



School of
Management and Law

Power Market Regulation: Basic Issues



Building Competence. Crossing Borders.

Prof. Dr. Reto Schleiniger
shie@zhaw.ch

«Hot Topics»

Security of power supply

Can a free market bring forward an adequate level of production capacity?

If not, what regulation is needed to attain an adequate level?

Support for renewables

Why should renewables be supported at all?

What is the relation between power market policy and climate policy?

Security of Supply: Different Interpretations

Political interpretation:

Power supply always satisfies demand at reasonable prices.

(Swiss Federal Council)

Problem:

In a liberalized market prices should not be capped in order to:

- Balance demand and supply
- Give investment incentives

Economic interpretation:

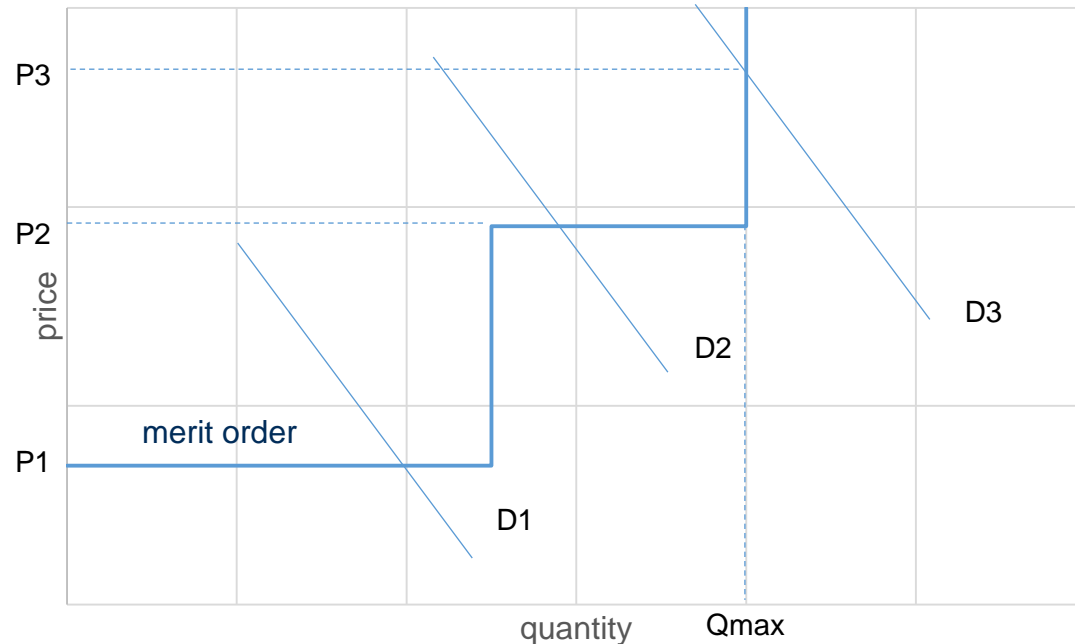
End users can obtain power whenever their willingness to pay is higher than the market price.

(German Federal Ministry of Economics and Technology)

Economic interpretation does not rule out high prices.

Security of Supply: The Ideal Market Solution

Market diagram in ideal market model



Fluctuating demand (D1, D2, D3)
yields different prices (P1, P2, P3)

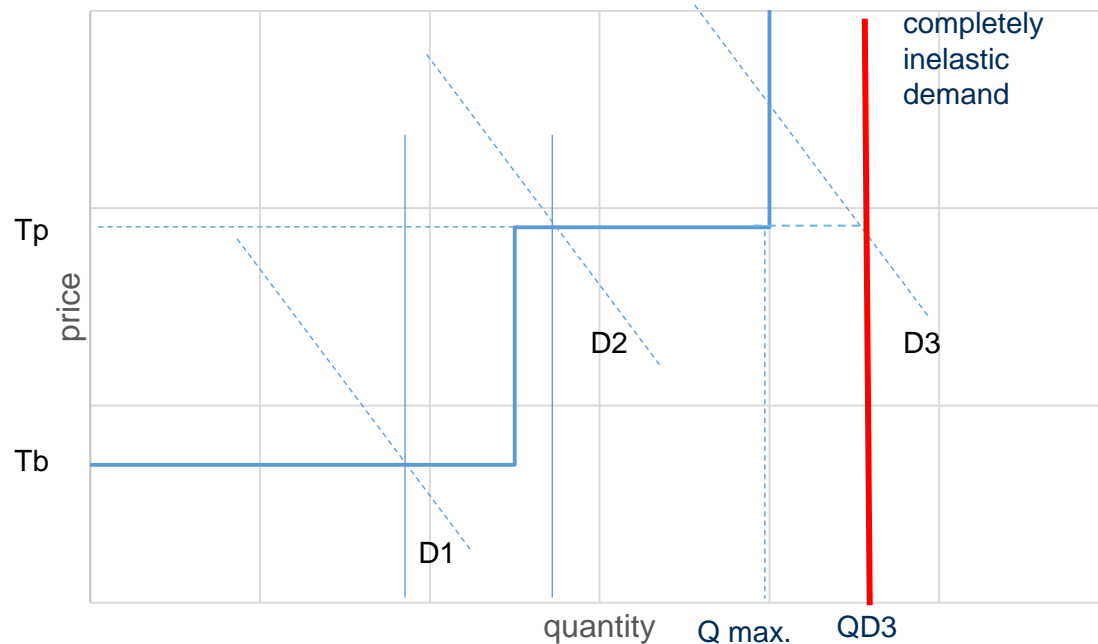
Capacity adjustment in the long-run:

- revenue < cost => production capacity declines => prices increase (until revenue = cost)
 - revenue > cost => production capacity rises => prices decrease (until revenue = cost)
- => Resulting capacity is optimal

Crucial assumption: Demand reacts to price changes

Security of Supply: Two Tariff Scheme

Market diagram with two tariff scheme



Two tariff scheme for end user:

- Base tariff T_b
- Peak tariff T_p

At demand situation 3 there is no spot market price that balances supply and demand

⇒ No market equilibrium results!

Underlying reason: Demand is completely price-inelastic

Security of Supply: Possible Solutions

- Real-time metering and billing

Continuously controlling market prices and adjusting consumption accordingly is very costly.

→ Smart grid combined with internet of things might solve the problem one day

Until then, regulation is needed to overcome the problem:

- Price regulation (**Value-of-Lost-Load** pricing):

VoLL-prices (e. g. 20'000 Euro/MWh) are set when demand exceeds supply and load is shed.

=> incentives to build optimal level of production capacity

- Quantity regulation (capacity mechanism):

Optimal capacity is determined politically and purchased in capacity market

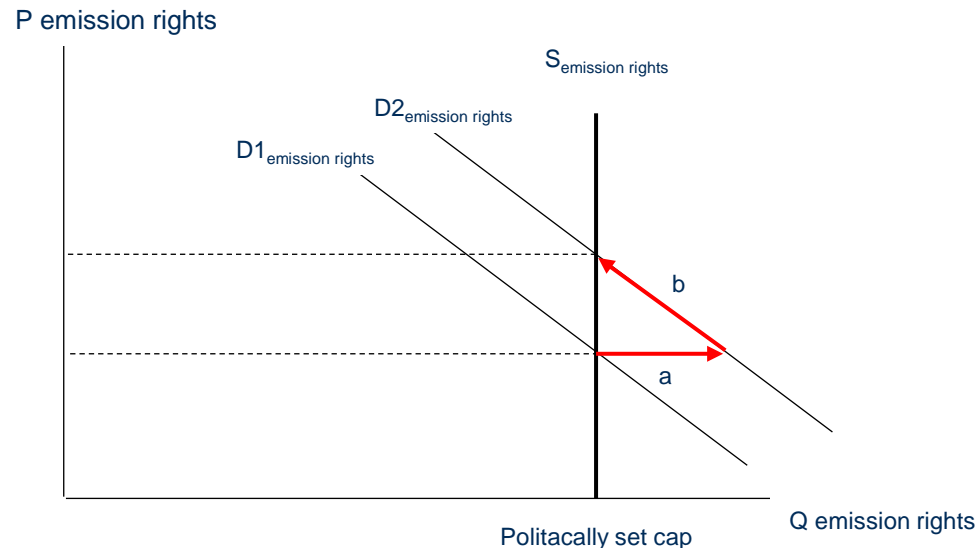
=> suppliers receive two income streams

- Capacity payment in the capacity market to cover fixed costs
- Power price in the energy market to cover variable costs

Support of Renewables and CO₂-Emissions

The CO₂-emissions of industrial emitters in the EU are capped by the EU emissions trading system.

Power import from fossil-fueled power plants and CO₂-emission price



Additional import demand for power from fossil-fueled plants increases the price for emission rights.

The total amount of emissions remains unchanged.

=> With a cap and trade system in force, power market policy has no effect on CO₂-emissions.

A more stringent cap on CO₂-emissions

- raises the price for emission rights
- raises the costs of fossil-fueled power plants considerably (10€/tCO₂ → 4-12 €/MWh)
- makes renewables more competitive.

Support of Renewables and Spill-Over from R&D Activities

R&D spill-overs represent positive externalities.

→ Private R&D efforts are too low.

Positive externalities can be internalized by subsidies.

However:

- R&D spill-overs are not limited to renewable energy activities.
- “... the share of social ... benefits of R&D in total benefits falls as we move downstream from pure research to technology innovation to deployment.”
(Metcalf, E. (2014), The economics of energy security)

=> The financial support of power production from renewables is not a well-targeted instrument to internalize R&D spill-overs.

Support of Renewables: Conclusion

There is little economic justification for a direct financial support of power production from renewable energy sources.

This does not mean:

that renewables will or should not play a major role in future electricity markets,
but that market penetration might occur later and be less profound compared to a situation
with explicit support schemes.