

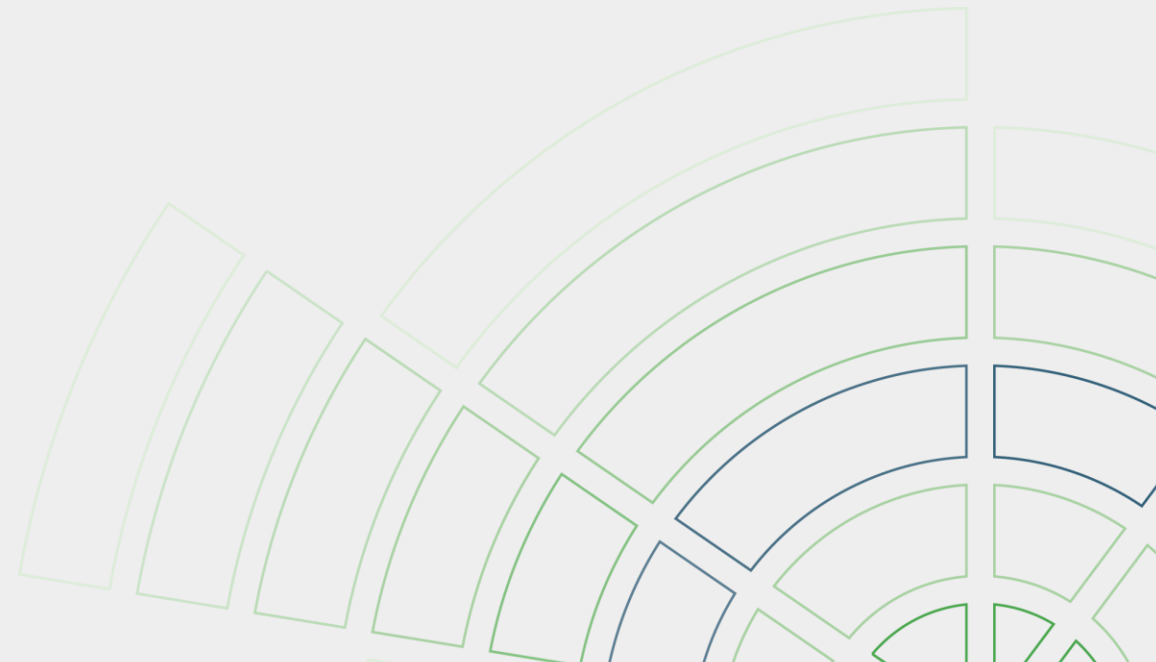
# District heating - the key to a smart integrated energy system

Nina Detlefsen



# Introduction

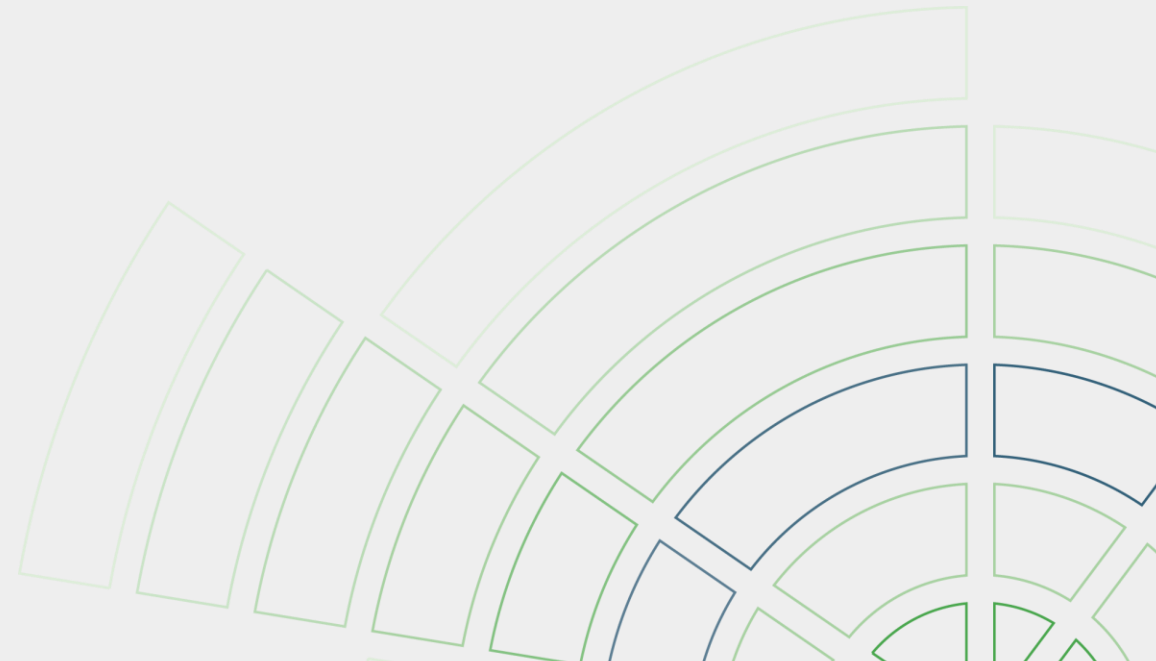
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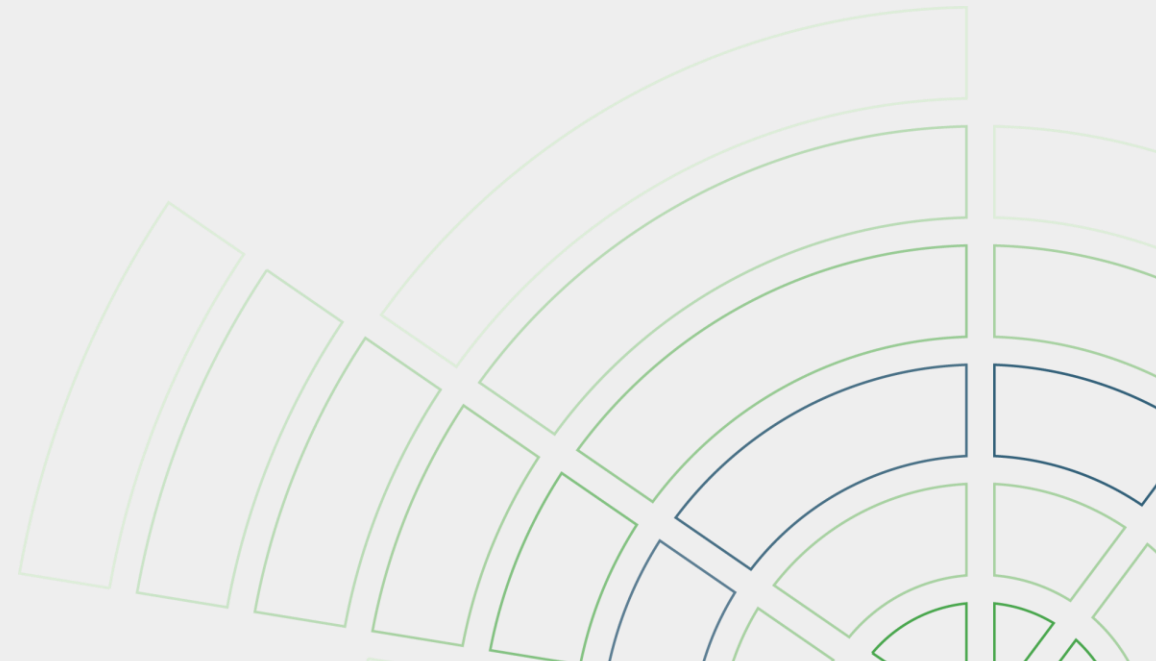
- Energy system: We have a challenge to meet climate goals. To help solving this challenge the energy system needs to become green.



