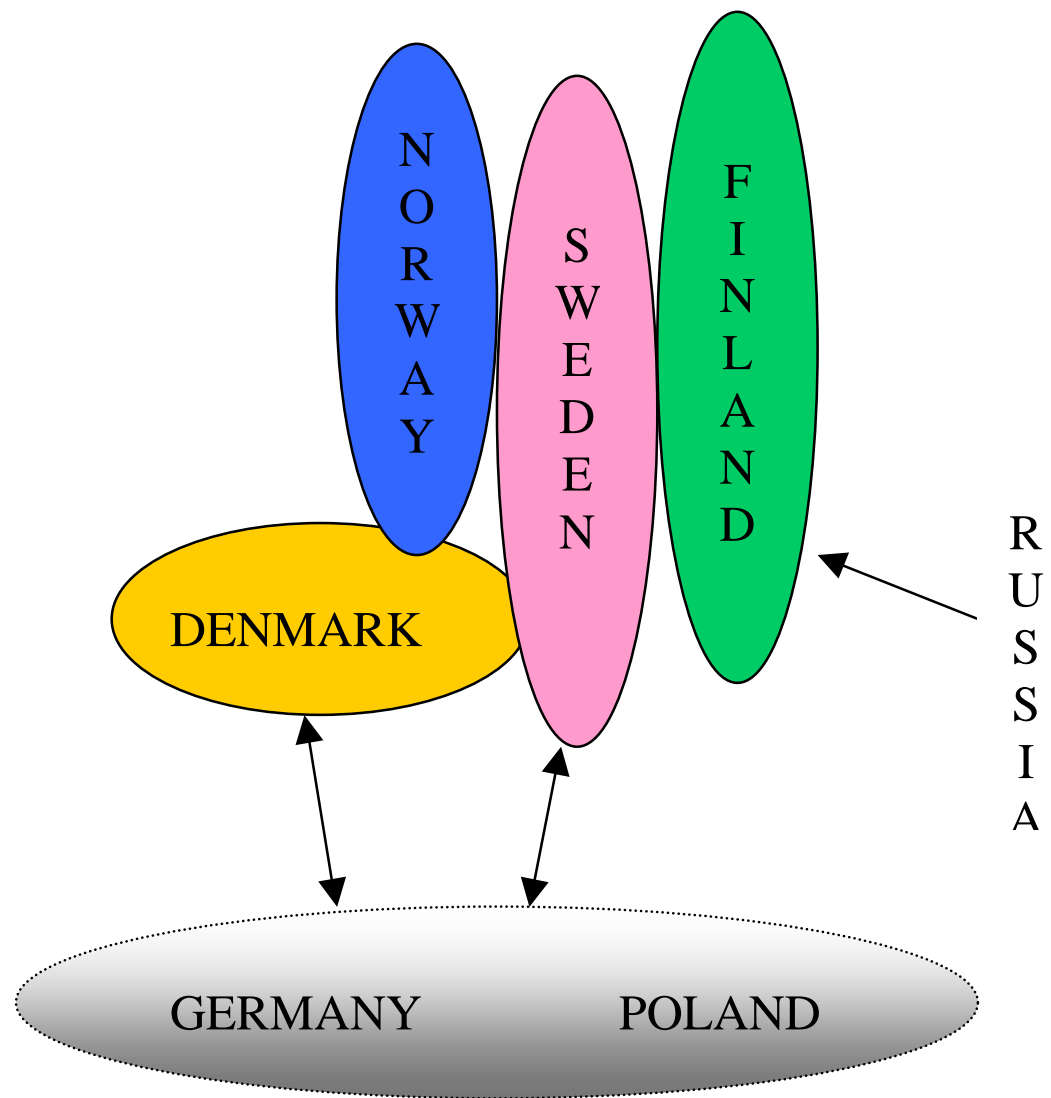


**Changing investment incentives in a  
deregulated European electricity market  
– the case of increasing transmission capacity  
between Sweden and Germany**

