

Danish experiences

The role of biomass in the transition from a system
based on coal

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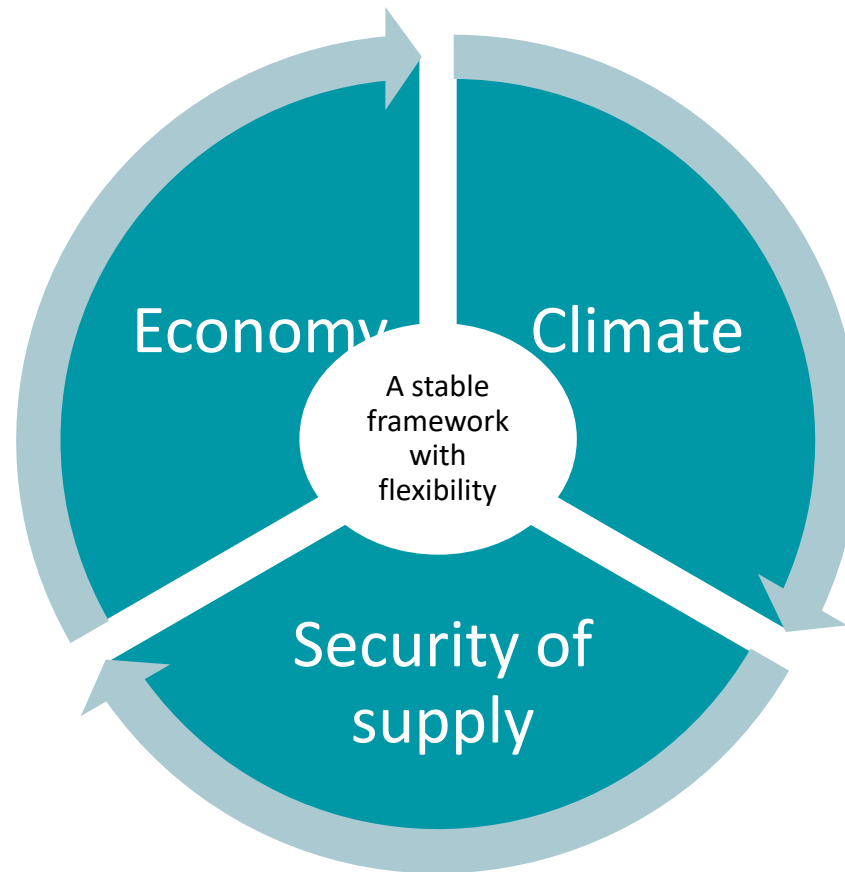
Agenda

The synthesis of bio-energy and wind for ensuring secure supplies of power and heat year around

- The phase-out of coal and the 'phase-in' of biomass
 - Where are we now?
 - How did we get there?
 - How is it working?
 - Where are we going now?
- Sustainability of biomass

