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EUROPEAN POWER MARKET DEVELOPMENTS AND IMPLICATIONS FOR NORWAY

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DRIVERS THAT IMPACT NORDIC HYDRO RESOURCES

Value of energy

Value of flexibility

CO₂ market development

Impacts costs for thermal generation & water values

Impacts relationship coal vs. gas

RES developments

Drives thermal generation out of market and depresses prices

Increases the need to balance intermittent generation

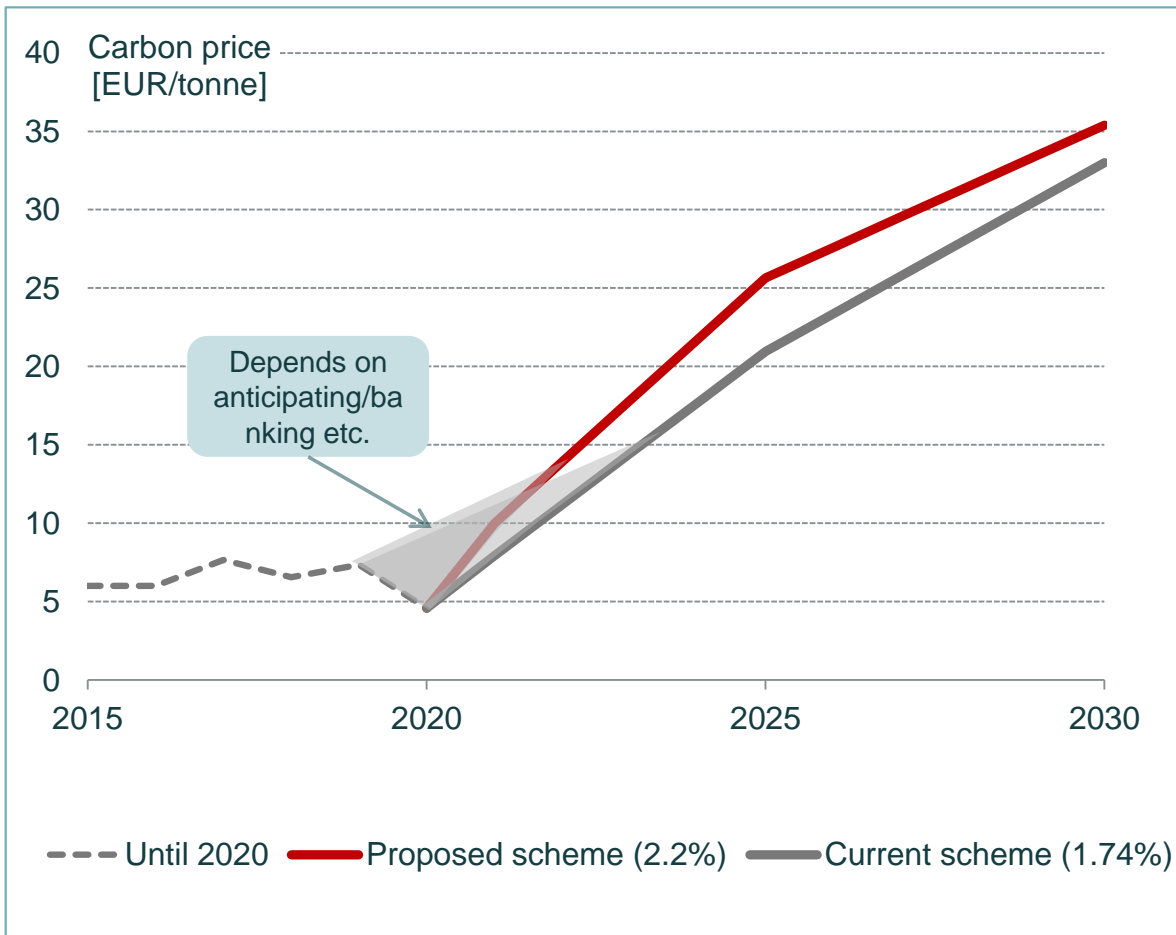
Market developments
(Cables, capacity markets, and price zones)