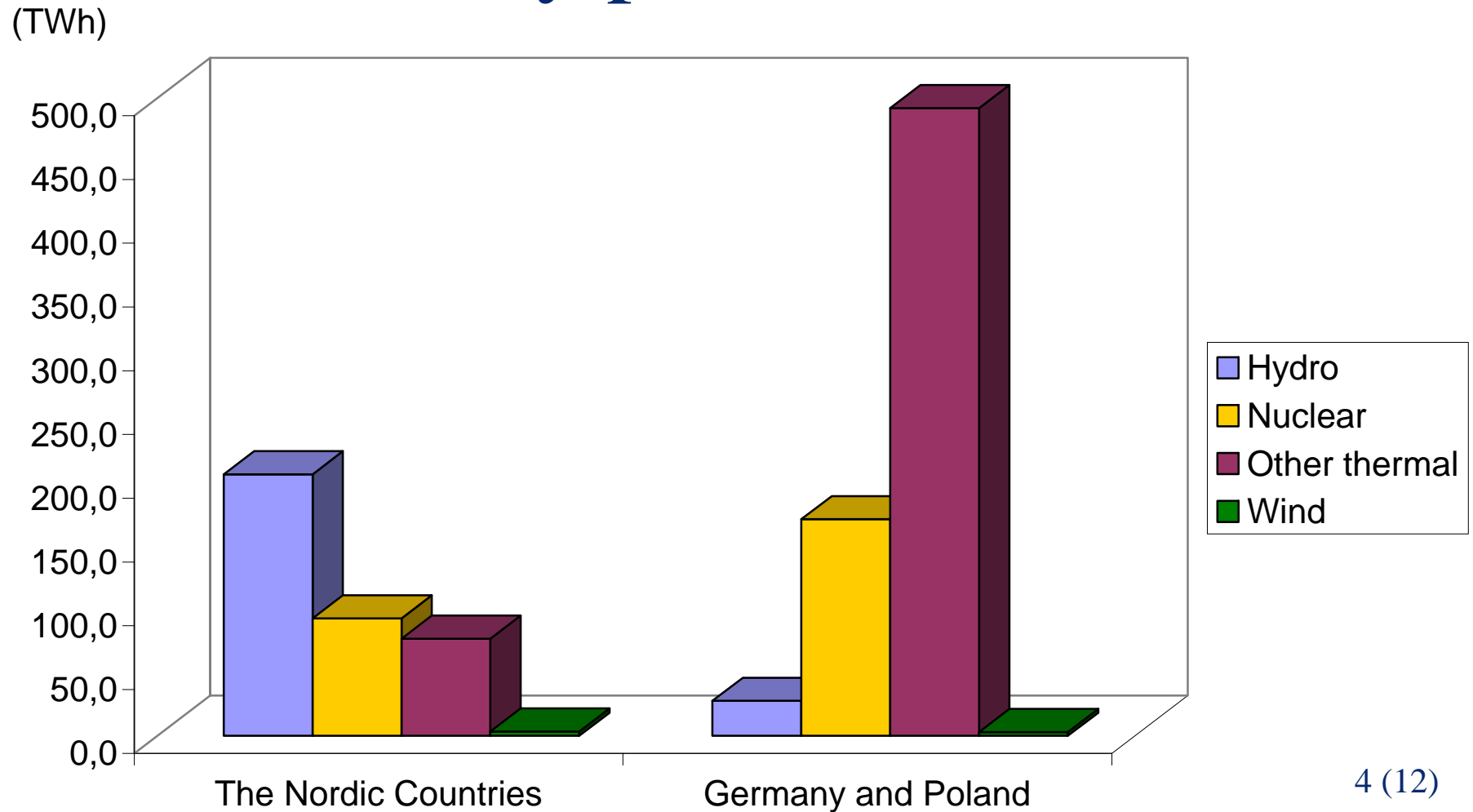
**Anna Krook Riekkola,**  
Ingrid Nyström and Erik Ahlgren

# Questions

- How will future investments in new electricity production change if the electricity trade with Germany and Poland increase?
- How shall this trade be described in MARKAL\_Nordic?

