Potential benefits and regulatory risks for new interconnections from Norway

Kick off seminar Hydro Balance
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Agenda

- Economics of Interconnectors
  - ✓ Norway – Europe/UK
- Benefits must exceed costs for all parties who can stop the project
  - ✓ Or it will not be realised
- Regulation matters – four examples
  - ✓ The case of ITC
  - ✓ Capacity pricing
  - ✓ Carbon pricing
- Regulatory risk: What can be done?

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Decarbonisation => Reducing flexible generation and increasing intermittent renewable generation

- We need new flexibility in generation, consumption and storage
- We need transmission and interconnection in order to
  - Even out some of the variability of intermittent generation across Europe
  - Use existing flexibility efficiently
  - Develop new flexibility where it is cost efficient

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Economics of Interconnectors

Norway – Continental / UK

- **Capital intensive. Life span of up to 60 years. 1,2 M€/MW + national grid reinforcements**
- Today: Available flexibility and "implicit pumping"
- Expansion beyond existing plans will soon require new generation capacity, and a bit later also increased pumping capacity
  - ✓ Pumping capacity: +/- 0,3 M€/MW
  - ✓ Higher short term cost of flexibility with pumping – energy efficiency 75%?
    - Interaction with increased Norwegian benefits from (seasonal) pumping?
  - ✓ *May need coordinated expansion of interconnectors and hydro flexibility. New regulation?*

Economics of Interconnectors

Norway – Continental / UK

Benefits / revenues come from

- **Price differences** (day ahead, intra day, ancillary services)
  - Congestion rent
  - Consumer and producer surplus
- Security of supply, reduced price uncertainty, more efficient competition
  - Capacity payments…

