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

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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?
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Electricity production 1999

The Nordic Countries

- Hydro
- Nuclear
- Other thermal
- Wind

Germany and Poland

- Hydro
- Nuclear
- Other thermal
- Wind

(TWh)
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

- WIND POWER
- BIO
- PEAT
- OIL
- GAS POWER
- GAS CHP&IND
- COAL POWER
- COAL CHP&IND
- NUCLEAR
- HYDRO

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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.

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