

# The Danish PtX

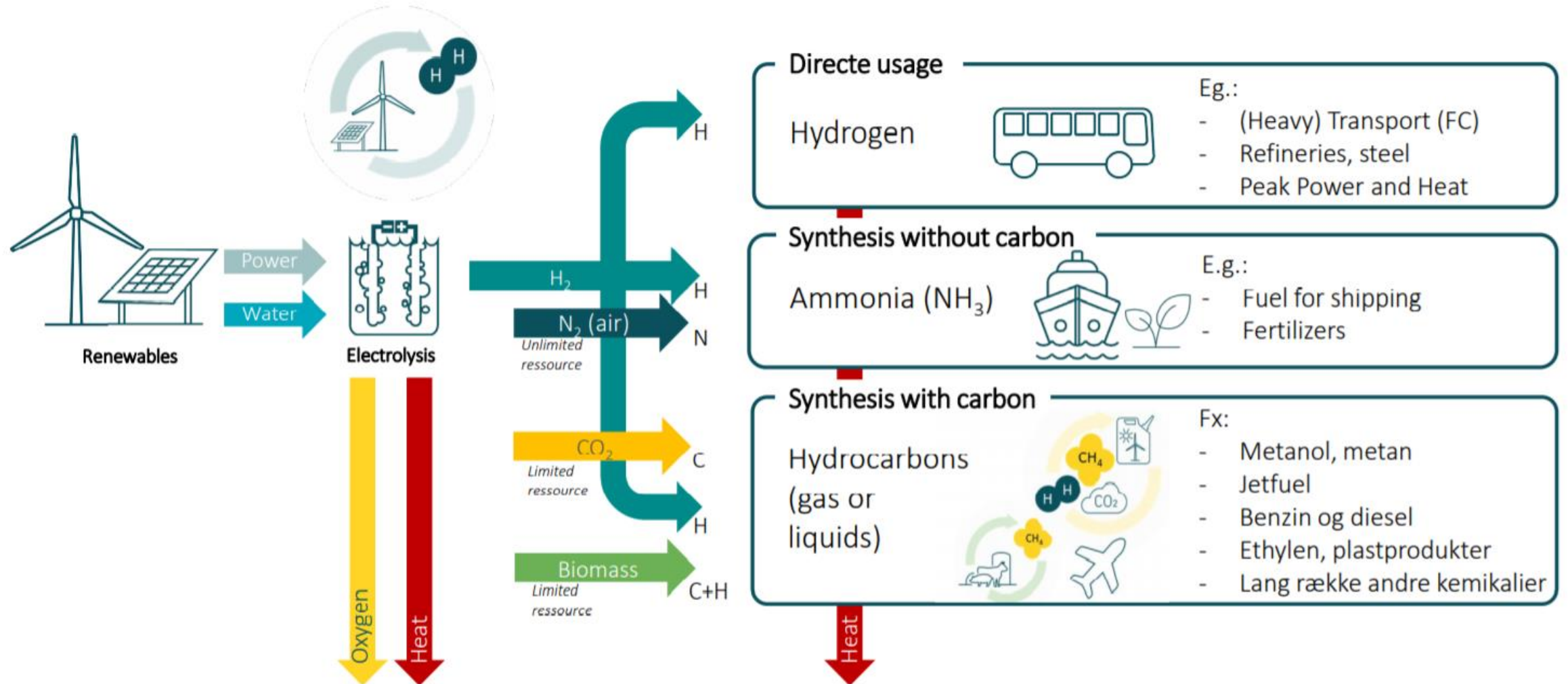
## ■ Value Chain

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# Scoping the Danish PtX Value Chain....

