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ENERGY EFFICIENCY
DIRECTIVE

Comprehensive Assessment draft – Denmark

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Concerted Action, Riga
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EED, Article 14,

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- Promotion of efficiency in heating and cooling

  1. By 31 December 2015, Member States shall carry out and notify to the Commission a comprehensive assessment of the potential for the application of high-efficiency cogeneration and efficient district heating and cooling, containing the information set out in Annex VIII. *(…)*

0. Content of the presentation

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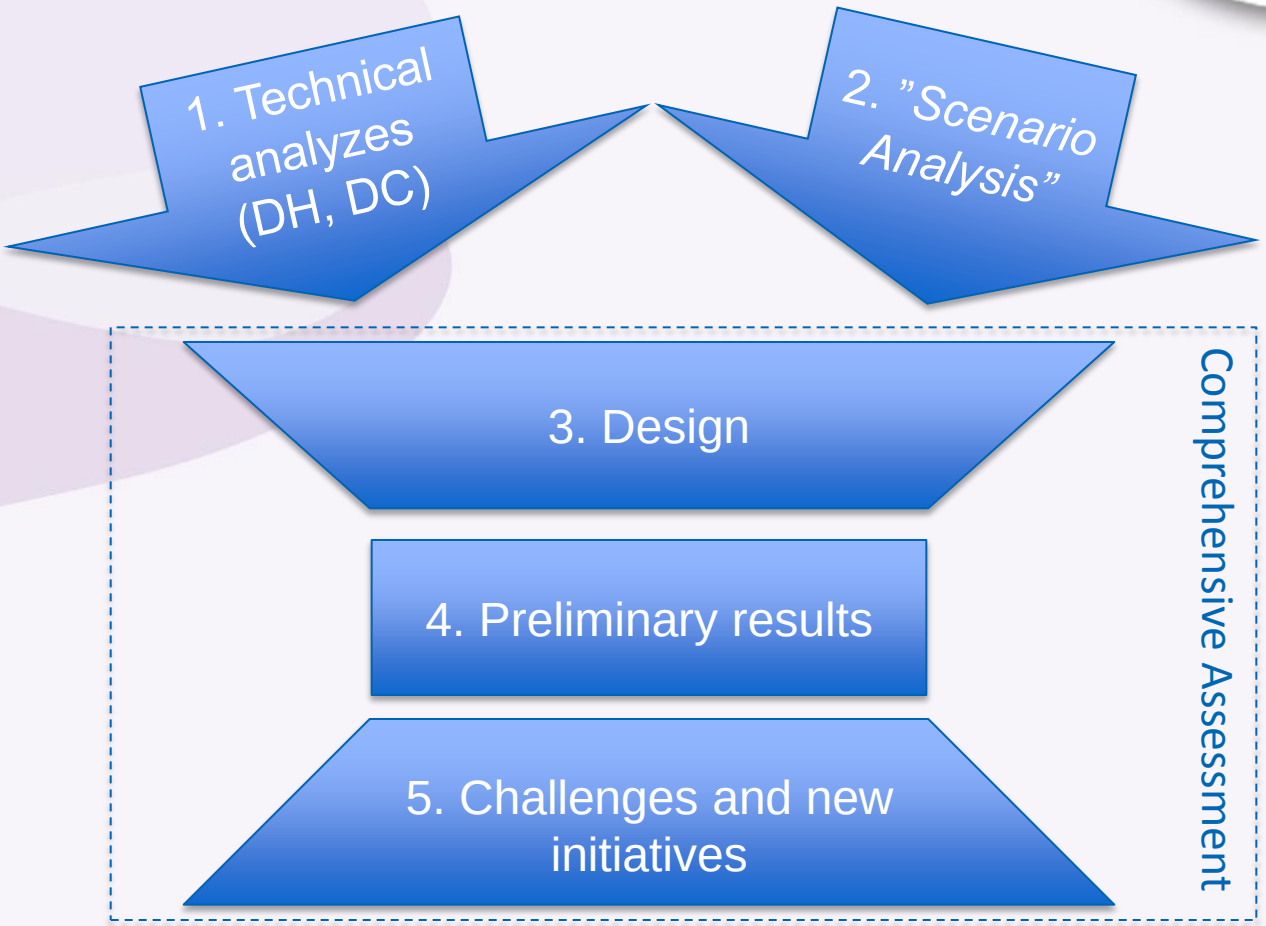
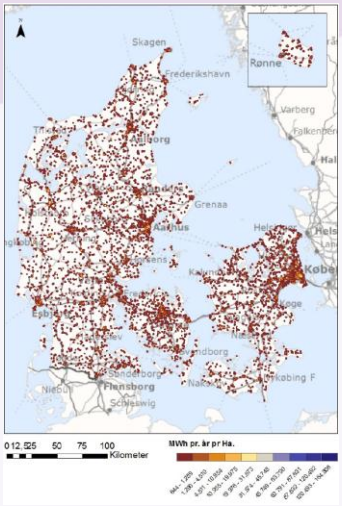
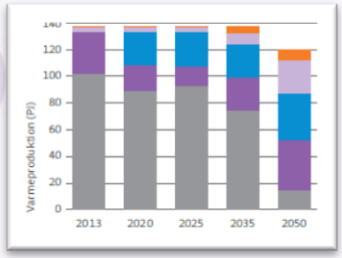


