

# ENERGINET

## ENERGINET PATHWAYS

100% clean energy – the importance of sector coupling, ESIG fall workshop, October 2024

Peter Markussen, Senior Director, System Operation,  
Energinet



VISION

GREEN ENERGY FOR A

BETTER WORLD



# ENERGINET

## THE ENERGY BACKBONE

We operate and develop the electricity transmission grids, gas pipelines and gas storage in Denmark and are also appointed to build future hydrogen infrastructure

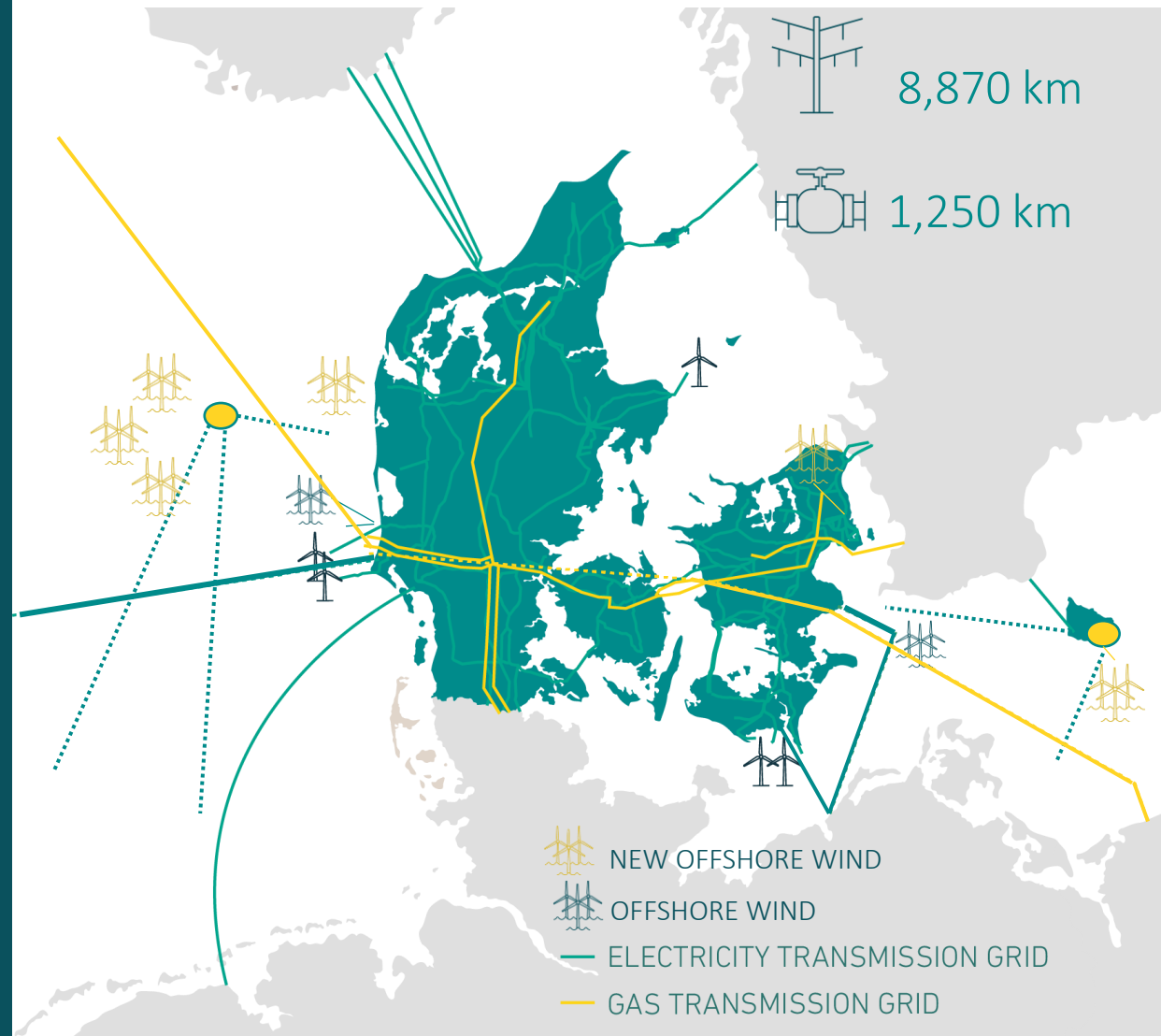
## ENSURE BALANCE

We have the day-to-day and long-term responsibility for the overall electricity and gas system in Denmark.