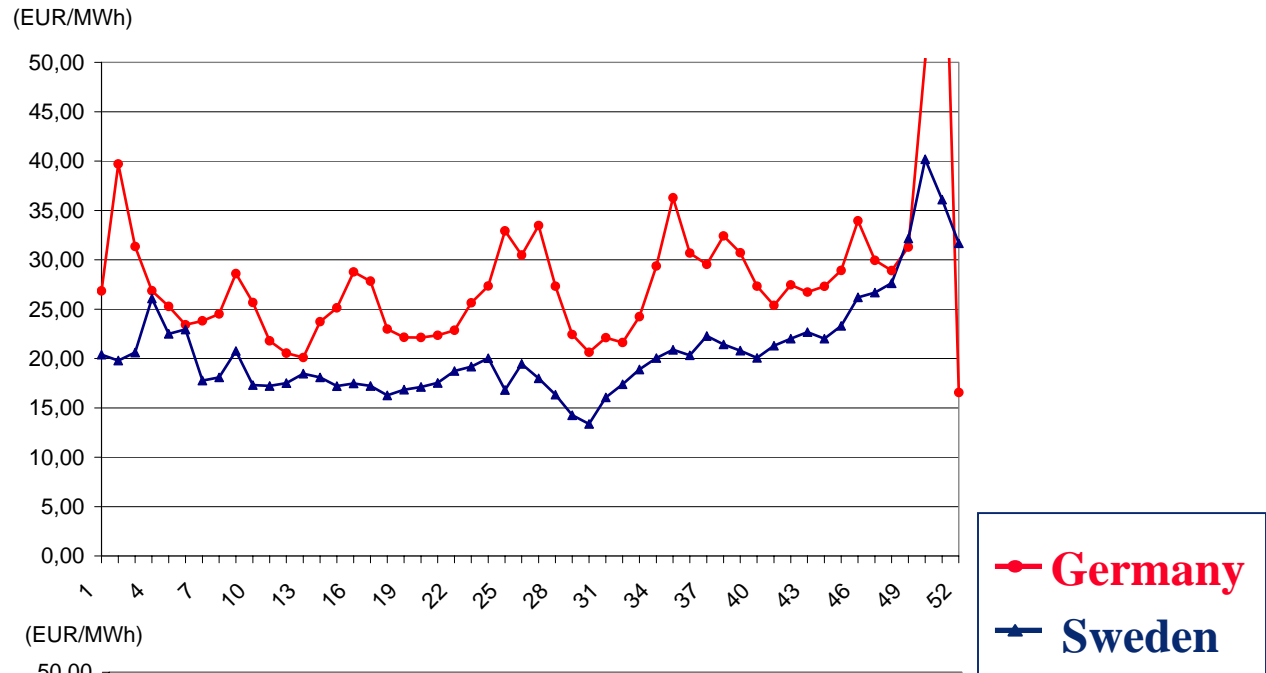


# Electricity production 1999

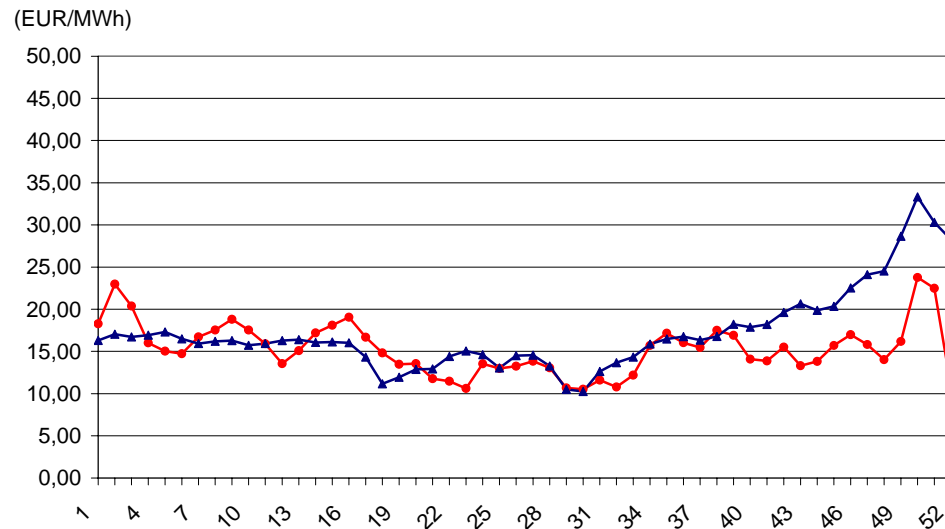


4 (12)