1. The technical analyzes



The District Heating Analysis

- ≈ 50% (199 PJ) of demand covered with DH (2013)
- Potential for up to 70% (189 PJ) by 2020
  - Socio-economic potential mainly in densification of current DH net
- Production:



Solar
Surplus heat
Heat pumps/electric boiler
Boilers
*CHP

The District Cooling Analysis

- Large untapped potential
  - Economically competitive and technically feasible
  - Smart grid advantages
  - Possible synergy with DH
- Main barriers: Knowledge, organization and regulation

** CHP was not analyzed separately, but is an integrated part of several studies, including the District Heating Analysis and Scenario Analysis*

2. Scenario Analysis

A cross sectoral scenario analysis

- Aims to present possible technical paths to a fossil-free energy system by 2050
- Scenarios: Wind, biomass, hydrogen, Bio+ and "Reference"
- Method: For each scenario, the most cost-efficient energy system in 2050 is constructed, hereafter back-casting to 2035 and 2020

2. Scenario Analysis

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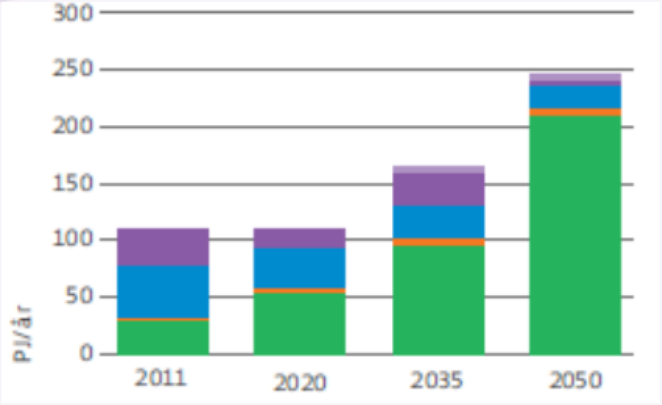
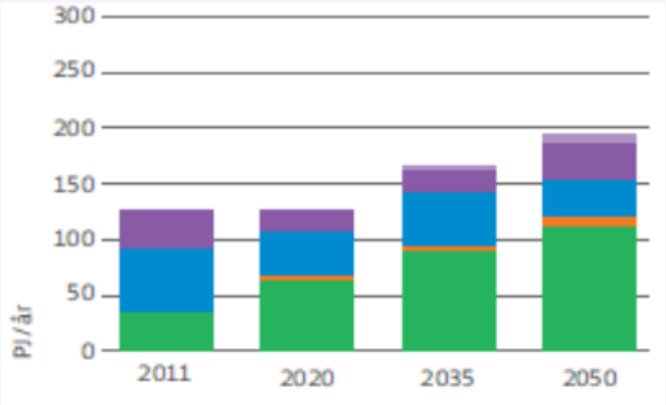
Findings

- Main direction wind vs. biomass to be decided post 2020
- DH will play a crucial role
  - Large variations in, how DH is produced
- DH-supply is expected to decrease - despite more consumers
- The role of CHP is more dependent on the scenario in play
  - Power production in scenarios:

Wind scenario



Biomass scenario



Biofuel production
Power plant
CHP
Solar
Wind

3. CA design

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The Danish energy system

- Current situation and general trends of relevance to CHP, DH and DC
- Scenario walk-through

Technical assessment

- Separate: DH, DC and CHP
- Relation to overall system and the different scenarios
- Demand, forecast, GIS maps, energy efficiency, etc.

Strategies, policies and measures

- Separate: CHP, DH, DC, Land use planning
- Current and considered initiatives

4. Preliminary results

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- CHP
  - The roll of CHP is deminishing
  - Many plants all-ready experience economic problems (few full-load hours)
    - Regulated through CBA – upholds capacity
  - Current support schemes for decentral CHP production (natural gas) expires by 2018
- DH
  - Ongoing regulation through socio-economic evaluation (CBA)
    - Individual solutions (e.g. bio-boilers and heat pumps) are becoming more competitive – especially for new dwellings
    - Close “race” between ind. NG-supply areas and DH – areas, This is regulated by the Heat Supply Act and socio economic criteria
- DC
  - Large untapped potential
  - New regulation put in place June 2014
  - Development is monitored and further initiatives are considered by Gov.

5. Main challenges and new initiatives

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Challenges

- Current and expected developments in the Danish system leaves reduced room for high-efficiency cogeneration.
  - What's the most cost-efficient way of upholding security of supply?
- How is DC best promoted?

New initiatives (under development…)

- Comprehensive analysis of energy taxation and support schemes to support green transition
- Geothermal analysis
- Demonstration program and task force unit for large heat pumps in DH
- Study of enhanced efficiency in district heating

(Will be reported as part of "policies and strategies for implementation")

Thank you for your attention...

