

# UNCERTAINTIES AND RISKS IN PLANNING FUTURE GAS GRIDS AND STORAGES

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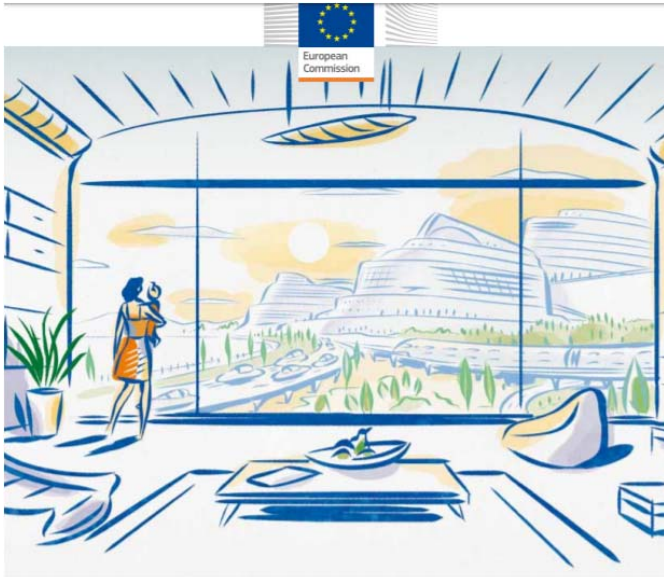
Department of Development and  
Planning