Cables increase value – but policy and regulation crucial

Opportunities in non-energy markets

CO₂ PRICE MAY INCREASE SUBSTANTIALLY POST 2020

Possible CO₂ price developments until 2030

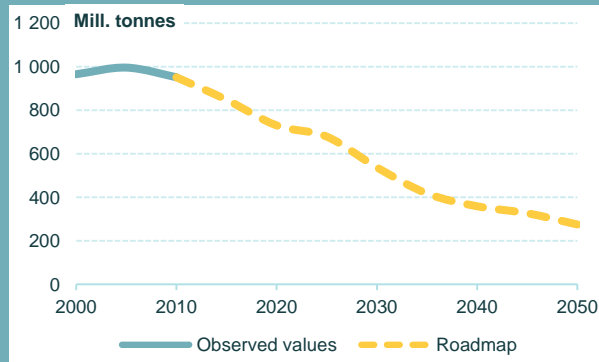


Driven by EU Road Map

Emissions reductions 2030 EU ETS

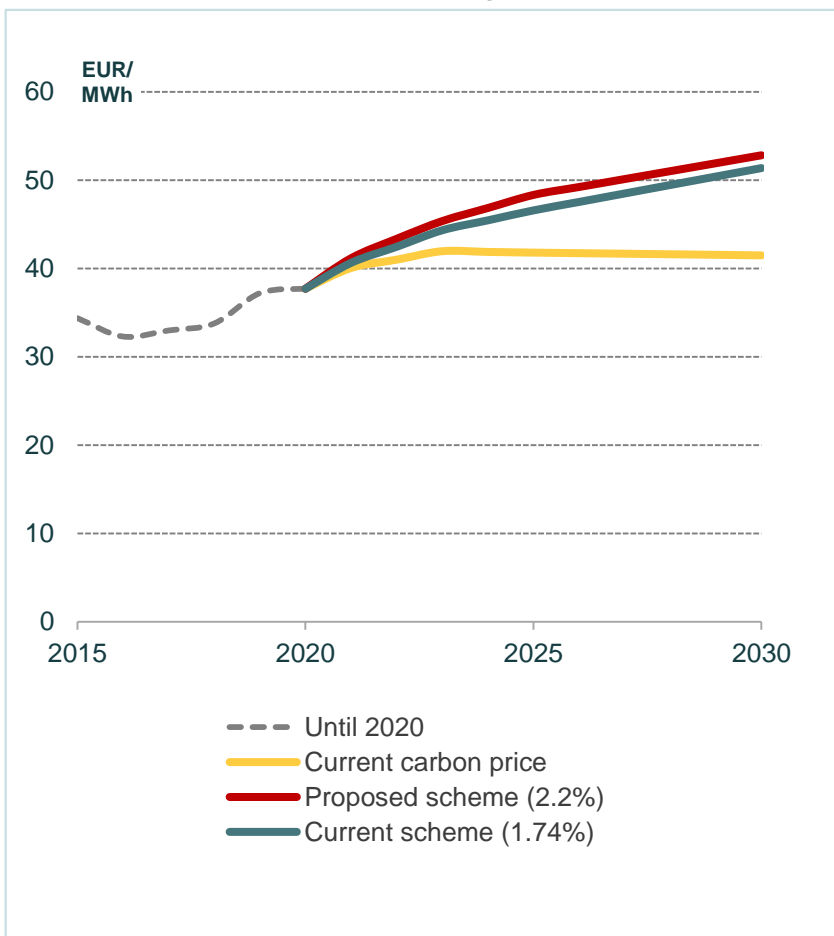
	2005	2030	2050
Total	-7%	-40 til -44%	-79 til -82%
Kraftsektoren	-7%	-54 til -68%	-93 til -99%
Industri	-20%	-34 til -40%	-83 til -87%
Transport	+30%	+20 til -9%	-54 til -67%
Husholdninger og tjenester	-12%	-37 til -53%	-88 til -91%
Jordbrug	-20%	-36 til -37%	-42 til -49%
Annet	-30%	-72 til -73%	-70 til -78%