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- Contact information

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EXTRA SLIDES

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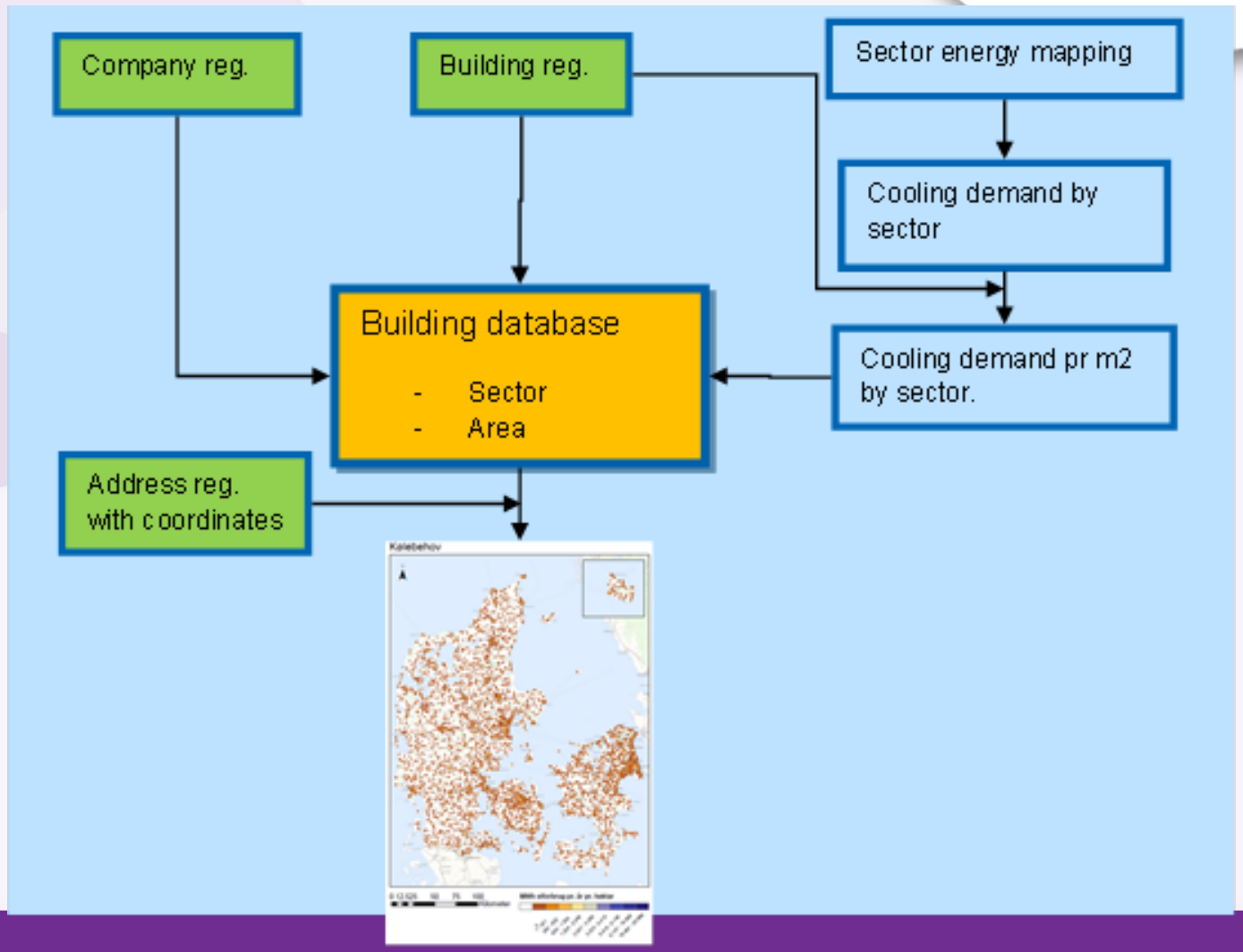
- District Cooling Analysis