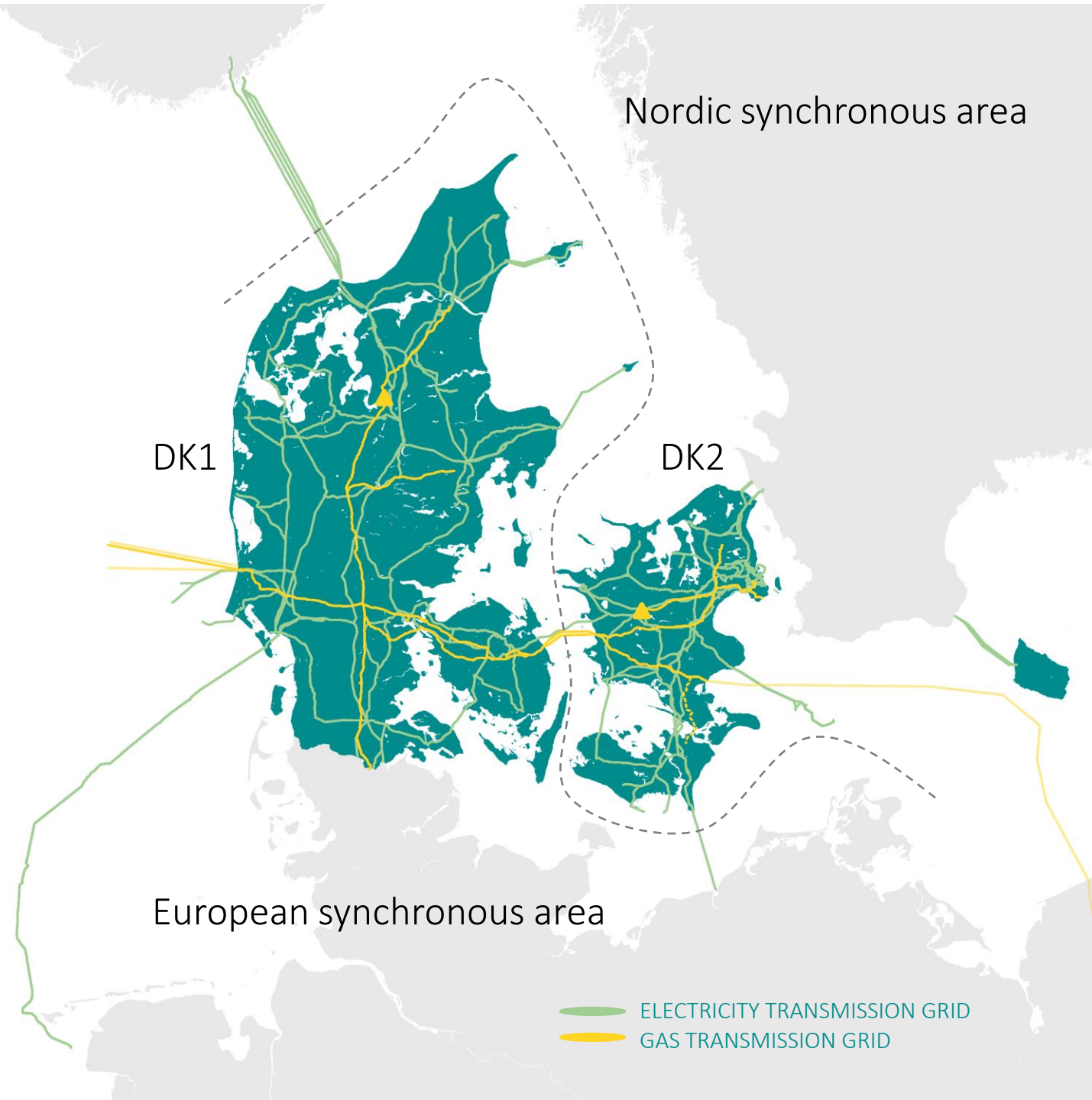
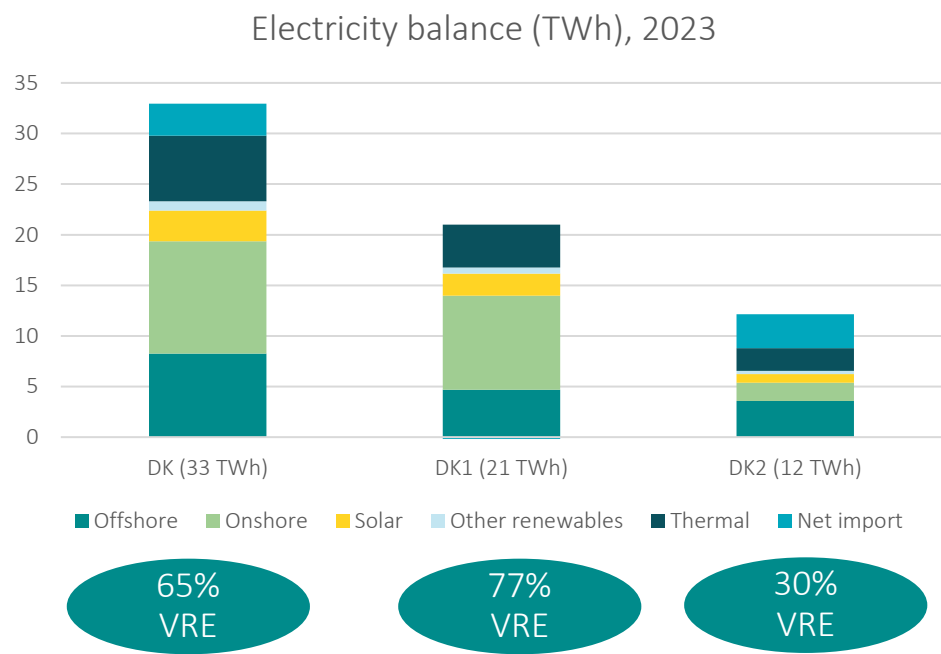
## WORKING FOR THE SOCIETY

Owned by the Danish Ministry of Climate, Energy and Utilities we safeguard society's interests as we move to a 100% green energy system.

