

Charting a Future for the Gas Industry

Lessons from the Northern European Transition

NW Gas Association 2026 Annual Energy Conference
June 3, 2026



- Consulting
- Workshops and events
- International Study Tours – 46 study tours with 900+ participants from OR and WA





Why Denmark and the Netherlands?

- Similarities to the Pacific NW
 - Size
 - High standard of living
 - On the sea
 - Environmental ethic
 - Entrepreneurial/export oriented
- NL and DK are not identical!
 - Industrial vs. agricultural focus
 - Domestic heating supply



FROM:
GAS DELIVERY

Delivering natural gas
to power our world

TRANSITIONING



Pipelines.



New energy.



Greater
possibilities.

TO:
ENERGY DELIVERY



Delivering cleaner energy
for a sustainable future



NATURAL GAS

GREEN MOLECULES



**RENEWABLE
NATURAL GAS**



HYDROGEN

Benefits of Using Green Molecules

- Provides a more future-proof business model
- Leverages existing infrastructure and expertise wherever possible rather than building new electrical distribution lines
- Takes advantage of higher energy density of gas molecules vs. electrons
 - Can service hard to electrify market sectors
 - Reduced infrastructure needs where additional distribution capacity is needed
- Embraces opportunities to build the green economy
- Addresses carbon reduction and other environmental goals