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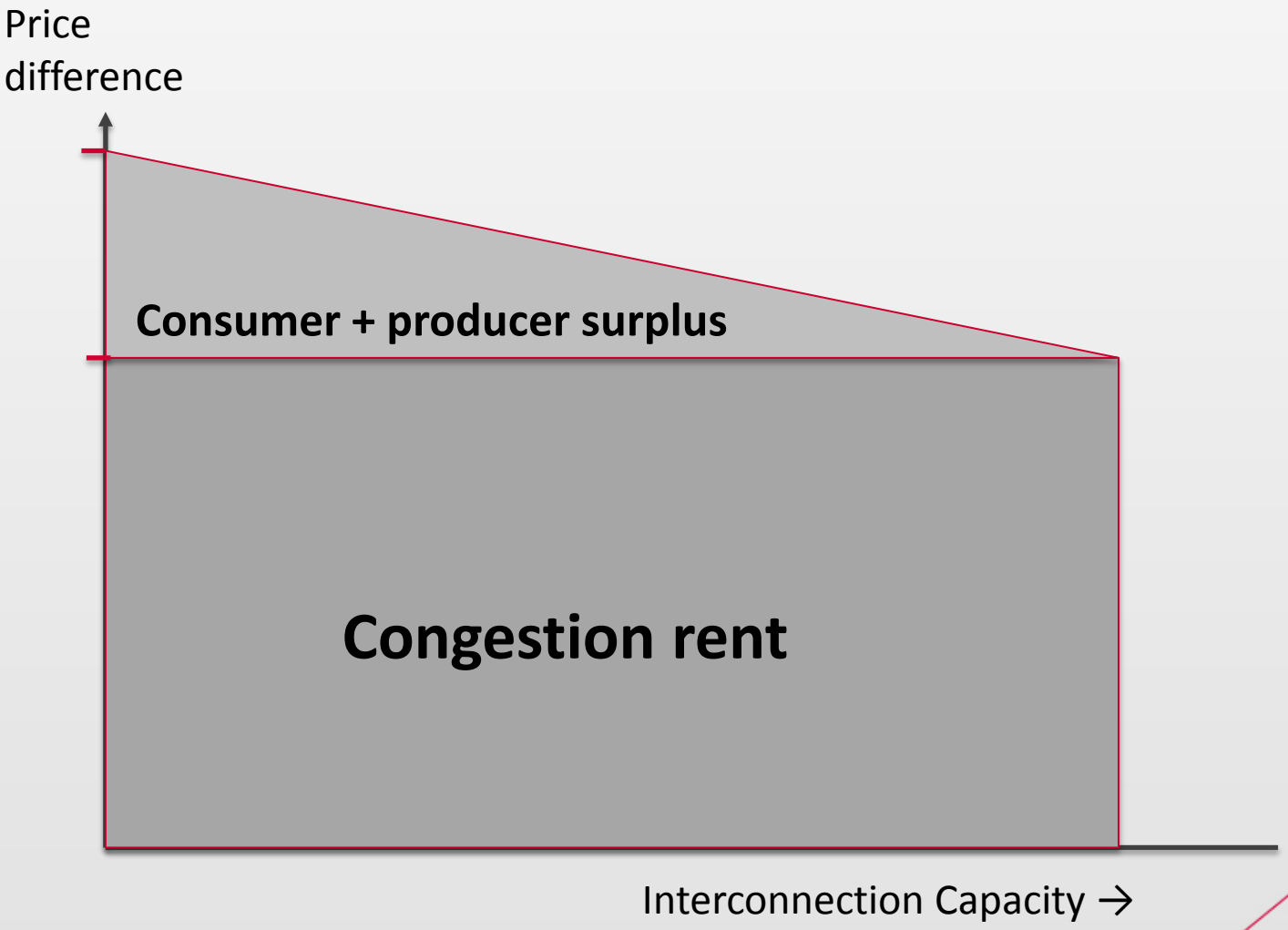
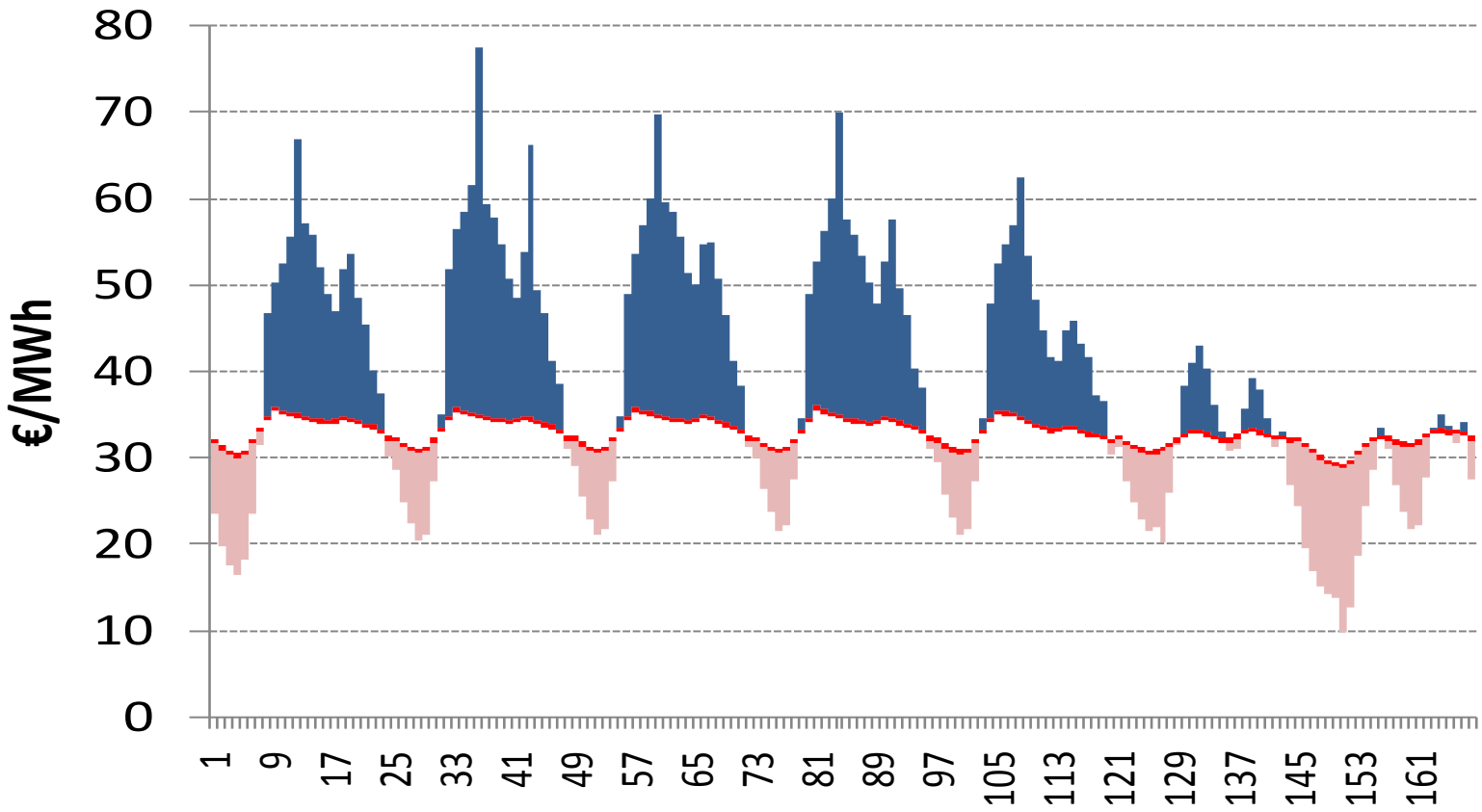