Appr. 2500 Employees

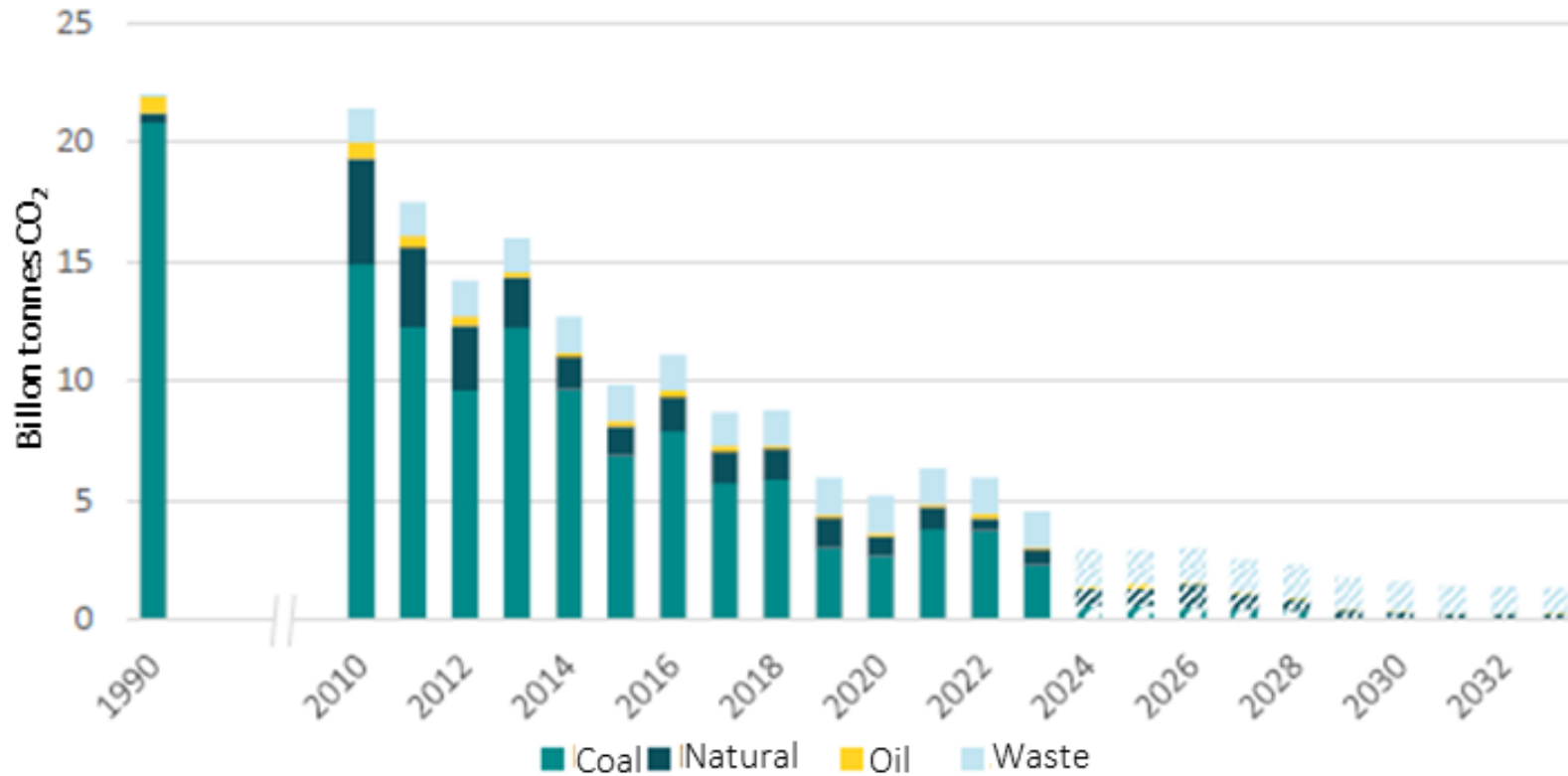


Energy island location, new OSW and connections only illustrative



# 15 YEARS OF GREEN TRANSITION

WITHIN THE DANISH POWER SECTOR CO<sub>2</sub> EMISSIONS FROM ELECTRICITY PRODUCTION HAVE BEEN REDUCED SIGNIFICANTLY

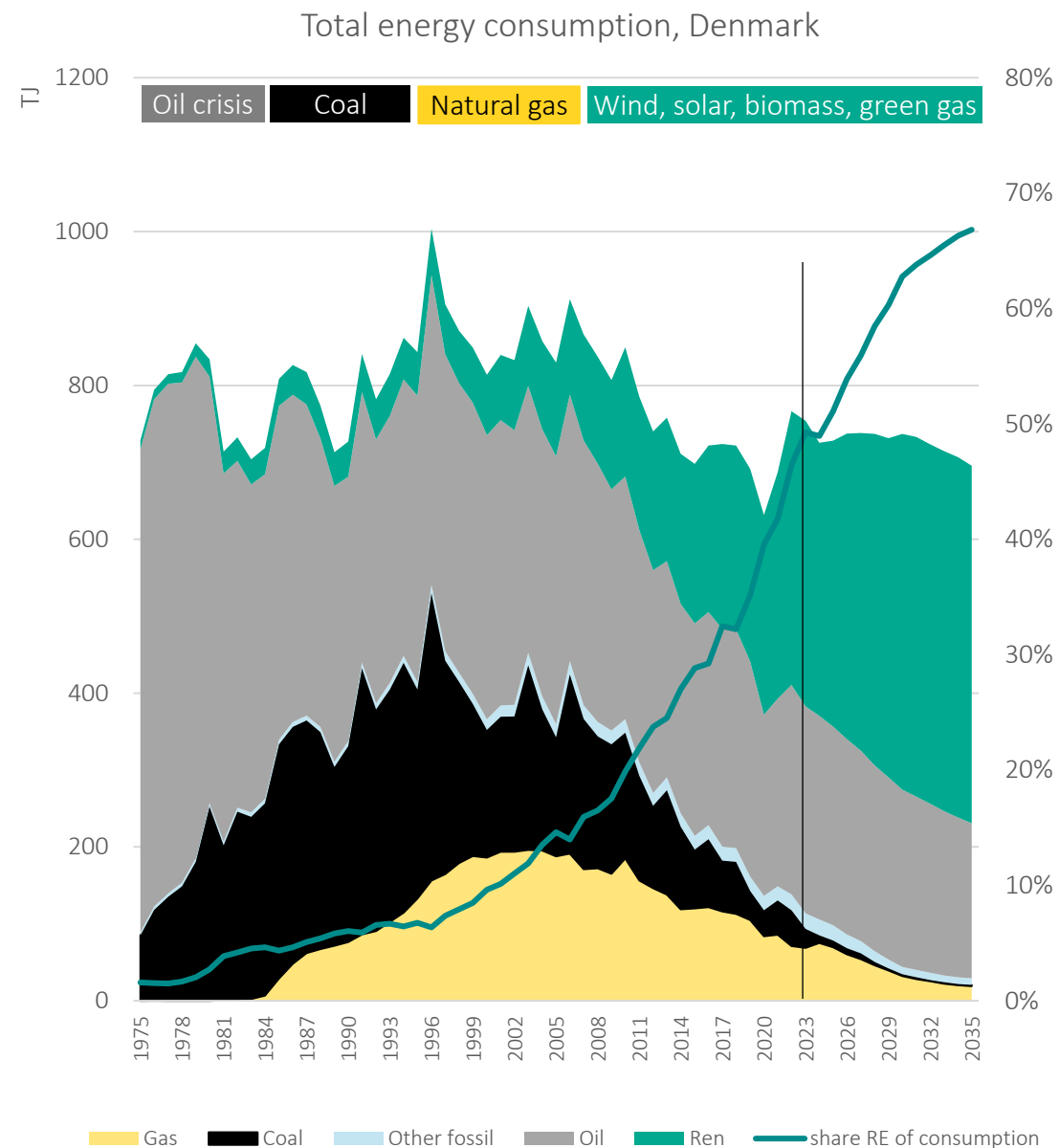


CO<sub>2</sub> emissions from thermal energy production (power and district heating)