## Average Elspot Price during Day-Time



## Average Elspot Price during Night-Time



# Method - Model

## MARKAL model

- Bottom-up
- Energy-economic optimization model
- Linear programming
- Minimize the cost
- Demand-driven

## MARKAL\_Nordic

- Time horizon up to 2050
- Focus on grid-distributed energy:
  - Electricity, gas and district heating
- Electricity trade between the countries

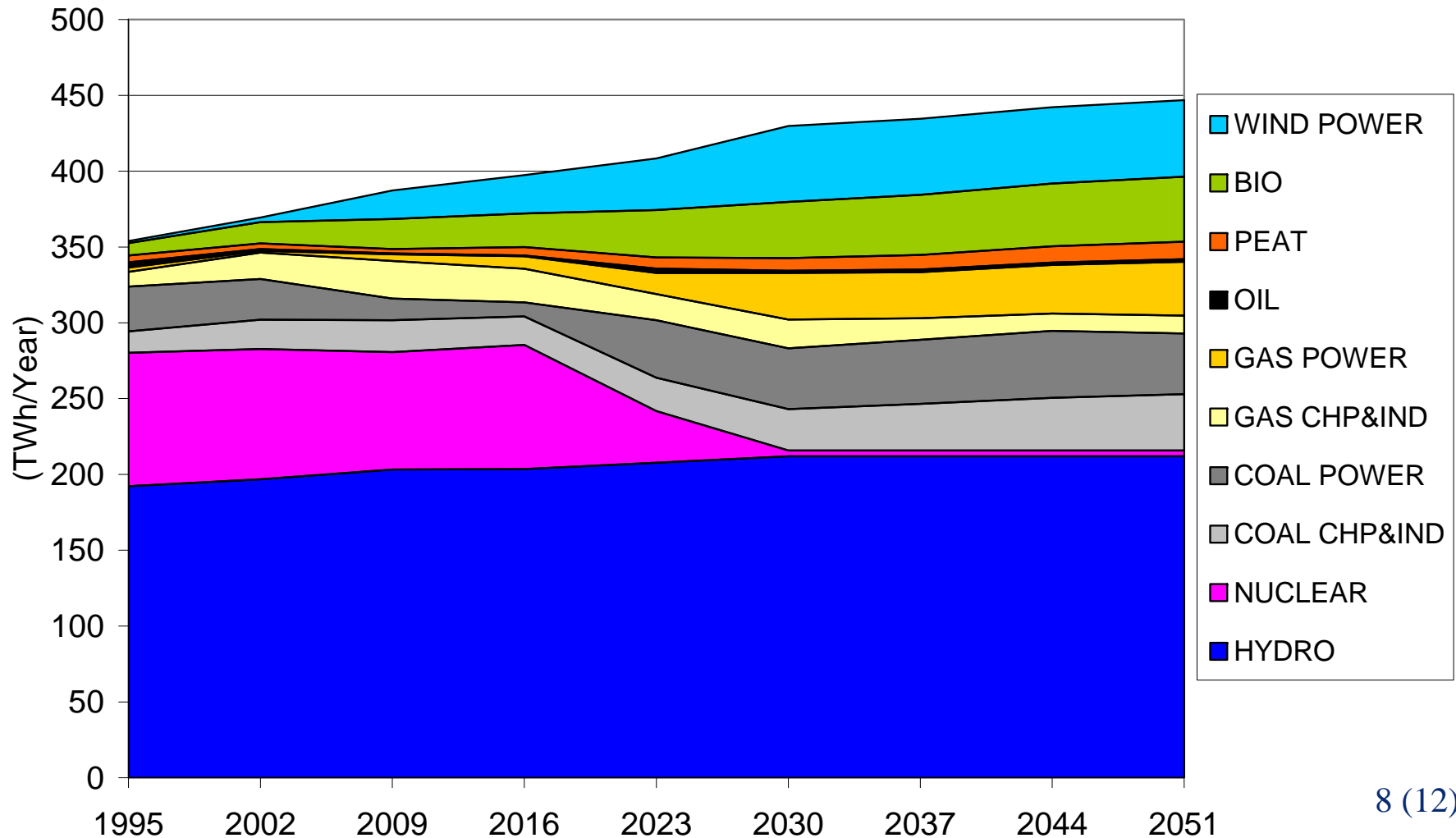
## Model Development

1. Different ways of describing trade

## Case studies

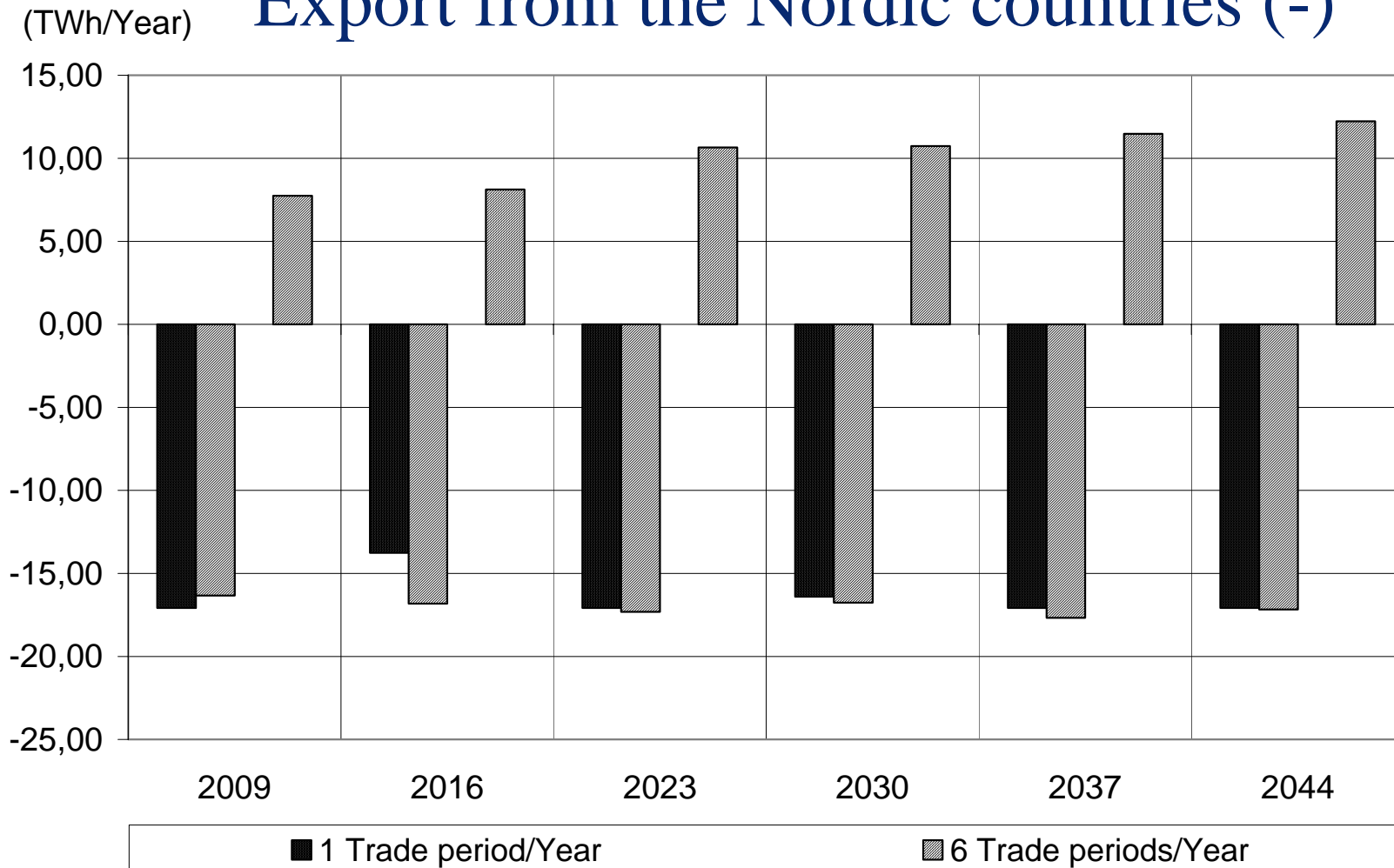
2. Different transmission capacity between Denmark/Sweden and Germany/Poland
3. Different price levels in Germany/Poland
4. Different price profiles in Germany/Poland

