Nordic solutions for unlocking a decarbonised, sustainable energy future

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Flexibility Resources
Finding ramping capabilities

Supply flexibility

Demand responds
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

Remove barriers

Large flexibility potentials in electrification of the energy sectors

Hindered by regulatory barriers

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

Framework conditions
District heating-electricity interface
Electrification as source of flexibility

Heat price

Electric boilers
Heat pumps
Heat only boilers

CHP

Electricity price

Heat storage
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
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

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Goals and RE-thinking of the Energy System

Current electricity system

- Centralised fossil-intensive supply
- Electricity market only

The trichotomy of energy policy

- Market design
- Sector coupling
- Flexibility

Decarbonised energy systems

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

Goals and RE-thinking of the Energy System

- Sustainability
- Reliability
- Competition
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