# THE DANISH ENERGY TRANSITION

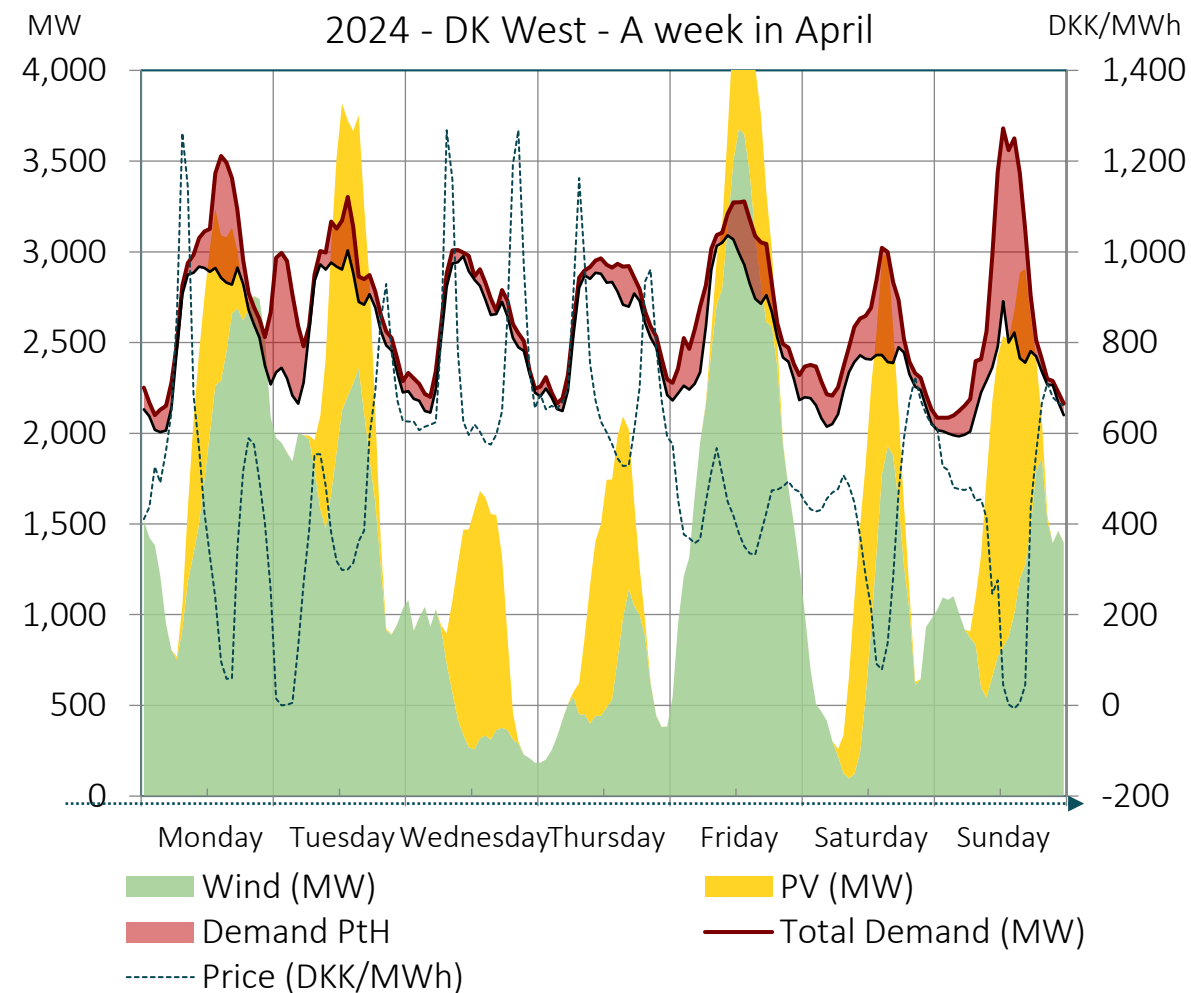
## MAIN TOOLS FOR GREEN TRANSITION

- Stable and holistic energy planning
- Clear mandate for TSO and transmission buildout
- Flexible electricity production and interconnectors
- Market based regulation and European electricity markets
- Digitalization of operation and markets
- Future focus on flexible consumption and sector coupling (PtX and hard to abate sectors)

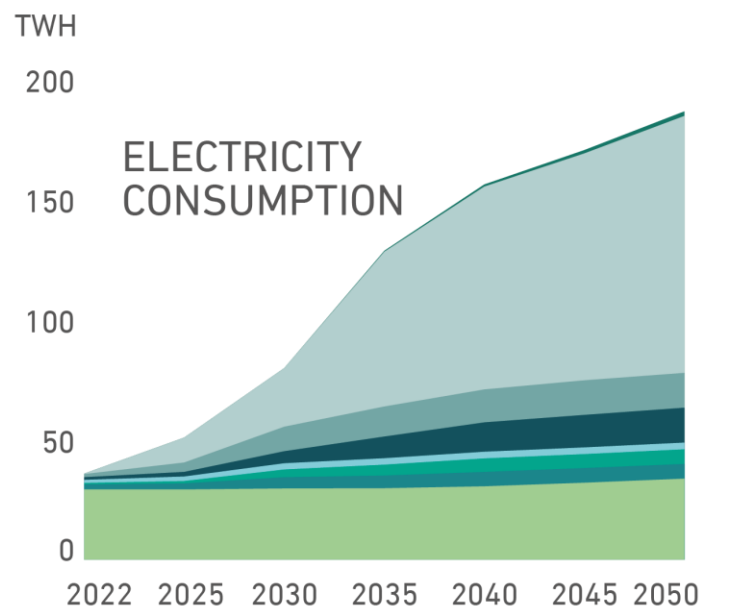


# FLEXIBILITY

- Exchange with neighboring countries as part of European day ahead electricity market