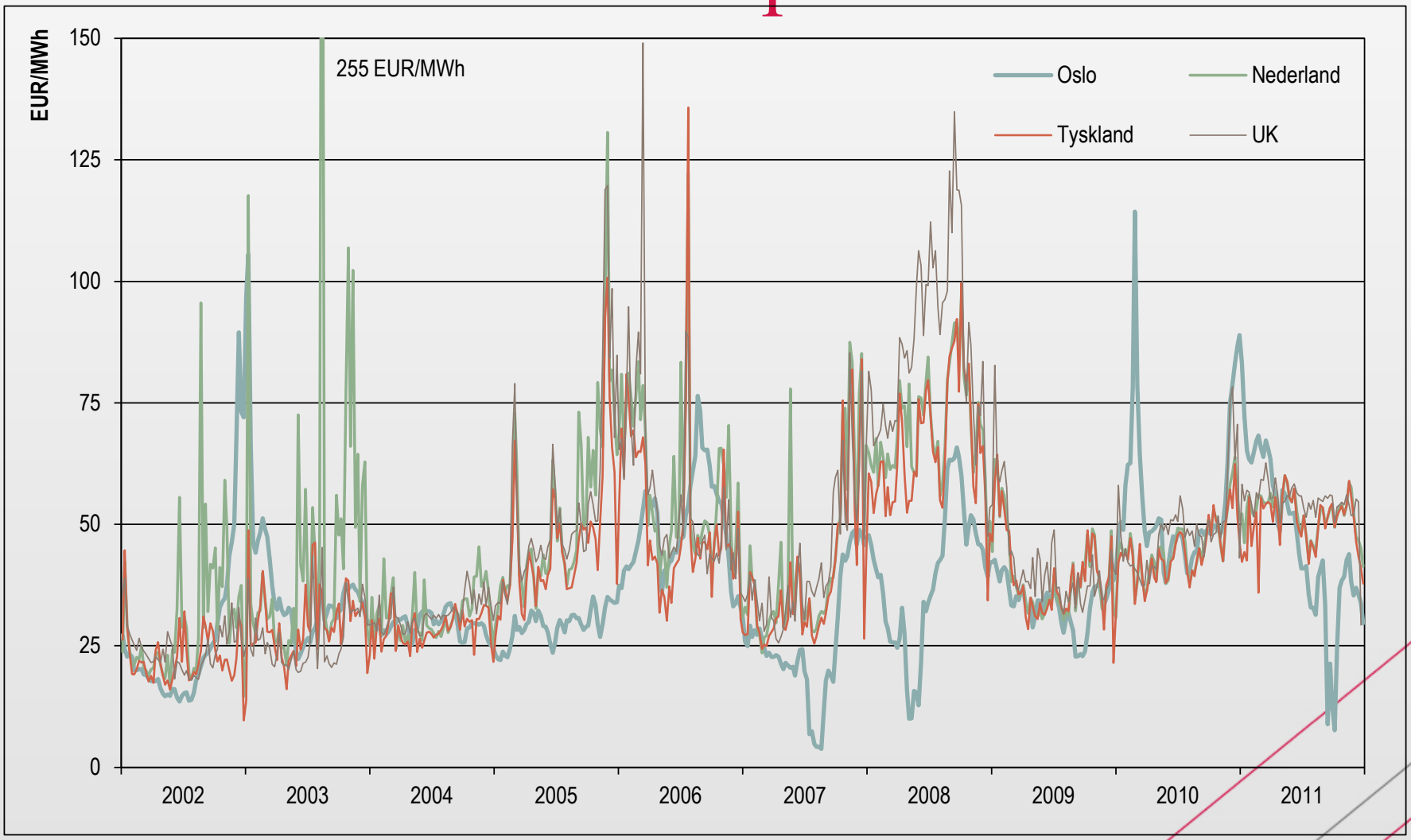
Diminishing incremental revenue when capacity is expanded