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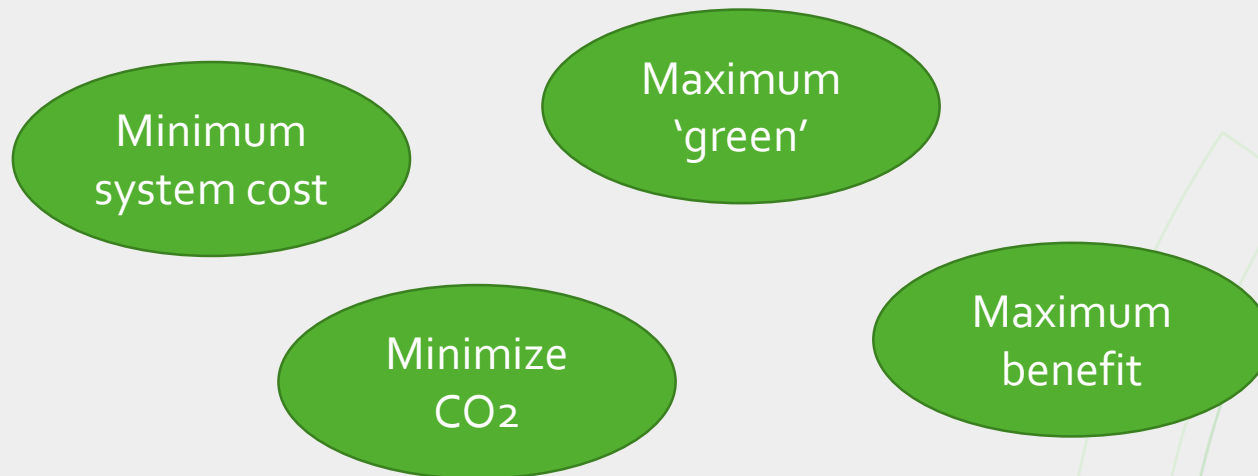
- Smart integration –
  - The sectors in the energy system needs to be integrated!
  - 'Smart' means ...



