



Renewable Energy in the Market.

Marco Caflisch
9th of November 2012

Overview.

- Political targets to increase renewable energy production
- Electricity trading
- Electricity generation types and their influence on the market
- Balance energy prices
- Increasing the renewable share in the electricity market

Renewable Energy Politics. Targets.

- 20/20/20 Targets, European Union
 - a 20% reduction in EU greenhouse gas emissions from 1990 levels;
 - raising the share of EU energy consumption produced from renewable resources to 20%;
 - a 20% improvement in the EU's energy efficiency.
- „Energiepolitik 2050“, Swiss Government
 - security of supply without new nuclear power plants
- Energy politics, City of Zurich
 - no new investments in nuclear power plants (decision 2008)
 - 2000W / 1t CO₂ society
 - Investing in renewable energy

Overview.

- Political targets to increase renewable energy production
- **Electricity trading**
- Electricity generation types and their influence on the market
- Balance energy prices
- Increasing the renewable share in the electricity market

Electricity Trading Markets.

bilateral trading

OTC Trading

trading on exchanges

Long term trading

D-1 Auction

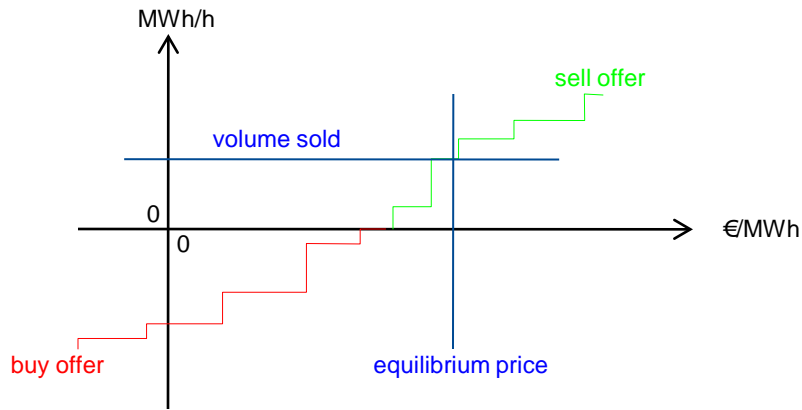
Intraday

Time of delivery

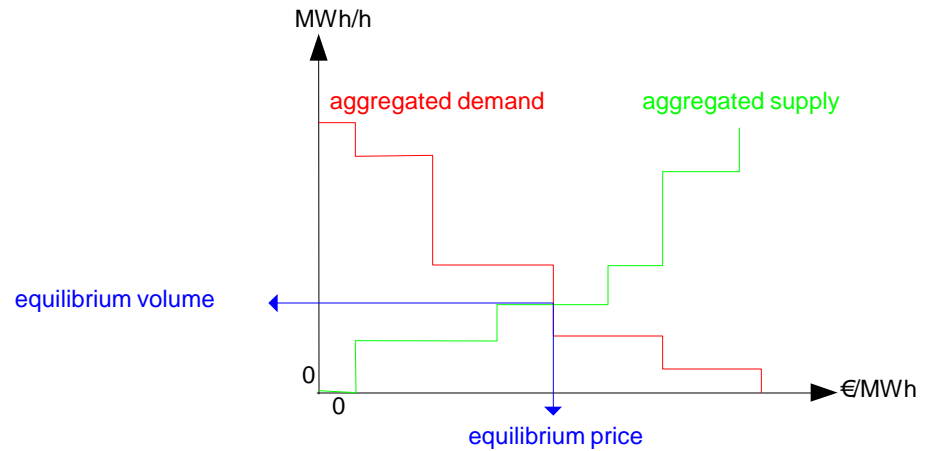
- OTC (over the counter)
 - Bilateral trade
- Long term trading (futures)
- D-1 Auction („spot prices“)
 - 1 price per delivery hour
- Intraday trading

Spot exchange D-1 auction.