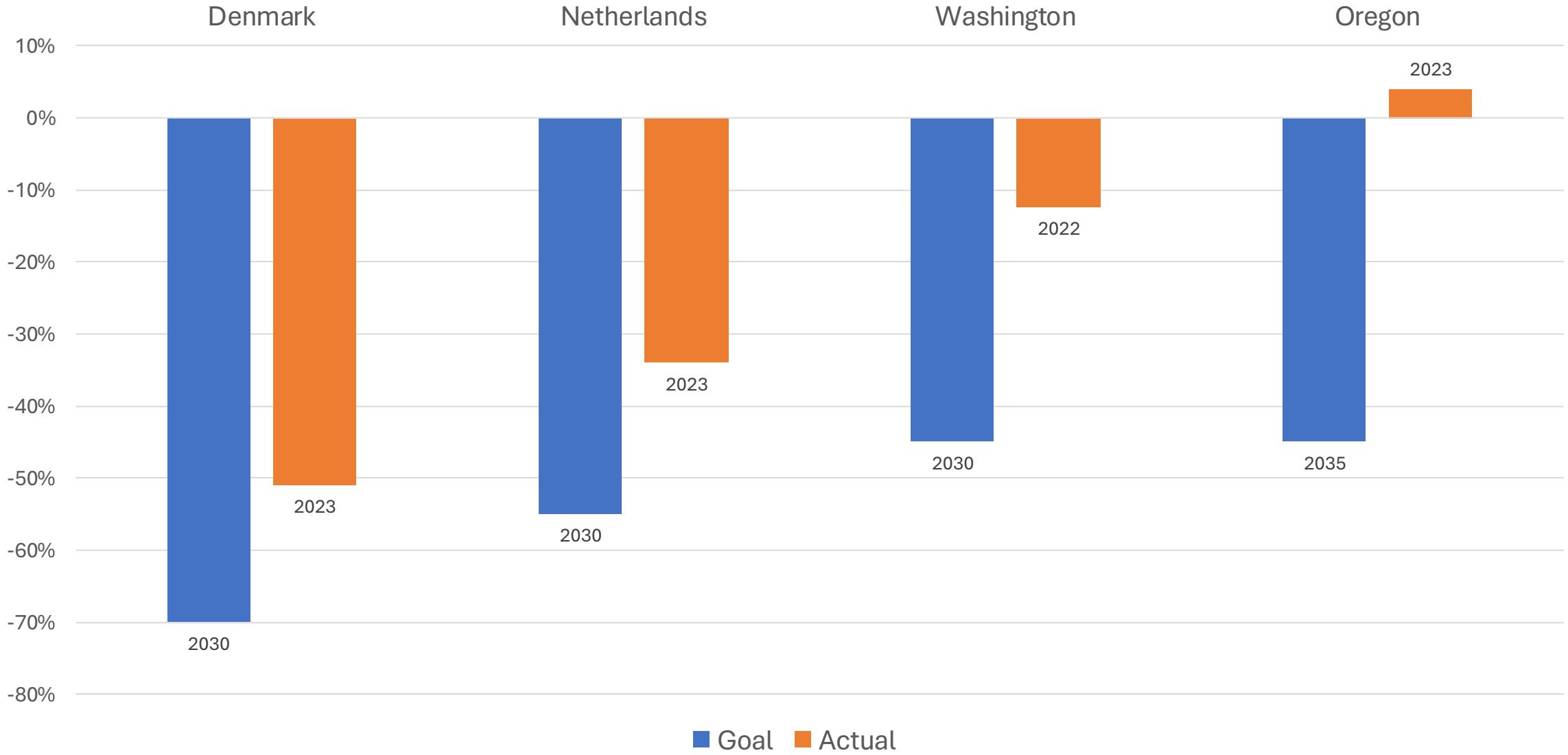
Capacity **20 GW**



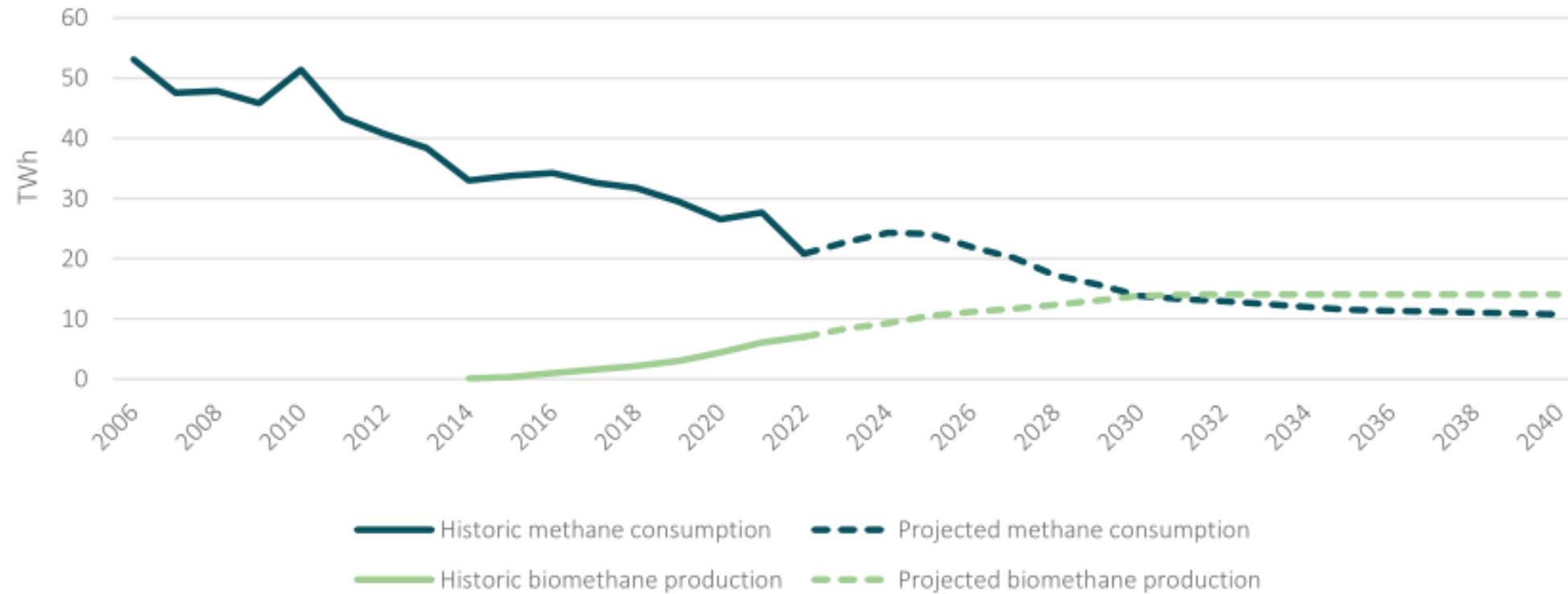
Capacity **350 GW**

Credits: Gasunie

GHG Emission Reductions Relative to 1990 Baseline



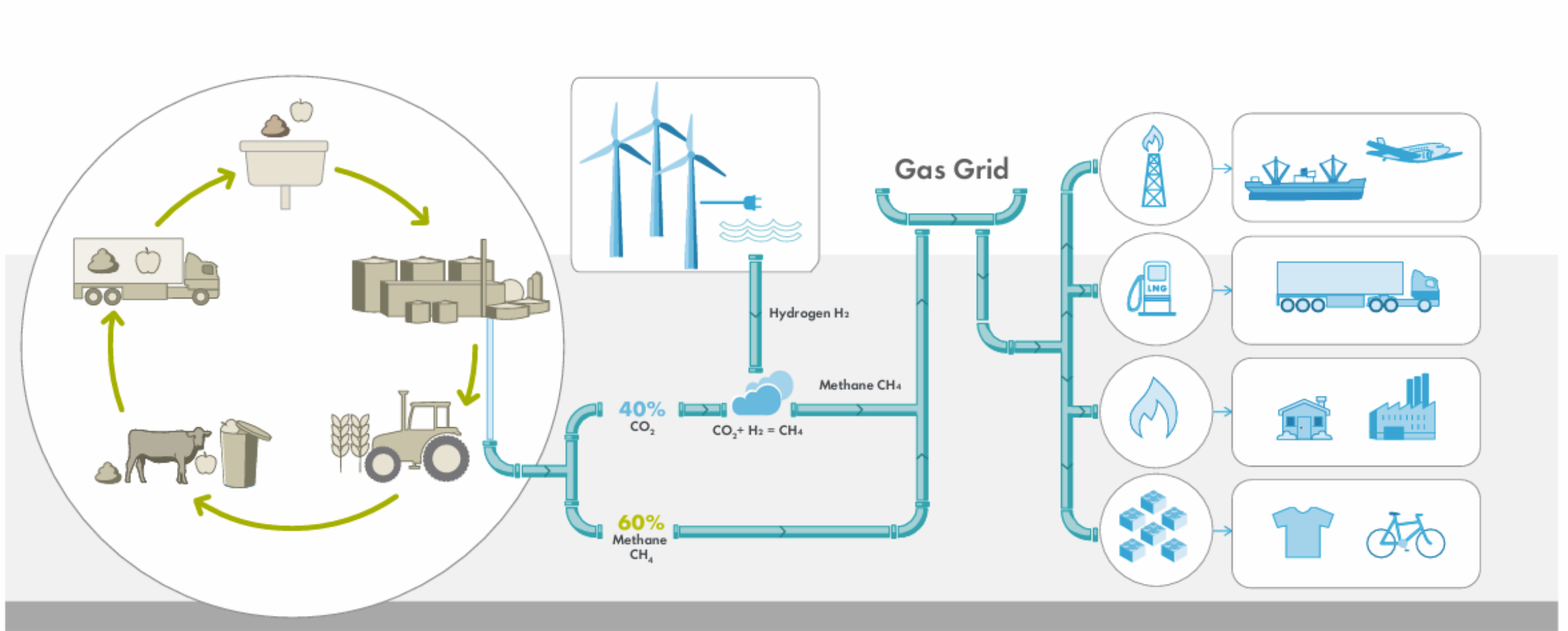
Danish Renewable Natural Gas Consumption and Production



Community Scale Biogas Plant – Large Scale Co-digestion Makes the Difference!



Shell Glansager Plant: Biogas + eMethane (Biogenic PtX)



Copyright of Shell International B.V.

Hydrogen Backbone at Port of Rotterdam


- Construction of 19 miles of 24-inch pipeline was completed in January 2026, and the pipeline was filled with green hydrogen
- Shell Holland Hydrogen 1 – 200MW electrolyzer plant is producing 80 tons of hydrogen per day
- Pipeline connects electrolyzer park and future major industrial users
- Combines with Porthos project for transport and storage of CO2 under the North Sea





Credits: Gasunie

Phase 1: Rotterdam (2026)

— Hydrogen network Netherlands

 Industry

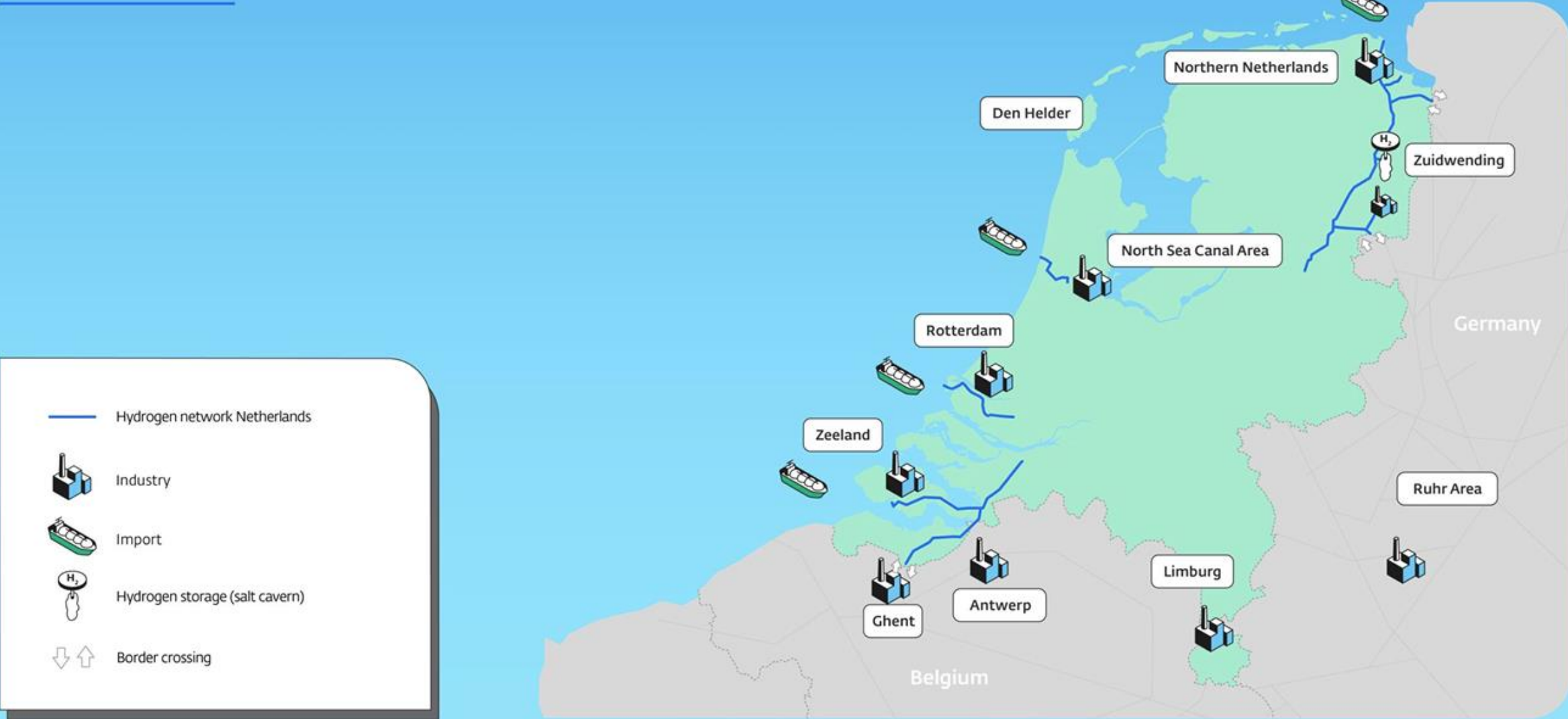
 Import

 Hydrogen storage (salt cavern)