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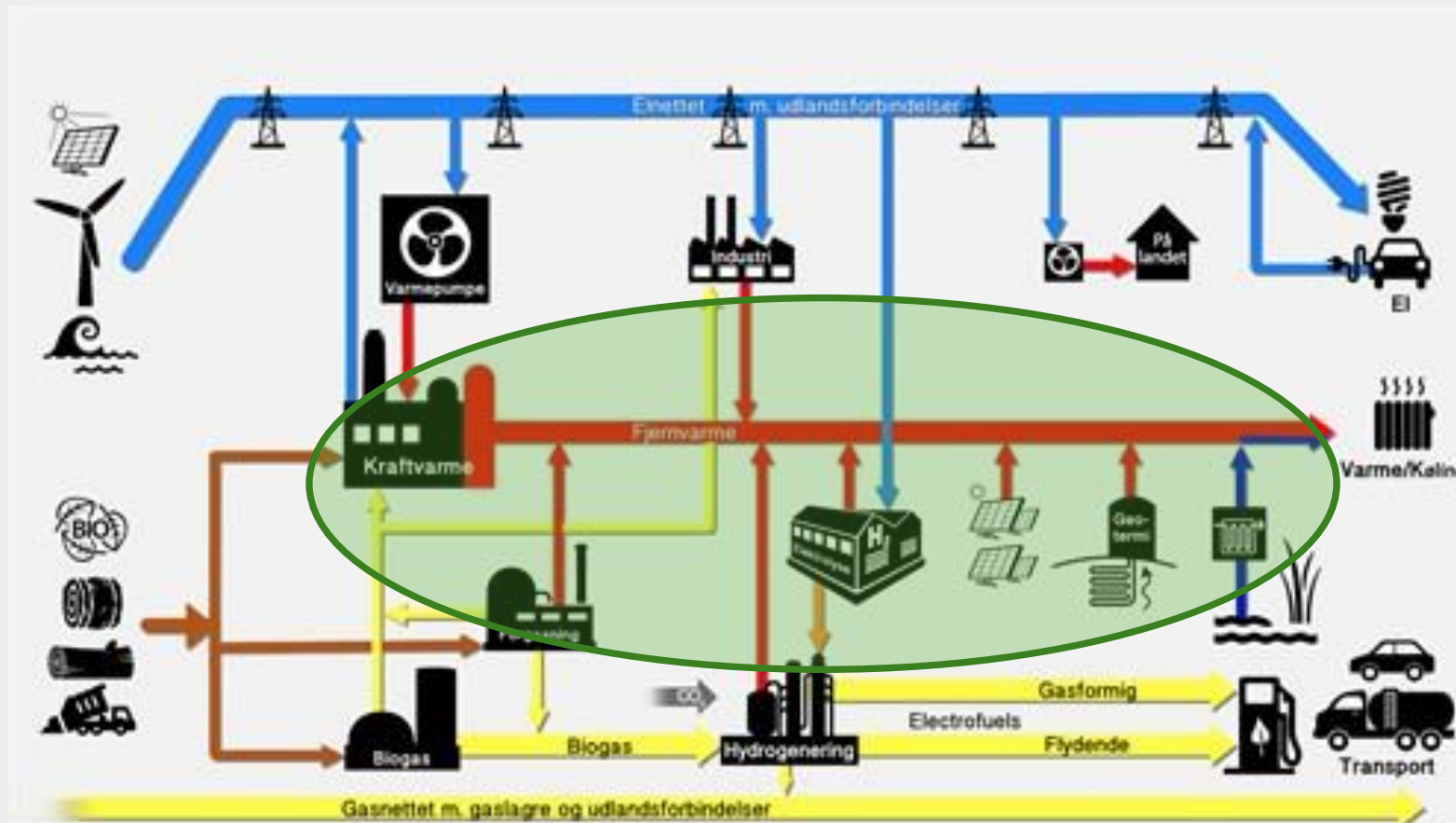
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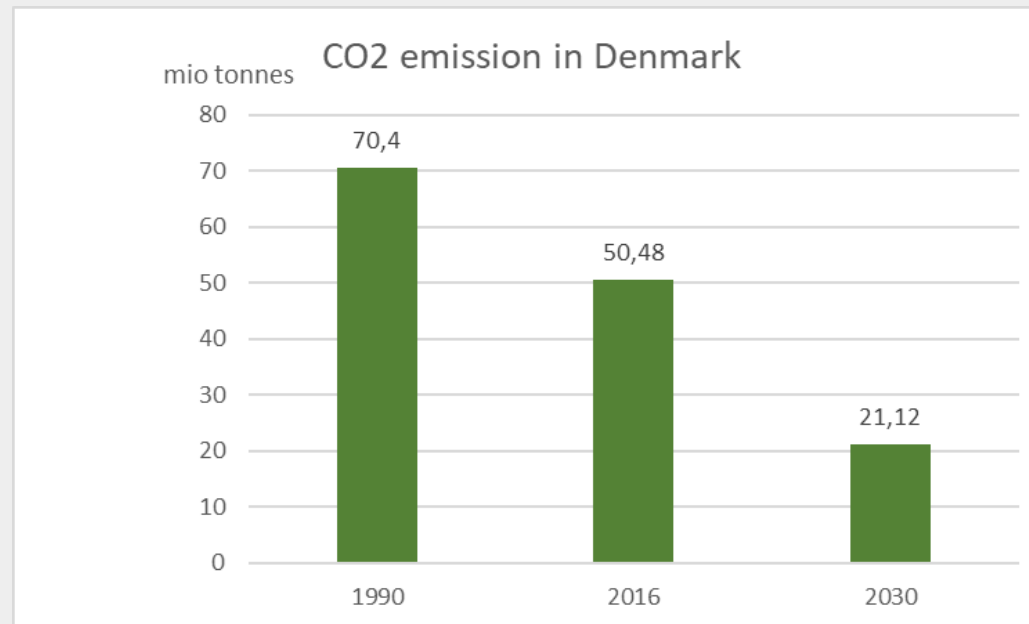
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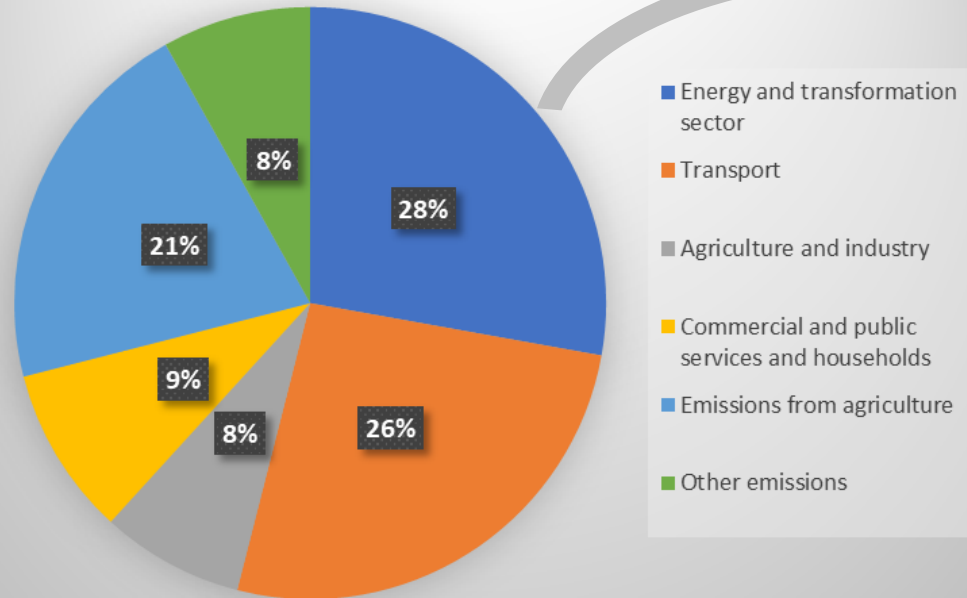
# Climate-challenge