offer by trader



spot exchange (aggregated offers)



volume

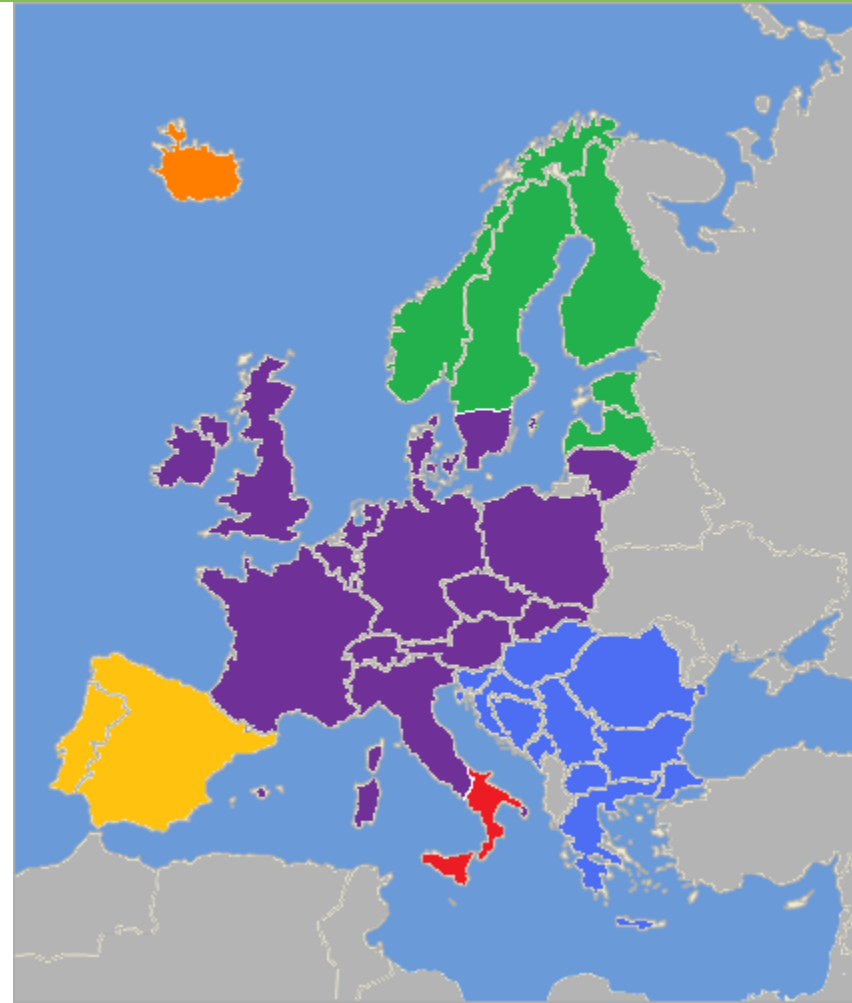


price

European electricity markets.

EU target: common electricity market.

- Past:
 - ~ 1 market area per country
 - 1 price per market area
 - Cross-border deals lead to converging prices
- EU target:
 - 1 common electricity price in Europe
- Consideration of grid congestions:
 - Market splitting for hours with congestions



[figurative illustration]

European electricity markets.