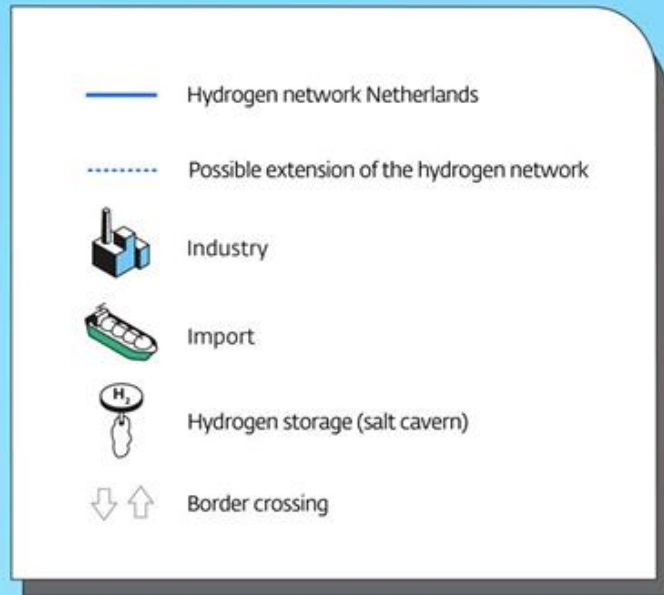


hynetwork

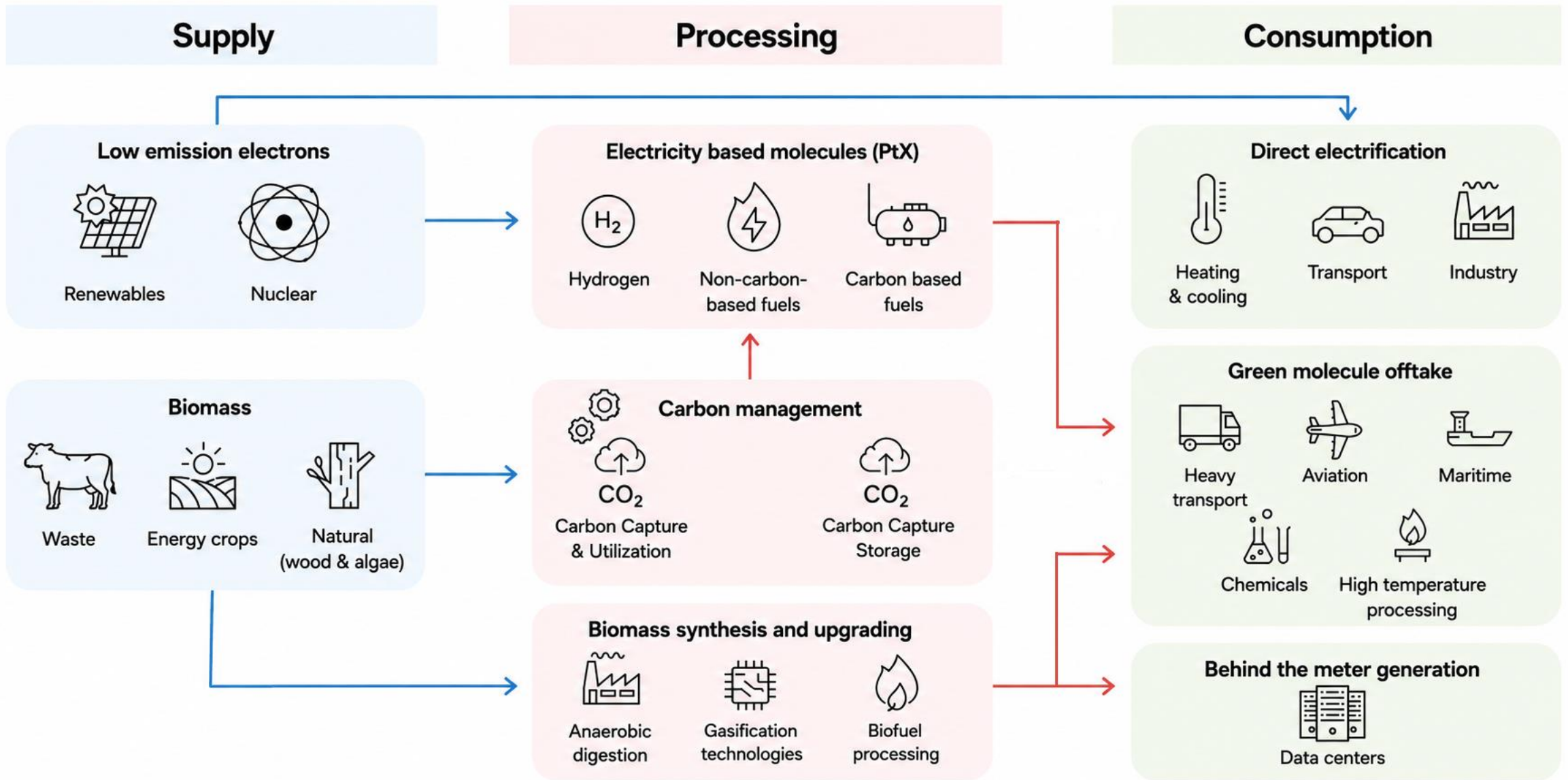
Phase 2: Coastal industry clusters (in or before 2030)



Phase 3: Connecting (2031-2033)



hynetwork



Credits: Mærsk Mc-Kinney Møller Center for Zero Carbon Shipping

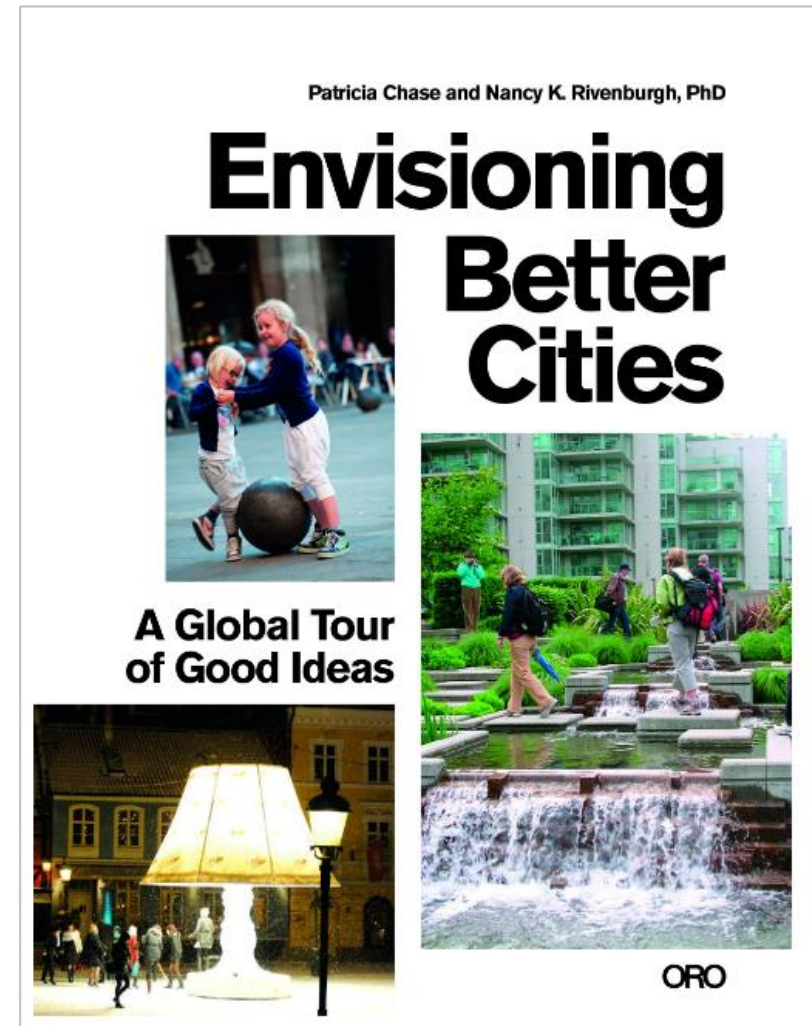
Thanks for your attention

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i-SUSTAIN

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**MINISTRY OF FOREIGN AFFAIRS
OF DENMARK**