In Denmark we have a goal that CO<sub>2</sub> emission shall be reduced by 70% in 2030 compared to 1990.

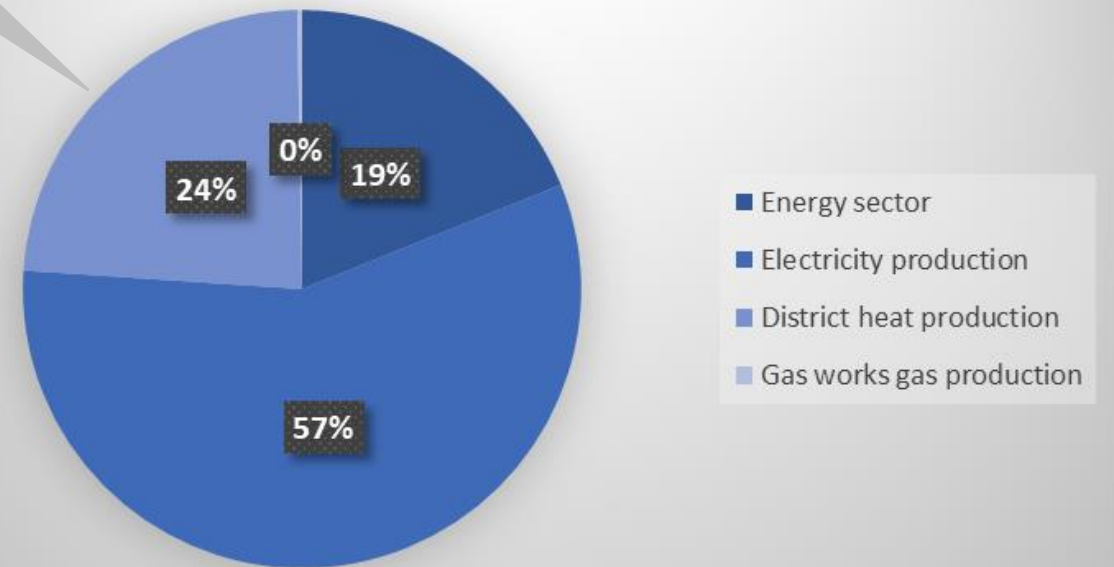


# Climate-challenge

## CO2 emission in 2016

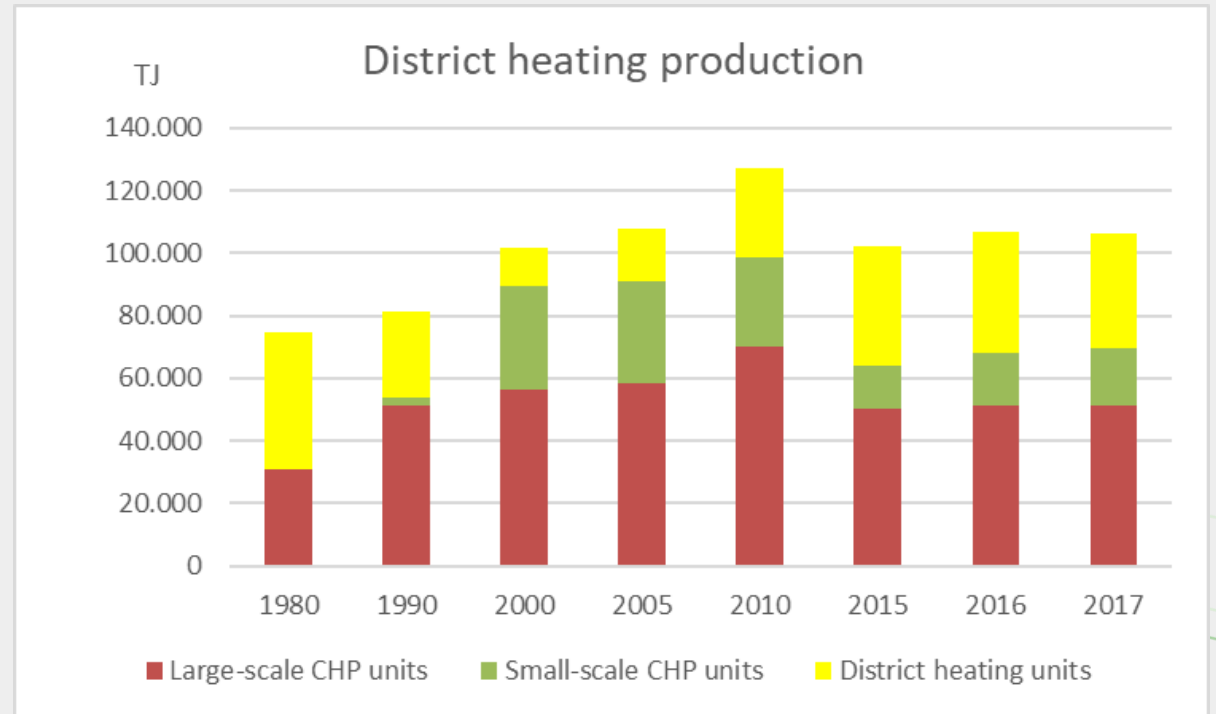
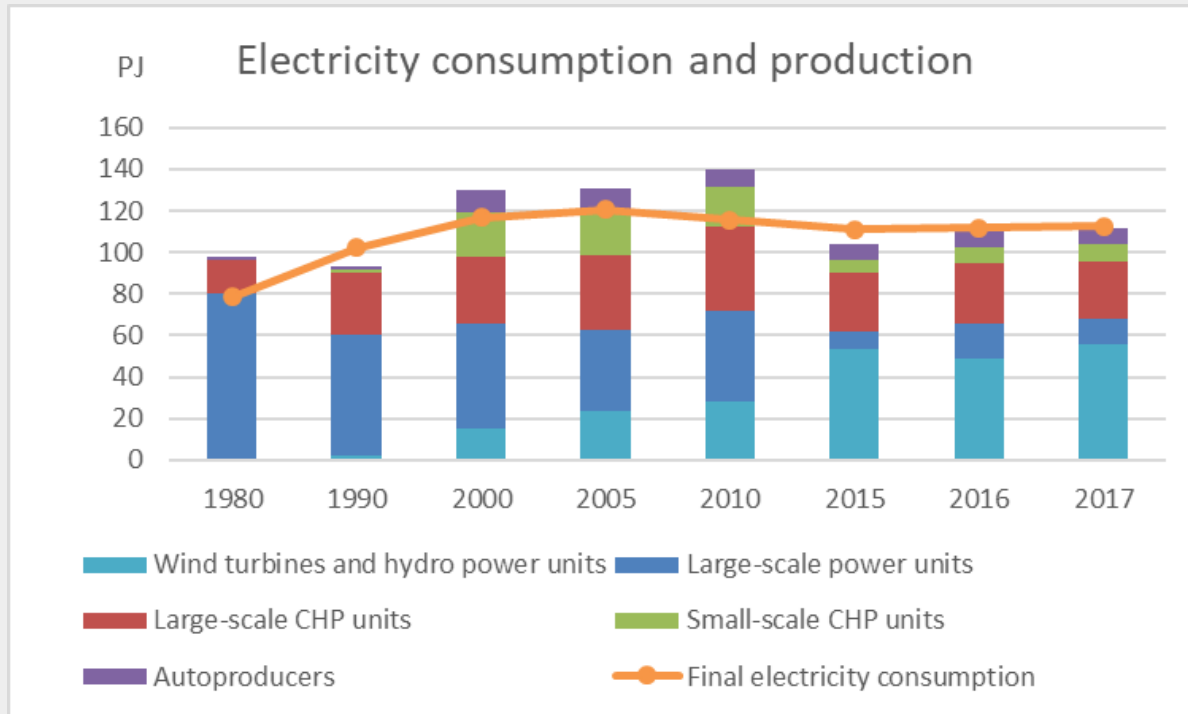