Sustainable Energy Planning



AALBORG UNIVERSITY  
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# EU GOALS FOR DECARBONISATION

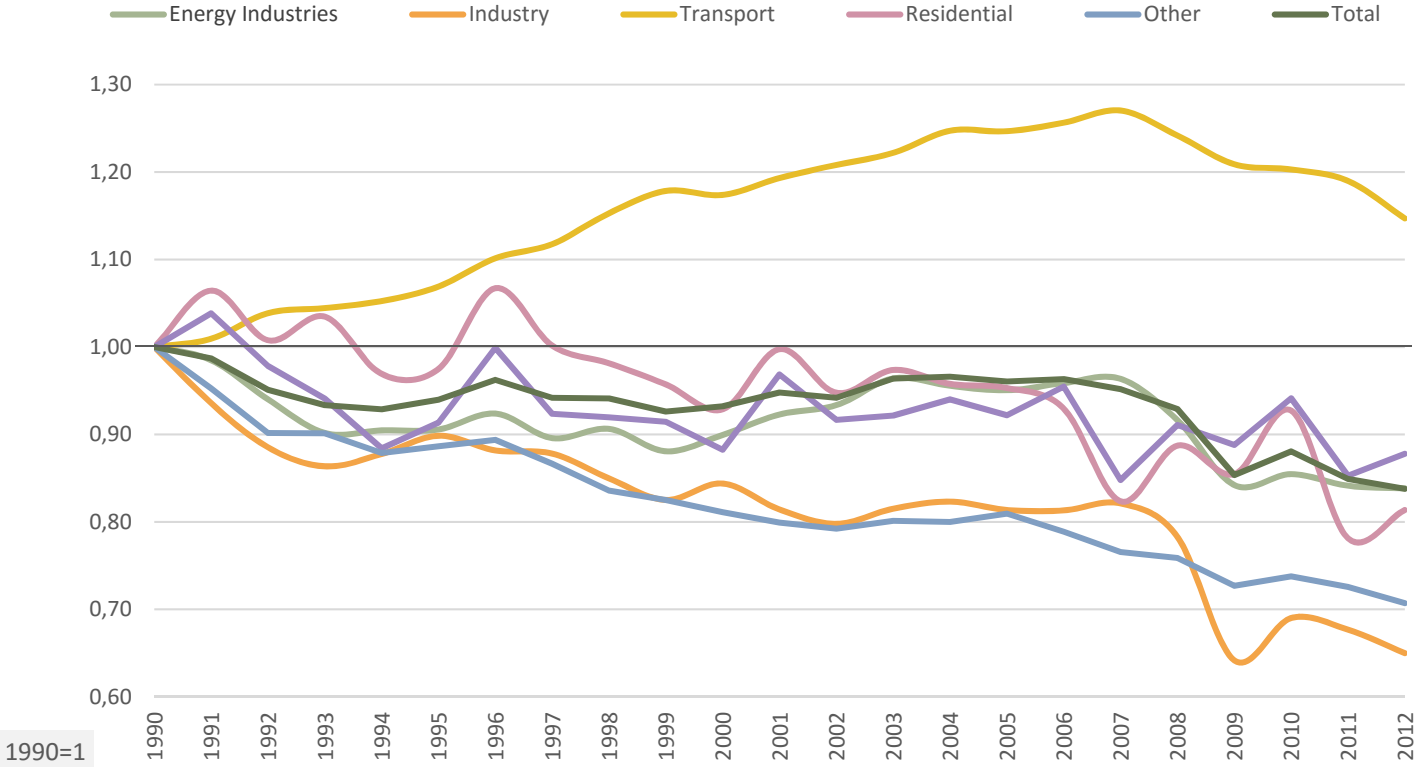


Energy  
roadmap 2050



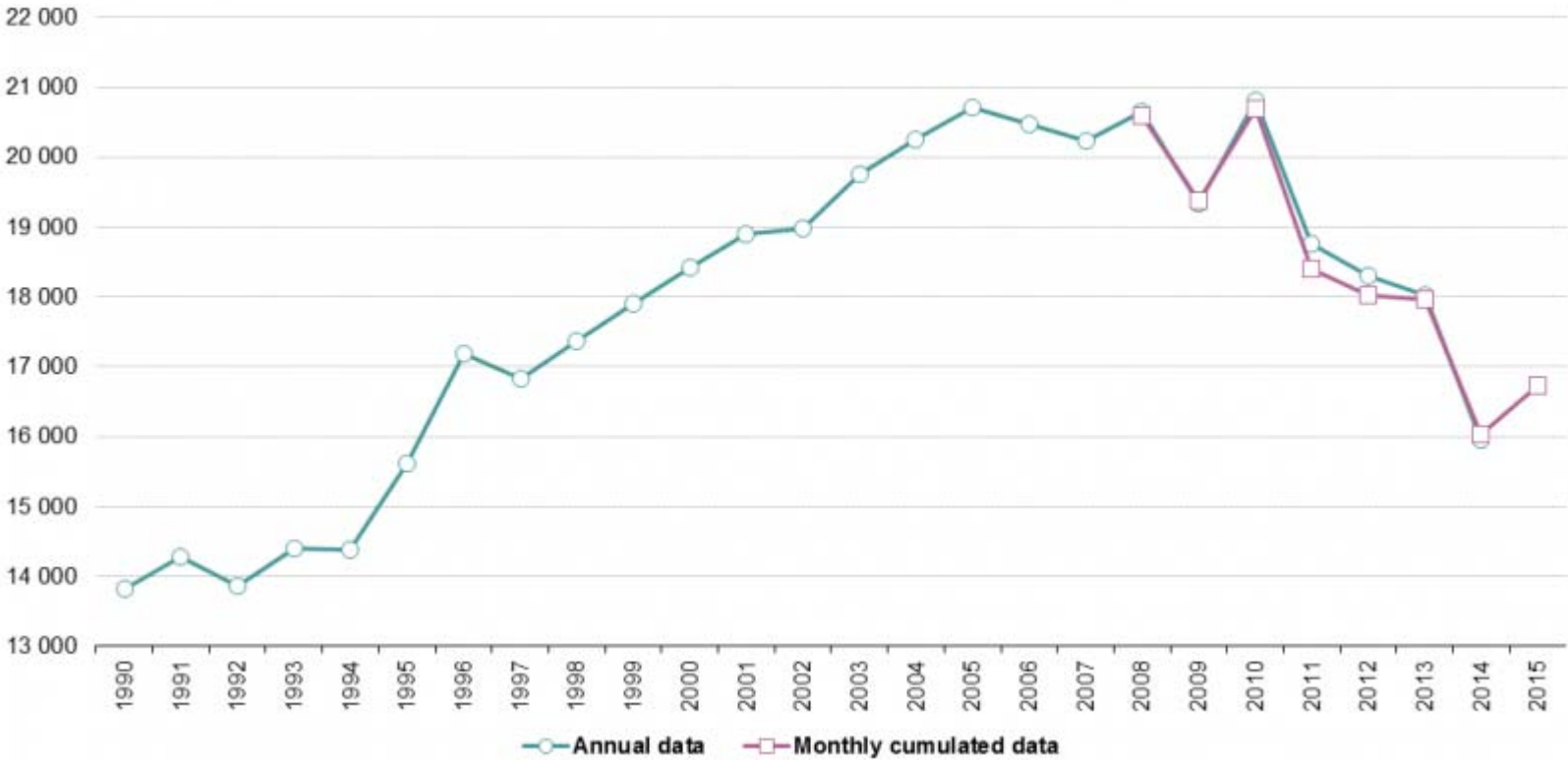
- Decarbonising the energy system is **technically and economically feasible**
- In the long run, all scenarios that achieve the emissions reduction target **are cheaper** than the continuation of current policies.
- **Early infrastructure investments cost less.** Immediately replacing old infrastructure with low-carbon alternatives can avoid more costly changes in the future.
- A **European approach** is expected to result in lower costs and more secure energy supplies when compared to individual national schemes.

