Insights on planning for power system regulators

IEA Committee on Energy Research and Technology
EXPERTS’ GROUP ON R&D PRIORITY-SETTING AND EVALUATION

Andreas Jahn
Senior Associate
The Regulatory Assistance Project (RAP)®
Anna-Louisa-Karsch-Straße 2
D-10178 Berlin
Germany
+49 30 700 1435 421
ajahn@raponline.org
raponline.org
RAP believes competitive energy markets, properly framed, are best able to deliver a low-carbon power system at the lowest reasonable cost. Lessons learned from many jurisdiction prove for required examples:

- Reliability - definition and mechanism
- Location matters
- Need for flexibility
- Demand side integration
Delivering reliability at least cost
Reliability, objectively

Average value of lost load ($/MWh)

Annual duration of firm load curtailment (hours)

One event in ten years

24 hours in ten years

Optimal?

Price cap

Source: W. Hogan, Harvard University, Kennedy School of Gov.
What is the role of markets?

Deliver reliability at least cost

Can markets deliver sufficient investment to meet established expectations for reliable electric services?

Energy-only

Administrative interventions – Price caps, high reserve margins...

Capacity
Operating Reserve Demand Curve in Texas/ERCOT and PJM

Source: Hogan, W. & pope, S for FTI Consulting & ERCOT
Increasing administrative “reliability” interventions harm market benefits

⇒ Increasing level of interventions weaken energy-only price signals

- Energy-only market
- Reserve shortage pricing
- Strategic reserve
- Capacity market
Increasing need for flexibility
RE supply drives need for flexibility and power prices, e.g. in Germany

Source: Agora-Energiewende.de – April 29th to May 6th 2018
There are many sources of flexibility
Toward capability, not capacity
Regulatory requirements

To achieve system security and resource adequacy (the two dimensions of reliability) at least cost, flexibility is key.

- Focus on capability instead of capacity
- System services with ramping quality
- Storage e.g., along with supply and demand
- Increase balancing areas (to limit flexibility need)
- Shorten dispatch intervals
Considering locational value
Locational value

The value of power supply is linked to location, due to availability of (un-) congested networks.

This locational marginal pricing (LMP) is addressed by nodal pricing, e.g. in the US.

Prices by nodes in Texas  
Source: ERCOT
Europe: Locational value not reflected in national bidding “zones”

Source: CEREG (Belgium Regulator 2016)
Regulatory considerations

• Location-related marginal costs need to be reflected in market prices
• Transition from one to another system is difficult/expensive
• Bidding zones only as a quick fix/interim solution
• In the long run, nodal pricing is the only cost-efficient solution
Benefits from demand side resources
Demand is willing to respond – screen shot of German demand

€/MWh

Demand and supply bids, Sept 14th, midnight to 1 a.m.

Source: Epexspot
Customers’ peak demand reduction from time-varying rate pilots

Regulatory consideration

Because supply is not an end in itself, it is needed to satisfy demand:

- Consider the benefit of savings and the shift in load compared to supply and transmission investments
- Create markets with fair competition for all resources, including demand-side resources
Key message

• Optimizing overall system flexibility is the key to cost-effective reliability

• Of the many possible sources of flexibility, flexible demand is likely to be the lowest cost, the most readily available and the least well developed

• Well-regulated competitive markets that price energy, based on its true locational marginal cost and drives those price signals to all customers able and willing to respond to them is essential
About RAP

The Regulatory Assistance Project (RAP)® is an independent, non-partisan, non-governmental organization dedicated to accelerating the transition to a clean, reliable, and efficient energy future.

Learn more about our work at raponline.org