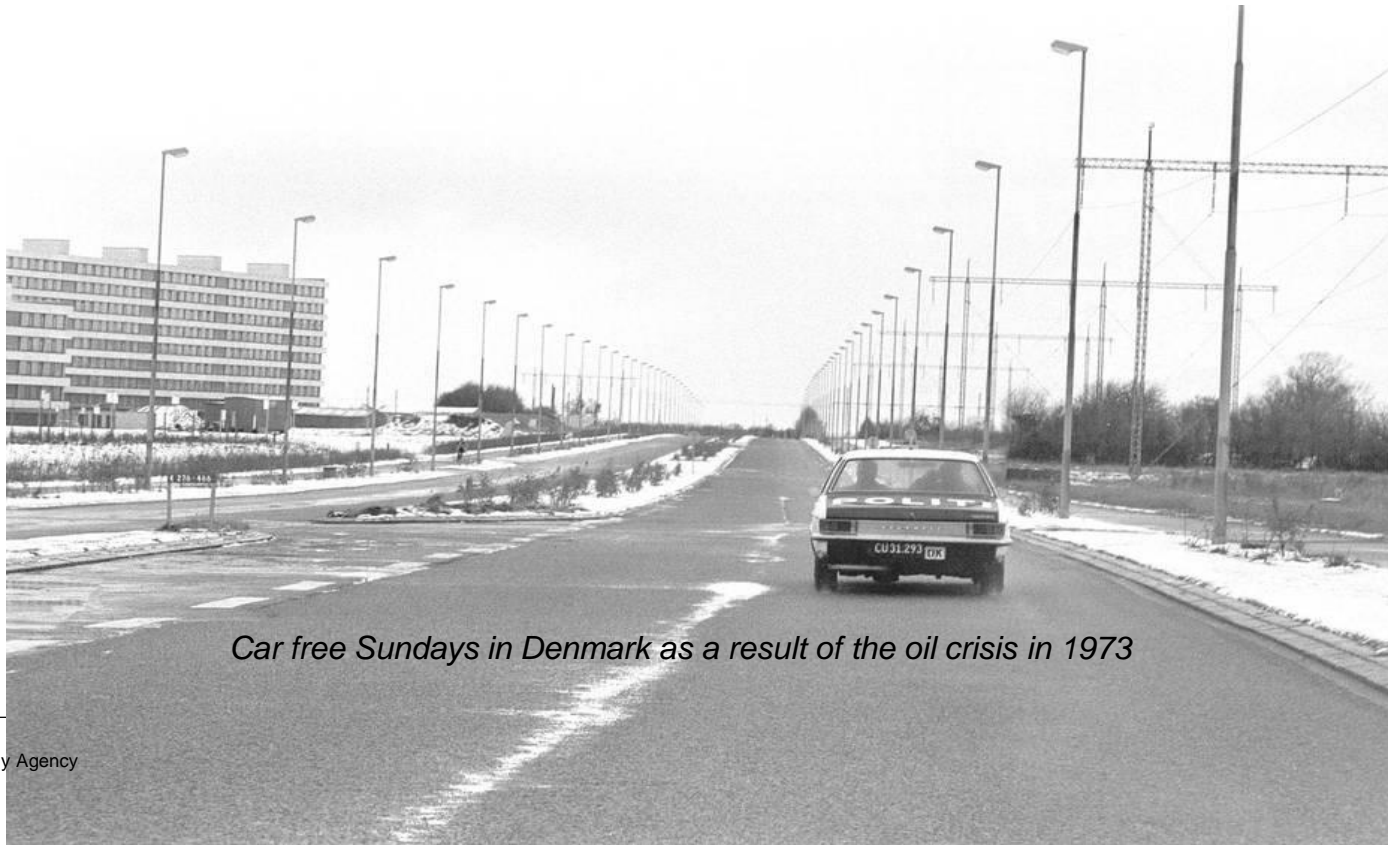


Key Elements of Danish Energy Policy



44 years ago

- 1973-74 oil crisis: 2 countries were 99% dependent of imported energy:
- Japan + Denmark
- Oil crisis caused a severe economic crisis and unemployment – and no driving on Sundays...