# EMISSION TRENDS



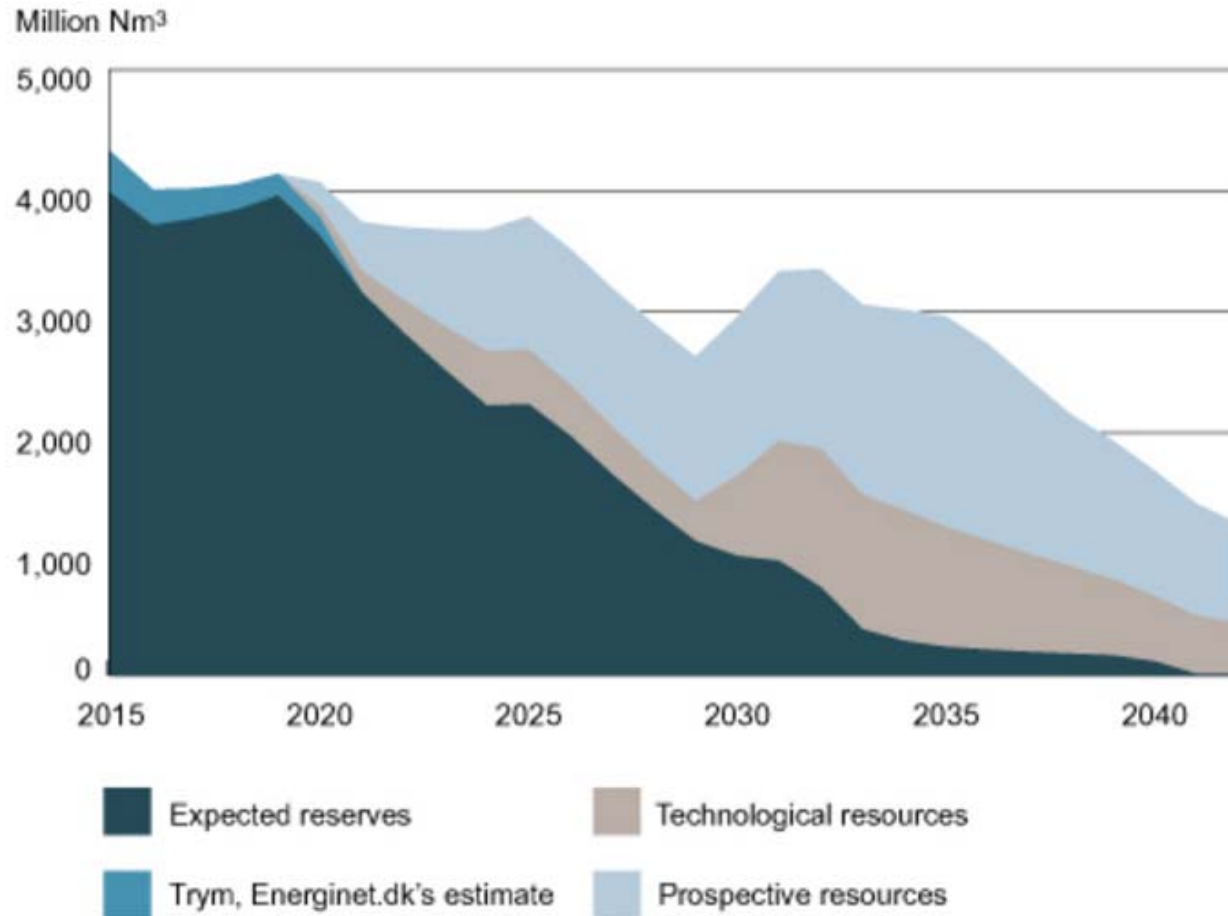
CO<sub>2</sub> emissions 1990-2012 \*Source: EU transport in figures - statistical pocketbook 2014