- Increasing consumption flexibility mainly driven by Power to heat (PtH) in district heating and to less degree EV charging
- Voluntary market based curtailment of solar and wind, when electricity price is low/negative

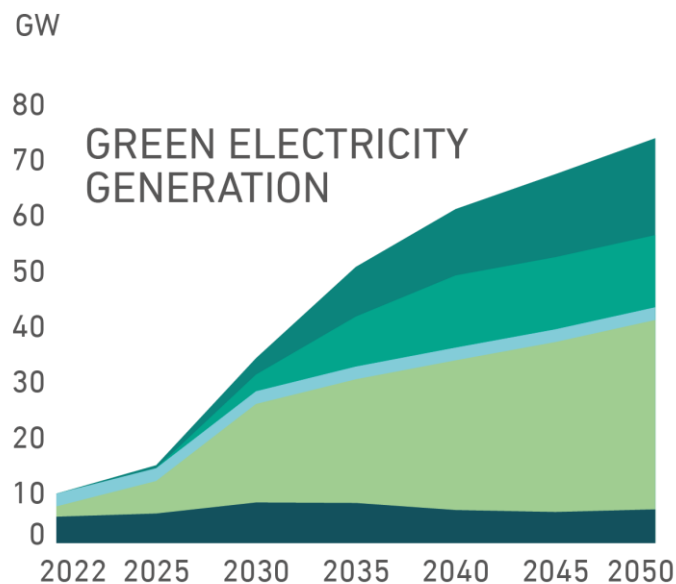


ELECTRIFICATION DRIVES THE CHANGE TO A CLIMATE NEUTRAL AND EFFICIENT ENERGY SYSTEM



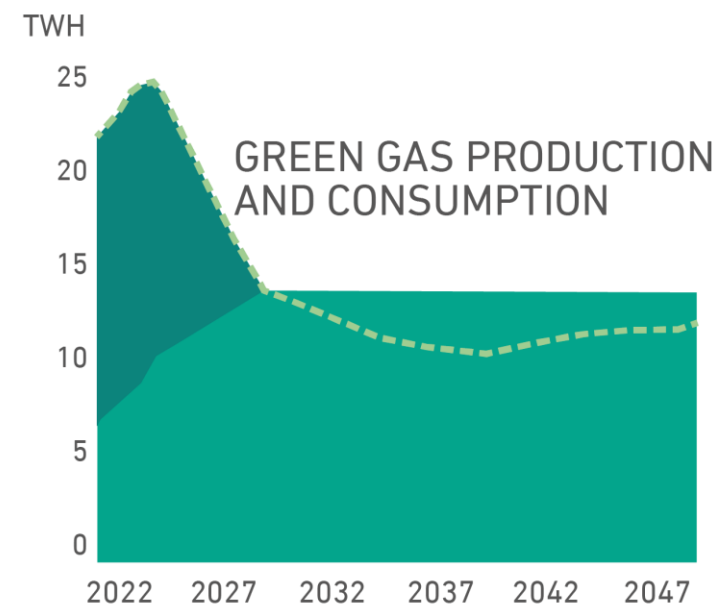
- TRADITIONAL ELECTRICITY CONSUMPTION
- HOUSEHOLD HEAT PUMPS
- LARGE HEAT PUMPS
- ELECTRIC BOILERS
- TRANSPORT
- DATA CENTRES
- POWER-TO-X
- DIRECT AIR CAPTURE