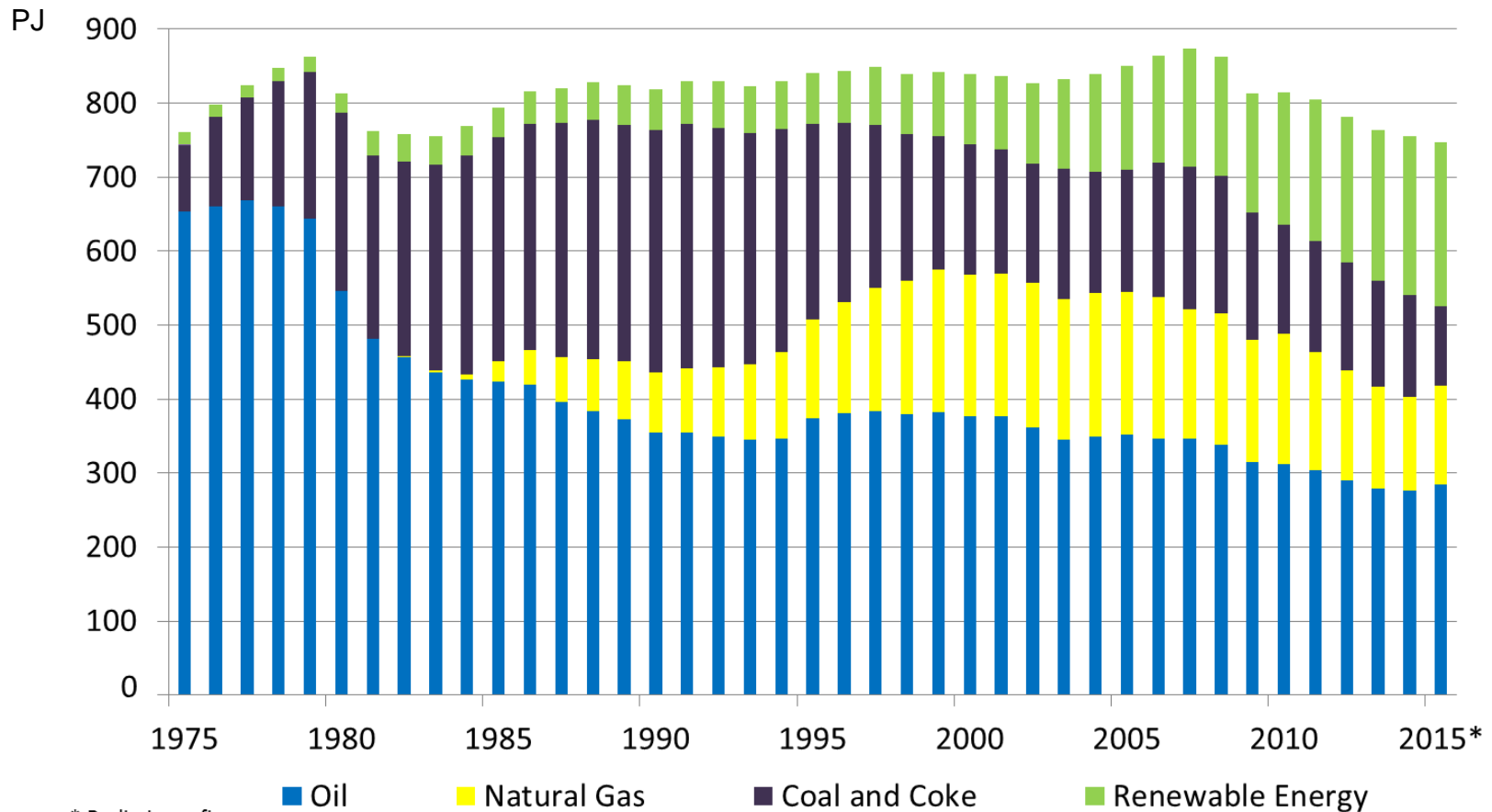


Car free Sundays in Denmark as a result of the oil crisis in 1973

Gross Energy Consumption 1975-2015

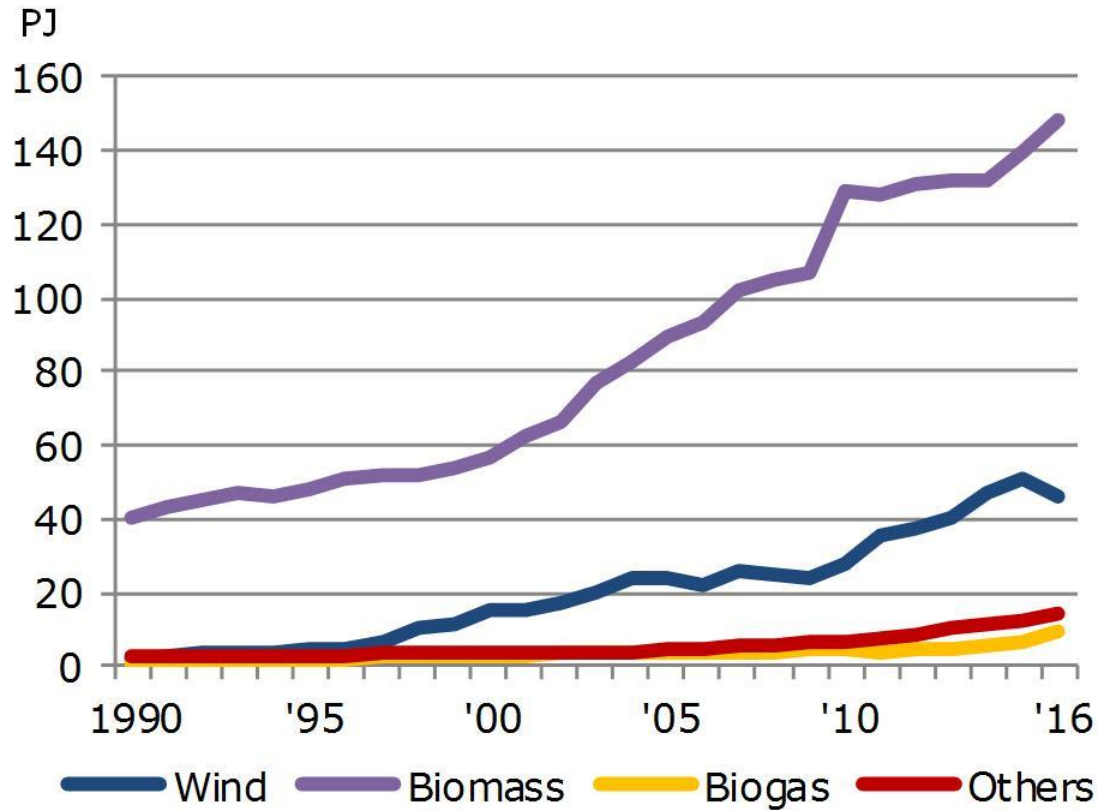
From oil to a mix of fuels

Climate adjusted



* Preliminary figures

Renewable energy – consumption by energy product



Key strategies

- **Long term strategies** based on broad political agreements prevent stop-go policies
- A suitable legislative and **local planning framework** which supports the local initiative and ensures predictability
- **Cost-effective subsidy schemes** with evaluation on a regular basis,
- **Energy taxes on fossil fuels** makes RE more competitive and use of fossil fuels more energy efficient
- **Dialogue** with sector stakeholders ensuring ambitious and realistic targets, as well as well functioning regulation
- In short: A combination of an effective **state and the market**

Solid biomass - history

- 1985: Ban on straw burning in fields => interest in using straw for energy purposes.
- 1993: Biomass Agreement required power plants to use 1.4 million tonnes of biomass (primary straw) for power generation in 2000
- 1997: Ban on the disposal of organic degradable wastes in landfill sites
- R& D efforts in biomass combustion

Present support scheme for solid biomass used for CHP

- A fixed feed-in premium of 15 øre / kWh (2 € cent) is granted for plants that use biomass for the production of **electricity**.
- **Heat** produced from bioenergy is not subject to energy tax.