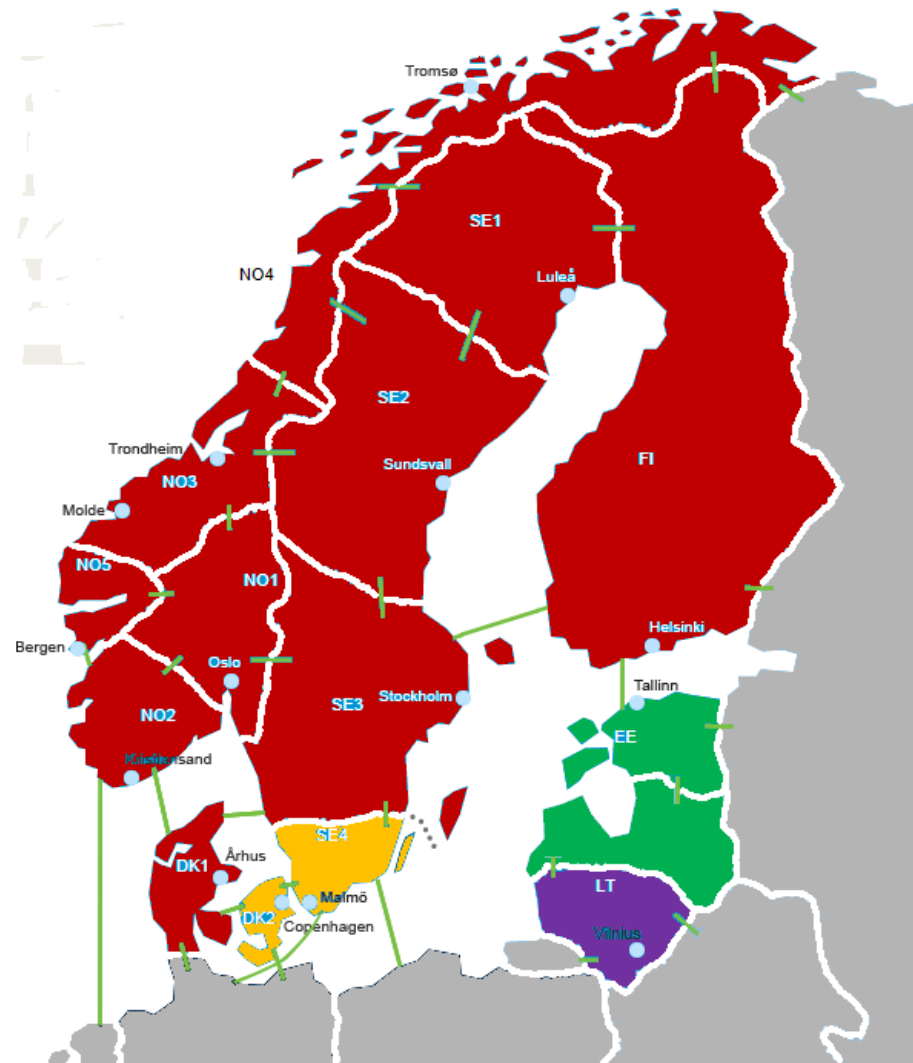
Advantages of a Market Coupling.

- Price signals (induced by over-supply / -demand) are transmitted over different electricity markets
 - e.g. The incentive for swiss pump storage plants to pump if strong winds blow in the north sea
- Incentive for investments in transmission capacities, if market areas are defined by physical grid congestions.
 - e.g. merchant lines
- Smaller price volatility due to higher traded volumes
- Effective use of full available grid capacity

Example.

Market Coupling Nordpool.

