



## The Future of Flexible Energy Systems - Flex4RES intro

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**Flex4RES**  
Flexible Nordic Energy Systems



# Flex4RES

## The Future of Flexible Energy Systems

Workshop  
KTH, Stockholm 28 November 2017

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Energy Economics and Regulation  
DTU Management Engineering , Denmark



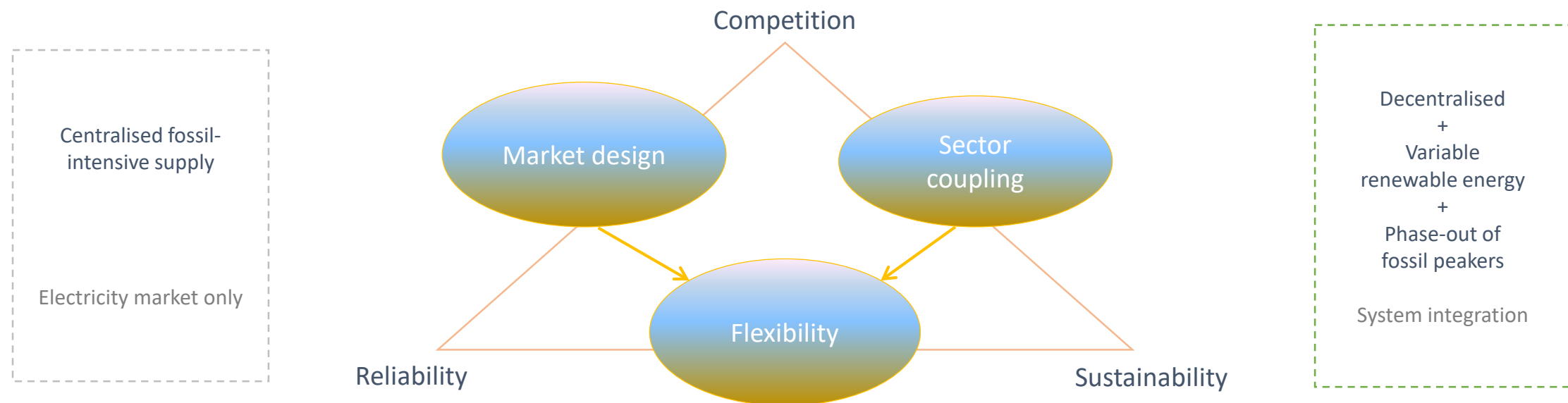
**Nordic Energy Research**  
**Nordic Council of Ministers**

# The Future Energy System

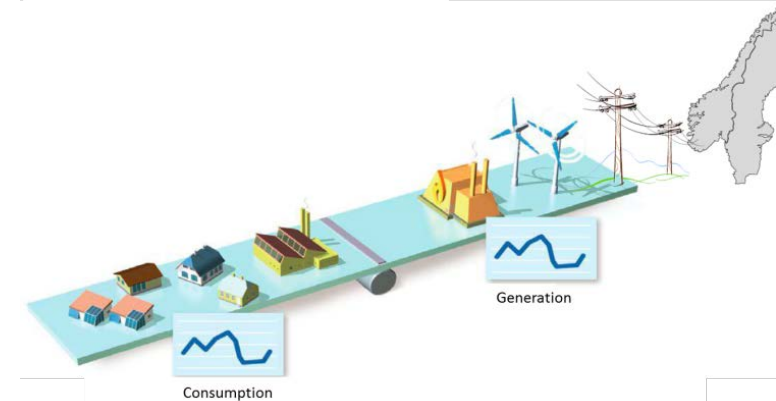
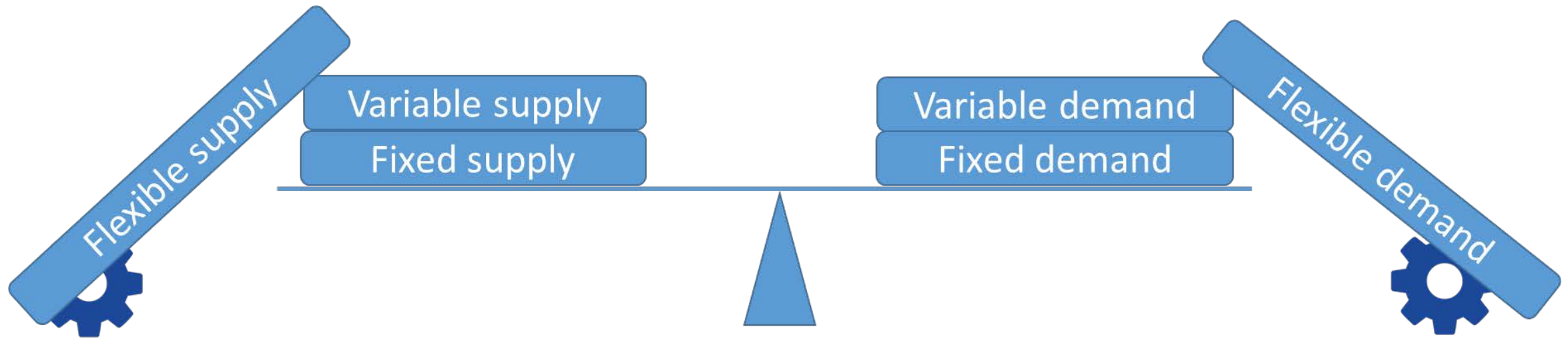
Goals and RE-thinking of the Nordic Energy Co-Operation