## Energy and transformation sector

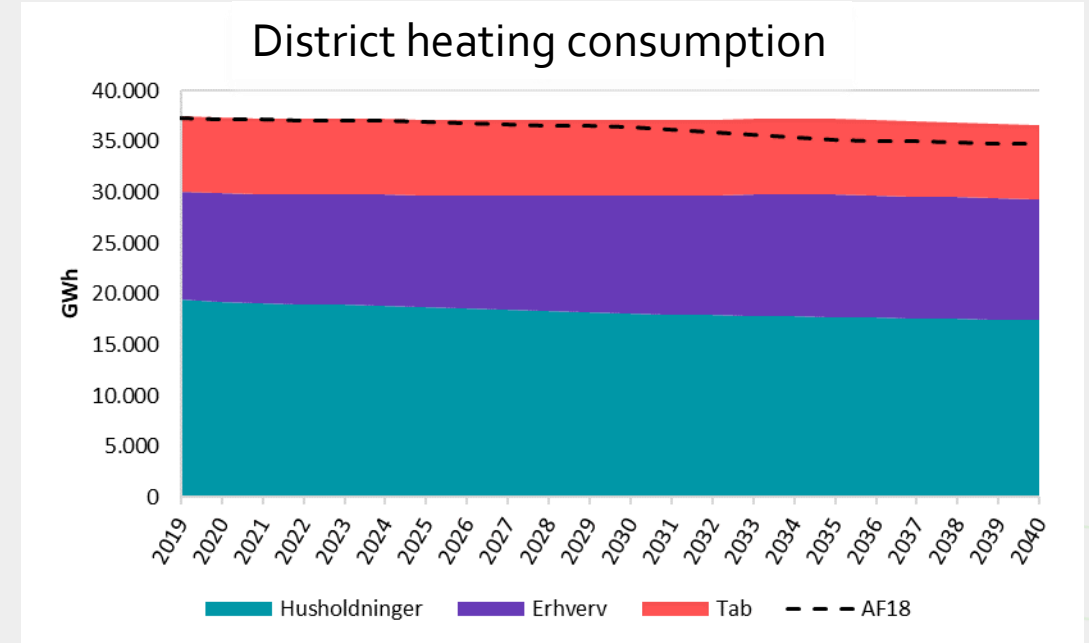
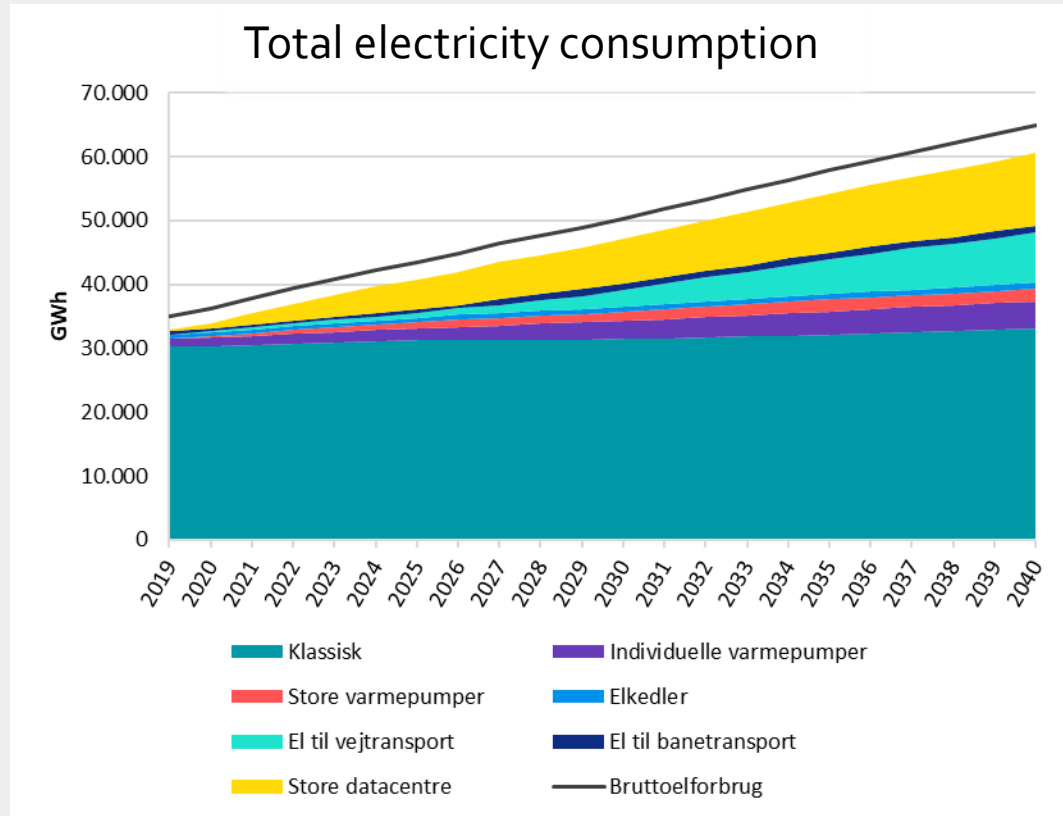




# Energy consumption and production



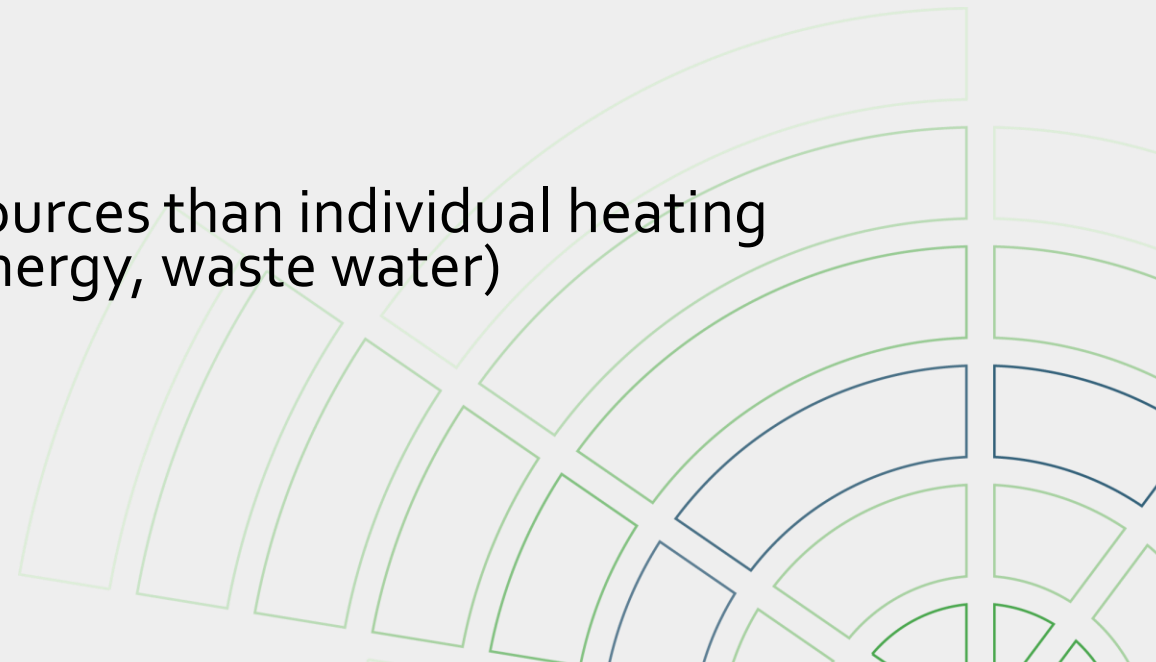
# Future energy consumption and production



Reference: Analyseforudsætninger til Energinet, 2019

# How district heating enables integration

- District heating is the simplest and cheapest energy storage
- District heating collects heating that otherwise are wasted
  - Coproduction of electricity and heating
  - Excess heat from industry
  - Cooling to industry, especially datacenters
- District heating collects heat from other sources than individual heating solutions (ex. Solar heating, geothermal energy, waste water)




# Already established district heating – how to increase integration?

- Capacity in existing system – network and production capacity
- Not?