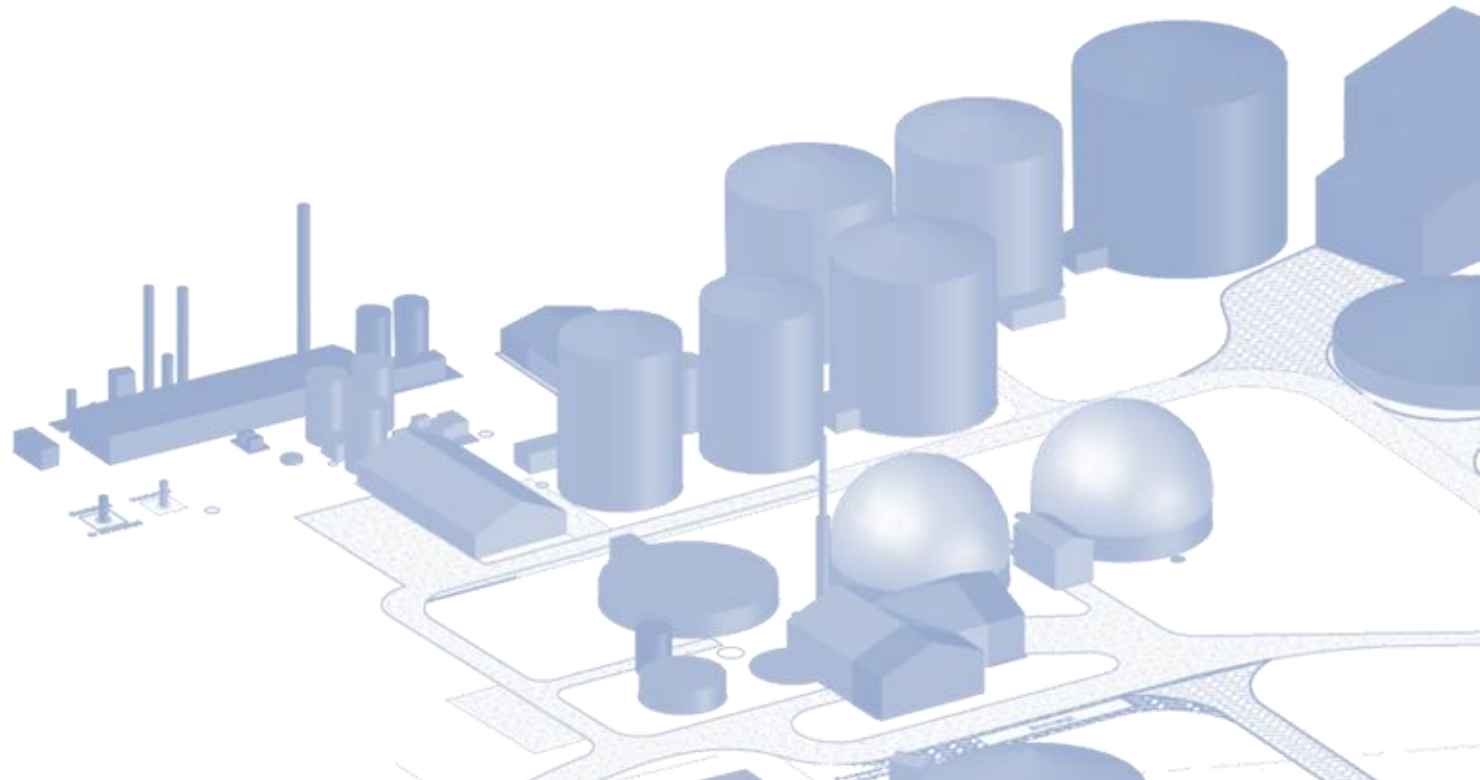
Danish perspectives RNG/PtX

Northwest Gas Association
Annual Energy Conference
Sunriver, Oregon

Thomas Sand Nielsen

from the Consulate General of Denmark in Houston

Wednesday, June 3rd, 2026



Who do I represent?

USA:

- Boston**
Consulate General of Denmark
- Chicago**
Consulate General of Denmark
- Houston**
Consulate General of Denmark

- New York**
Consulate General of Denmark
- Silicon Valley**
Consulate General of Denmark
- Washington D.C.**
Embassy of Denmark

Canada:

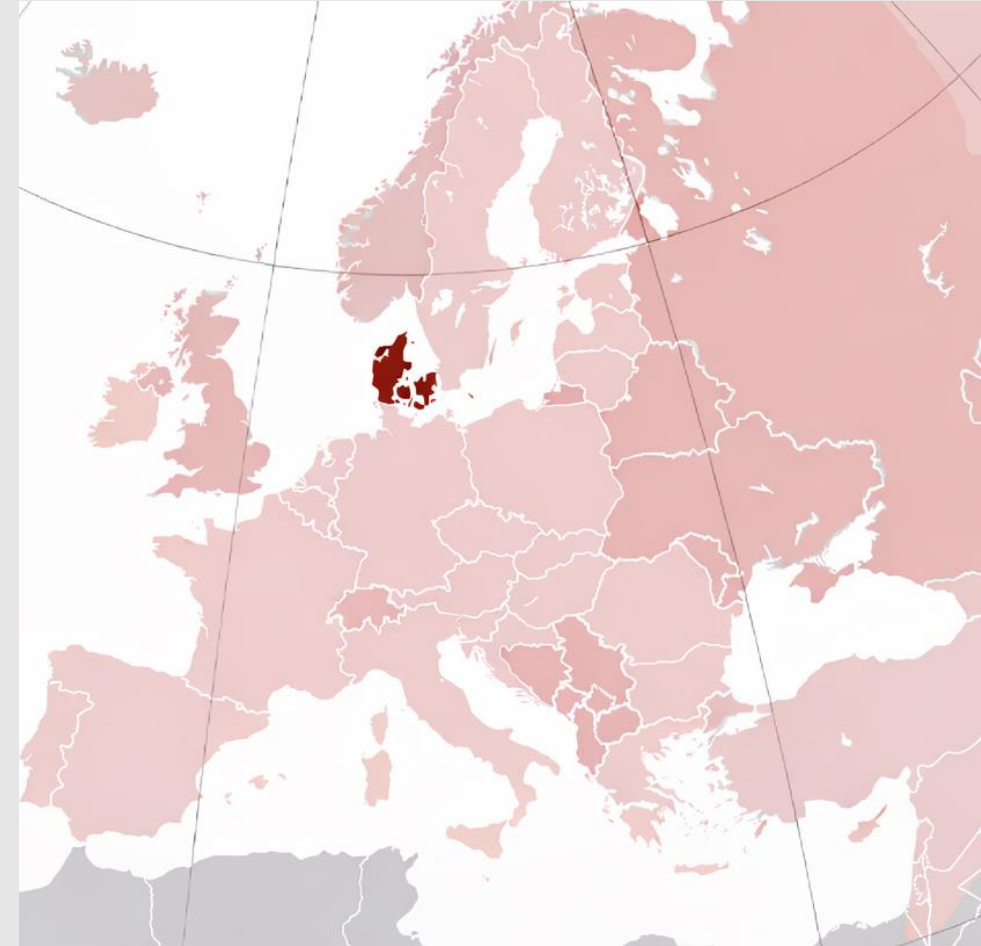
- Ottawa**
Embassy of Denmark
- Toronto**
Consulate General of Denmark