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# Flexibility definition

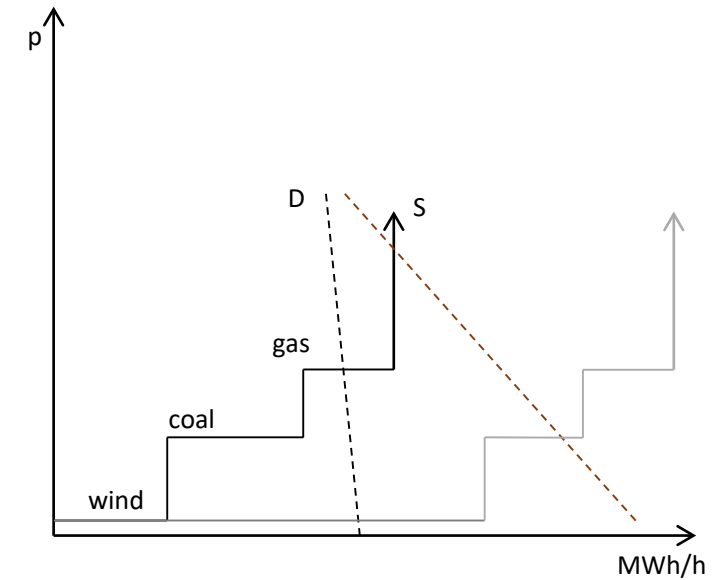
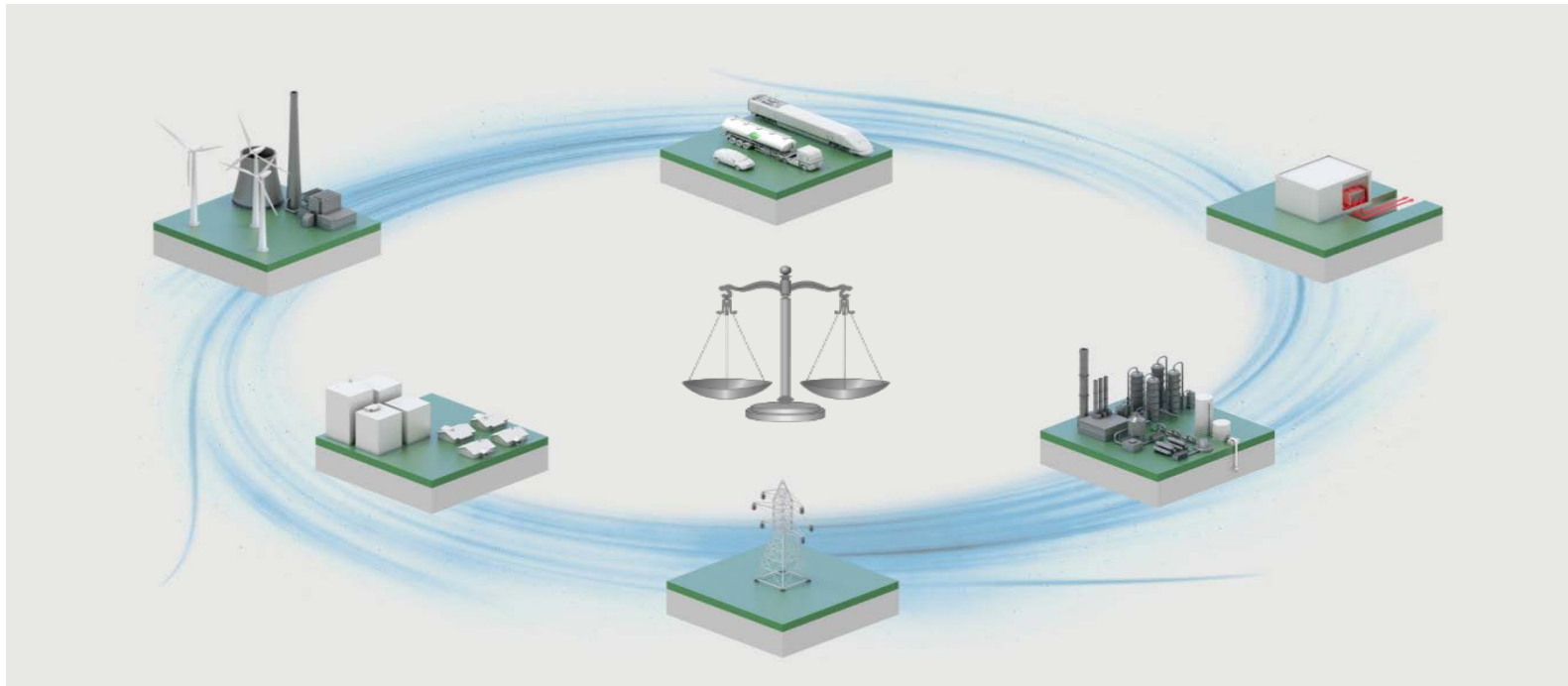
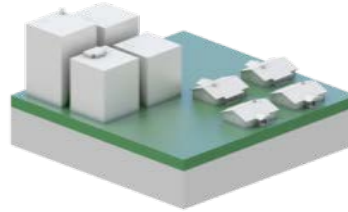
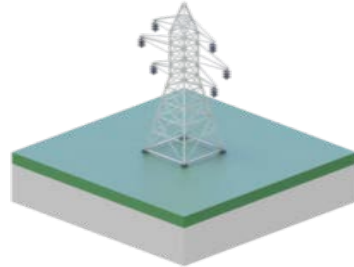


# Flexibility Resources/Market Actors

Electrification/sector coupling - Finding ramping capabilities



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# Objectives



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The primary objective of Flex4RES is to

**Identify and assess regulatory and technical pathways towards coherent Nordic energy systems**

The secondary objectives are to:

- a) **Estimate the potentials and costs of flexibility** in the Nordic power market created by the coupling of and increased interaction between different energy markets (electricity, heat, gas and transportation).  
Estimate the need for flexibility in the future Nordic power market.
- a) **Identify regulatory and technological barriers.**
- b) **Develop coherent regulatory frameworks and market designs** that facilitate energy market couplings that are optimal for the Nordic conditions in an EU context.
- a) **Adapt a high-resolution Nordic energy market model** covering heat, power and transport for quantification of the impacts of different market couplings, regulatory frameworks and market designs.  
**Estimate the cost and benefits** of a coherent energy system framework.