# EUROPE HAS PASSED THE POINT OF PEAK GAS CONSUMPTION...



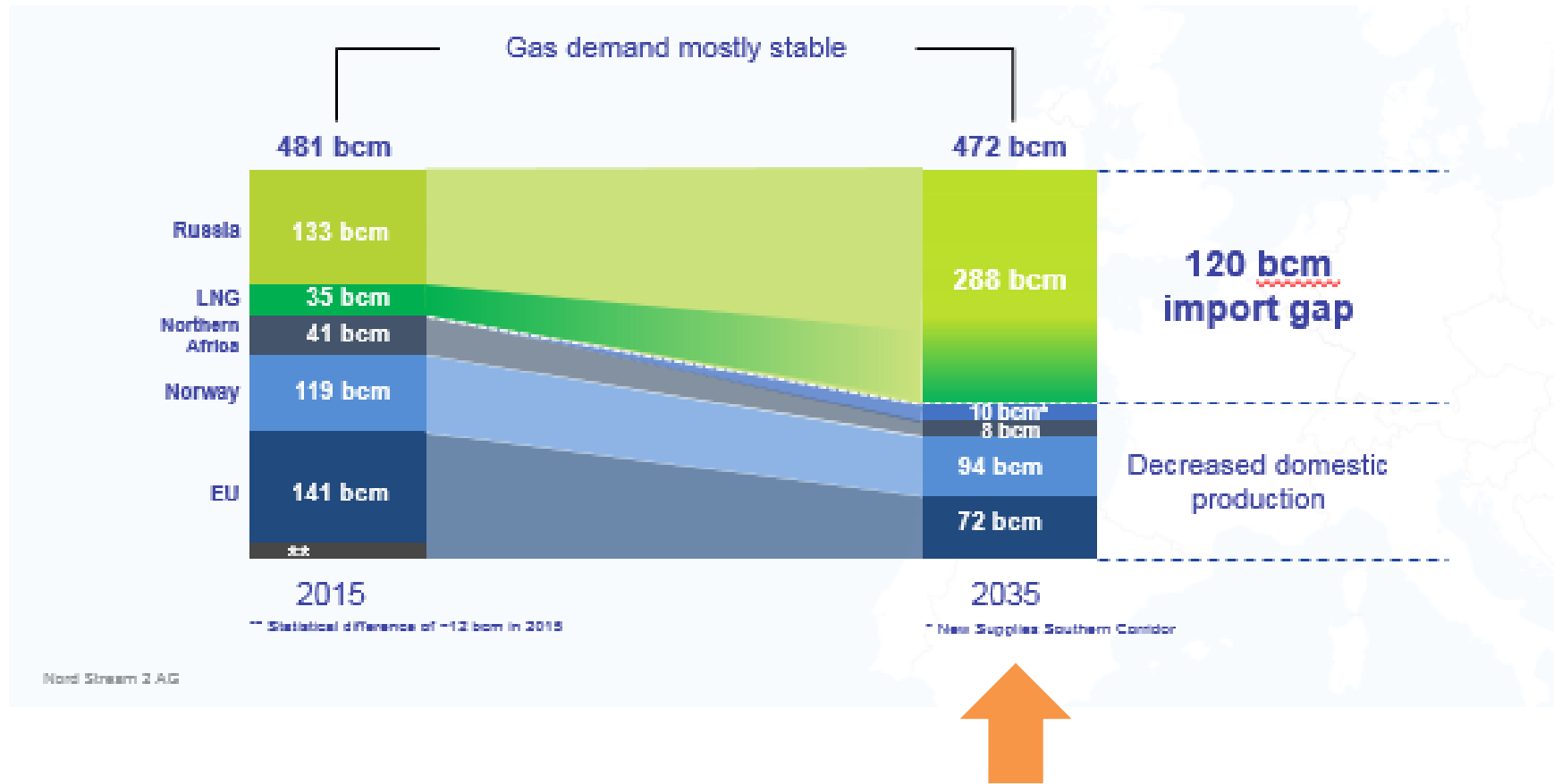
Source:  
Eurostat

# PROJECTION OF GAS SUPPLIES FROM THE NORTH SEA 2015-2042



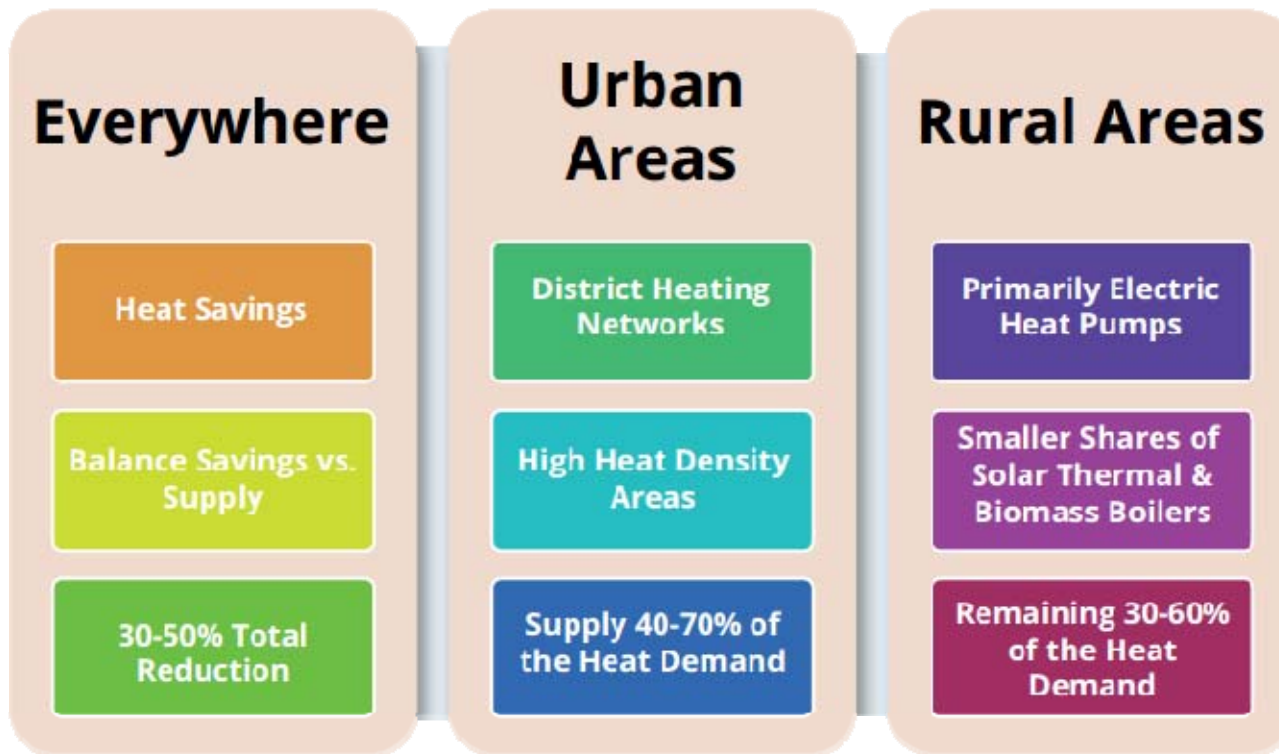
*Source: The Danish Energy Agency and Energinet.dk 2014.*

# NORD STREAM DEBATE



TOTAL FAILURE OF THE EU DECARBONISING GOALS!