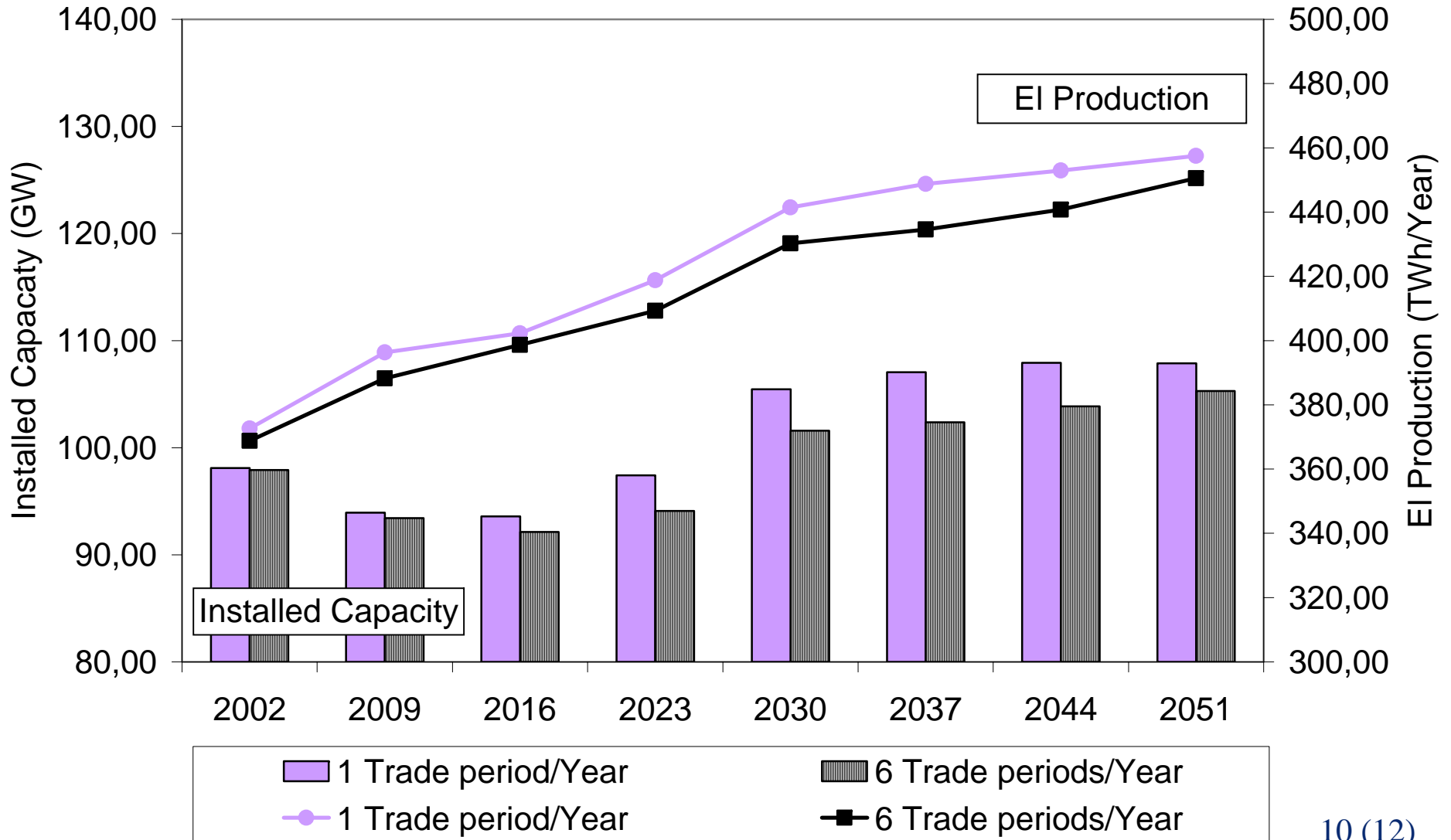
# Electricity production in the Nordic countries – with existing capacity to Germany/Poland

