Nordic solutions for unlocking a decarbonised, sustainable energy future

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Nordic solutions for unlocking a decarbonised, sustainable energy future

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Flexibility Resources
Finding ramping capabilities

Resource
- Dispatchable
- Variable
- Trade

System
- Electricity

Service
- Buildings
- Industry
- Transport

Supply flexibility
Demand responds

Flex4RES
Flexibility Resources
Finding ramping capabilities

- **Resource**
  - Dispatchable
  - Variable
  - Trade

- **System**
  - Heat
  - Electricity
  - Gas/fuel

- **Service**
  - Buildings
  - Industry
  - Transport

- **Supply flexibility**
- **Sector coupling/Electrification**
- **Demand responds**
Sector coupling
Electrification as source of flexibility

Distribution of EU energy consumption
(Source: EU Heating and Cooling strategy)

Large flexibility potentials in electrification of the energy sectors

Hindered by regulatory barriers

Remove barriers

From technical to realisable potentials

Framework conditions

- Market design
- Direct regulation
- Fiscal policies
- Support schemes
- Grid regulation

Hindered by regulatory barriers
District heating-electricity interface

Electrification as source of flexibility

Heat price

Electric boilers

Heat pumps

Heat only boilers

CHP

Electricity price

Heat storage

Power to heat

Heat demand

Variable RE

Electricity demand
Choice of heat supply - at different electricity prices

Patchwork regulation between electricity and heat
- Taxes on electricity consumption
- Heat is taxed at the fuel input
- Biomass exempted for taxes

More heat only boilers.
Decoupling of electricity and heat markets

Electric boilers
Heat only boilers
CHP

Taxes on electricity use & grid tariffs

Electricity price
Heat price
Unlocking a decarbonised, sustainable energy future

Make the sector coupling/electrification as flexible as possible
- Remove barriers
- Improve the business case for flexible power-to-heat/gas technologies
- Increase market integration and the value of VRE

Coherent changes in market designs, regulatory framework condition, and coupling of markets

Strong today - Stronger tomorrow

www.Flex4RES.org

#Flex4RES
Current electricity system

The trichotomy of energy policy

Decarbonised energy systems

Centralised fossil-intensive supply

Electricity market only

Market design

Sector coupling

Flexibility

Competition

Reliability

Sustainability

Decentralised + Variable renewable energy + Phase-out of fossil peakers

System integration

Goals and RE-thinking of the Energy System
Wind Power has consequences for the energy system!

Steeper residual load duration curve
- Less base load hours
- Lower price levels

Market design: Capacity mechanism or Scarcity pricing
Wind share in Danish annual electricity consumption