# HEAT ROADMAP EUROPE



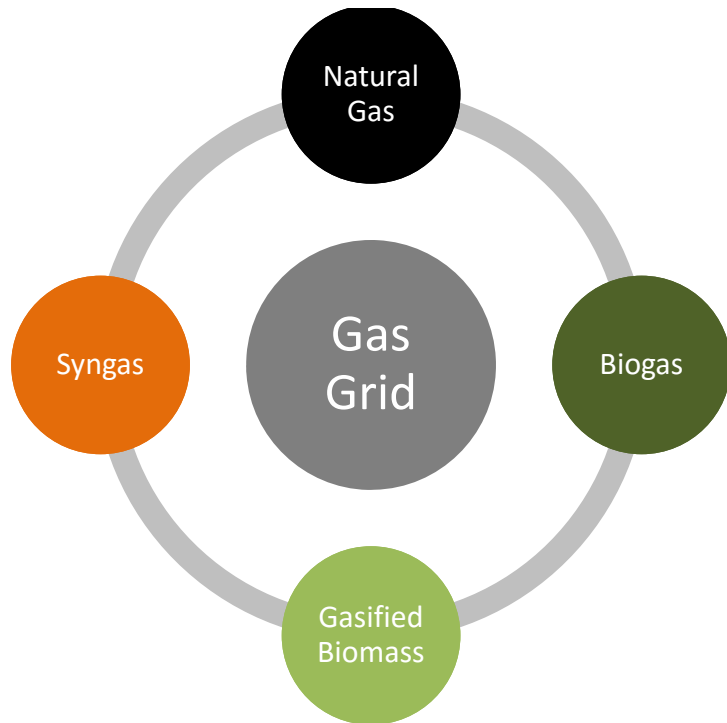
<http://www.heatroadmap.eu/>



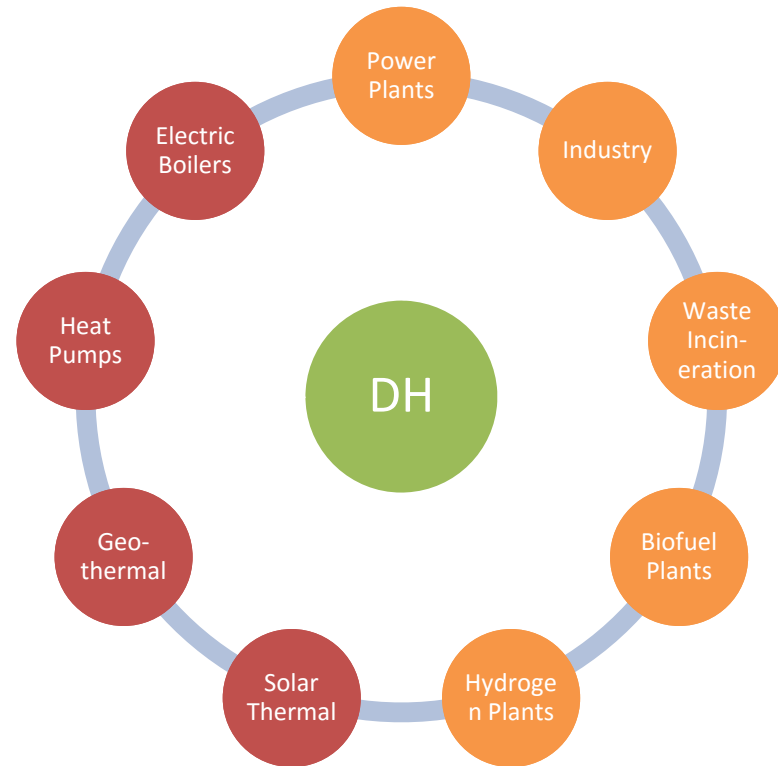
# GAS GRID

VS.

