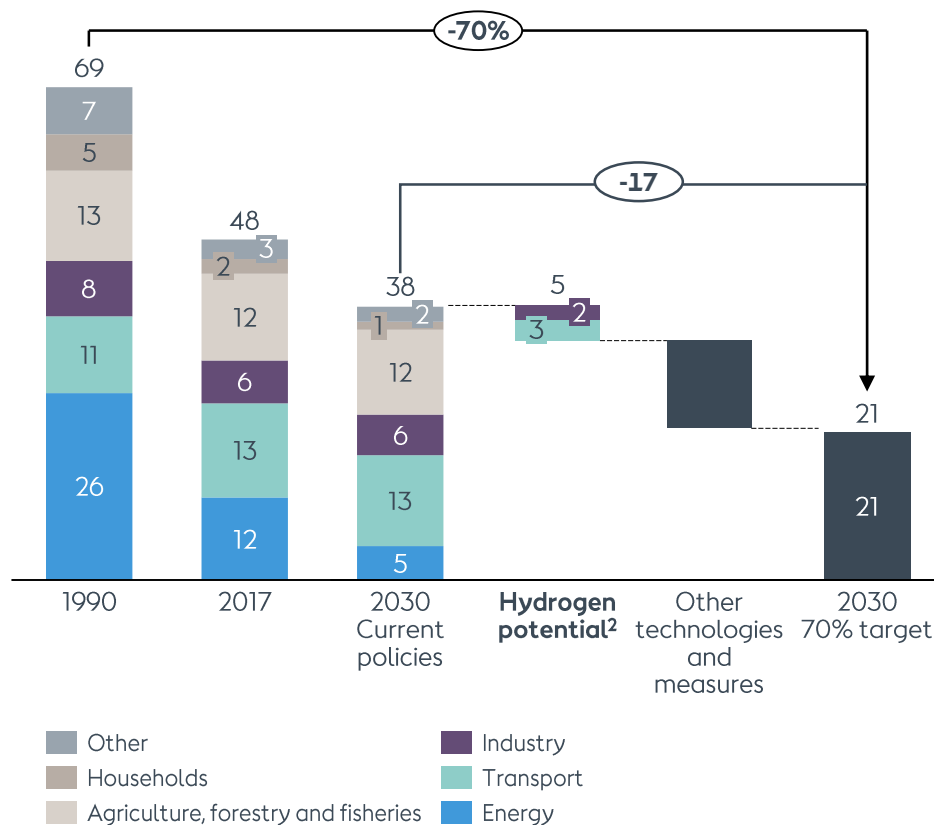


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VP Hydrogen

# Reaching the 70% target will require significant efforts in hard-to-abate sectors that hydrogen can help decarbonise

- 17 MtCO<sub>2</sub>e gap → Need for new policies
- Especially in the transport sector
- Direct electrification is most efficient in most cases
- **Indirect electrification, through hydrogen, is likely most efficient in some heavy transport and industry**