From Centralized to Decentralized CHP

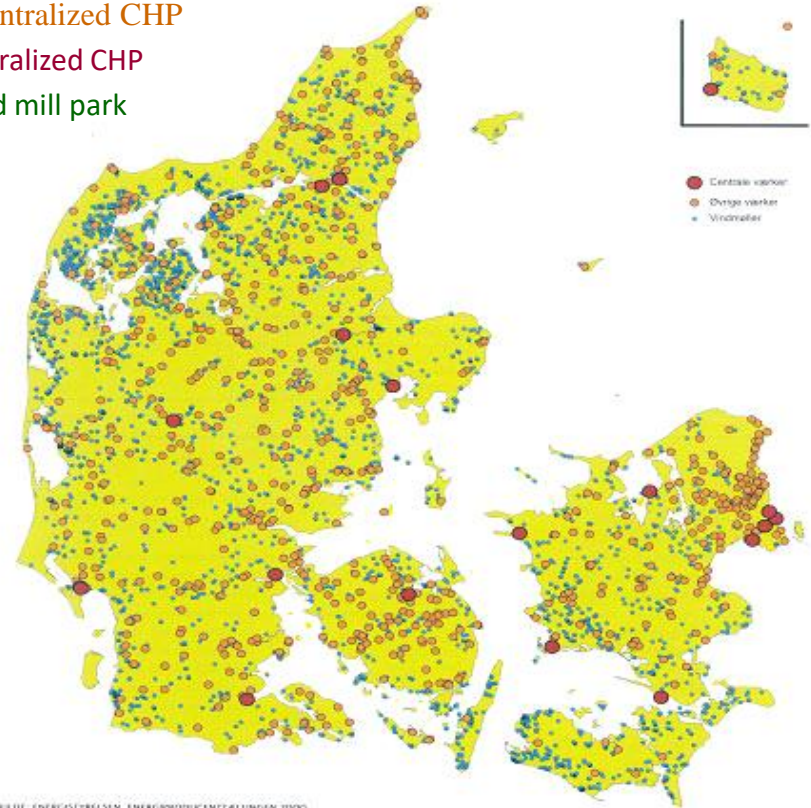
Centralized production in the mid 80's



Decentralized production of today

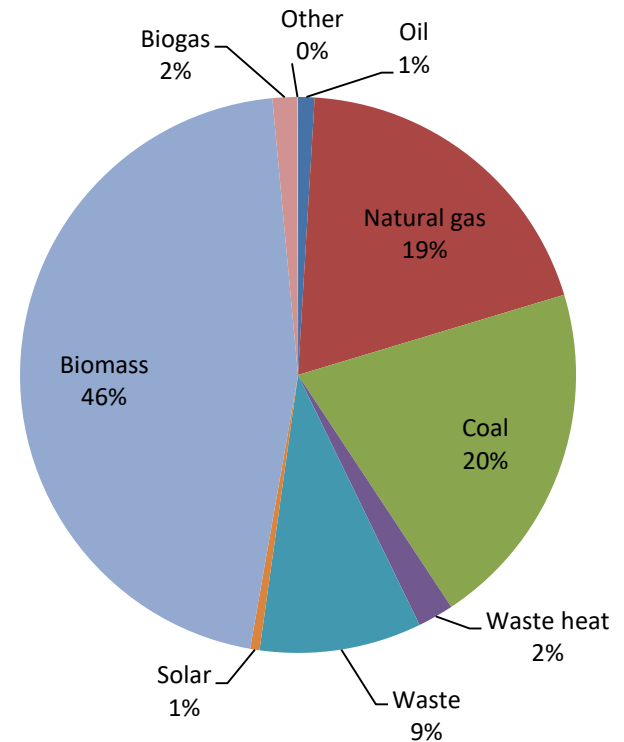
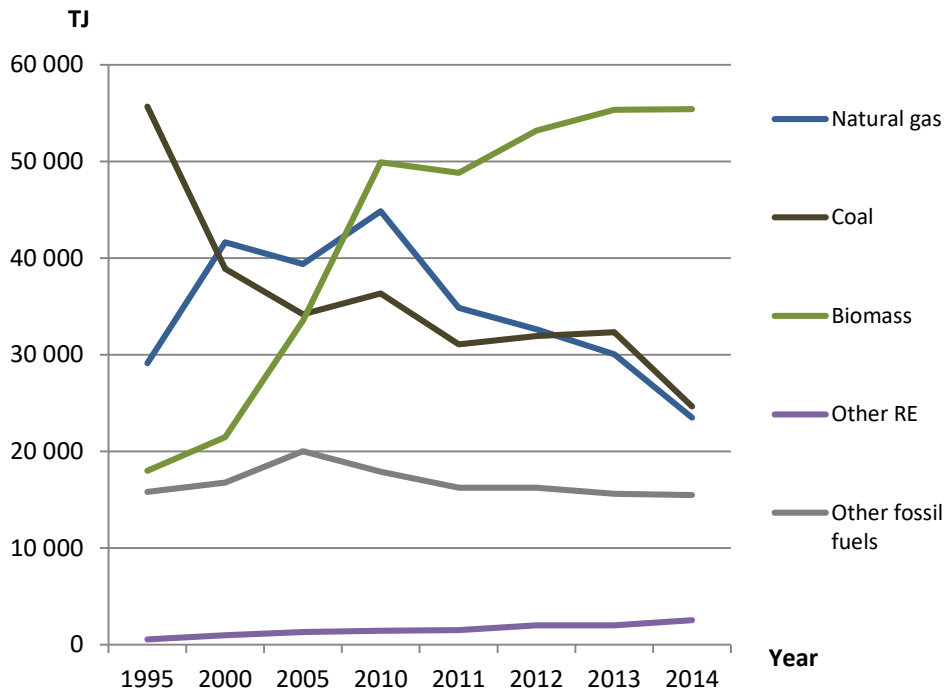
Legend:

- Decentralized CHP
- Centralized CHP
- Wind mill park



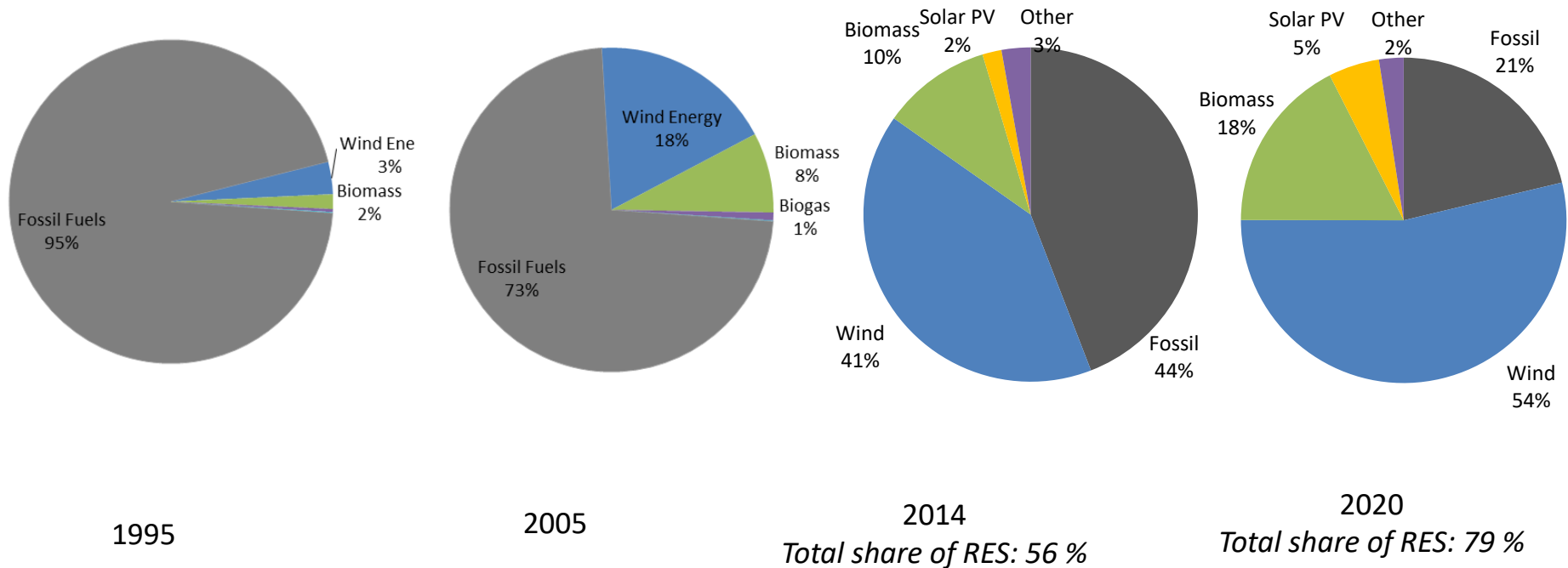
Transforming District Heat

More than half of heat consumption is district heating



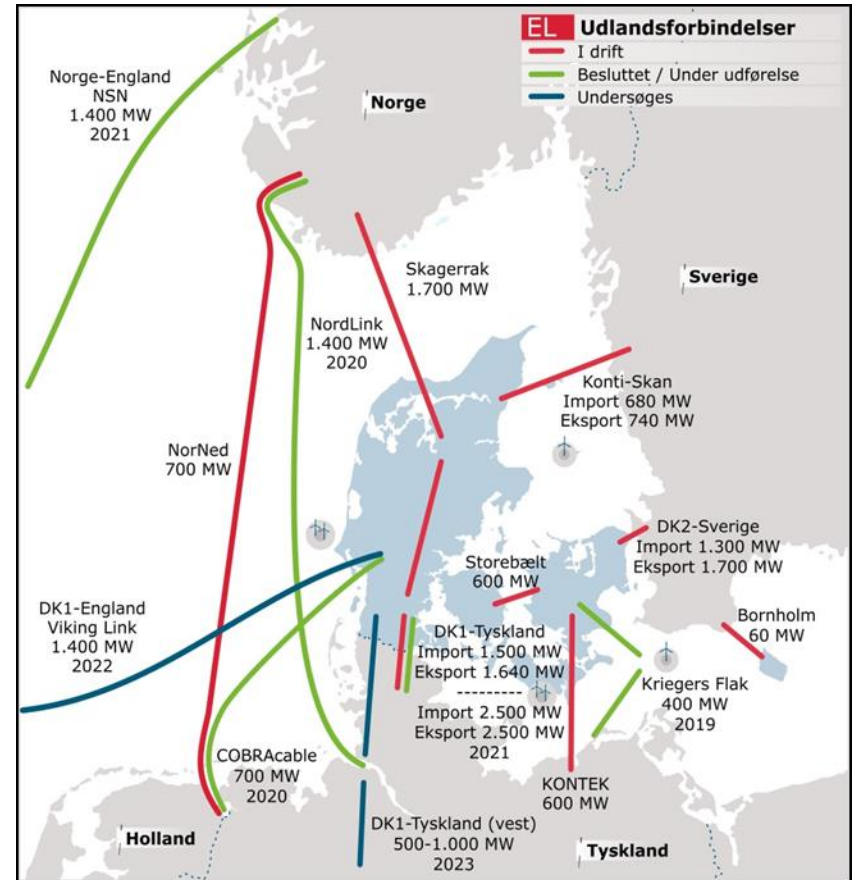
Denmark's Power Mix

Electricity production based on type of input



Danish electricity system

- Strong interconnectors
- Increased system flexibility for integrating wind and solar power
- Success of Nordic market is integration of different technologies over a large geographical area resulting in more robust national power systems



Future policy

Danish Energy Goals

- Cheaper and greener energy
- In 2030:
 - Meet at least 50% of the energy needs of Denmark with renewable energy
 - Coal will be completely phased out of electricity production
- In 2050 Denmark will be a low-emission society and independent of fossil fuels.

Energy policy from 2020 – first steps towards 2030

The government proposal

- Reduction of taxes on electricity - electrification
- Harmonization of subsidies to renewable energy
- 800 MW offshore wind – more to come
- Exposure to competition of energy savings
- Deregulation of the heating sector
- Increased research
- Further effort for export of energy technology