# DH GRID



High quality energy for a low quality demand

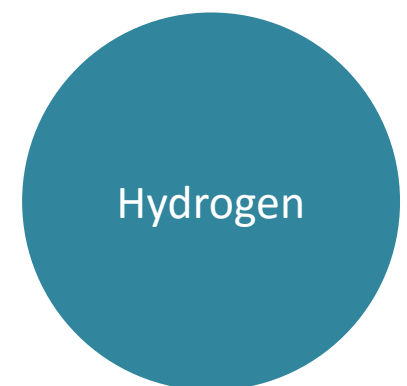
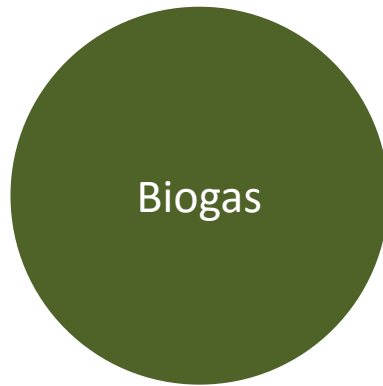


Low quality energy for a low quality demand



**DO WE NEED THE GAS INFRASTRUCTURE?**

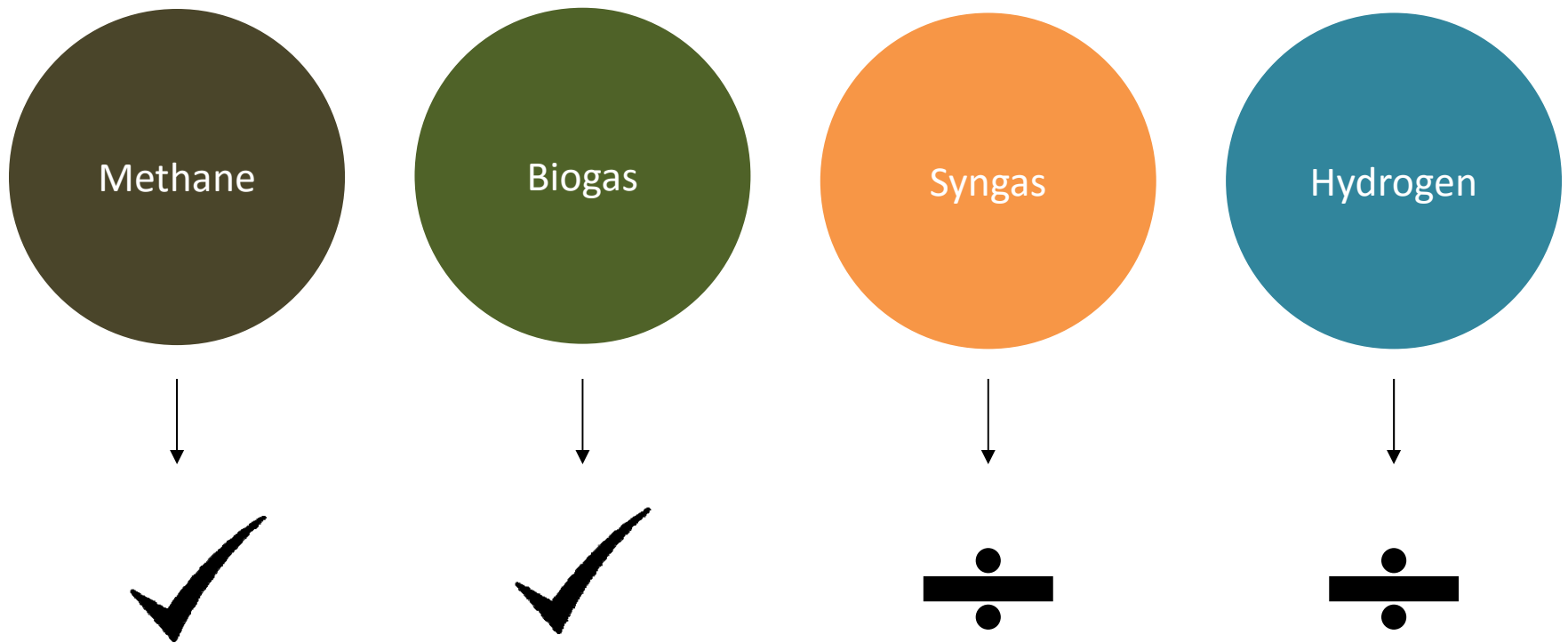
# WHICH GAS TYPES WE WILL USE?