Turning green electrons into green molecules



# Overview of the Danish PtX ecosystem

## Wind OEMs



## Energy traders



## Network & clusters



## HRS



## Mobility



## Bioresources



## Consultants



## Electrolysers



## Integrators



## Transportation



## Developers



## Universities



## Subsuppliers



## Fuel Cells



## Industry / hubs



## Power-to-gas



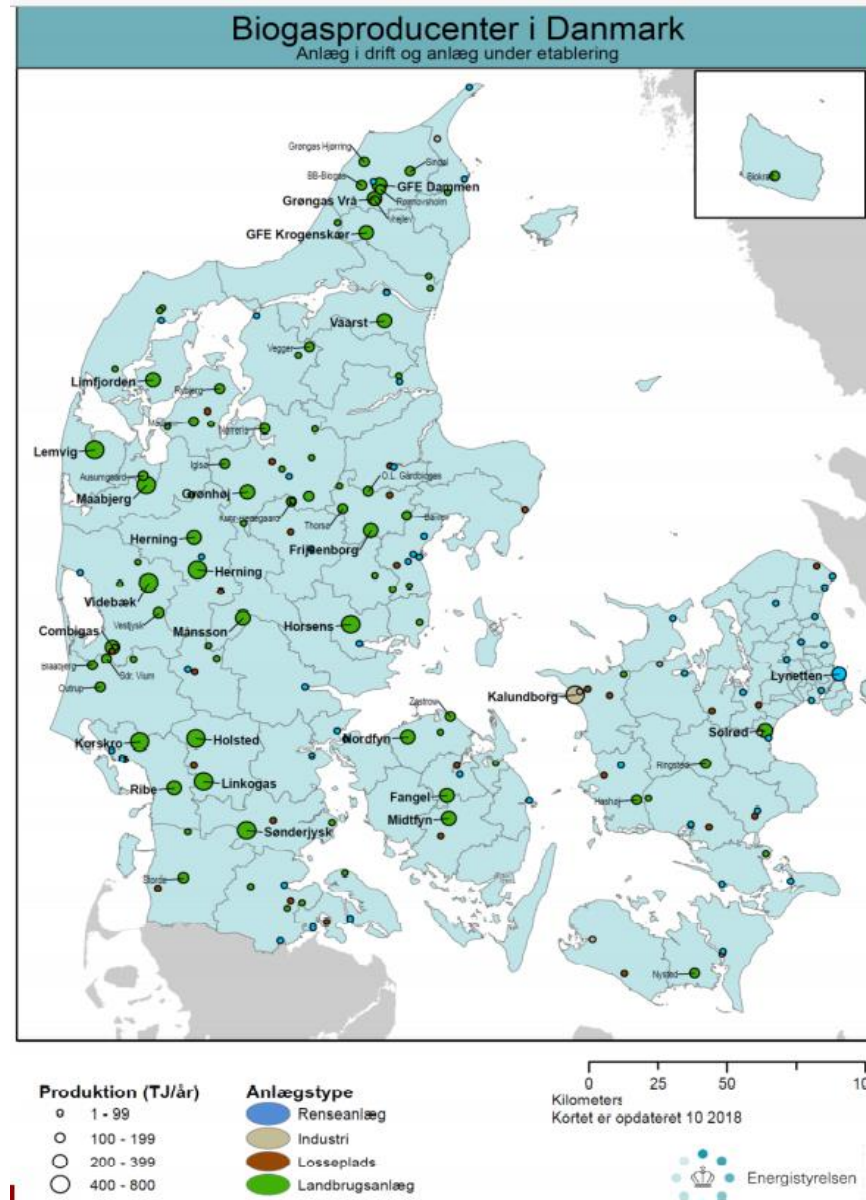
National electricity & gas system operator / TSO



# Denmark – blessed with vast renewable resources

30 – 40 GW  
offshore wind  
potential in the  
Danish part of  
the North Sea

Challenge: only  
5 – 7 GW can be  
absorbed by  
electricity grid



Wind OEMs

**SIEMENS** Gamesa  
RENEWABLE ENERGY

**Vestas**

Bioresources

nature energy    e-on

STRANDMØLLEN

Developers

**Ørsted**    CIP

EUROWIND ENERGY A/S    Copenhagen Infrastructure Partners

be better energy    EUROPEAN ENERGY

VATTENFALL

Everfuel

# High shares of intermittent renewable energy – system challenges but PtX opportunities

## DANISH GREEN TRANSITION

### STATUS (2019):

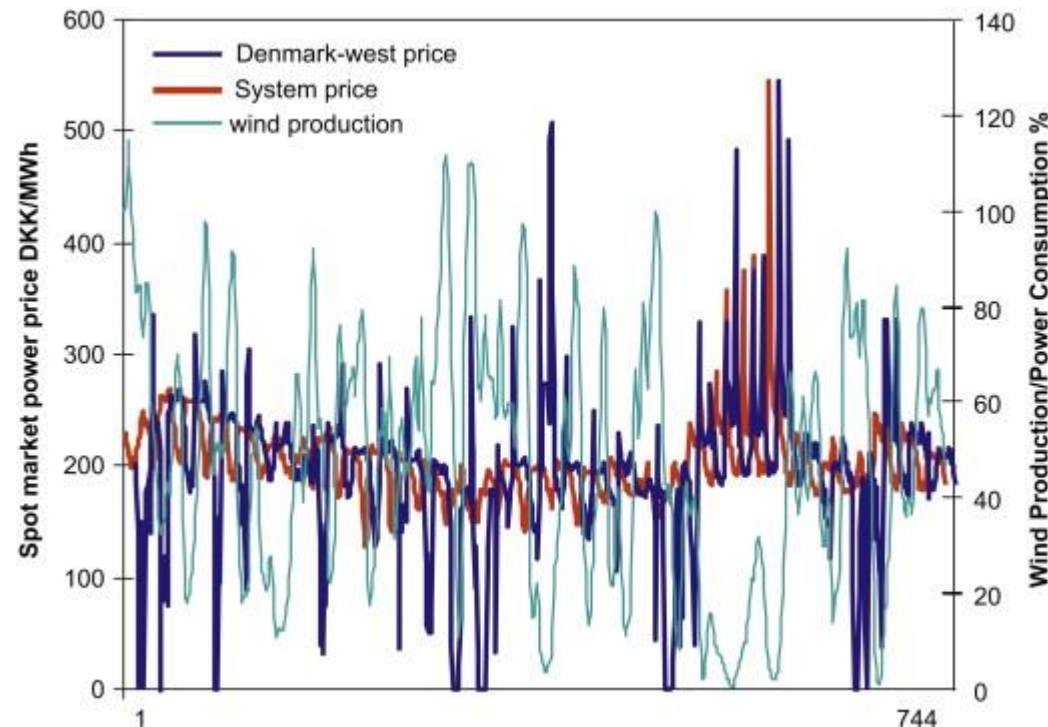
73% green electricity  
35% green energy  
13% green gasses

