

Capacity Markets vs. Flexible Options to support Renewable (intermittent) Energy in Electricity Markets - A case of Germany

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Issue

- Concern over security of supply due to Increasing renewable (intermittent) energy in the electricity market in Germany
- Fundamental policy decision between extra payments for conventional power plants, that is capacity market vs. a flexible package of measures
- Policy should be cost-effective, environmentally and socially acceptable

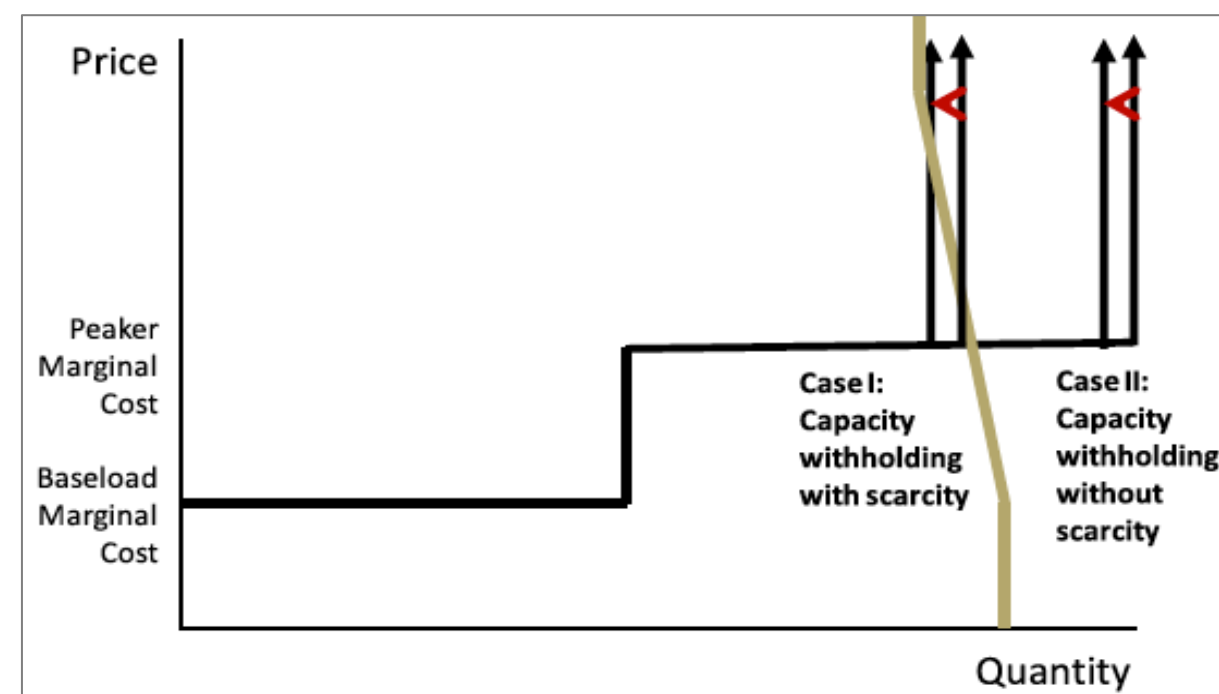


Fig.1: Scarcity and market power

Research Questions

- Why do pure electricity markets fail in addressing the issue of supply adequacy?
- How do capacity markets work and how can they be designed?
- Are capacity markets not suitable for Germany and what are the alternatives?
- What policy should Germany adopt to support RES-E while maintaining supply adequacy?

Methodology

- Use of examples, equations, graphs, results and findings from published work
- Parameters considered: cost effectiveness, consumer welfare, market structure and power, environmental impact
- Tools and concepts used: Linear programming and Cost & Benefit analysis, game theory, market structure and competition, real options

Capacity Markets

- Provide incentives to additional capacity and reduce probability of blackouts
- Reduce consumer risk by hedging against price spikes.
- Reduce supplier risks by providing payments
- Capacity price is sub-optimal and reduces consumer surplus