Combining databases



Forecast of cooling energy demand

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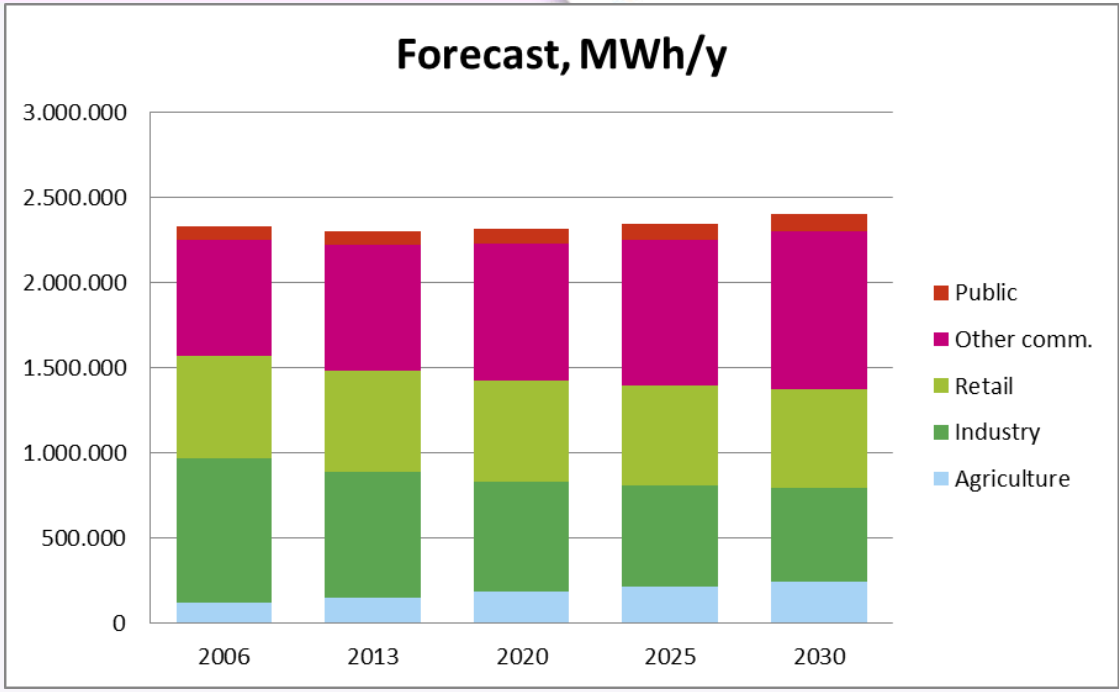
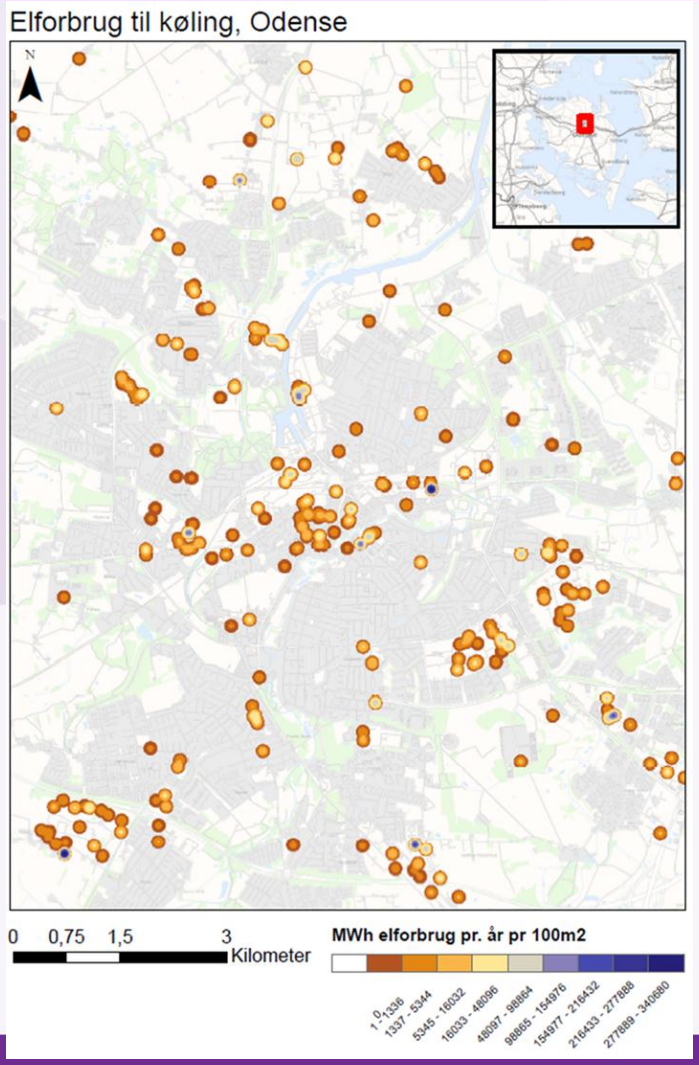
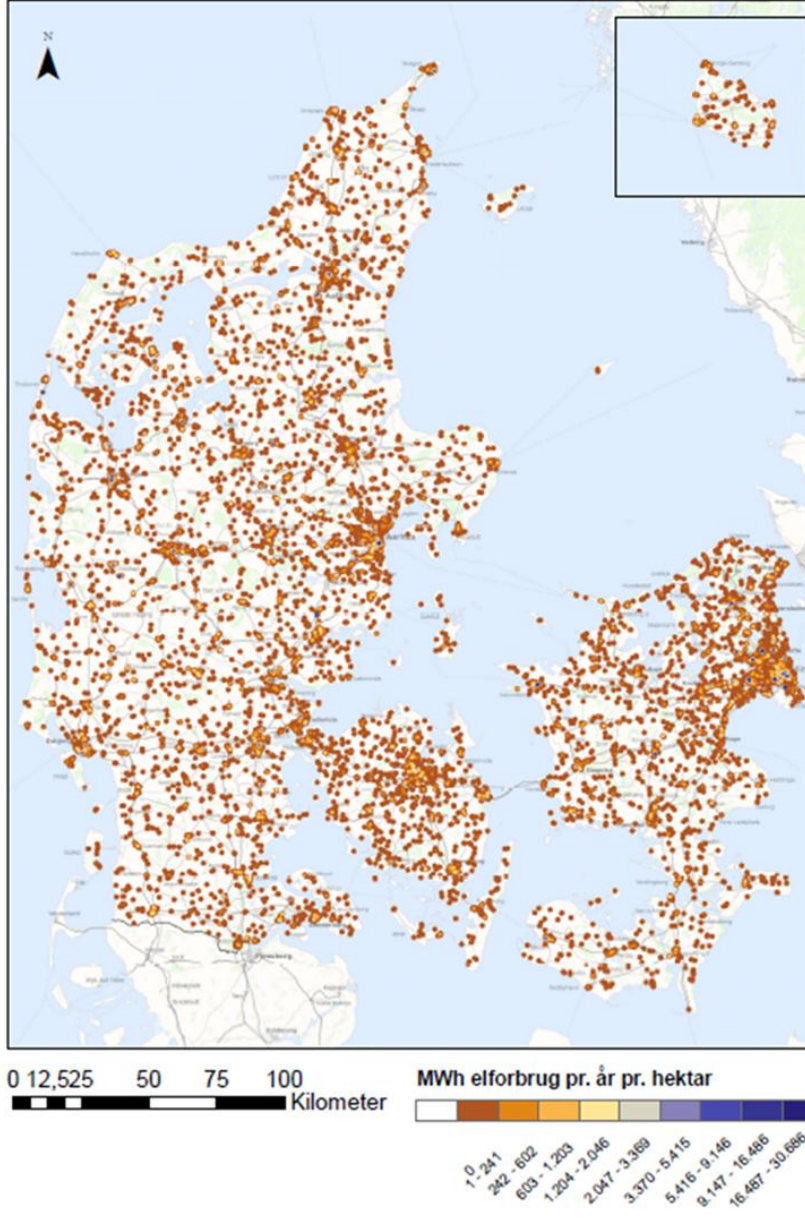
- Commercial and public sector demand projected on basis of m2
- Industrial and agriculture demand projected on the basis of value-added projection
- Extrapolation from 2006-2012 – figures.