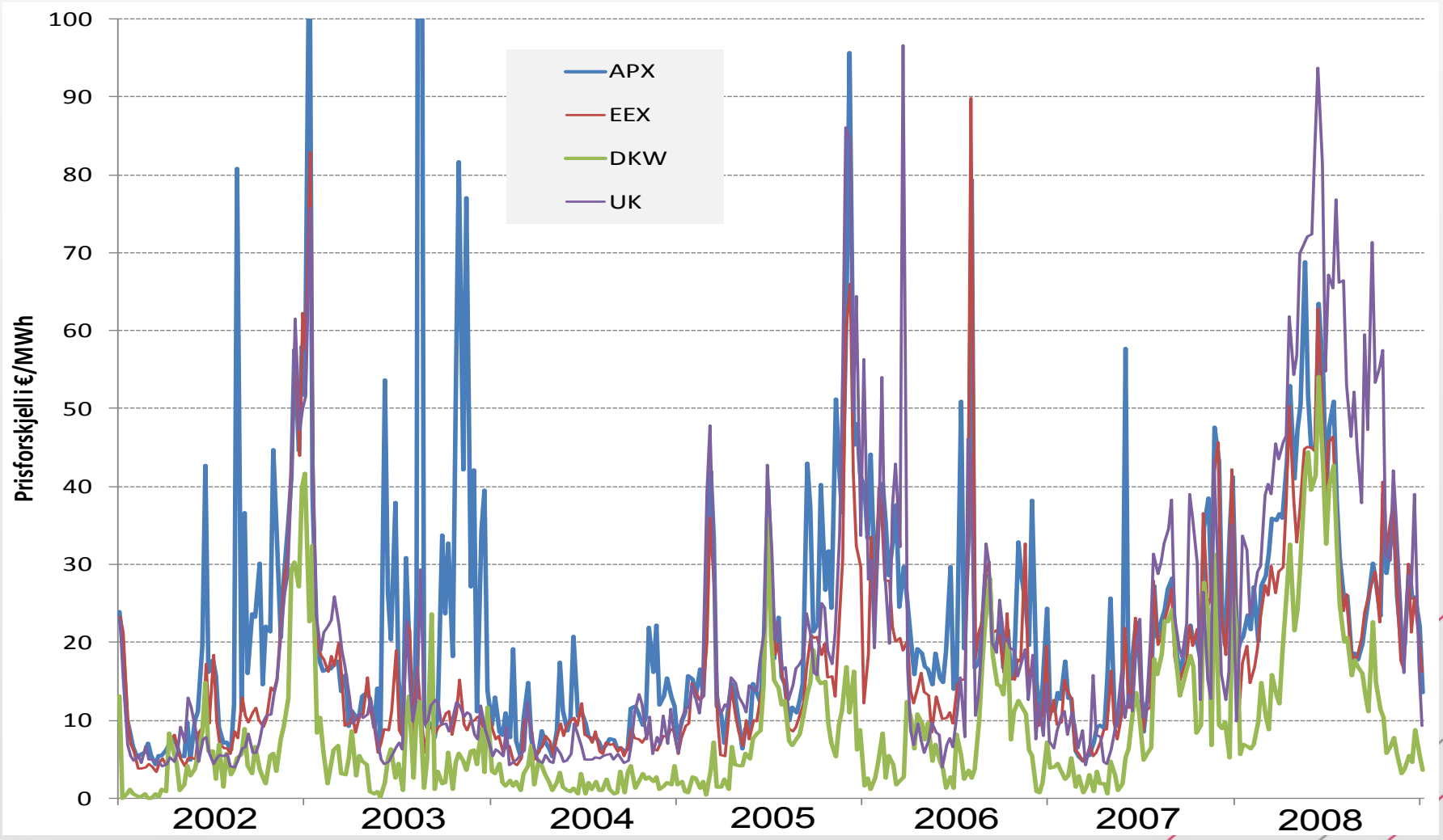
Price difference a normal week



Market shocks and fuel price variations increase profit



Average price difference per week varies substantially (Norway – partner)



How much is profitable from a European perspective?

- The first new interconnectors seem to profitable
- History tells us…
- Technical potential > 20 GW
- More intermittent generation and higher CO2-prices increase profitability
- But what about the PV and capacity payments cutting peak prices?

Benefits must exceed costs for everyone with the power to stop an interconnector

- Two countries must agree
  - And there are many stakeholders...
- Perceptions of future benefits may differ
- Uncertainty
  - Market development (e.g. fuel prices)
  - Technology
  - **Regulatory risk**

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Regulation example 1: Inter TSO Compensation (ITC)

- ITC generates payments between countries (TSOs) for the "use" of the grid in other countries
  - To cover variable cost and incremental capacity cost
  - Norway currently pays approx € 12 million per year
  - Suggested and postponed model: approx € 90 million per year
- E.g. Norway sells power to Denmark and have to pay for the use of the grid all the way to Italy...