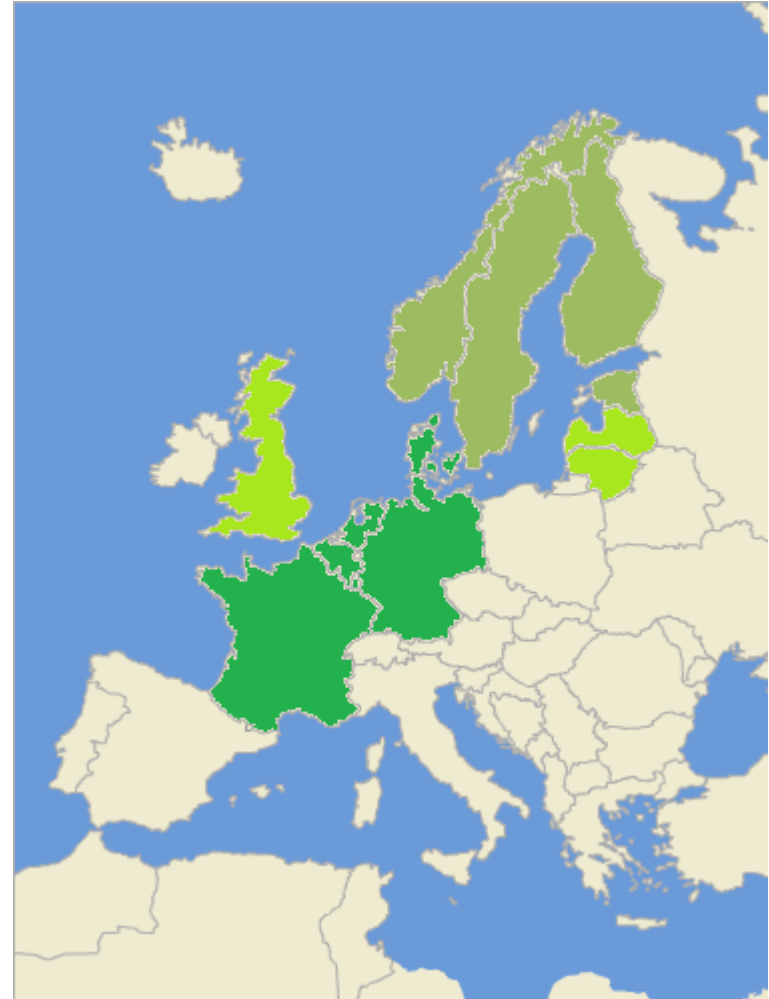
- Market Coupling in Scandinavia since 1993
- Market areas defined by grid bottlenecks
- Example of 5.7.2012 shows the market splitting within the coupled markets (24 single hours)



NWE.

Most progressive market coupling area in Europe.