Estimated emissions power & heat sector



DIRECT IMPACT ON NORWEGIAN POWER PRICES

Power prices Norway

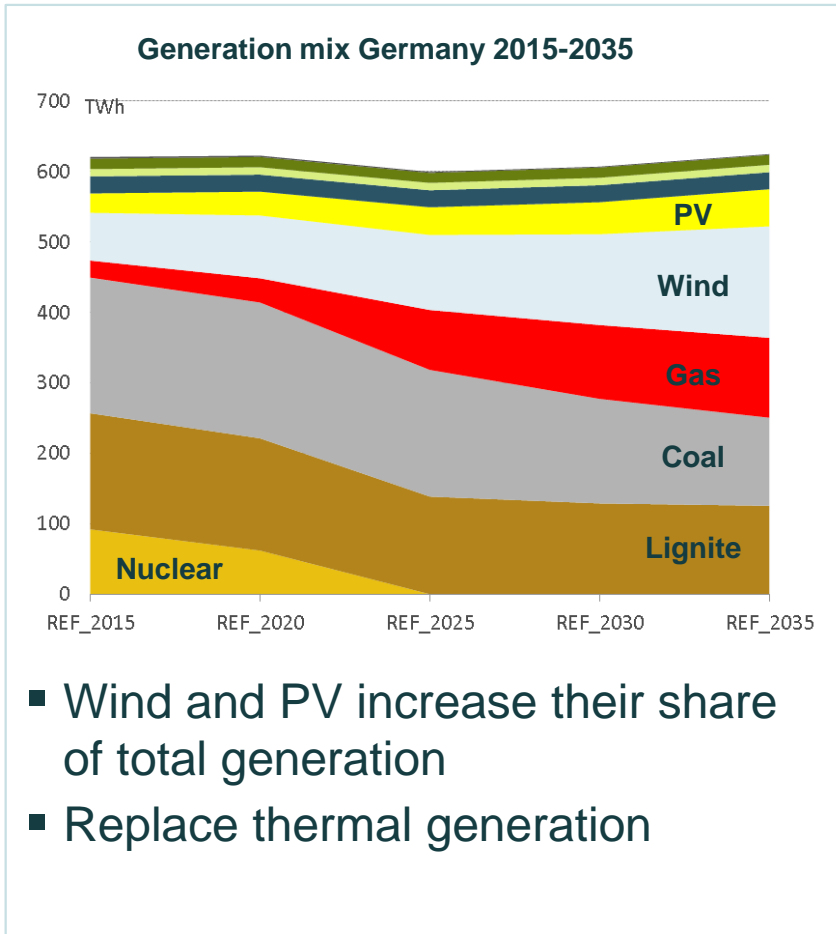


Impact on hydro power

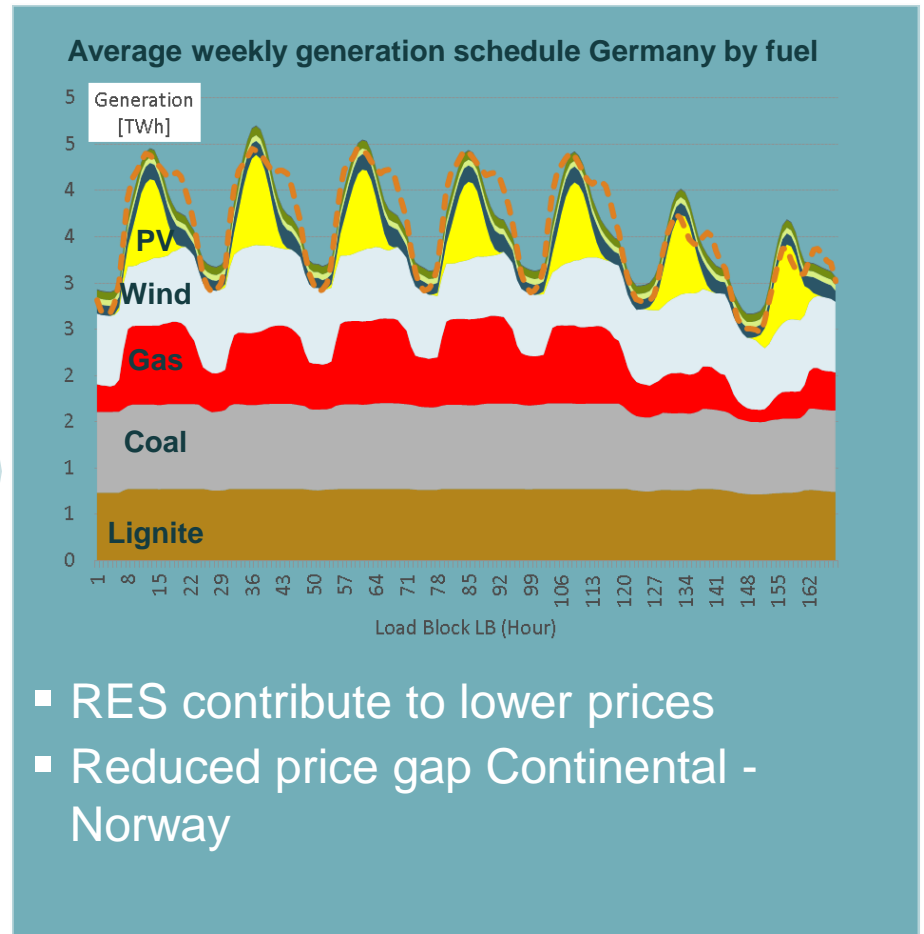
- High CO₂ prices are good news for Norwegian hydro power producers
 - Higher power prices = Higher revenues
- Main threat: CO₂ price collapse (or collapse in price of natural gas)
 - Currently surplus of more than 2.1 billion CO₂ allowances, and unlikely to be reduced substantially in the period up to 2030.
 - Crucial: Market confidence in a continuation of the EU ETS post 2030