GIS maps of cooling demand





Cooling production cost analysis

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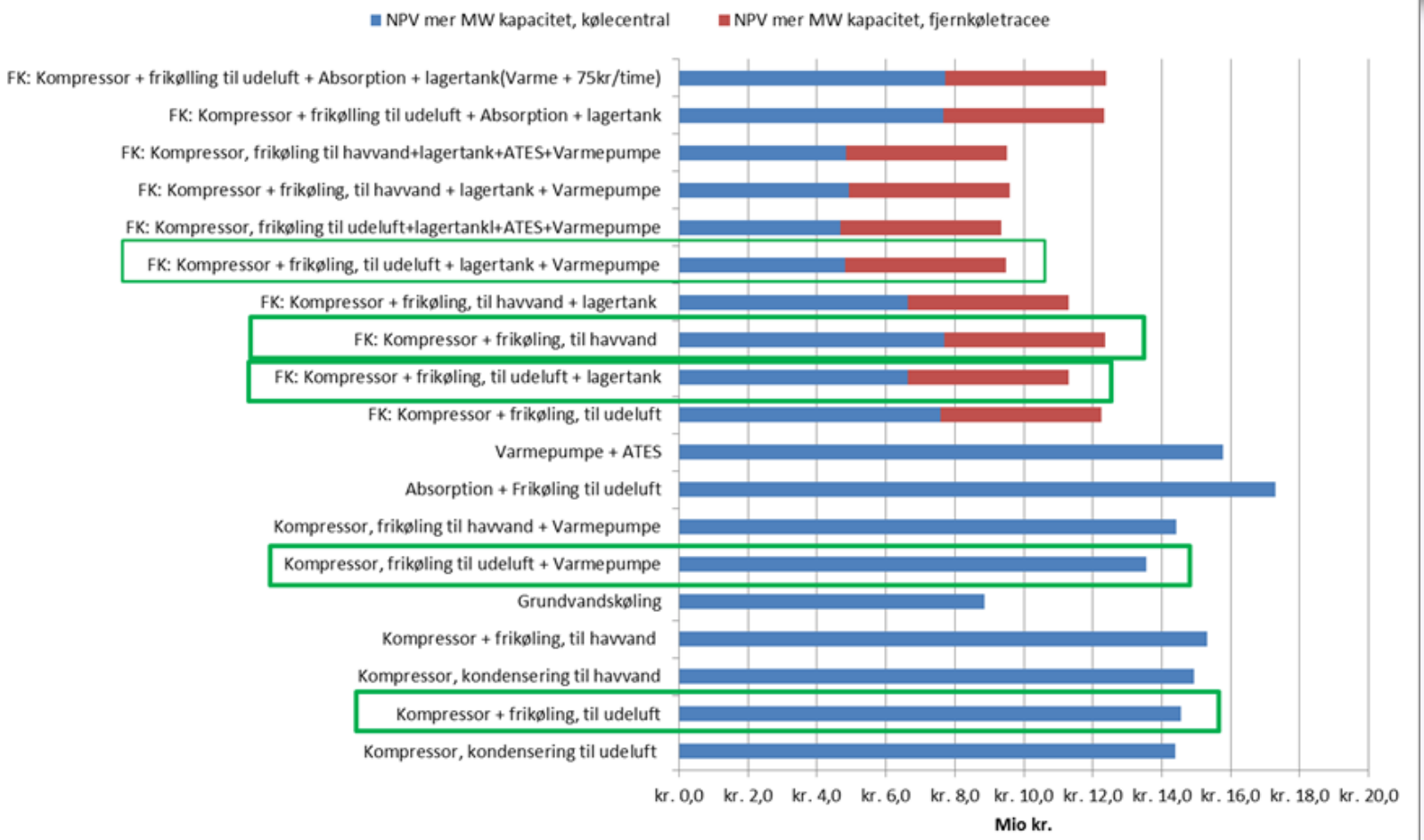
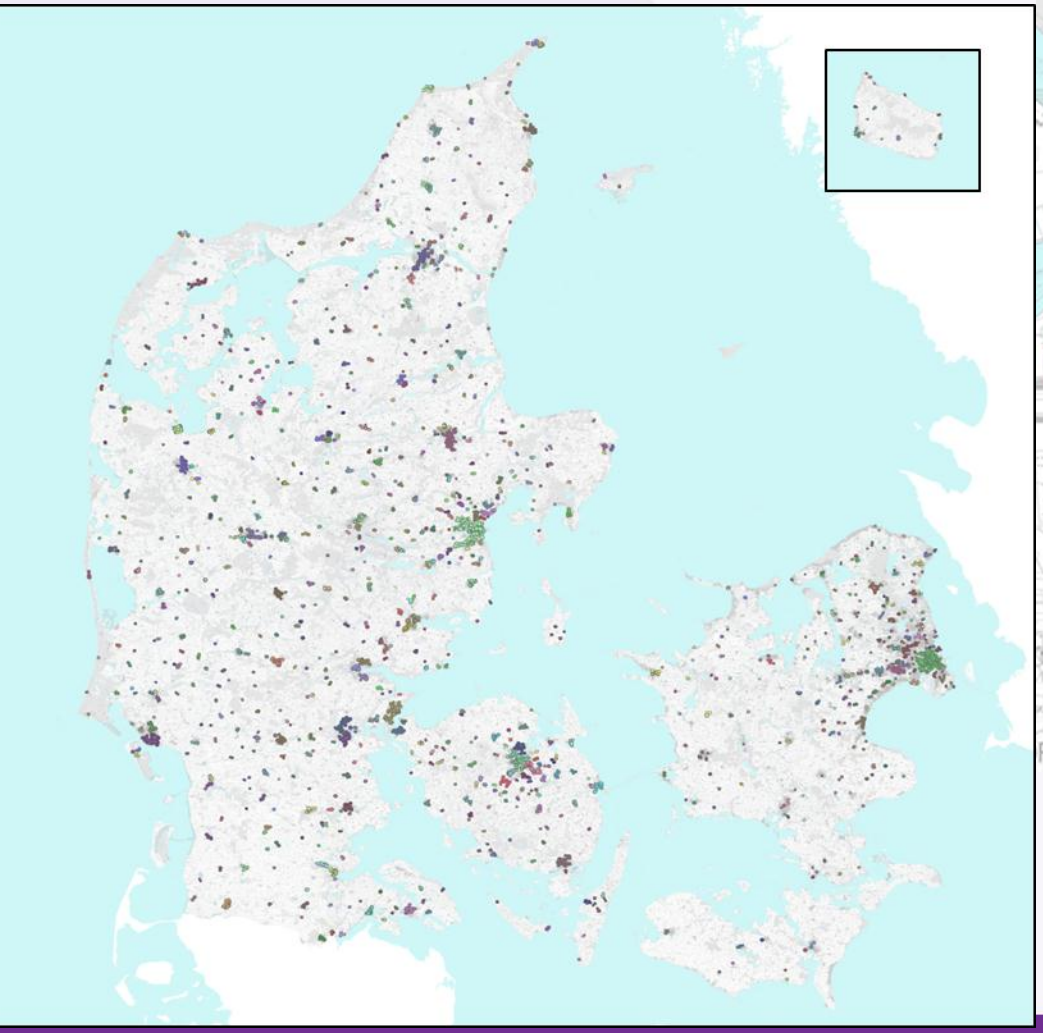
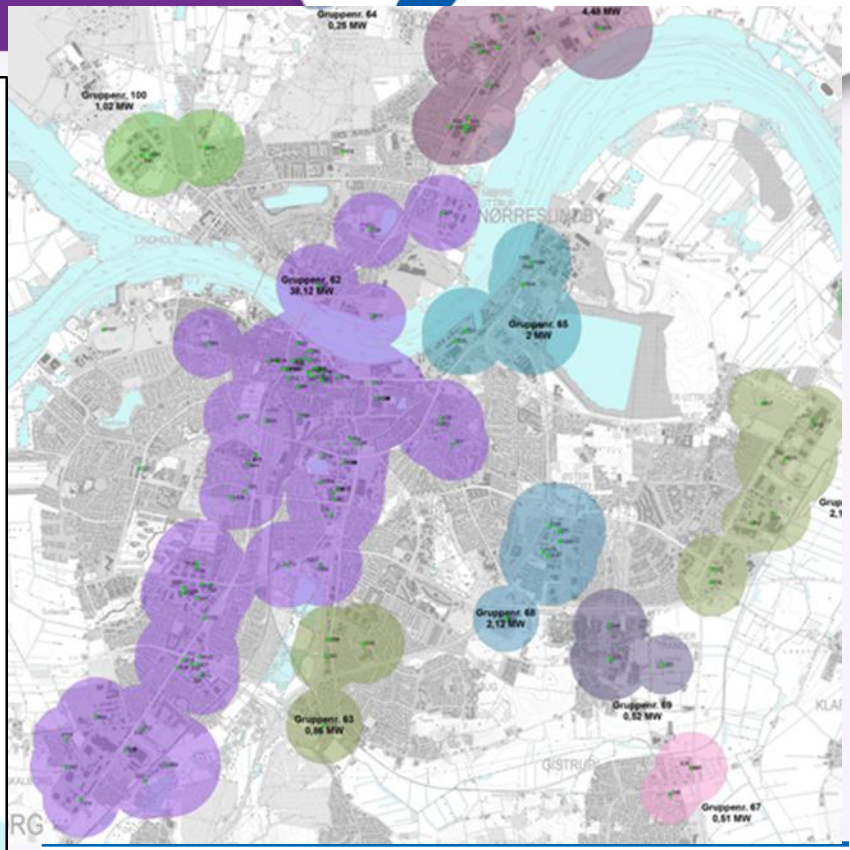
Life cycle costs of selected cooling systems, MDKK NPV



Technical potential assessment





Total cooling [MW]	Technical potential [MW]	Share of technical potential
5.142	2.866	56 %

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- Danish Energy Strategy

Milestones up to 2050

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The government's energy policy milestones up to 2050

In order to secure 100 pct. renewable energy in 2050 the government has several energy policy milestones in the years 2020, 2030 and 2035. These milestones are each a step in the right direction, securing progress towards 2050.