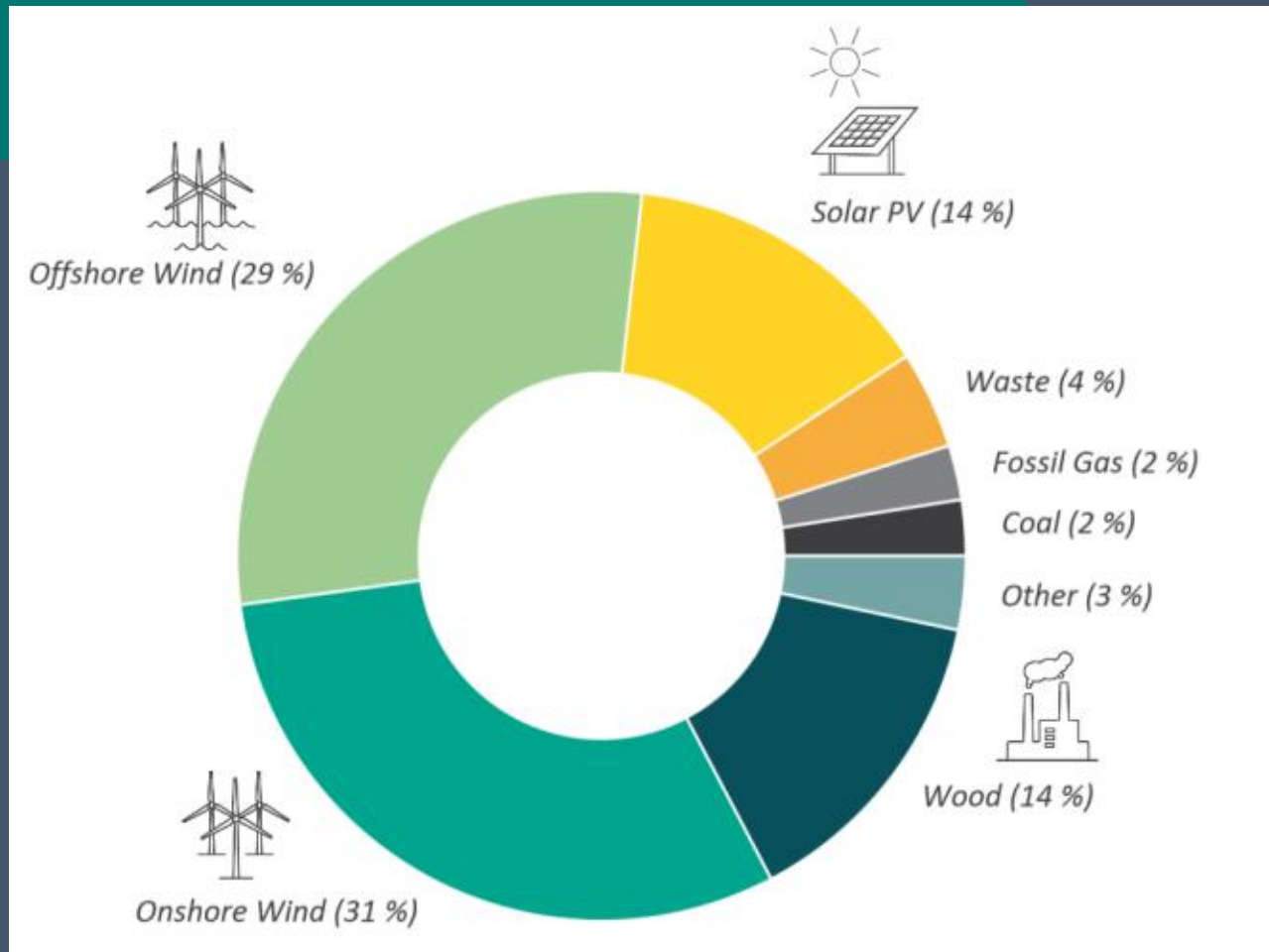
Denmark

A quick introduction

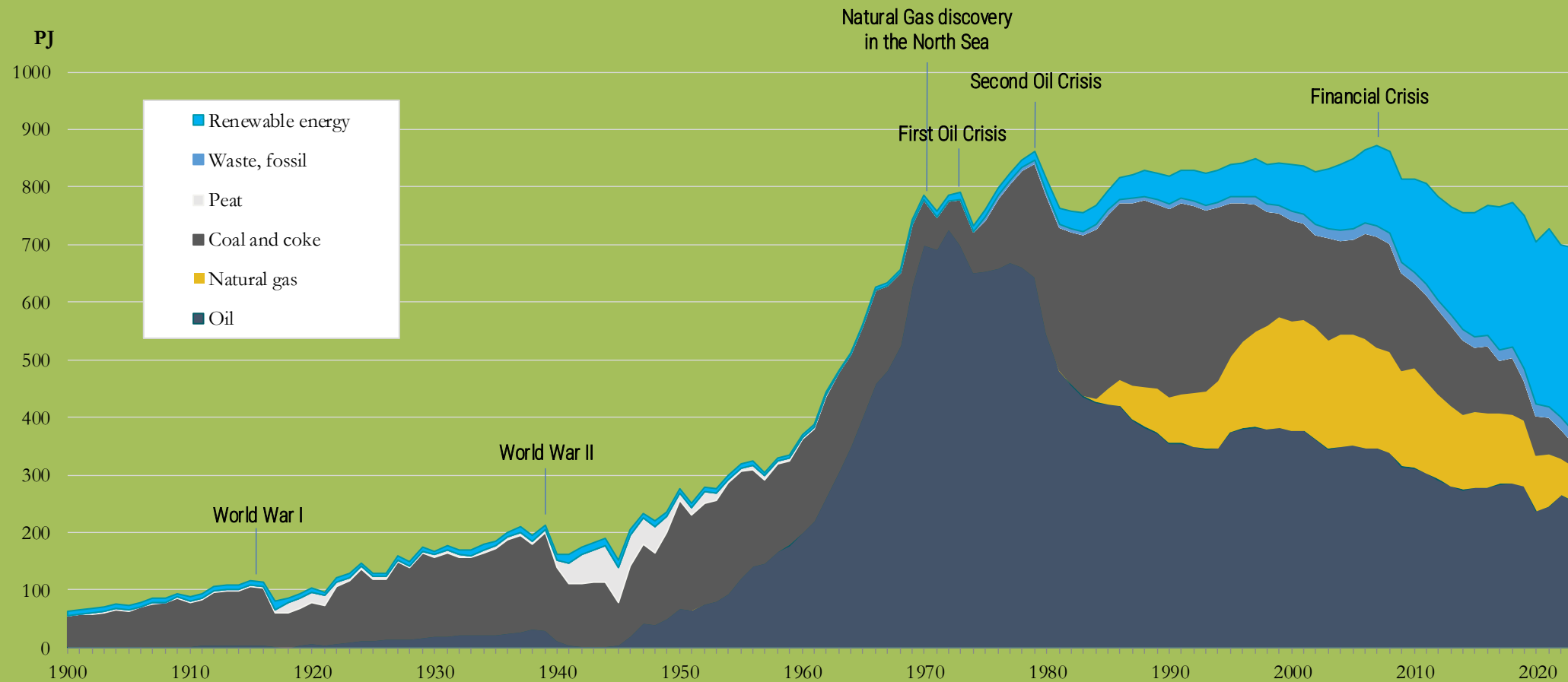
- Population: 6 million / Area: 16,600 sq mi
- About 20-25% of all export is ag and food related / 6% of the total workforce
- Ag/Food Sector:
 - About 2,000 pig farms producing close to 30 million piglets/year
 - 1.4 million cattle incl. 550,000 dairy cows
 - Roughly 60% of the entire land area is agricultural
- **Energy frontrunner** – Home to global companies like Ørsted, Vestas, Danish Crown, Arla, Carlsberg, Novozymes, Siemens Wind Power, A.P. Moller – Maersk, Novo Nordisk