### 2030 TARGET:

100% green electricity  
55% green energy

### 2050 TARGET:

100% green energy



~ 70% of electrolyser OPEX is cost of energy

By deploying trading strategies and grid balancing services cost of energy can be reduced by up to 50%

Energy traders



Energi Danmark

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# Electrolysers, Green Hydrogen Systems









Pressurised Alkaline technology

Pressurised alkaline has unique propositions



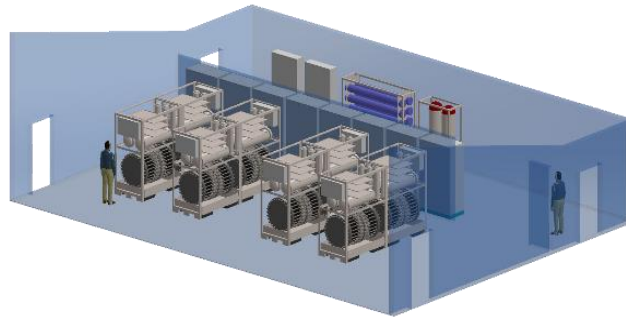
Advantages of pressurised alkaline electrolysers compared to other technologies

-  Mature, proven technology
-  Higher capacity
-  Higher up-time
-  Low component costs
-  Not dependent on iridium and platinum supply
-  Long life time






Scalable, modular, and versatile

Modular units with a wide range of application areas



Application areas

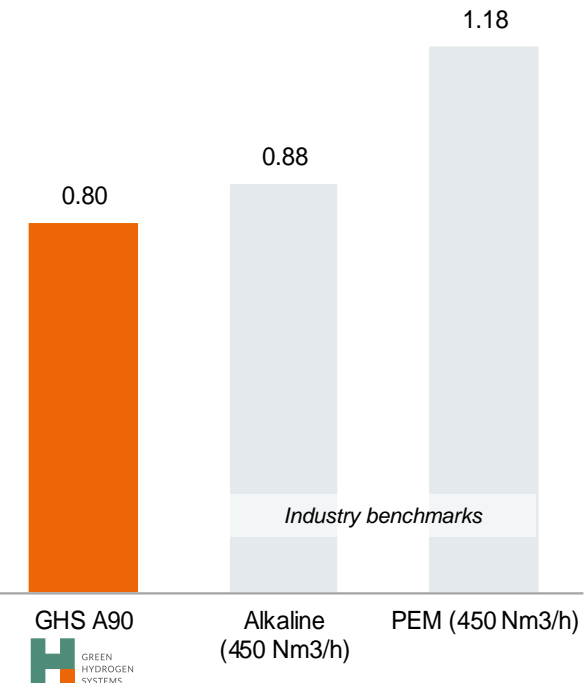
-  Transport (storage)
-  Power-to-X (storage)
-  Industry