Emissions in Denmark<sup>1</sup>, MtCO<sub>2</sub>e

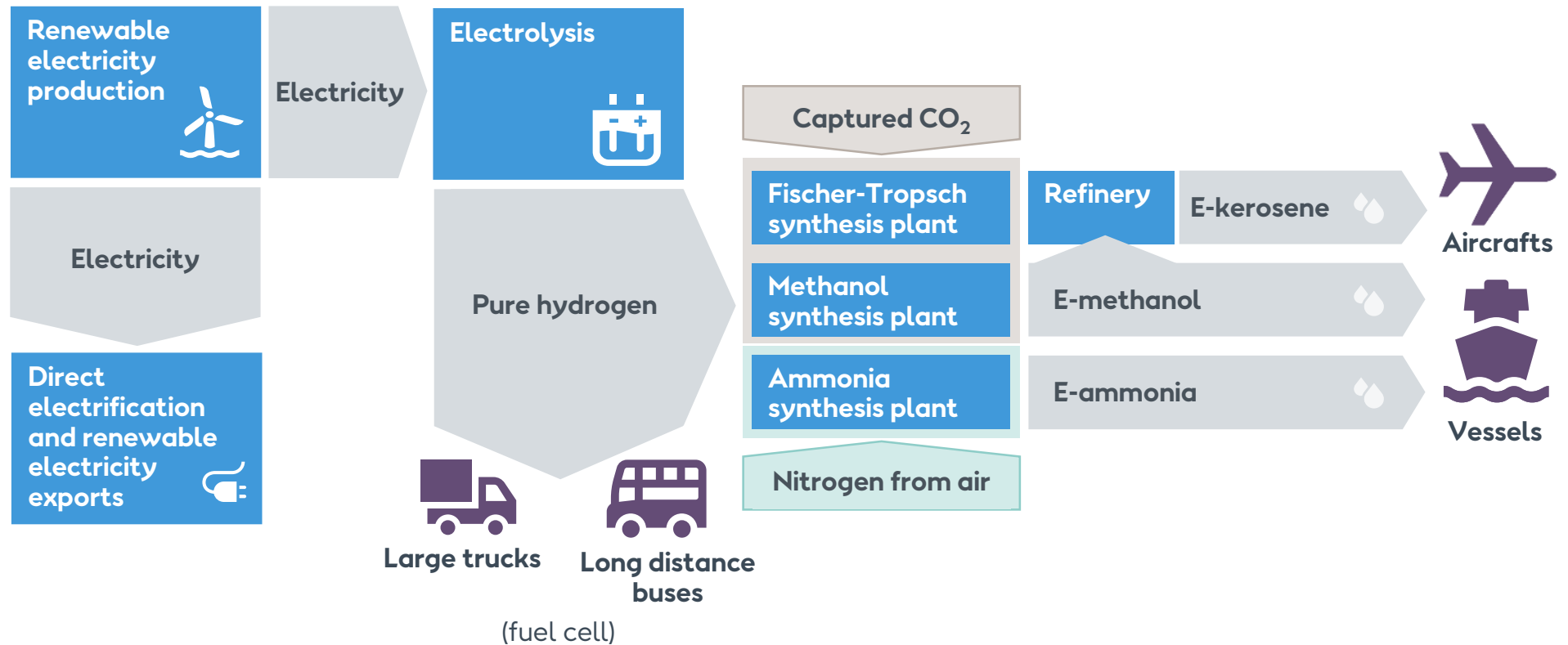


1. Source: Energistyrelsen's [Basisfremskrivning 2019](#).

2. Estimated on the basis of likely most efficient option, i.e. where there was a cheaper, more efficient alternative to hydrogen, hydrogen potential was disregarded (e.g. where direct electrification is feasible).

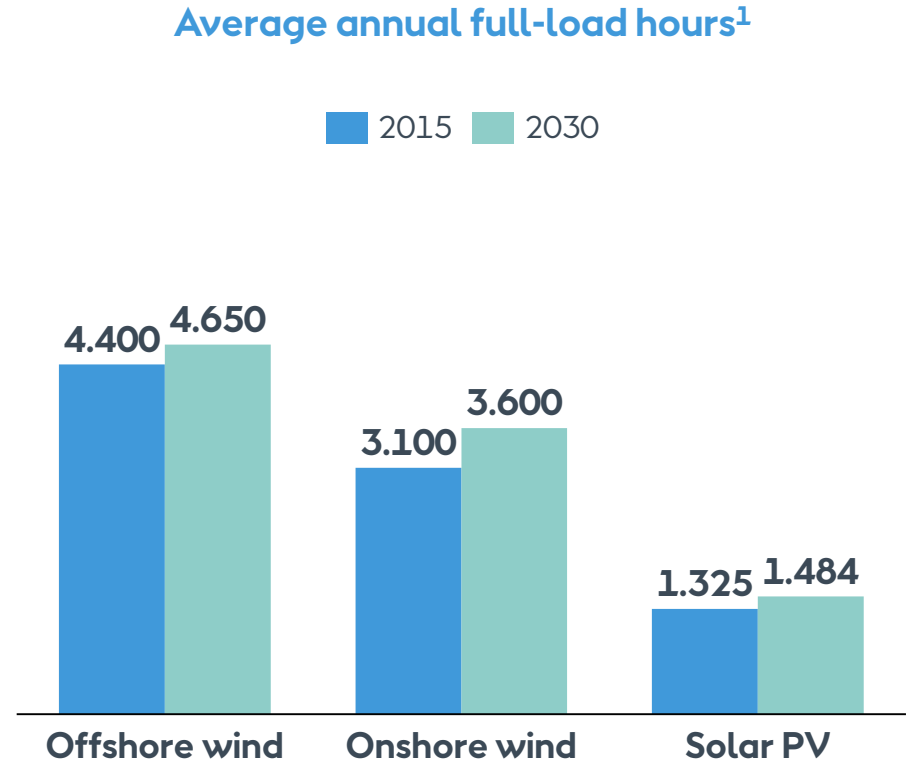
# Renewable hydrogen can decarbonise sectors where direct electrification is not feasible

Energy losses from conversion create a natural hierarchy in technology choices



# The offshore wind potential of Denmark is a great match for electrolyser operation

- Denmark has an offshore wind potential that exceeds its total power needs
- Optimally utilising that potential requires new and flexible electricity demand, such as PtX
- The generation profile and load factor of offshore wind ensures that *renewable* hydrogen can be produced in the volumes (and timeframes) required