## Bottlenecks in network

- Activate local flexibility
- Build local production (heat pump - electricity boiler etc)
- Build storage
- Increase infrastructure

## Short on production capacity

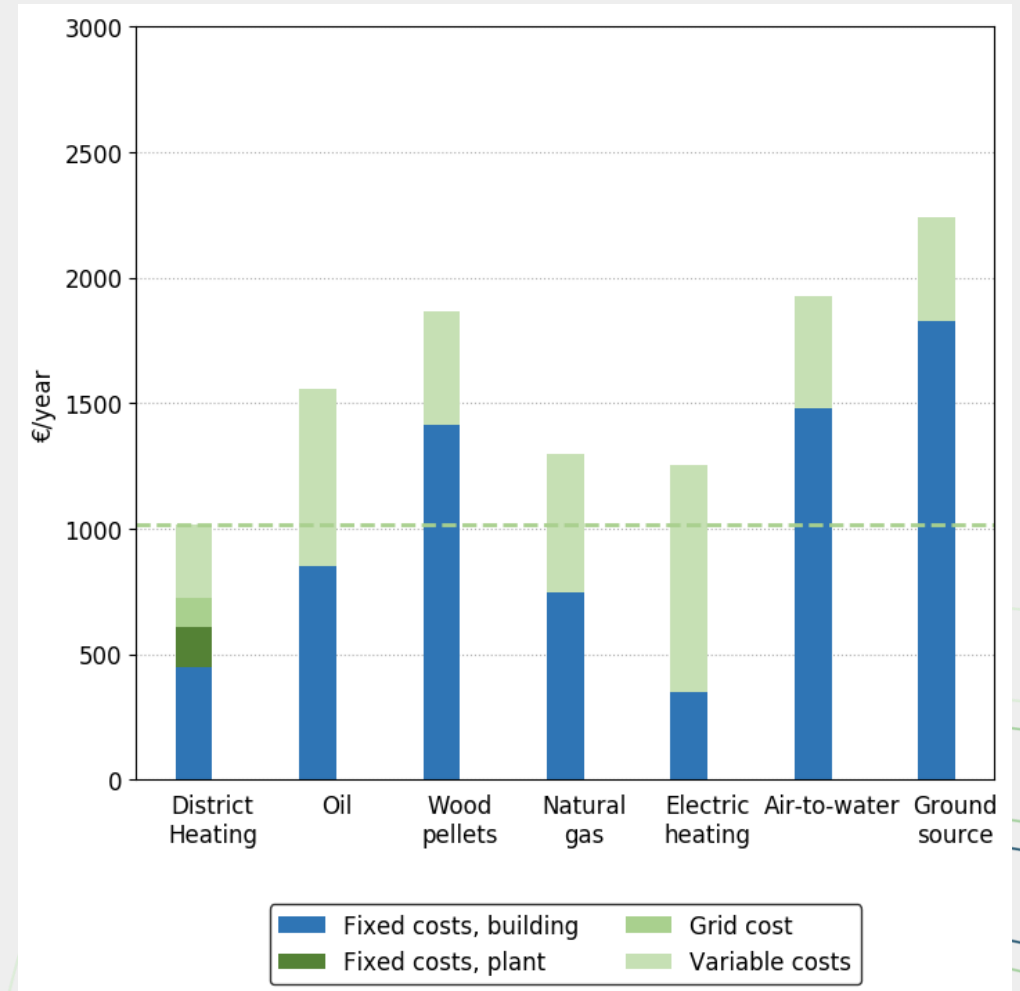
- Optimize location for new capacity
  - Build flexible capacity
  - Investigate possible storage options
- 

# District heating in low energy houses and new areas?

District heating – not everywhere!

Example:

Low energy houses at a certain density.