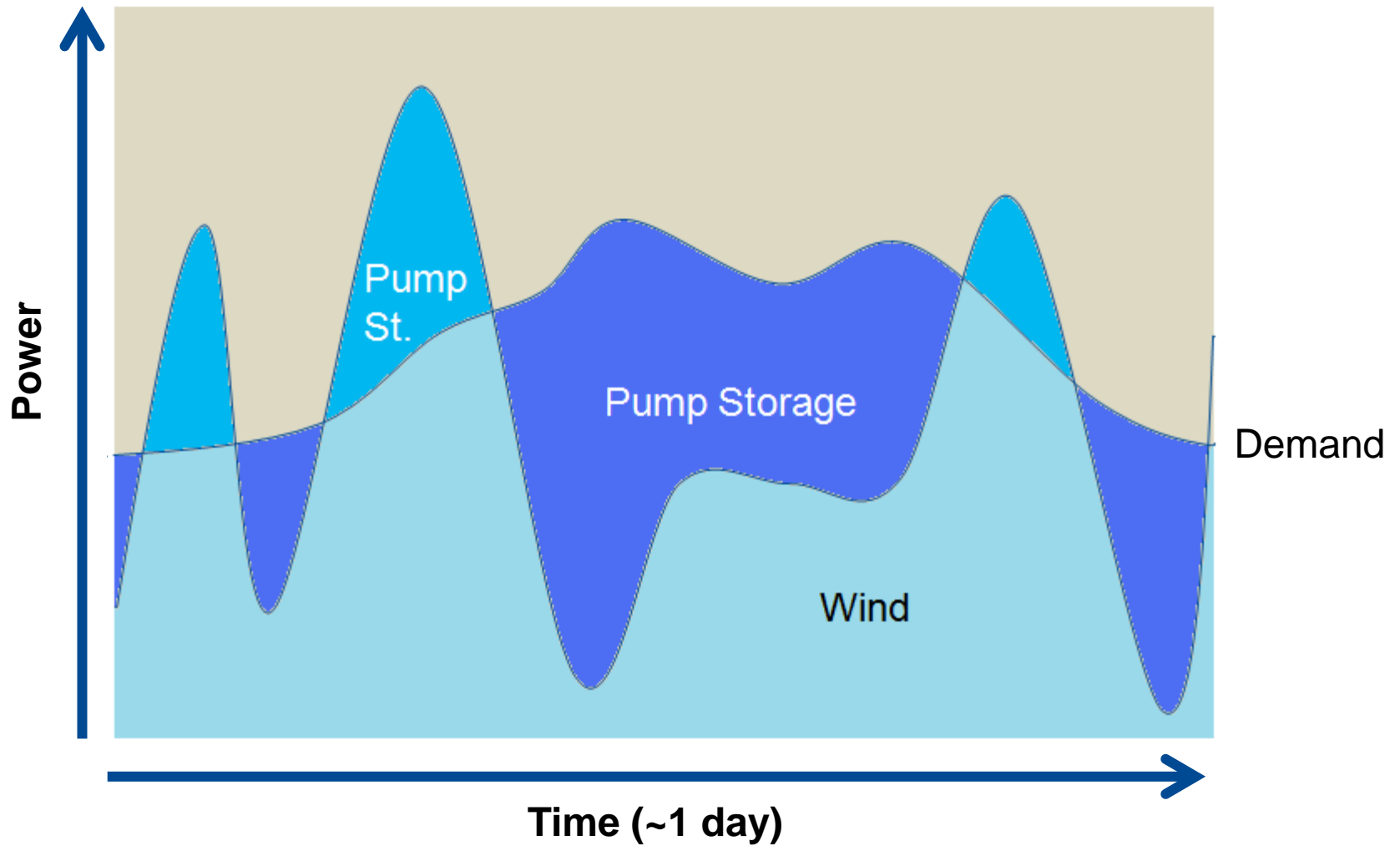
- Since 1993 Market Coupling in Sweden / Norway
- Since 2006 Market Coupling in FR / BE / NL (+LU +DE 2010)
- Since 2011 Volume Coupling of both regions (+ FI +EE)
- In 2013 UK, LV, LT are joining