Competing on cost

Cost competitive in hydrogen production

2020 LCOH<sup>1</sup> CAPEX contribution (EUR/kg):



# HRS & System integration / PtX conversion





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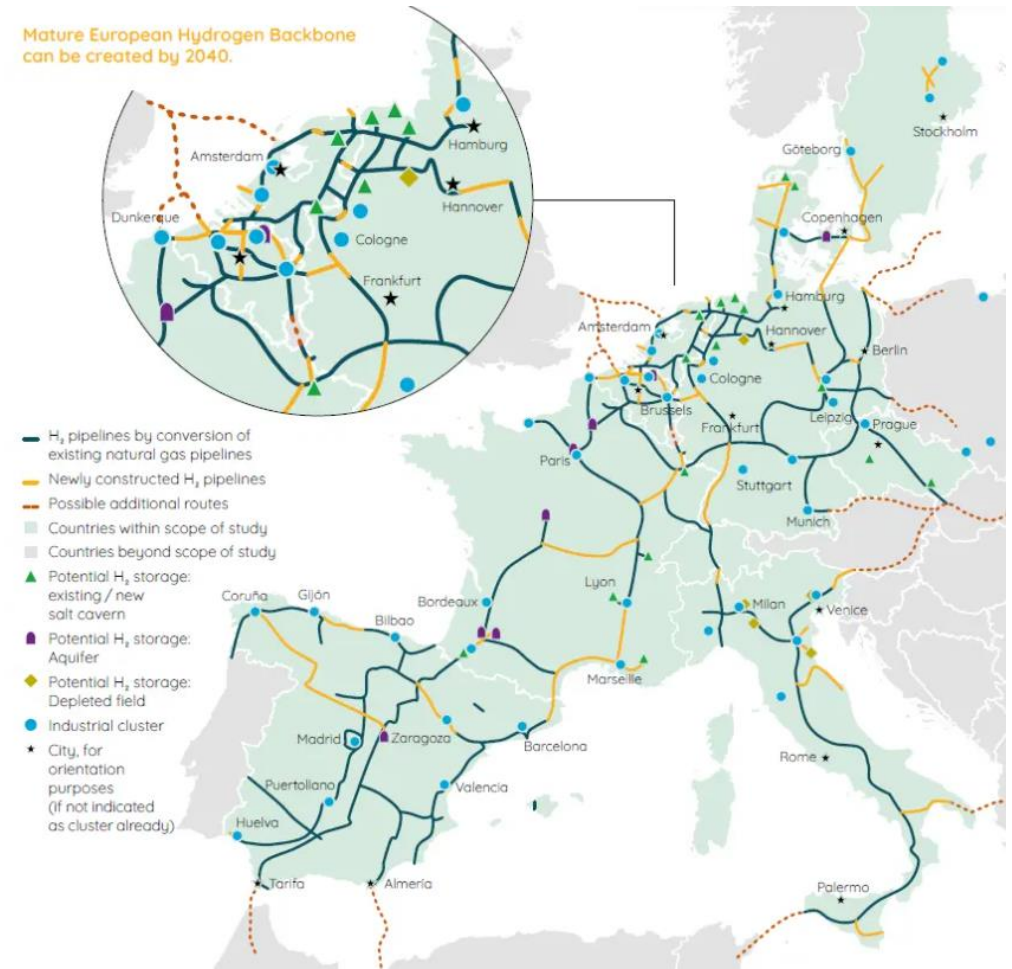
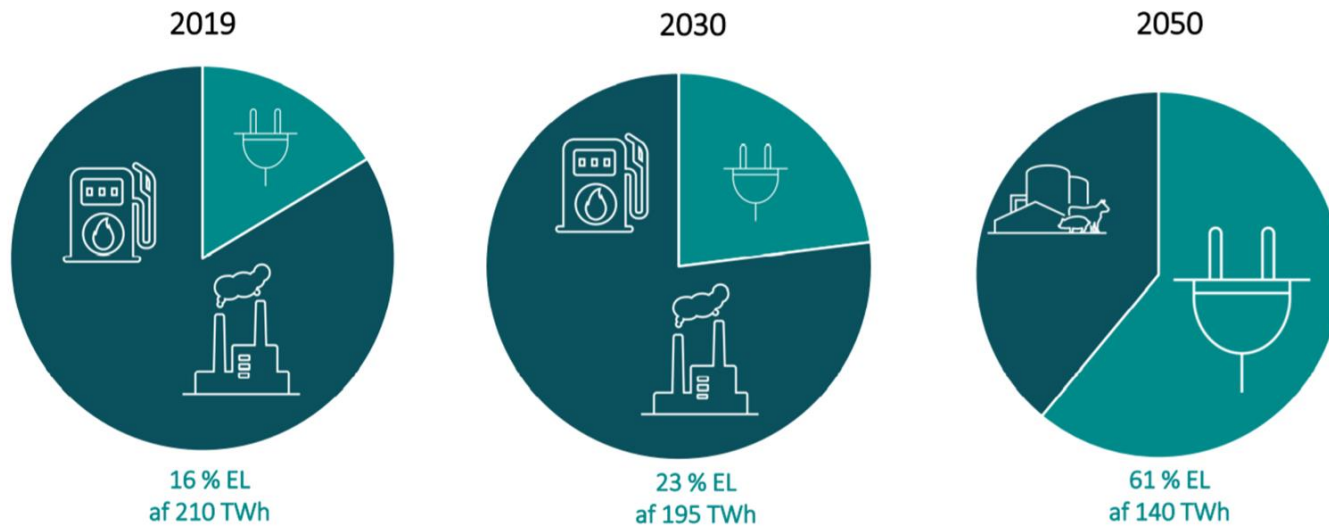
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# Future outlook & visions...





GREEN  
HYDROGEN  
SYSTEMS

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