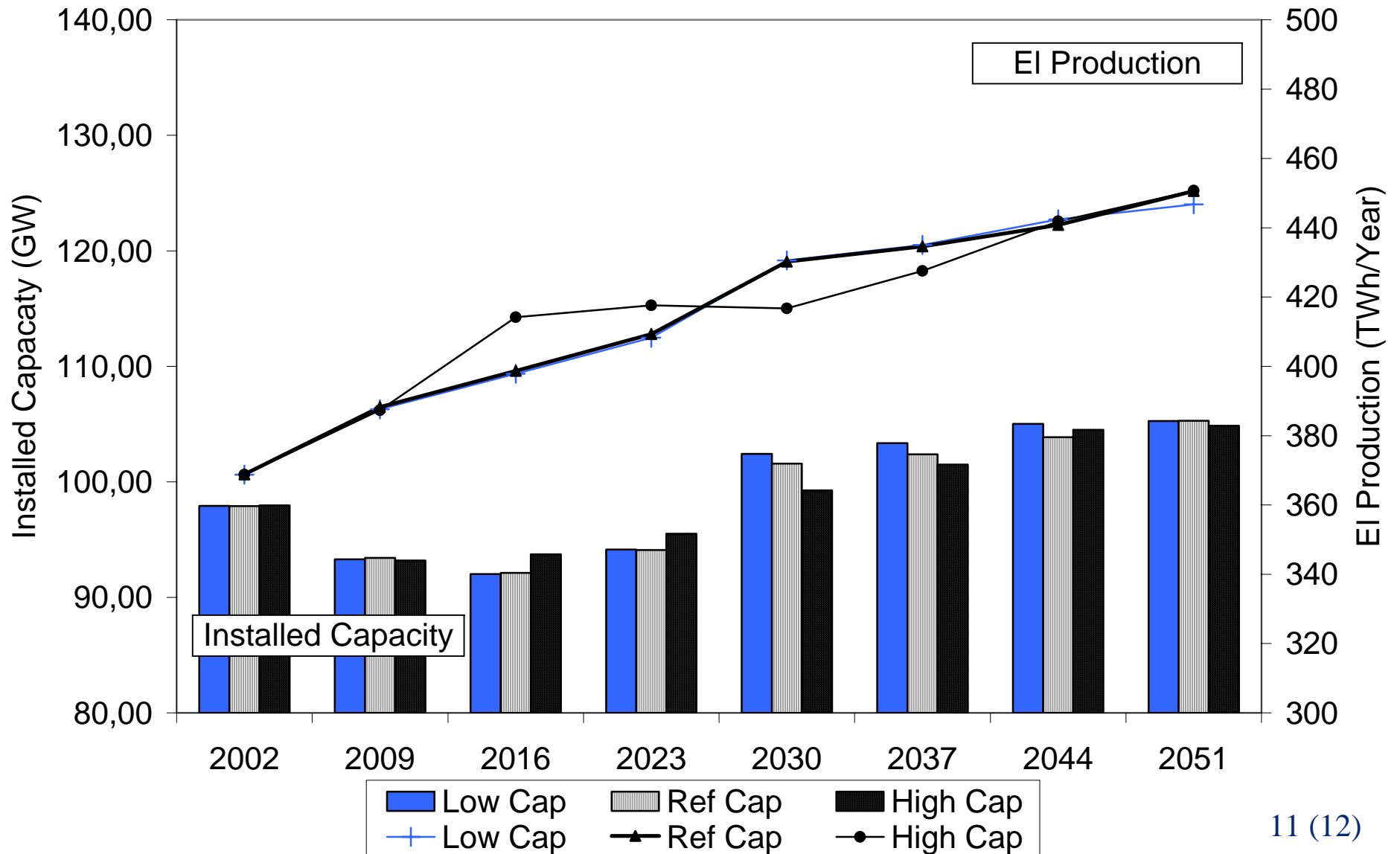




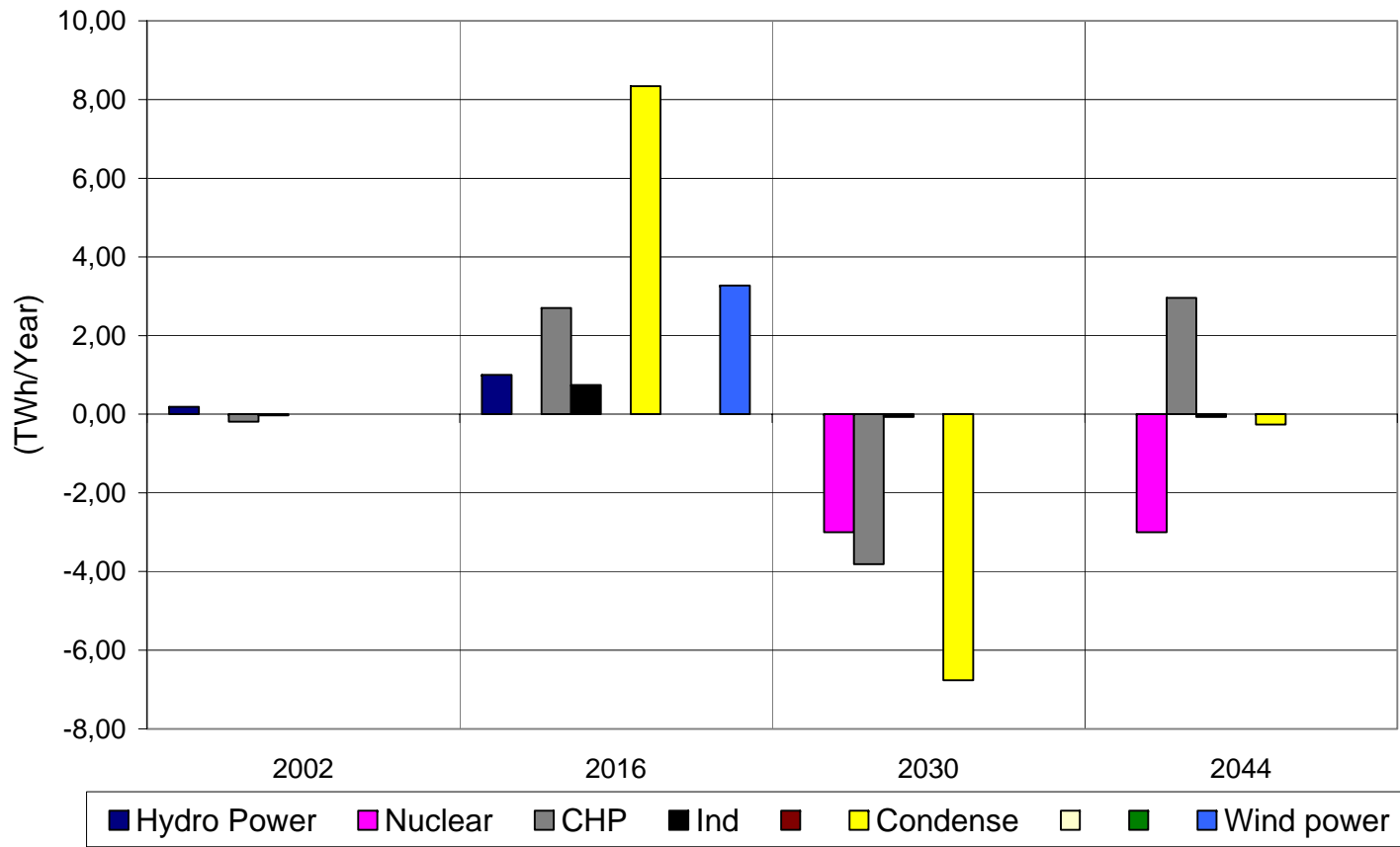
# Import to the Nordic countries(+) and Export from the Nordic countries (-)







## Differences in Electricity production – High transmission capacity compared to Existing



+ More prod in case "High cap" compared with "Existing cap"

÷ Less prod in case "High cap" compared with "Existing cap"

# Conclusions

- When modeling the Nordic electricity system it does matter how cross-border trade with surrounding countries is described.
- There is a potential for more trade in both directions between Denmark/Sweden and Germany/Poland
- A non-functional market at the transmission lines, results in a less efficient electricity system in the Nordic countries.

## Acknowledgement

- to the Swedish National Energy Agency (STEM) <sup>12</sup> (12)