WHAT HAS BEEN ACHIEVED IN THE LAST 20 YEARS ACCELERATES TOWARD 2040



- ONSHORE WIND
- SOLAR
- OFFSHORE WIND
- ENERGY ISLANDS
- FUTURE OFFSHORE WIND POWER

GREEN GAS (BIO METHANE) SUPPORTS THE SECURITY OF SUPPLY AND SMOOTH TRANSITION

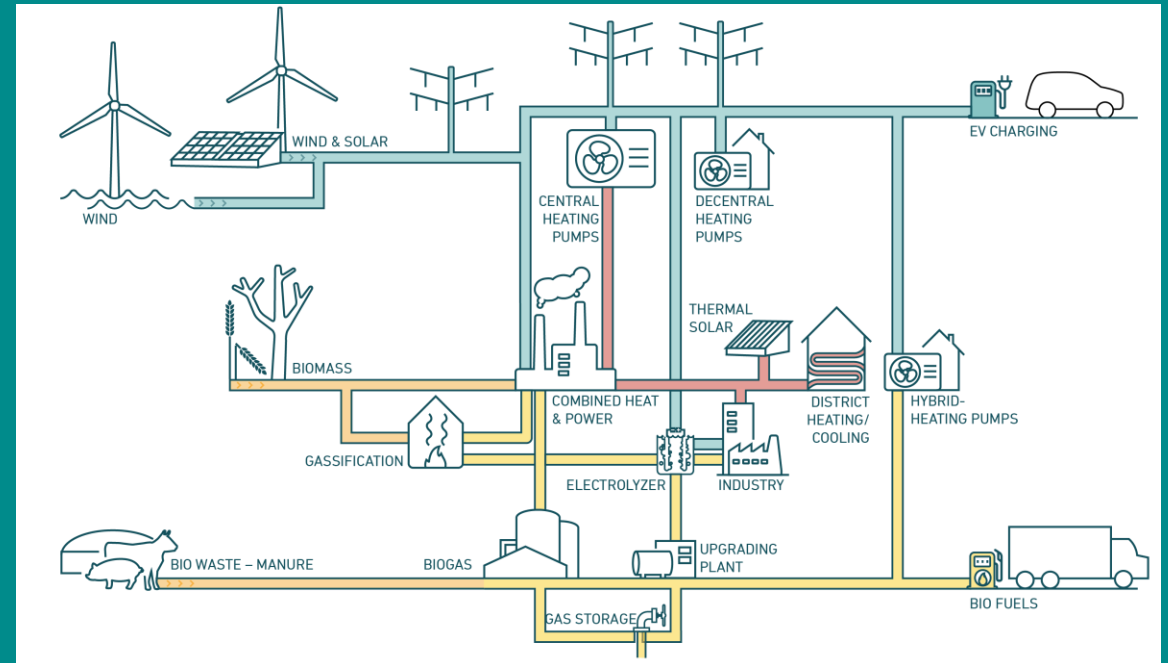


- NATURAL GAS
- GREEN GAS
- GAS CONSUMPTION

# TOP 4 PREREQUISITES FOR THE ENERGY SYSTEM OF THE FUTURE

1. The power grid must be expanded to meet future needs
2. The power grid must be utilised in the best possible way
3. There is an increased need for ancillary services to maintain power system stability
4. Green gas grid must be competitive