Share of total electricity production by energy source in 2025

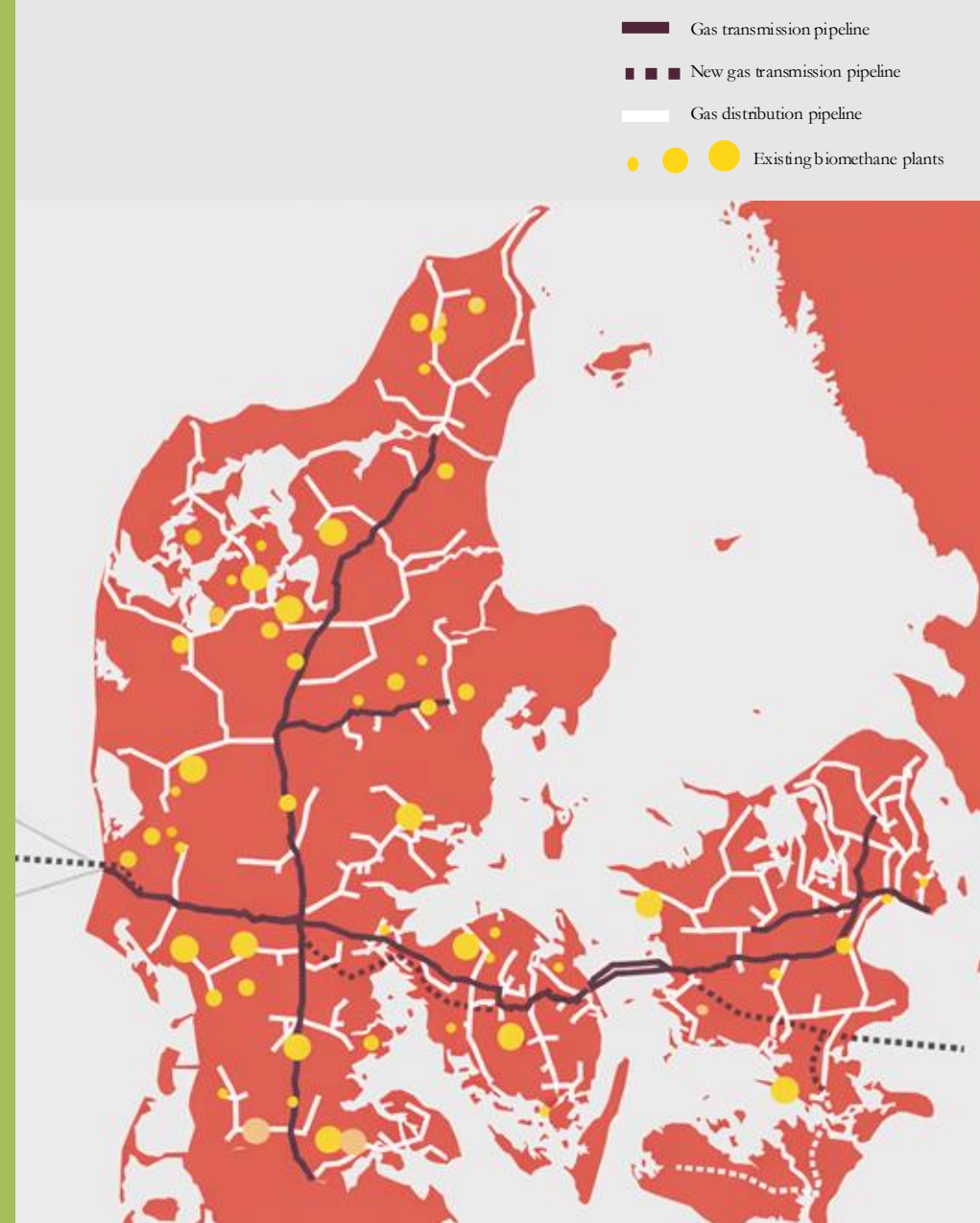


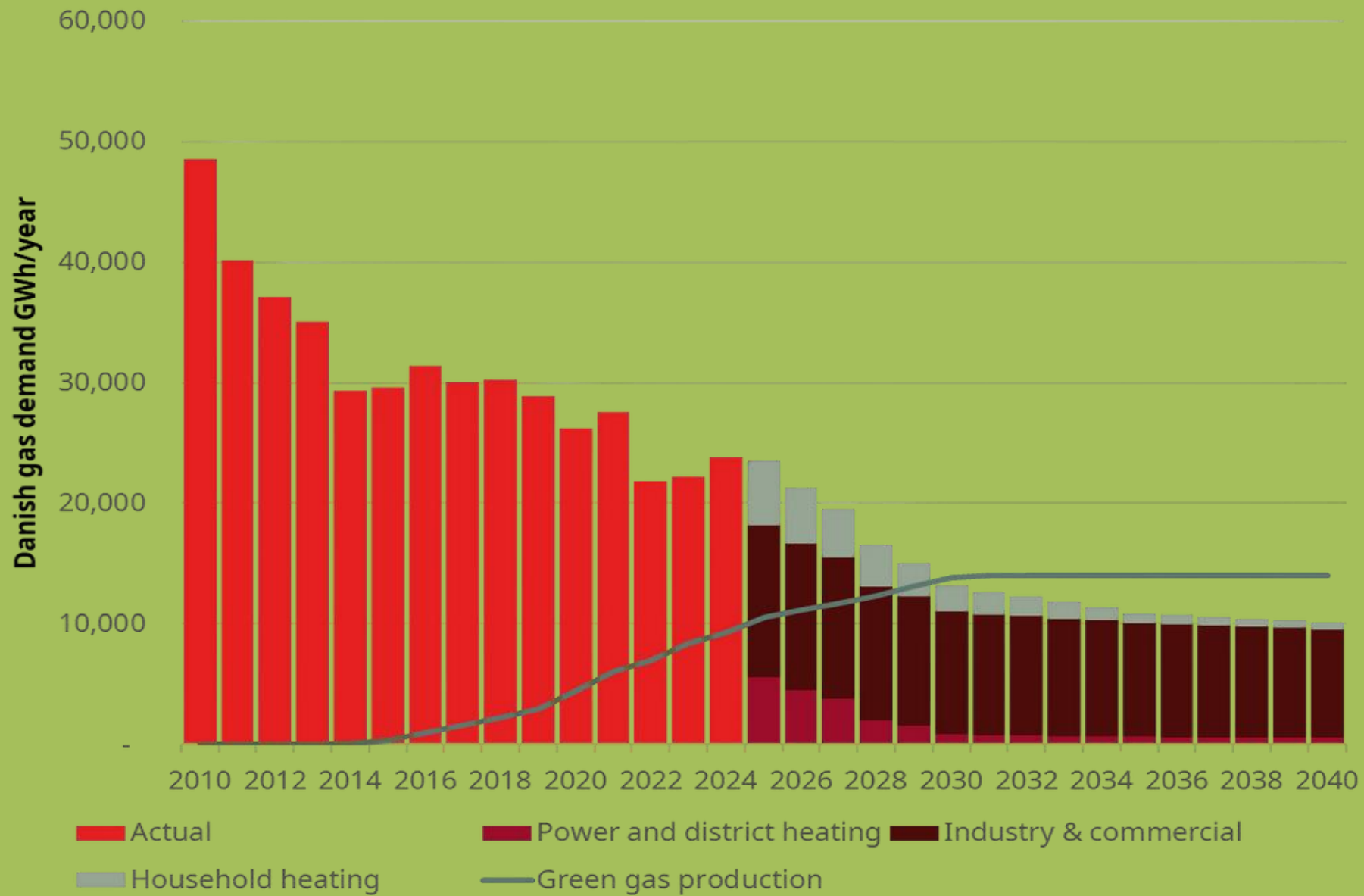
Denmark's energy consumption the last 100 years