# Ørsted's announced hydrogen projects



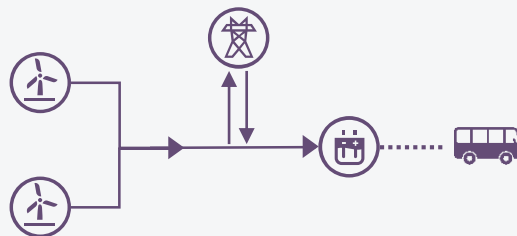
## H<sub>2</sub>RES

- Partner(s): Ørsted, Everfuel, Nel, GreenHydrogen, DSV Panalpina, Hydrogen Denmark, Energinet

- Funding: DKK 34.6m received from EUDP

- Project setup:

2MW electrolyser at Avedøre connected to 2x3.6MW offshore wind turbines producing hydrogen for buses, trucks and potentially taxis<sup>2</sup>

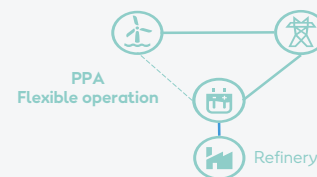


## Westküste 100

- Partner(s): EDF Deutschland, Holcim Deutschland, Open Grid Europe, Raffinerie Heide, Stadtwerke Heide, thyssenkrupp Industrial Solutions, Entwicklungsagentur Region Heide, Fachhochschule Westküste

- Scope (phase 1): 30MW electrolyser. Renewable hydrogen for refinery to replace current consumption of fossil hydrogen<sup>1</sup>

- Project setup:



## Gigastack feasibility study

- Partner(s): ITM Power, Element Energy

- BEIS-funded study to investigate the potential delivery of bulk, low-cost and zero-carbon hydrogen

- The project's scope includes (i.a.) investigation of a new 5 MW stack design, a semi-automated manufacturing facility, and operational innovations

- The project could potentially progress into a second phase, to further study and test the learnings from the first phase at industrial scale



## Dutch hydrogen programme

- Climate Agreement targets by 2030:

- 3-4 GW of electrolysers installed
- Support for renewable hydrogen

- Programmatic approach to industry development

- Ørsted is committed to supporting this transition, with ongoing discussions and projects with potential partners to replace fossil hydrogen in industry

- Ørsted participates in the cross-industry Institute for Sustainable Process Technology (ISPT) gigawatt study

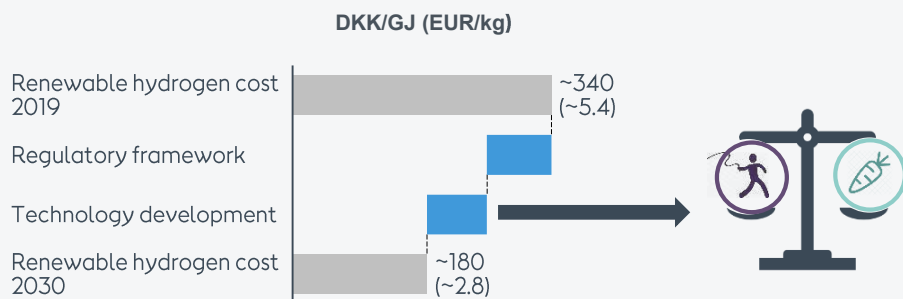
5 1. Second phase could deliver e-kerosene for Hamburg Airport and would likely require up to 700MW electrolysis

2. Ørsted scope is production of H<sub>2</sub>. Distribution of H<sub>2</sub> from Avedøre to bus operator conducted by Everfuel

# Key principles of a regulatory framework supportive of PtX roll-out

1

## Creating demand through a combination of support mechanisms



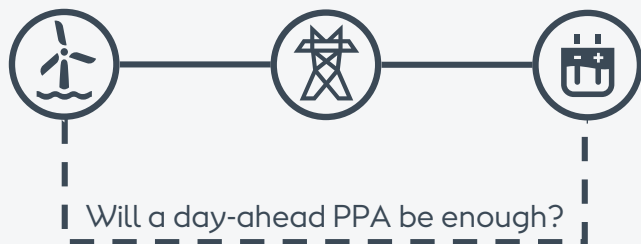
2

## Bringing power to where it is needed, and creating a flexible tariff system



3

## Favourable REDII implementation, particularly in defining what renewable hydrogen actually is



4

## Eliminate skewed incentives in carbon pricing

Free EU-ETS allowances currently handed out only to fossil hydrogen production, and not renewable hydrogen