Overview.

- Political targets to increase renewable energy production
- Electricity trading
- **Electricity generation types and their influence on the market**
- Balance energy prices
- Increasing the renewable share in the electricity market

Daily Demand Shape.



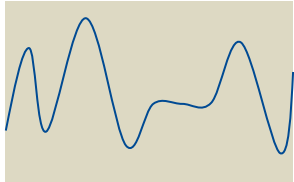
Production Types by shape.



constant

Nuclear Fission

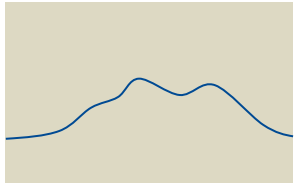
Run Of River



volatile

Solar PV

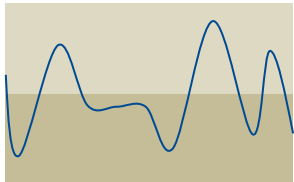
Wind Onshore



flexible

Natural Gas

Hydro Storage



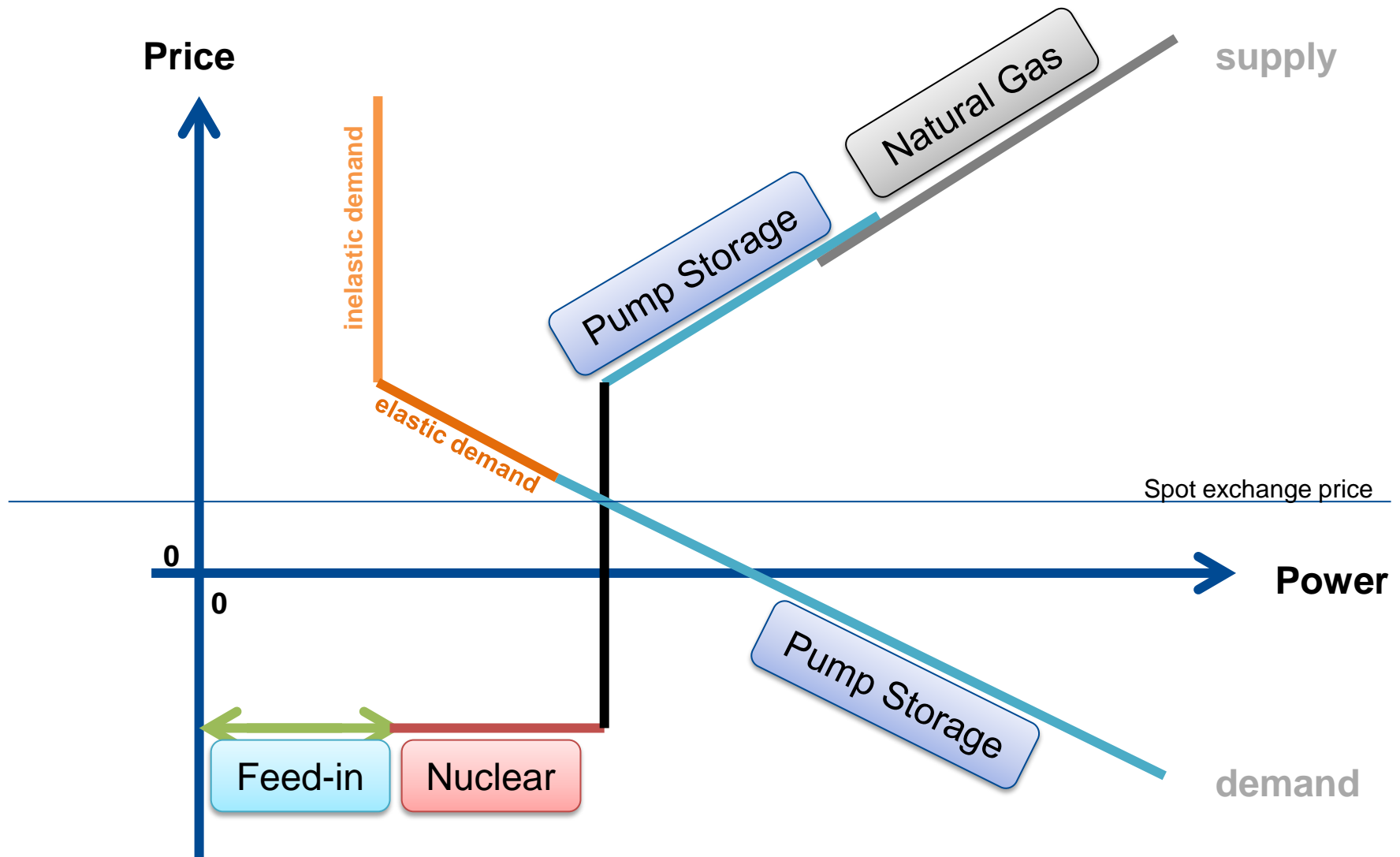
flexible,
supply / demand relevant

Pump Storage

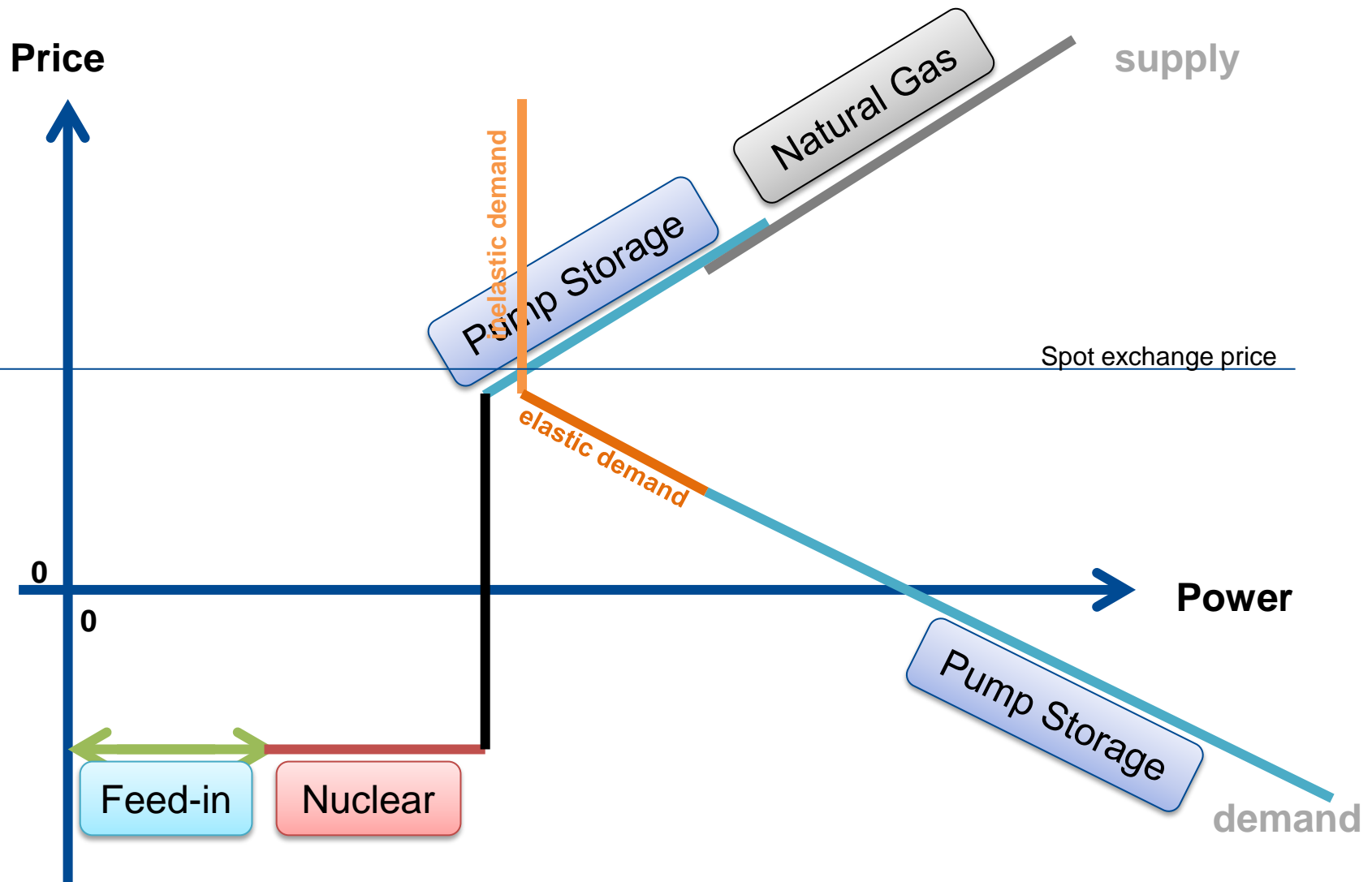
Thermal Storage

Price building.