2020

Half of the traditional consumptions of electricity is covered by wind power

2030

Coal is phased out from Danish power plants

Oil burners phased out

2035

The electricity and heat supply covered by renewable energy

2050

All energy supply – electricity, heat, industry and transport – is covered by renewable energy

The initiatives up to 2020 will result in a greenhouse gas reduction by 35 pct. in relation to 1990.

Energy agreement, March 2012

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These are the headline results for 2020:

2020

- More than 35% renewable energy in final energy consumption
- Approximately 50% of electricity consumption to be supplied by wind power
- 7.6% reduction in gross energy consumption in relation to 2010
- 34% reduction in greenhouse gas emissions in relation to 1990

Main initiatives in the Energy Agreement, March 2012

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1. A more energy efficient society
2. Wind power and new RES-technologies
3. RES in industry, buildings and transport
4. Bioenergy in Danish energy supply
5. Smart grids
6. Financing the initiatives

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Besides a large number of sub sector analyses are being carried out, managed by Danish Energy Agency

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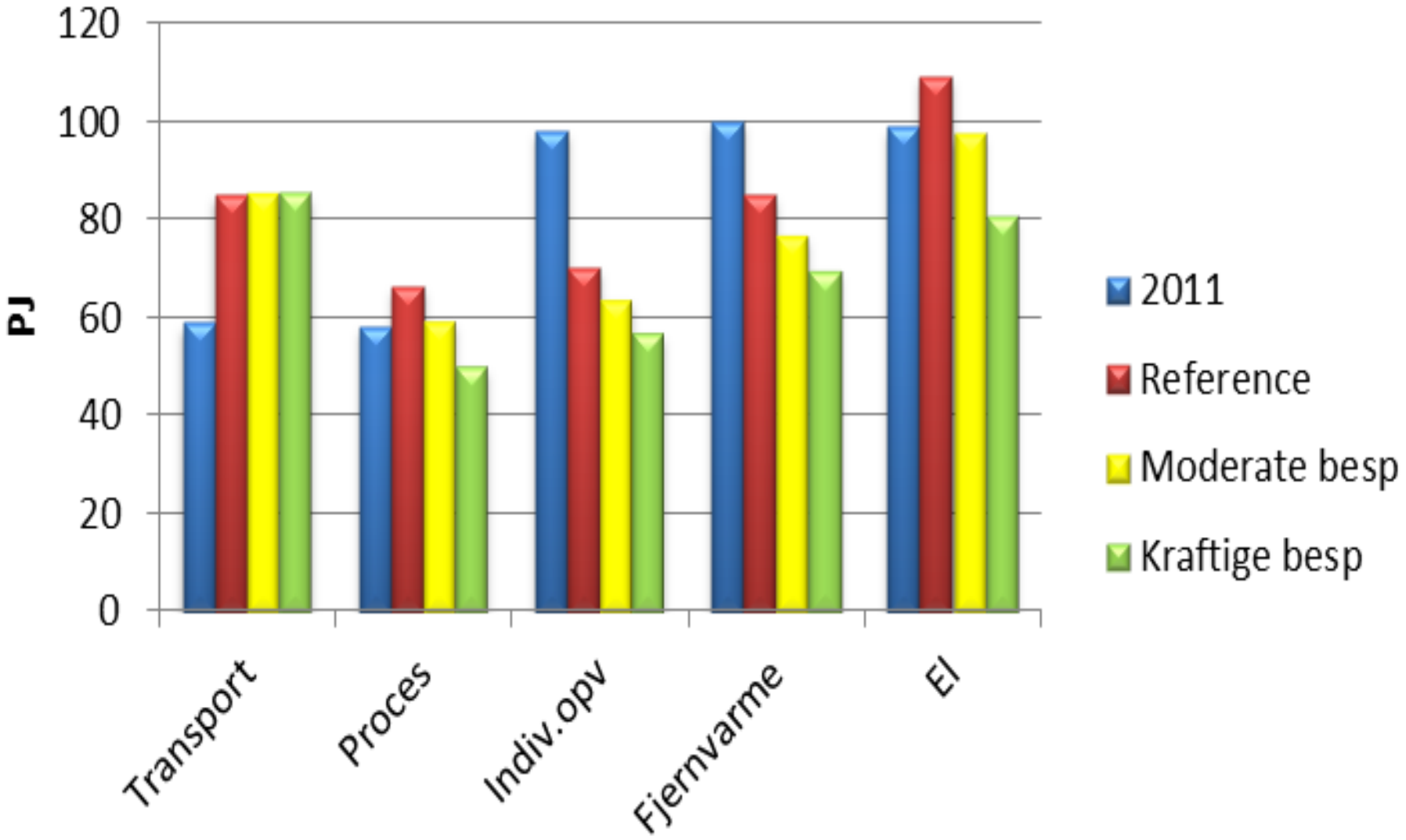
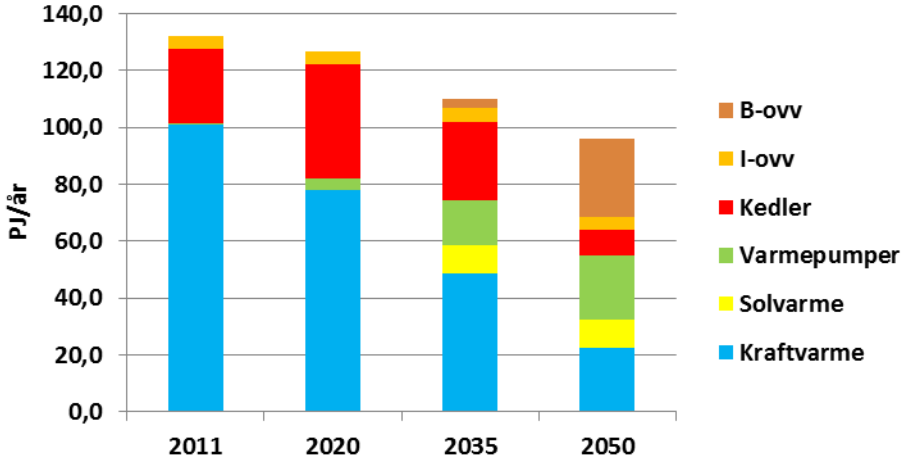
- Scenario Analysis