Climate Targets and Existing gas Infrastructure

- National Government Goal – Zero emissions by 2050
 - Agriculture, transportation and energy are primary target sectors
- The future – Increased demands for GHG reduction
 - Fewer farms, but the same production
- Why?
 - Oil crises of the 1970s exposed vulnerability to imported energy
 - Focus on energy security, resilience, and self-supply
 - Climate goals later accelerated an already established direction





Denmark's ambition for 100% green gas

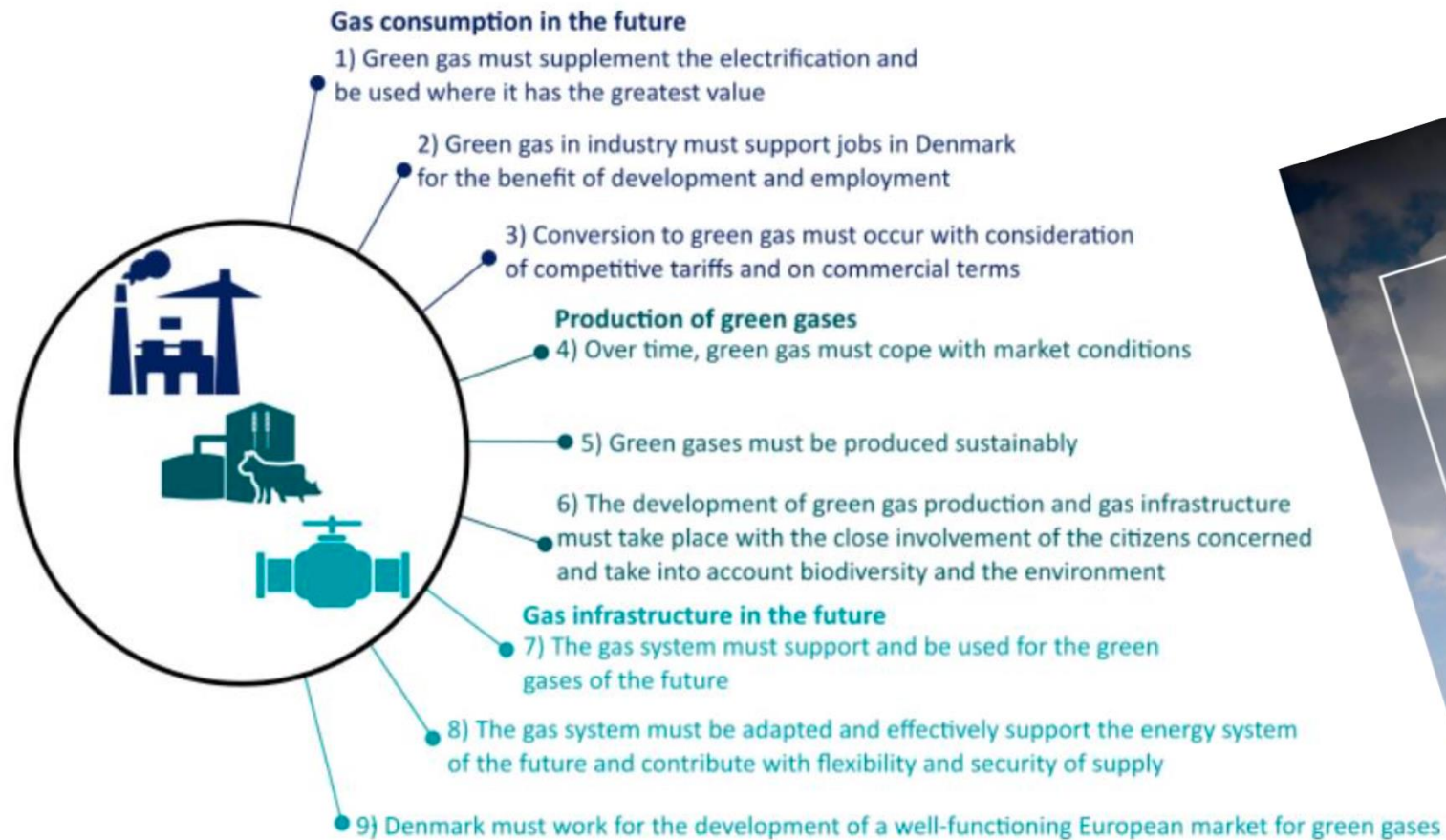
- The Danish Energy Agency project the production and consumption of gas based on **political ambitions**
- Growth in production of biomethane – reaching 100% of gas demand by 2030-35
- Three drivers of future growth:
 - **Green Tripartite Agreement** and the decarbonization of agricultural sector
 - **Sector Coupling**, decarbonizing shipping and heavy industries
 - **EU Integration** of market and security of supply – independence of Russian natural gas



Biomethane is a ‘Swiss army knife’ containing several advantages



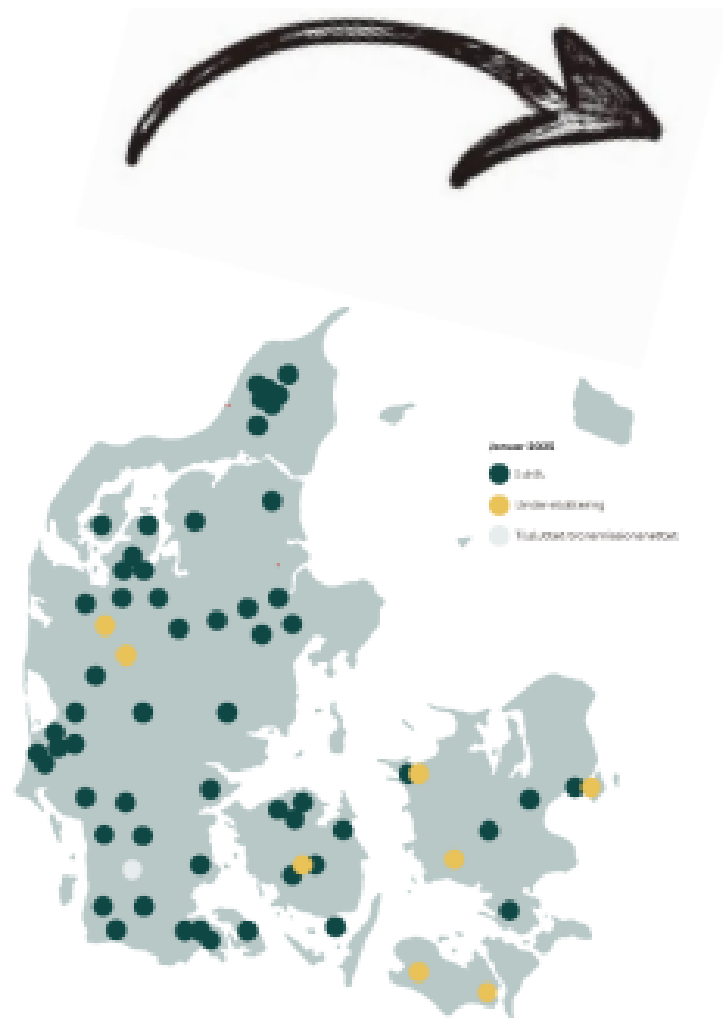
Denmark's Comprehensive strategy - balancing and integrating different goals