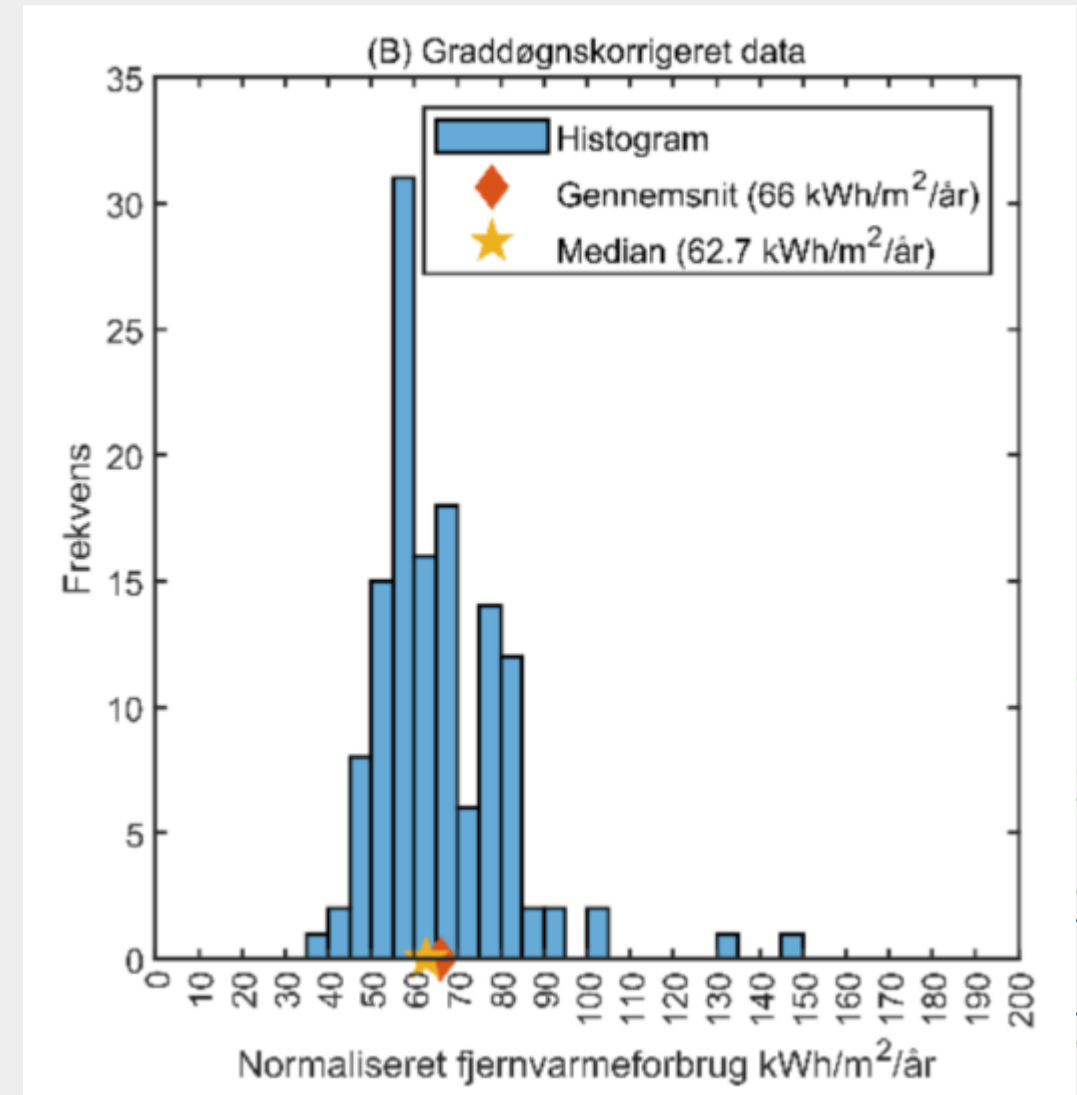


# Consumption in new houses

Based on building regulations houses are designed to certain energy restrictions.

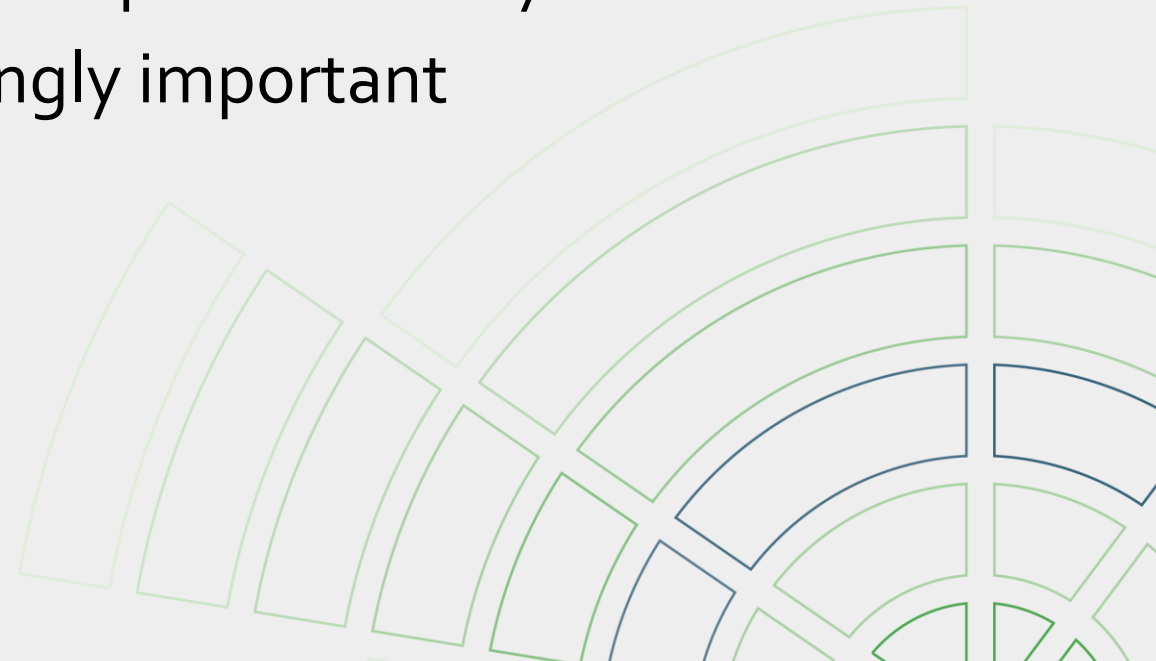
But how does new houses perform?

Based on 143 single family houses in Aarhus built in 2016 and 2017 – measured consumption of district heating in 2018.



# Development trends in district heating to increase 'smartness'

- Large investments within a few years – focus on electrification
- Focus on creating a diverse production capacity
- Regulatory framework important – especially taxes and tariffs
- Digitalization enhance knowledge and optimize the system
- Risk management becomes increasingly important
- Planning has become difficult







GRØN ENERGI

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**Thank you**

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