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Socio economic impact of the different electricity market designs between Russia and EU

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Content of the presentation

1. Cross-border connection between Finland and Russia is not in efficient use
2. Differences in the electricity market design in the Nordic market and in Russia complicate the cross-border trade
3. What can we learn from the experiences of the Nordic-Russian electricity trade?

Present use of the FIN–RUS -interconnection

- In January-September 2012, the imports from Russia to Finland were reduced to 3.0 TWh, from 8.5 TWh in the previous year
- The utilization rate of the transmission capacity has fallen from 80-90% in 2010 and 2011 to 35% in 2012
Nordic energy-only market design

- In the Nordic energy-only market, generators earn money only when they produce electricity
  - The dispatched generators earn to cover their variable costs
  - If a generator is not exactly at the margin, it can earn money to cover its fixed costs
- Electricity prices are allowed to peak when the market is short
  - During the shortage hours, also the peak generators can earn money on their fixed costs

Russian energy+capacity market design

- In the Russian energy+capacity market, generators earn money by producing electricity and for being available to produce
  - Income from selling electricity in the day-ahead market covers the variable costs of generation (this is the energy part of the market)
  - Capacity payments cover the fixed costs of generators (this is the capacity part of the market)
- Consumers pay separately for the electricity and capacity
  - Exporter is treated as demand and the exporter’s capacity payment depends on the maximum export during peak hours
Cross-border trader’s profit…

… when exporting from Russia to the Nordic market:

\[ \text{Profit} = \text{Electricity sold in the Nordic day-ahead market} - \text{Electricity purchased in the Russian day-ahead market} - \text{Capacity costs in the Russian market} - \text{Grid fees} \]

Example of cross-border trader’s costs when exporting electricity from Russia to the Nordic market

Assuming the present one-way connection and the current price levels we get:

- Electricity price in the border node in Russia is about 20 €/MWh
- The capacity cost can be around 25 €/MW,h
- The grid fee can be e.g. 5 €/MWh

The price in the Nordic market has to be at least 50 €/MWh to make the cross-border trading profitable → there is a ‘dead-band’ in the cross-border trade when prices in the Nordic market are 0-50 €/MWh
Hypothetical case: exporting electricity from the Nordic market to the Russian market

- The cross-border trader has to go under the day-ahead electricity price in the border node in Russia, e.g. 20 €/MWh → cross-border trading is profitable only when the price in the Nordic market is below 20 €/MWh (ignoring grid fees)

If two-way trading was possible, there would be a 'dead-band' in the cross-border trade when the Nordic electricity prices are 20-50 €/MWh

Economic impacts of reduced cross-border trade in the import market (Nordic)

- The import market sees lower supply as a result of reduced cross-border trade, causing a price increase
  - Consumer surplus is reduced
  - Producer surplus increases
Economic impacts of reduced cross-border trade in the export market (Russia)

- The export market sees lower demand (the cross-border trader buys less in the day-ahead market), causing a price decrease
  - Consumer surplus increases in the day-head market but the capacity price stays the same → consumers are paying for extra reserve
  - Producer surplus is reduced in the day-ahead market but some compensation comes through capacity payments

European electricity markets goals

1. Market integration
   - More efficient use of cross-border connections
   - Increased social welfare
   - Price convergence
   - Reduced need for reserve capacity

2. Carbon-free electricity generation
   - RES schemes
   - Need to support conventional generation to stay in the market as reserve capacity → national capacity mechanisms?
What can we learn from studying the interaction of the Nordic and Russian electricity markets?

- The lesson: Different market designs can have a significant impact on the use of the cross-border connection
  - Inefficient use of the transmission lines, e.g. day-head electricity prices could justify the trade but capacity payments prevent it \(\rightarrow\) COMMERCIAL BOTTLENECK

- The situation in Europe at present: transmission networks are characterized by TECHNICAL BOTTLENECKS:
  - We need more cross-border capacity to support the single market
  - We need more transmission capacity to level out the impacts of intermittent renewable generation

Conclusions

- Technical bottlenecks can limit the cross-border trade but the commercial bottlenecks can stop the trade entirely
  - Europe is trying to solve the technical bottleneck problem by extensive investment program to upgrade the transmission networks
  - At the same time, the national capacity mechanisms can create commercial bottlenecks that cause inefficient use of the lines
  - Bottlenecks always have welfare impacts

- We are missing the analysis concerning the impacts of national capacity mechanisms on market integration and the cross-border flows in Europe
  - Nordic–Russian -interconnection is one the few test cases where we can learn about the challenges of different market designs

- Europe cannot afford the inefficient use of transmission networks if it wants to promote renewable generation and the single market
Thank you!