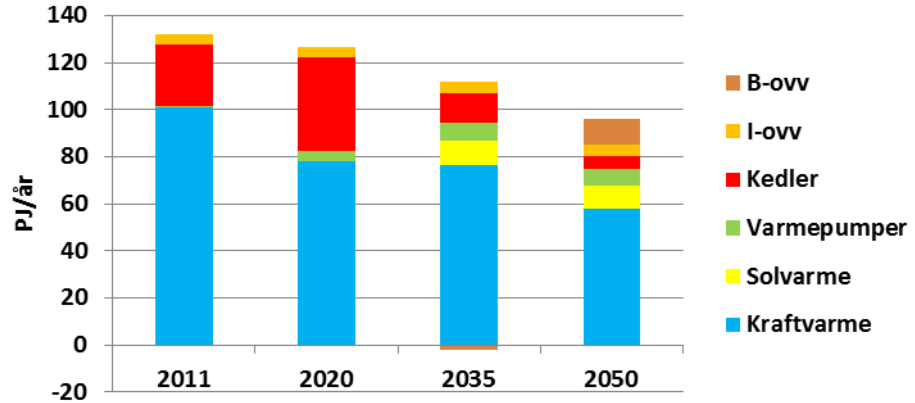
Nettoenergiforbrug 2011 og 2050



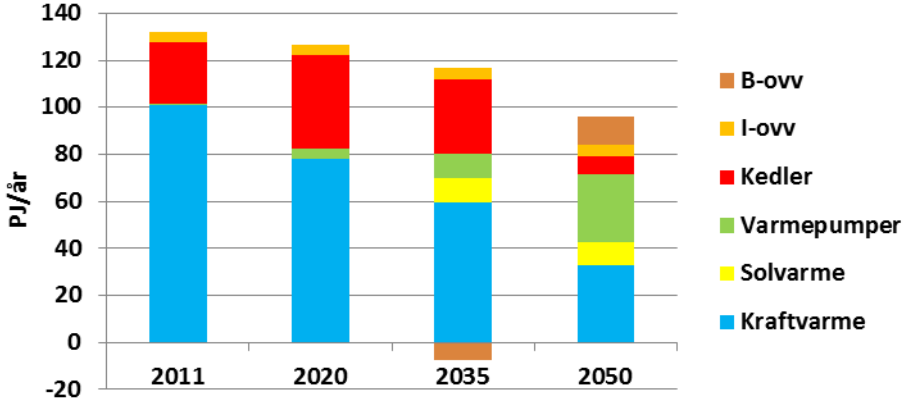
Fjernvarmeproduktion i vindscenariet



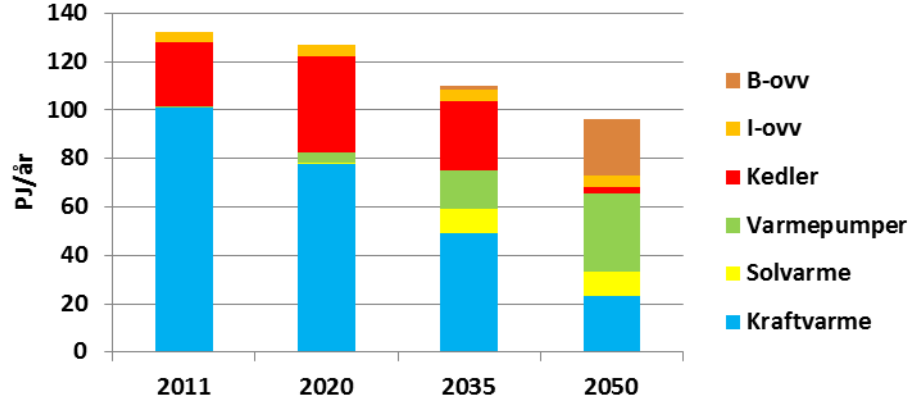
Fjernvarmeproduktion i bio+ scenariet



Fjernvarmeproduktion i biomassescenariet



Fjernvarmeproduktion i brintscenariet



Udvikling i bruttoenergiforbrug