Ensuring reliability in a decarbonised power system: Cost-effective options for Spain

Fundacion Renovables workshop

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1 Clean Energy for All Europeans legislative framework
CE4All Package

• To achieve reliability at least cost:
  • Well-functioning energy and balancing markets
  • Regionalisation
  • Demand-side participation
  • Generation
CE4All Package

• Monitoring security of supply: EU-wide assessment + optional national assessment
• Identify and remove obstacles and prioritise energy market reforms
• In case of residual risks:
  • Can a strategic reserve resolve the issue?
  • Market-wide capacity mechanism is last resort solution
Spanish Security of Supply outlook
Evolution of capacity

Source: REE

[Bar chart showing the evolution of capacity for different energy sources from 2009 to 2018. The chart includes categories like Hidráulica, Carbón, Eólica, Otras renovables, Bombeo puro, Fuel/gas, Solar fotovoltaica, Solar térmica, Otras renovables, Ciclo combinado, Nuclear, Residuos no renovables (1).]
Evolution of demand

Source: REE
Spain has an **overcapacity** problem

**Target Margin: 1.1**

Historical margins. Source: REE
What about the future?

No risks even in most extreme situations
De-rated margin analysis (2025 - winter season)

- Natural Gas
- Reservoir Hydro
- Other RES
- Pumped Storage
- Solar
- Other Non-RES
- RoR Hydro
- Onshore Wind
- Other Non-RES
- Imports (NTC for 2018)
- Peak Demand
- De-rated Margin

Target margin

MW

60000
50000
40000
30000
20000
10000
0

De-rated margin (%)
Scope for SoS intervention

- The Spanish market has an overcapacity problem and expected to continue so in the medium-term
- An intervention is **unnecessary**
- In fact, Spain needs to retire plant to return to a healthy market
3 What market reforms for Spain?
Capacity value lies in flexible, energy services

...so market model should reflect this
Rapid growth in range of needed services
Appropriate pricing of energy services

- Price (€/MWh)
- Quantity (MW)
- Average VoLL
- Marginal cost supply curve
- Energy plus reserves demand (2)

$P_3 = 800$
Ensure demand for reliability is appropriately valued through scarcity pricing

Locational Marginal Pricing

• High remedial action costs in Spain: €0.4 bn in 2017
• Locational signals will be all the more important in a decarbonised system
• Benefits of locational marginal pricing:
  • Congestion is valued
  • Better utilisation of network and generation assets
  • Right signals for development of new resources
  • Access flexibility
Regionalisation and network development

- Interconnector expansion one of Spain’s key objectives
- In addition to the “hardware,” it will also be important to also enhance the “software”
  - About 50% of optimal interconnector capacity made available to the market (ACER analysis)
  - Important to increase this level
  - Further market integration - work in progress
Demand side flexibility

- Retail tariff design matters...a *lot*
  - Voluntary, regulated RTP in place, but no market offers
  - Significant share of consumers under regulated market
  - What about network tariffs?
  - New applications, e.g. EVs offer great opportunities

- Regulatory framework for explicit demand response, storage largely missing
  - Enable demand-side resources to participate in all market segments
  - Development of aggregation
New role for responsive demand

Moving from a world where we forecast load and schedule generation, to a world where we forecast generation and schedule load will now need to shape, not just shave, demand.
Distributed generation (DG)

- DG will play a key role in the future
- Self-consumption: important to align signals with system value
  - New decree a significant step in the right direction
  - Remuneration based on time of injections ✓
  - But why cap the potential revenues?
  - What about network tariffs?
Multiple complementary levers

- Grids
- ICs
- Demand response
- Storage
- Generators
- Market geography
- Market operations
- Energy & services markets
Conclusions

- Spanish market has an overcapacity problem – retire capacity
- Well functioning energy and ancillary services markets is the best way to achieve reliability at least cost
- Key: reveal true value of flexibility
- Consider all available levers
Resources

- Hitting the Mark on Missing Money: How to Ensure Reliability at Least Cost to Consumers
- Regional resource adequacy assessments: The key to ensuring security of supply at a reasonable cost
- Realising the benefits of European market integration
- Start with smart: Promising practices for integrating electric vehicles into the grid
- Cleaner, Smarter, Cheaper: Network tariff design for a smart future
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

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