## Renewable gases for future energy system:

- Biogas from anaerobic digestion or upgraded with H<sub>2</sub>
- Gases from biomass gasification
- Power-to-gas technology

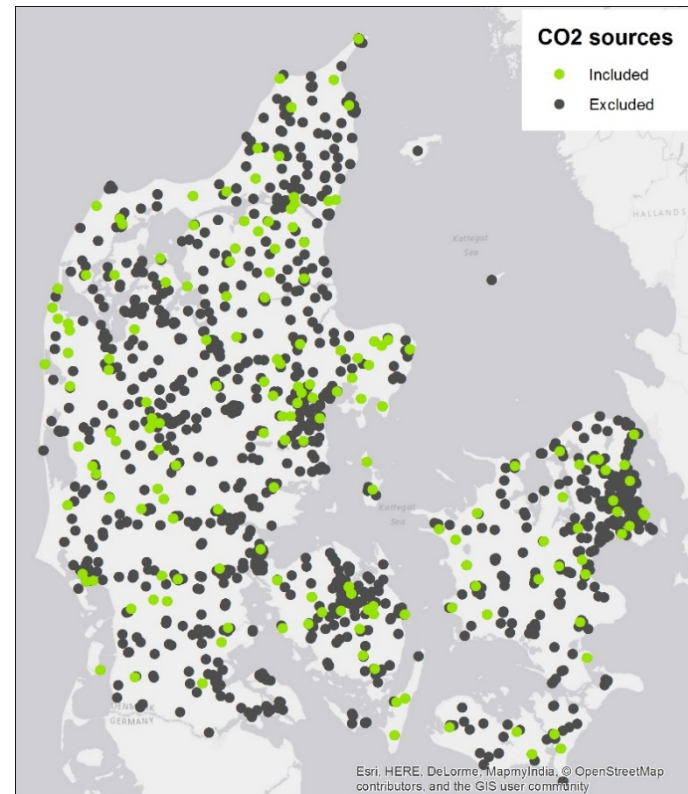
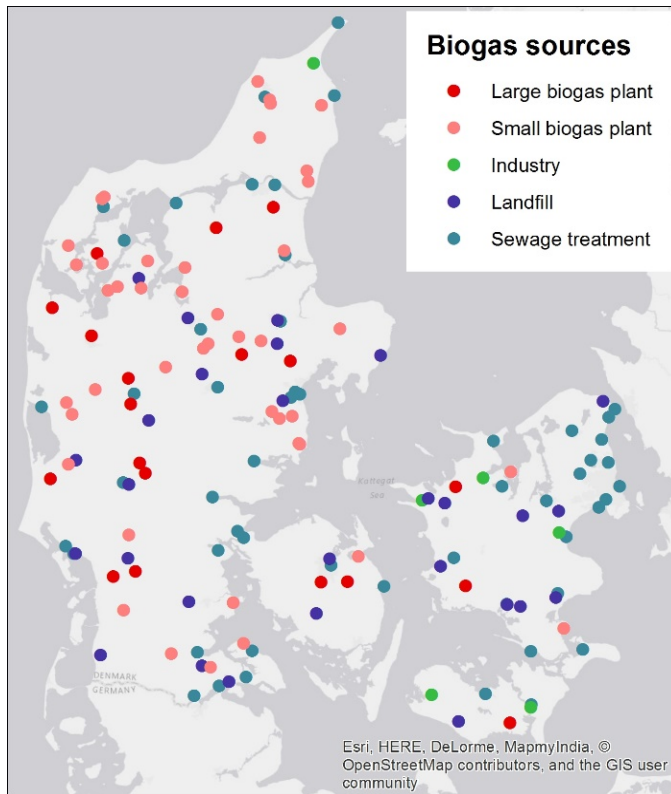
# WHICH CAN BE TRANSPORTED?



Hydrogen – max 15-20% in the gas grids, in DK only 2%

Syngas – explosive mixture cannot be transported, need dedicated network

# POTENTIAL FOR USING THEM IN THE SYSTEM



Biogas

Methane

Syngas

Methane

Liquid fuels

## CHALLENGES AND RISK

- Risk of lock-in in the existing technologies
- Methane as central fuel in the system
  - Do we mind conversion losses from methane to other fuels?
- Going liquid cannot be avoided
- Rethinking the role of the gas network

# THANK YOU FOR YOUR ATTENTION

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