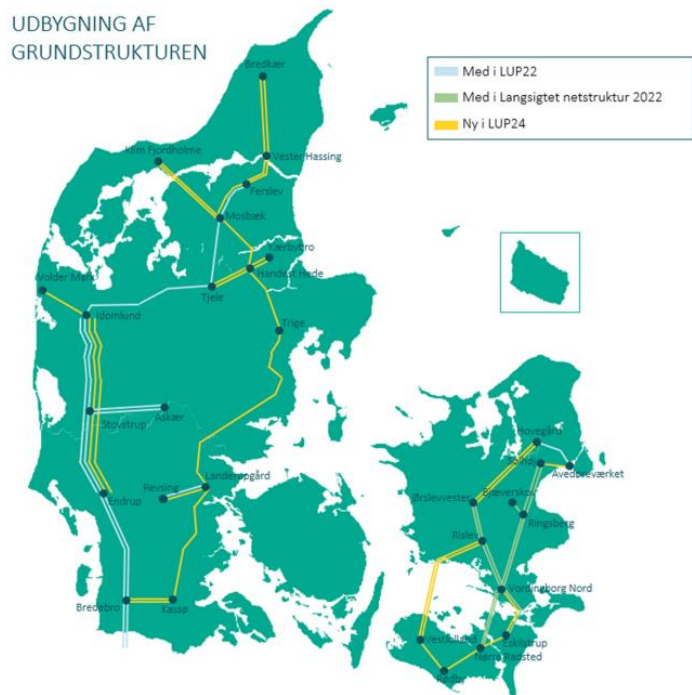
## THE ENERGY SYSTEM OF THE FUTURE





# LONG TERM DEVELOPMENT PLAN 2024 – PUBLIC HEARING VERSION

## Electricity transmission

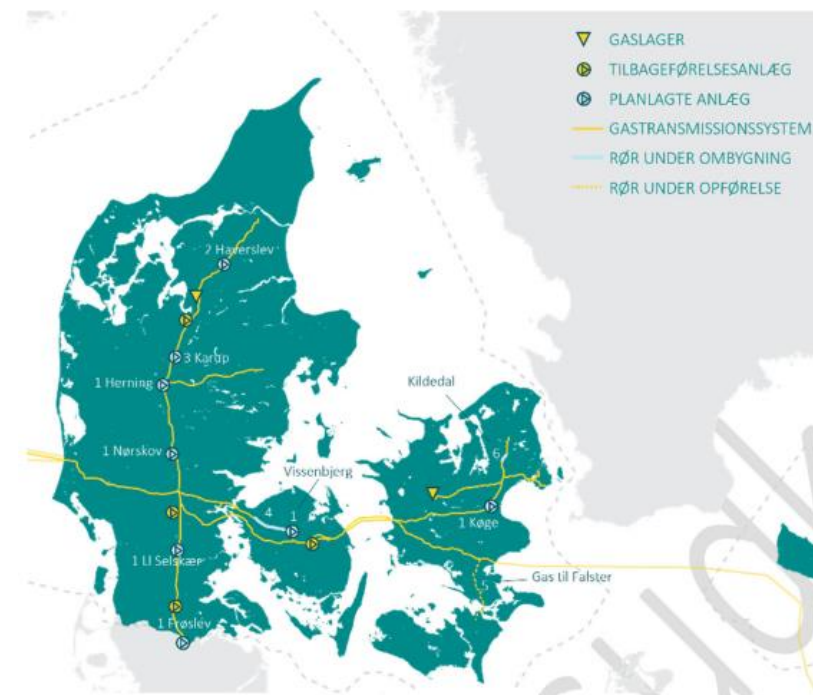


Figur 3 400 kV forbindelser i LUP22 og LUP24

## Hydrogen transmission



## Gas transmission



# INCREASED UTILIZATION OF GRID – LARGE SCALE OFFSHORE WIND AND OVERPLANTING

DANISH TENDER FOR +6 GW OSW  
PUBLISHED 22 APRIL 2024

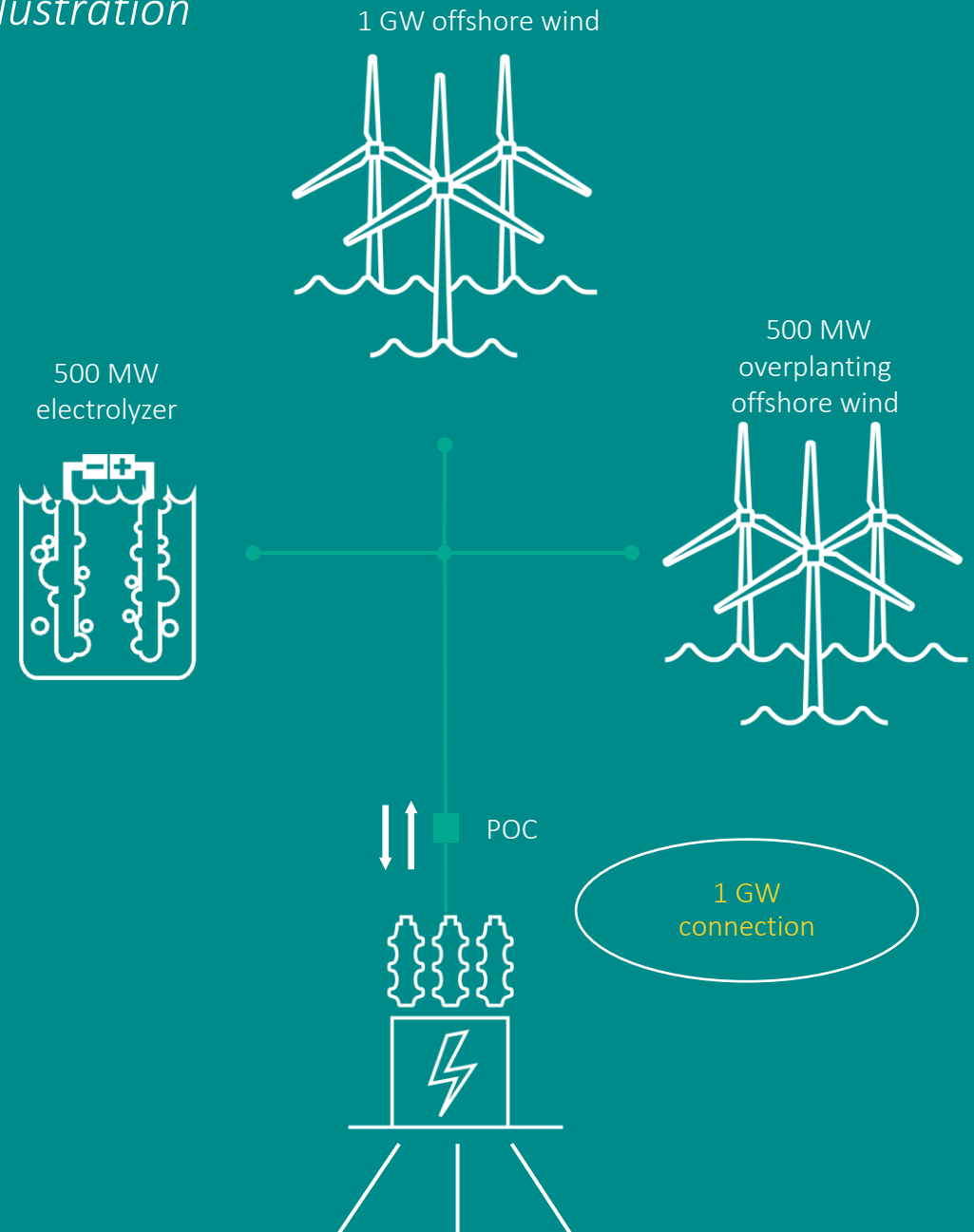


- The 6 GW offshore wind are tendered and grid connection ensured
- Option of overplanting– potentially 4 GW or more
- No state subsidies and with a yearly concession payment for use of seabed

# WHAT DOES OVERPLANTING MEAN?

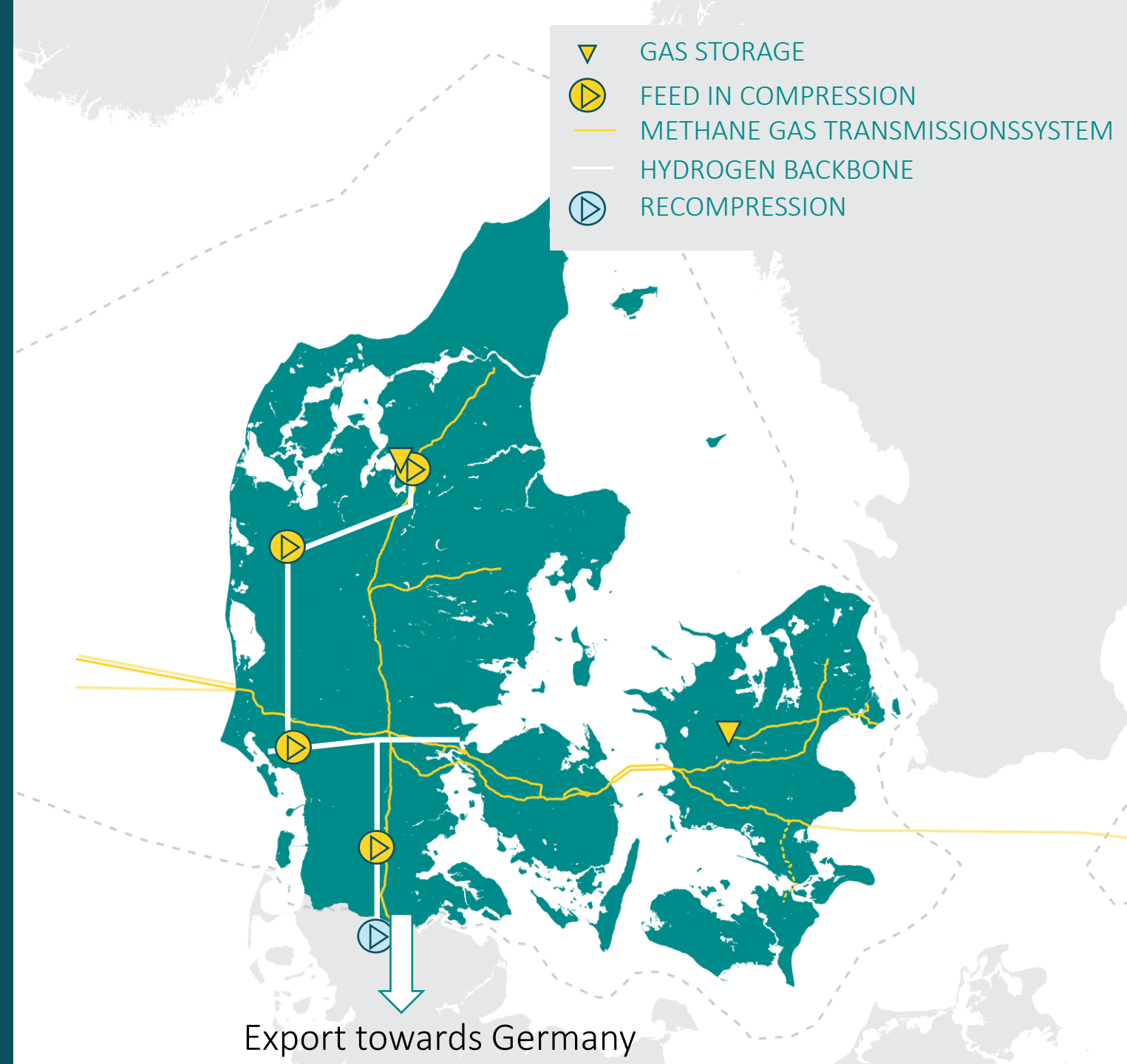
- 1 GW offshore wind tender – 1 GW grid connection is ensured
- Possible to increase offshore wind capacity (over planting) to increase utilization of grid connection
- Also possible to establish ptx, battery, solar capacity or other kind of generation or consumption before grid connection

## Illustration



# HYDROGEN BACKBONE

- Enables large scale hydrogen production for **export** and **production of fuels**
- **Reduces peak grid utilization**
- New tool for **balancing of electricity**
- Transmission plan based on announced and planned projects
- Expected commissioning 2032



# THANKS FOR YOUR ATTENTION



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For more information please  
contact: [pmr@energinet.dk](mailto:pmr@energinet.dk) or visit  
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## A BALANCING ACT