INCREASING RES SHARES SURPRESS PRICES

RES developments Continent

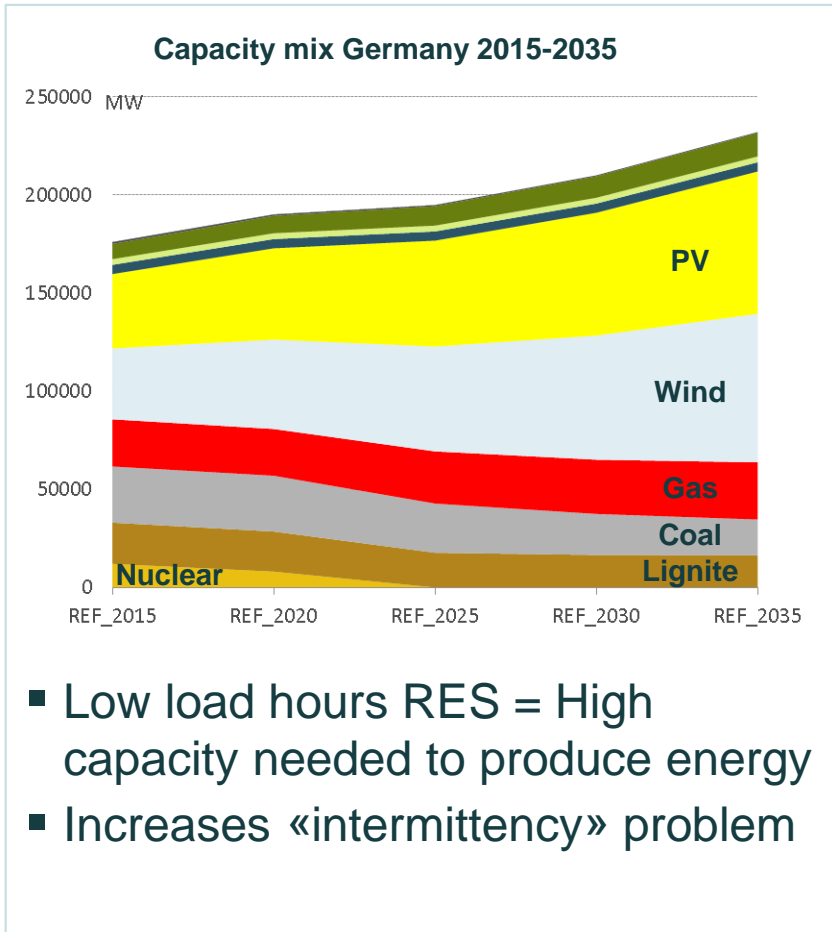


Replaces thermal generation

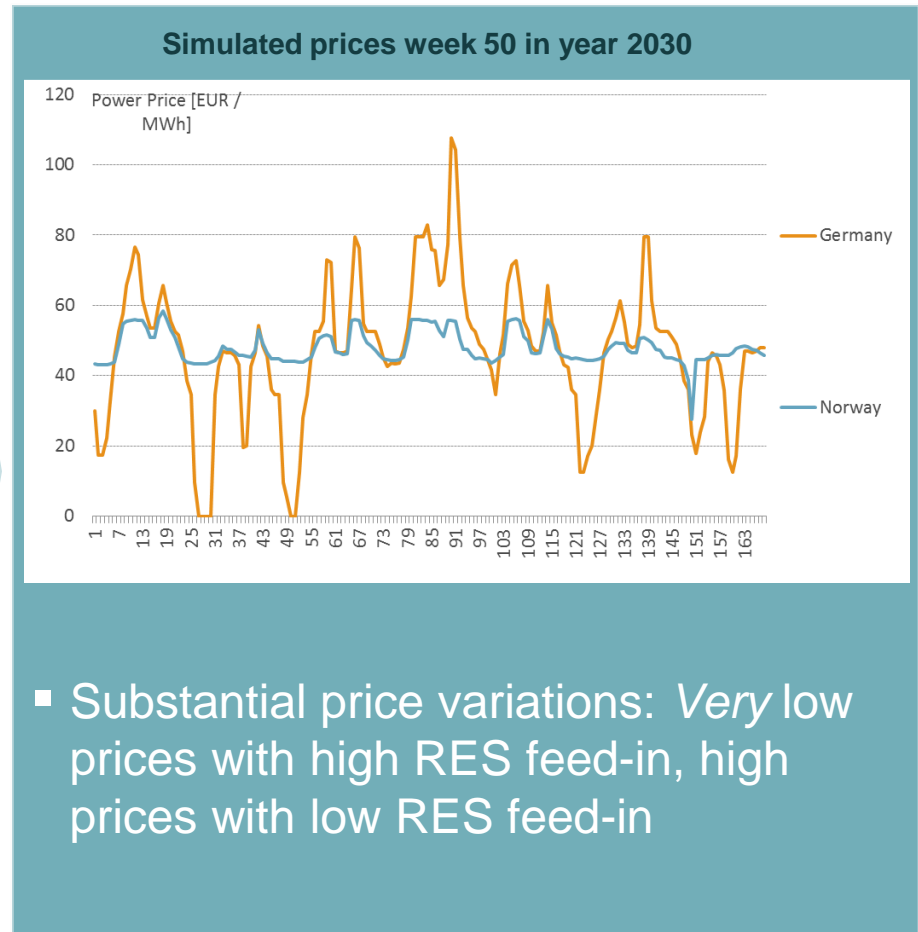


VOLATILITY INCREASES, HENCE NEED FOR FLEXIBILITY

RES capacity shares substantial



Substantial price swings

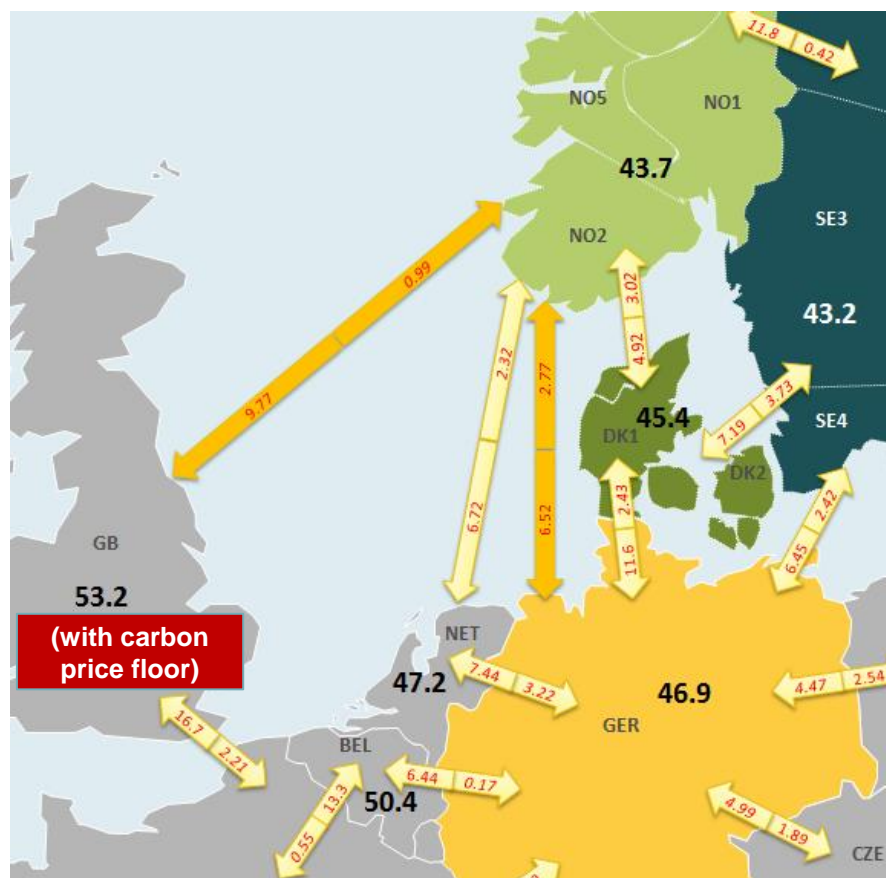


NEW CABLES INCREASE MARKET INTEGRATION

Planned new cables

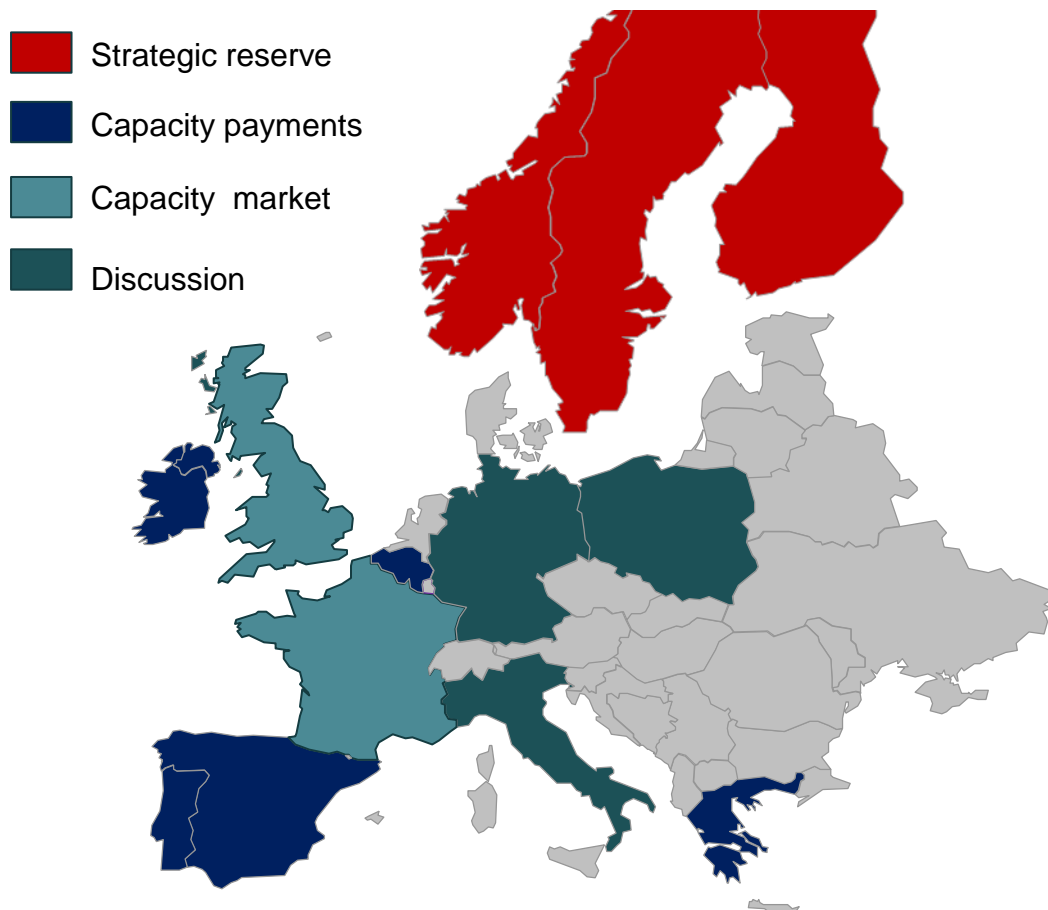
- Several cable projects
 - NordLink to Germany
 - NorthConnect to GB
 - Other initiatives
- Physically more integrated system
 - Increase prices convergion
- Potential opportunities for Nordic players (in addition to somewhat higher prices)

Simulated trade 2030 between selected countries



CAPACITY MARKETS AS SAVIOR AND THREAT

Capacity market overview



Problems

- Nationally oriented responses
 - Not taking the IEM and X-border trade into account
 - Could contribute to excess capacity and lower prices
- May reduce value of trade and undermine cable revenues
- Market design for cross-border trade not clear

BOTH OPPORTUNITIES AND THREATS ON THE HORIZON

Main opportunities

- Credible and tight carbon policy
 - Re-instate market confidence
 - High carbon prices
 - High power prices
- Well designed capacity markets (if needed) with cross-border participation
- Participation in other markets in other time frames
 - Reserve capacities, balancing

Main threats

- Low carbon prices resulting from lack in market confidence
- Too one-sided focus on RES subsidies
- Ill-designed capacity markets not allowing for cross-border activity
 - Over-capacities
 - Low spot prices
 - Little opportunities



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