⇒ For Norway: A tax on interconnections – a strong disincentive if not kept under control

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Example 2: Capacity payments

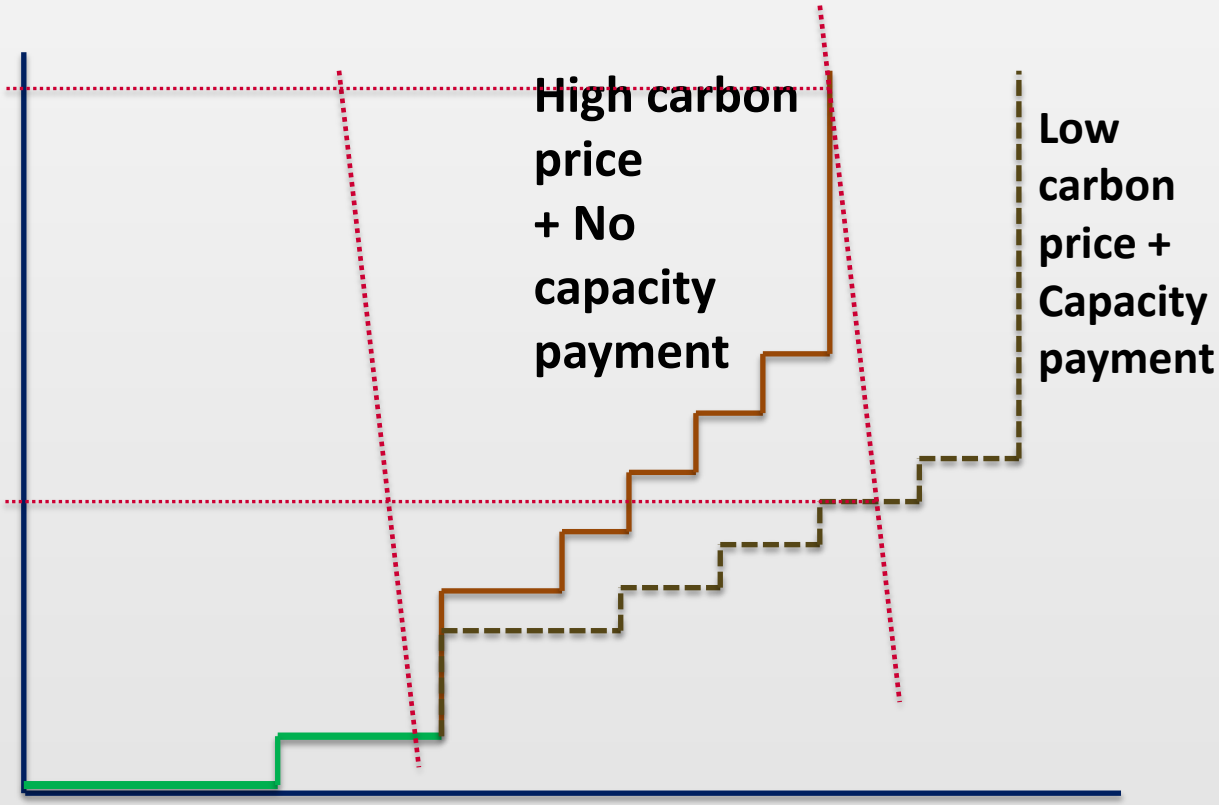
- Capacity payments increase capacity and reduce peak prices in the day ahead market
- *Distort investments unless demand, storage and interconnectors are included*
  - Worst case: supporting old coal plants instead of promoting new flexibility

Example 4: Too low carbon price

- Support for renewables and energy efficiency programs imply that we can reach a given emission level with a lower carbon price

  $\Rightarrow$ Carbon price lower than shadow price of emissions
- Low carbon price → lower peak prices
  - Lower start and stop cost, lower MC in the higher end of the supply curve
- Reduces the profitability of an interconnection to Norway

Capacity payments and too low carbon price



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Regulatory risk: What can be done?

- *Can we reduce the risk*?
  - Reach a more stable and better market design, political framework and regulation? A common need for most investors in the power sector
    - E.g.: 2030 targets and a (more) credible political framework in Europa. Climate low in UK
    - National/EU agreements that exclude some regulatory risk
  - Contracts or business models that reduce counter part risks?
    - E.g. Handling of grid congestions or hydro producers responding according to true costs and capacity
  - EU, ENTSO-E, States, TSOs and other players involved

Regulatory risk: What can be done?

- *Can we share the risk in a better way?*
  - Business models and long term contracts?
  - For a country that *needs* flexibility, an interconnector reduces total risk
    - More *diversified* against system crises – easier to let the market solve the balancing
    - An argument for putting more of the financial risk on the importers?
  - Ownership?

Thank you

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