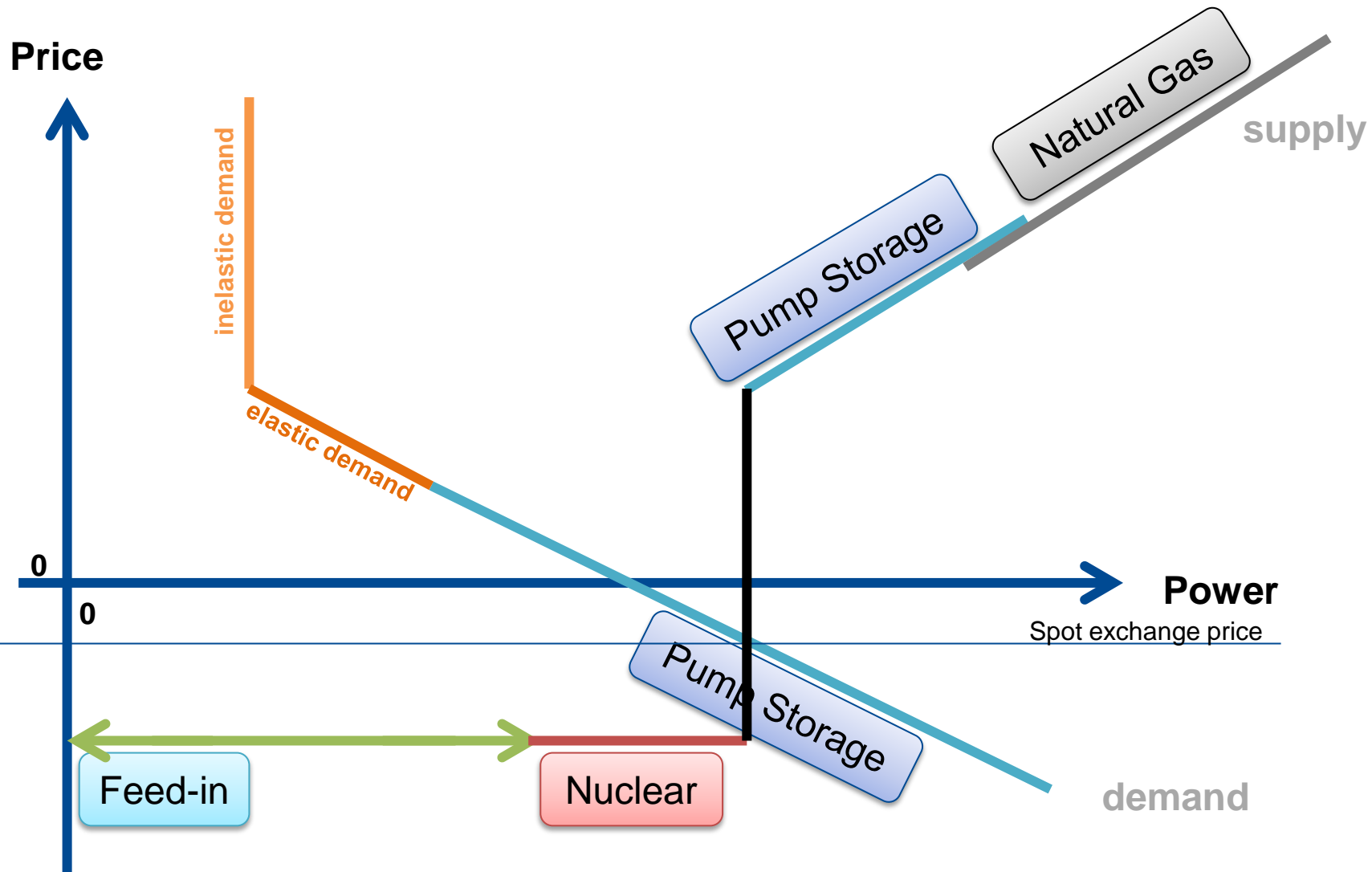
Simplified short term example (1 single hour D-1).



Price effects. Short term (1 single hour D-1). High demand at noon.



Price effects. Short term (1 single hour D-1). High renewable production.



Overview.

- Political targets to increase renewable energy production
- Electricity trading
- Electricity generation types and their influence on the market
- **Balance energy prices**
- Increasing the renewable share in the electricity market

Balancing Energy Prices.

Penalizing for unbalances in different Control Areas.

Imbalance prices in comparison to market prices	grid- destabilizing imbalance of a producer (e.g. balance group ewz)	grid- stabilizing imbalance of a producer (e.g. balance group ewz)
Germany (all 4 CA's)	worse than market prices	better than market prices
France (CA RTE)	worse than market prices	equal to market prices
Switzerland (CA Swissgrid)	worse than market prices	worse than market prices

Overview.

- Political targets to increase renewable energy production
- Electricity trading
- Electricity generation types and their influence on the market
- Balance energy prices
- Increasing the renewable share in the electricity market

Conclusions.

How to support renewable energy on electricity markets.

- Funding renewables outside the wholesale electricity markets:
 - Economic incentives (Feed-In tariffs, auctions for attainment of regulatory quotas)
 - Certificate markets

- Incentives for price-stabilizing elements in markets with high renewable shares
 - Storage (e.g. pump storage / on-site storage / power to gas/heat)
 - Backup power plants (e.g. gas)
 - Large markets (market coupling, grid enforcements)
 - Demand side management

- Reducing the penalty in balance energy prices (for grid-stabilizing unbalances)

Questions?