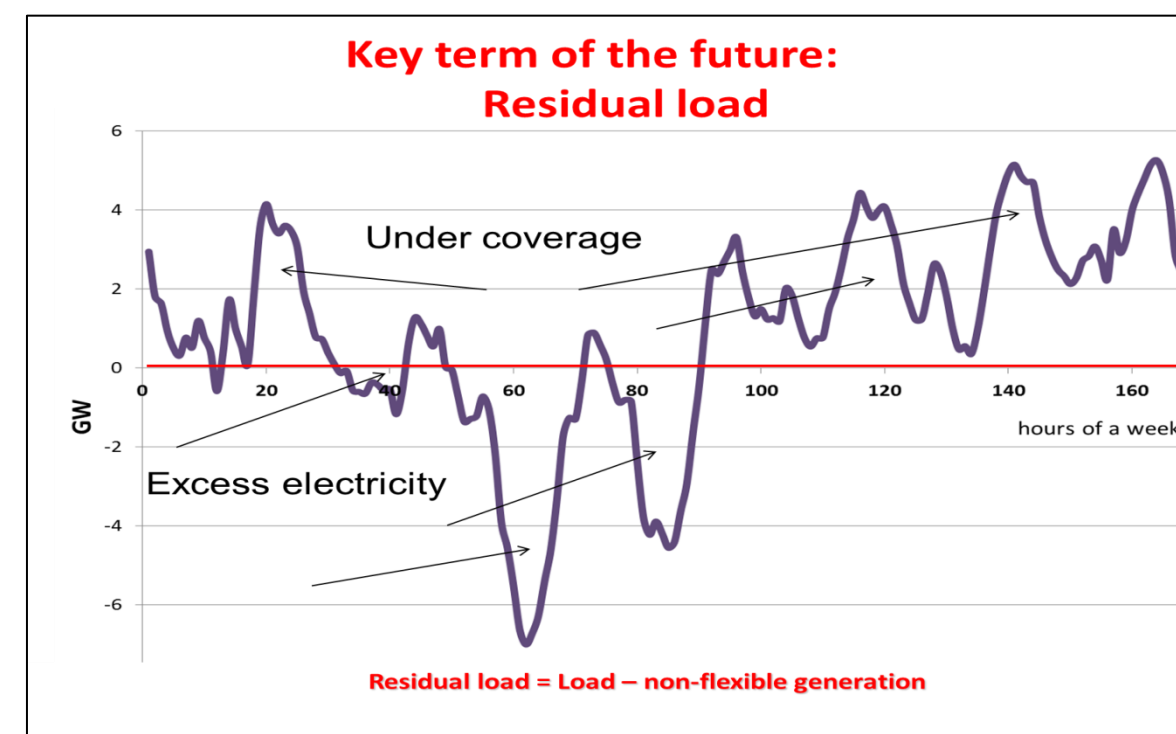


Fig.2: Concept of residual load

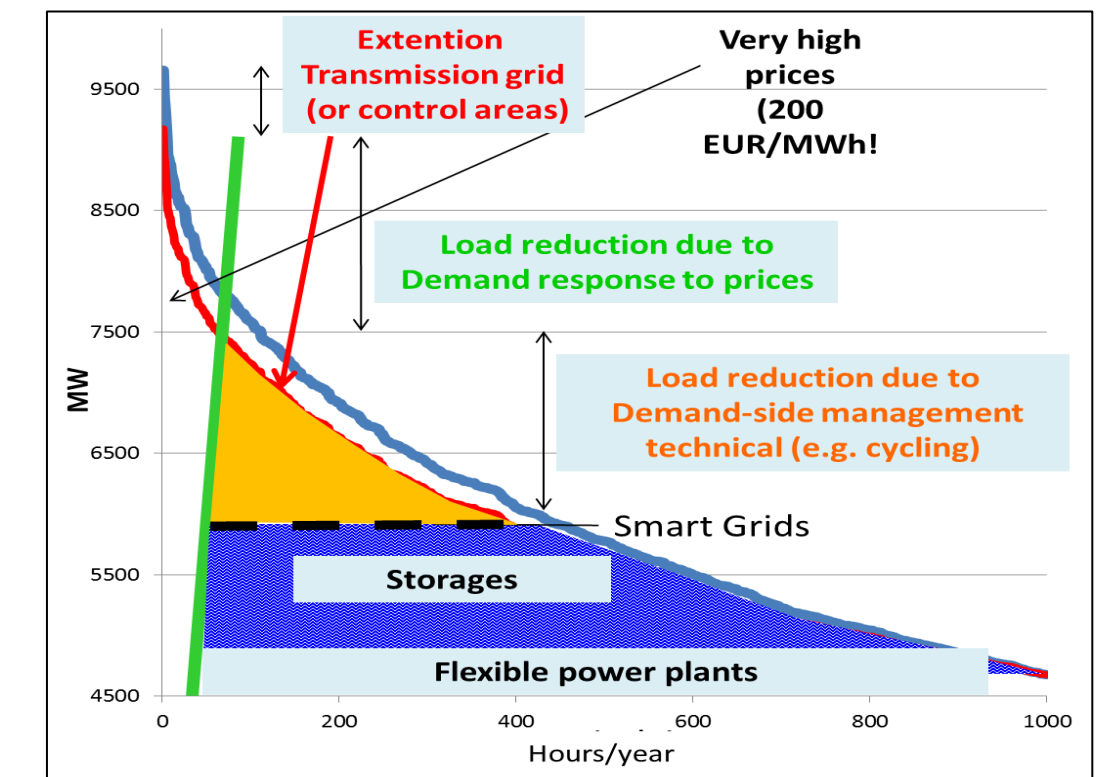


Fig.3: Flexible option portfolio

Flexible Options

- Pumped hydro storage: Enough competition and controlled market power increases consumer surplus and reduces price volatility while ensuring adequate supply.
- Demand response: Reduces price volatility, enables consumer to alter usage and decide own welfare, however sole use of DR may not be sufficient to address peak load requirement.
- Increased efficiency, flexibility, help environment goals.

Conclusion

- Capacity markets will not be suitable for Germany
- Best to first exhaust the full potential of all market participants especially that of the demand-side
- Focus should be given on developing suitable policies to incentivize and support flexible options for long term sustainability.