Transformation of the gassystem

Today

- 287.000 costumers – and still declining
- New biomethane under construction
- Biomethane share of 40 %

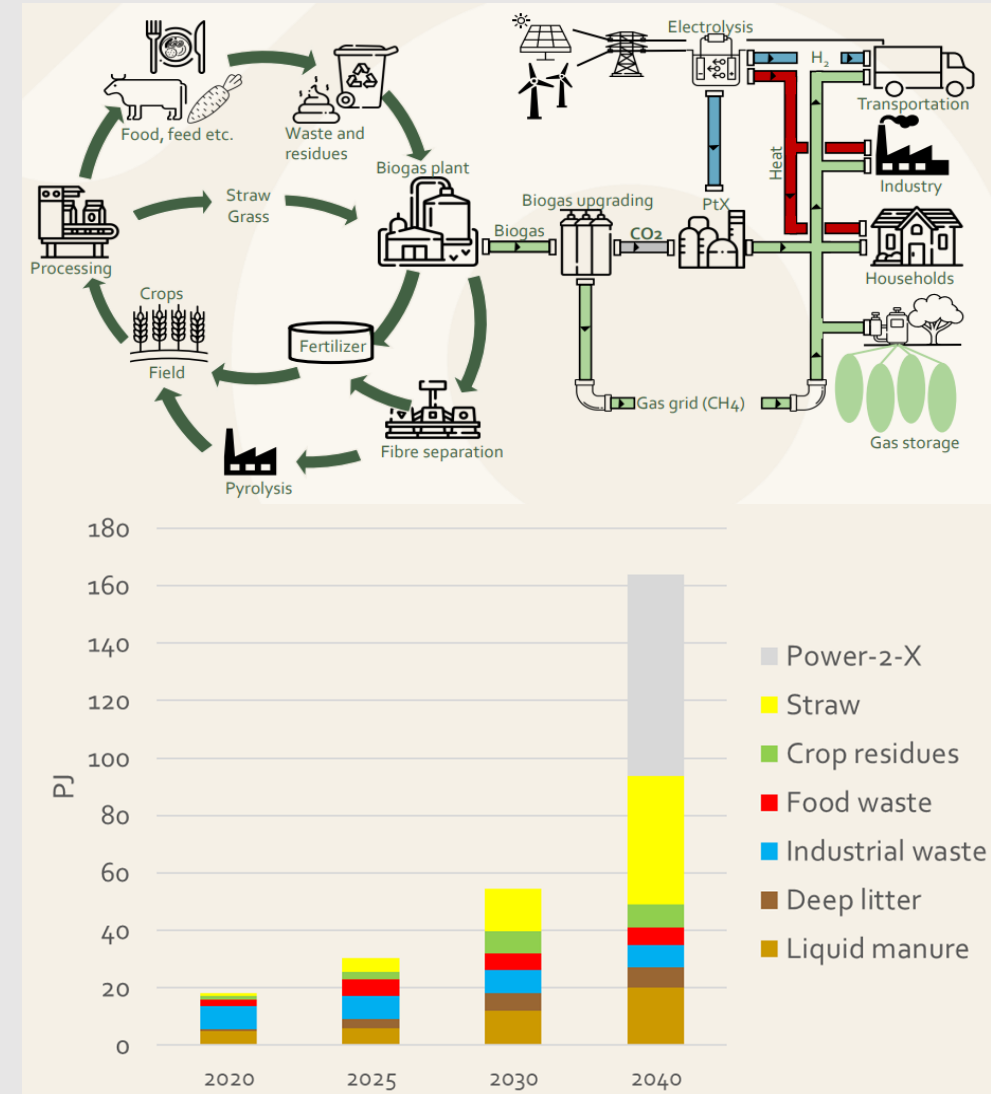


The future (according to forecast)

- Fewer private households
- Electrification of the industry and businesses
- More peak and reserve load
- More biomethane producers
- 100 % biomethane by ~ 2032

From Biogas to Green Fuels: Denmark's Competitive Edge

- Denmark has abundant offshore wind resources, access to biogenic CO₂, and a robust, flexible energy system
- Working to create a supportive regulatory framework and the necessary infrastructure to ensure the PtX industry can operate effectively and competitively in the long term
- Biogas and biomethane provide biogenic CO₂ for e-fuel production, making them a key enabler for synthetic fuels



Denmark's PtX Strategy: Scaling Hydrogen, E-Fuels

- Strategy from 2021 targeted 4–6 GW electrolysis by 2030, backed by a USD 200 mio. production tender and rules
 - **Infrastructure:** Hydrogen backbone to Germany and port-based PtX hubs
 - **Purpose:** Decarbonize aviation, shipping, (chemicals,) and heavy industry
- Focus on global leadership – Exporting Danish PtX technologies and fuels to international markets

Objective 1

Power-to-X must be able to contribute to the realisation of the objectives in the Danish Climate Act

Objective 2

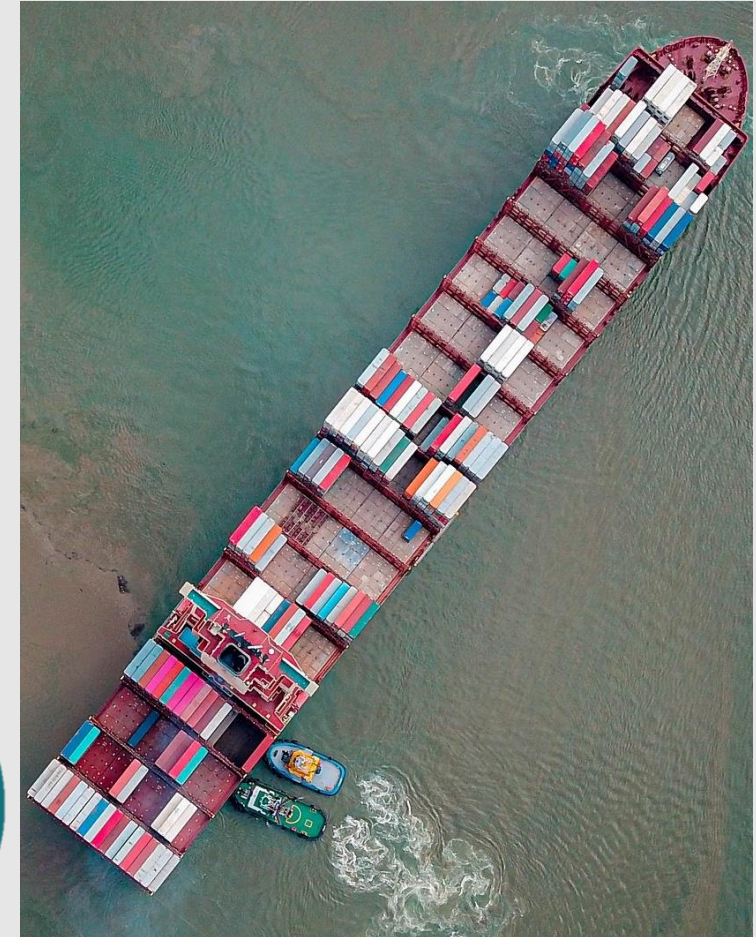
The regulatory framework and infrastructure must be in place for Denmark to utilise its strengths and allow Power-to-X to perform on market terms in the long run

Objective 4

Denmark must be able to export Power-to-X products and technologies

Objective 3

The integration between Power-to-X and the Danish energy system must be improved



State of play today for PtX/Hydrogen

- Target for PtX agreement in 2022 was 4-6 GW by 2030
 - But so far, only 0,1 GW of electrolyser capacity has been established in Denmark
- Capacity sale for the Seven opened in January and will run the rest of 2026
- Market has to prebook 18% of the pipelines capacity to realize the Seven (a booking requirement of 0.5GW) and we remain optimistic this will happen





Want to learn more?
Let's connect!

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