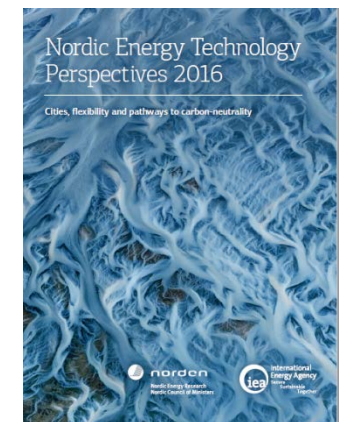
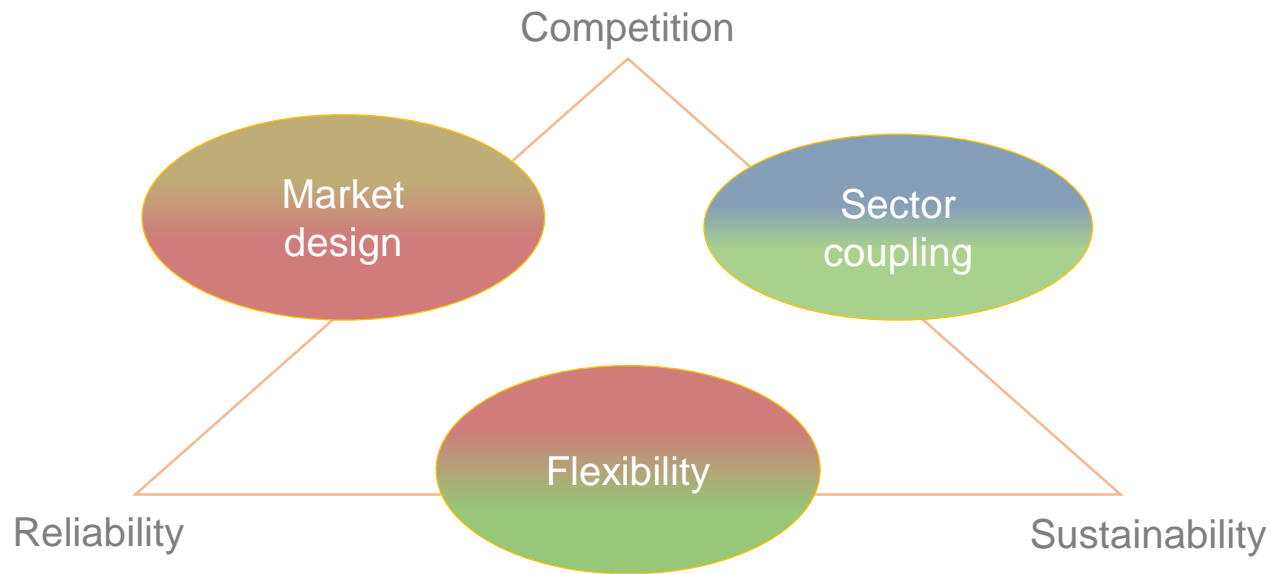
# Nordic Energy Co-Operation

## Policy Scenarios towards 2050



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The Future of Flexible Energy Markets  
We agree where we want to be in 2050  
The question is **how** we get there  
*Strong today - Stronger tomorrow*





# Flex4RES

Flexible Nordic Energy Systems

[www.Flex4RES.org](http://www.Flex4RES.org)

Funded by:



Nordic Energy Research  
Nordic Council of Ministers



# Today



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- 13.15 **Major flexibility potentials in the Nordic/Baltic region**  
Lennart Söder, KTH, Sweden.
- 13.30 **The future flexible, decarbonised, and coherent energy markets.**  
Barriers and policy/technology scenarios  
Klaus Skytte, DTU, Denmark.
- 13.50 **Benefits of flexible use of electricity in the district heating sector.** Preliminary results from the energy system modelling activities  
Torjus Folsland Bolkesjø, NMBU, Norway.
- 14.15 **Coffee break**
- 14.30 **Policy/technology initiatives to a well-functioning energy market**  
Farid Karimi, Aalto, Finland.
- 15.00 **Perspectives on the pathways for improved flexibility in the Nordic and Baltic energy system** Round table discussion
  
- 16.40 **Summing up.**
- 17 End of workshop



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