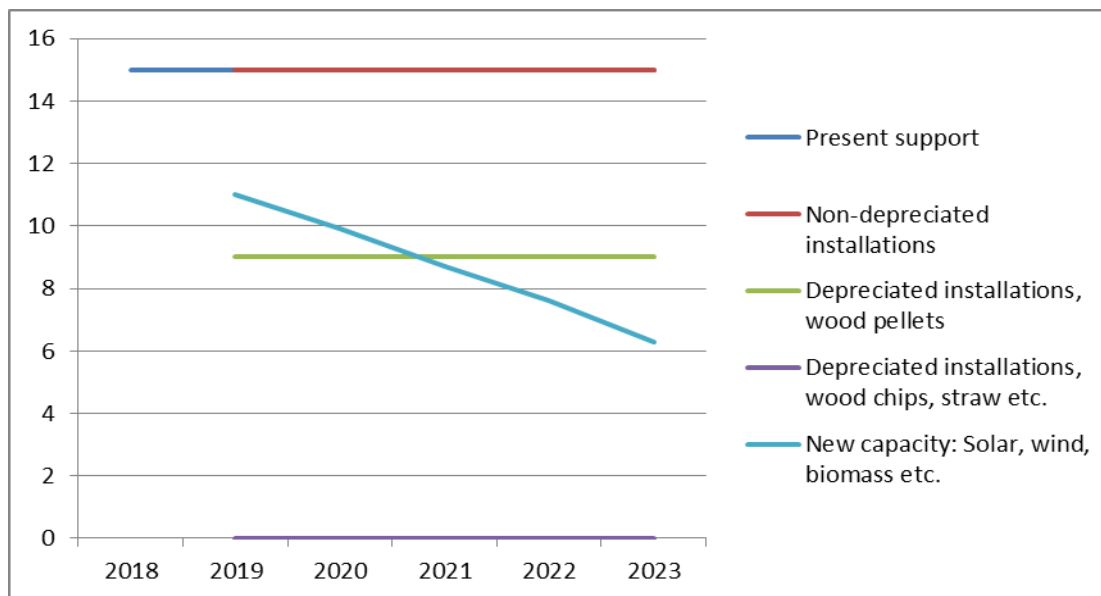
Future support for electricity from biomass

Government proposal

Existing installations

- Non depreciated installations: 15 øre (2 € cent) the rest of the depreciation period.
- Depreciated installations: 0-9 øre/kWh (0-1,2 € cent).

For new installations the support level will be connected to the result of technology neutral tenders of solar and wind



Improvements of the market

Government proposal

- Improving the electricity market model, focusing on marketisation of critical aspects of the electricity system, promoting flexibility, and adaptation of new technologies on market conditions.
- Implementation of Electricity Market Model 3.0 in the period 2020-2025, with ongoing monitoring of security of supply.
- Analysis and assessment of launched initiatives, including the wholesale model, remote meter reading and flexible billing, all of which are designed to promote competition and consumer involvement in the electricity market, as well as analysis of the future role of Danish grid owner companies.
- Preparation of an action plan for smart energy, to be presented in 2020, with focus areas including the use of data and digitisation.

Sustainable biomass

Industry agreement

Industry agreement to ensure sustainable biomass (wood pellets and wood chips)

https://www.danskenergi.dk/sites/danskenergi.dk/files/media/dokumenter/2017-09/IndustryAgreement_Biomass-20160623.pdf

Headlines:

1. Legality
2. Protection of the forests' ecosystems
3. The forests' productivity and ability to contribute to the global carbon cycle must be maintained.
4. The forests must be healthy and well-functioning
5. Protection of biodiversity, sensitive areas and areas worthy of preservation
6. CO₂ emissions limits from biomass value chain
7. Social and work-related rights must be respected
8. Additional requirements targeted at carbon cycle, maintenance of forest carbon stock, Indirect landuse change and Indirect wooduse change

Sustainable biomass

Industry agreement to ensure sustainable biomass (wood pellets and wood chips)

- Biomass sustainability must be documented through annual reporting on compliance.
- The report must be verified by a third party
- The agreement will be evaluated this year

Positive experiences, but room for improvement:

- Both owners of CHP and suppliers of biomass have accepted the new standards and have changed behavior
- International rules would have better effect

Next step: Regulation in the Directive on Renewable Energy

Thank you for your attention!

Any questions?

Read more at www.ens.dk and

<http://en.efkm.dk/energy-and-raw-materials/energy-for-a-green-denmark/>