Workshop on Electricity Market Design: Capacity Remuneration Mechanism


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Introduction

- Resource Adequacy:
  - Mechanisms to manage capacity of installed generation, and adequacy to meet demand
  - Becoming more challenging

Many jurisdictions moving towards explicit capacity remuneration mechanisms
Capacity markets may be necessary where it is politically (or otherwise) not possible to allow sufficiently high scarcity prices.
A plethora of different capacity mechanism designs have been explored and implemented. Can be challenging to compare between jurisdictions:
- Terminology differences
- Lack of common framework
Developed a 2-tier framework for categorising capacity mechanism designs:
- Useful framework for comparing and considering designs
2 Tier Design Framework for capacity market design

- **First Tier Design Choices**
  - What is the capacity product to be traded?
  - Who determines the amount of capacity to be procured?
  - What is the procurement process?

- **Second Tier Design Choices**
  - All other significant design choices
1. What is the capacity product to be traded?

- Most common types of capacity markets trade “capacity credits” or similar
  - A physical megawatt (MW) of generating (or demand-side) capacity made available to the market in a particular year (or defined timeframe).
  - May be complex provisions that define the consequences if that capacity is ultimately not available at times when it is required.
- More recent innovation: trade a financial instrument, eg. “Reliability Options”
  - A call option similar to a cap contract traded in energy-only electricity markets.
  - Generators sell reliability options, and must then pay that central authority the difference between the spot price and the strike price, whenever the spot price exceeds the strike price [1].
  - Creates a severe penalty for failing to be available during scarcity periods.
  - Currently under consideration in Italy.
2. Who determines the amount of capacity required?

- Option A: **Central authority** directly determines the volume of capacity that is required
  - Possibly based upon a forecast of peak demand several years in advance.

- Option B: **Load Serving Entities** self-determine the amount of capacity to be procured
  - Based upon their own forecast of their anticipated customers’ demand, and the risk associated with the penalties defined by a central authority if they fail to forecast accurately.
  - “Decentralised Capacity Market” model

- Option C: **Customers** determine the amount of capacity that they want to contract for directly with providers
  - “Capacity Subscription” model
3. What is the procurement process for capacity?

- Option A: central authority directly procures capacity through a central process
  - such as an **auction** or **tender**
- Option B: LSEs are responsible for procuring capacity, potentially through a **bilateral trading** process.
## Common Terminology

<table>
<thead>
<tr>
<th>Product Description</th>
<th>Who determines how much is procured?</th>
<th>Procurement process</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Centralised capacity market</strong></td>
<td>Physical Capacity</td>
<td>Central Authority</td>
</tr>
<tr>
<td><strong>Capacity Obligation (France)</strong></td>
<td>Physical Capacity</td>
<td>Central Authority</td>
</tr>
<tr>
<td><strong>Decentralised capacity market</strong></td>
<td>Physical Capacity</td>
<td>LSEs</td>
</tr>
<tr>
<td><strong>Capacity Subscription</strong></td>
<td>Physical Capacity</td>
<td>Customers</td>
</tr>
<tr>
<td><strong>Reliability Options (Italy)</strong></td>
<td>Financial Instrument</td>
<td>Central Authority (usually)</td>
</tr>
</tbody>
</table>
Current developments in Europe

- existing capacity mechanisms
- some elements of a capacity mechanism in place (types of strategic reserves)
- implementation of a capacity mechanism or its revision in progress
- capacity mechanism under consideration

The French capacity mechanism: Type, Status, Aim

Type:
- Capacity Obligation
- Physical Capacity is set by central authority and traded bilateral

Status:
- Decree in 2012 contained the main principles
- ACER report April 2014 explained market rules
- Decree signed January 2015
- First delivery year: January 2017 to end of December 2017

Aim: Security of Supply
- Tackle the peak load issue (especially in Winter)
- Boost Demand Side Management (DSM)
The French capacity mechanism: Design

- Minister of Environment
  - Defines Security of Supply

- ACRE
  - Oversight Transparency

- TSO (RTE)
  - Issues certificates

- DSM

- Retailer Obligation (Demand certificates)

- Bilateral trade of certificates

- Capacity operators (Provide certificates)

Price of certificates reveals value of Security of Supply
Price is zero if there is no risk on Security of Supply
The French capacity mechanism: Cross-border participation

Status:
- No explicit participation in first phase, only implicit through obligation setting
- Target: explicit participation in second phase
- Stakeholder consultations on explicit participation (2014)
- Options of hybrid model e.g. participating in French balancing market

Defined principles by RTE:
- Without harmonising security of supply criteria across Member States, but rather upholding the division of competences defined in the Treaty of Lisbon;
- Without reserving interconnector capacity;
- Within volume limits reflecting the physical limitations of import capacity during peak periods;
- Subject to the creation of a mechanism for cross-border certification or control in order to avoid double counting;
- Subject to the signature of agreements to govern operational management in crisis situations.
The Italian capacity mechanism: Type, Status, Aim

Type:
- Reliability Option
- Adequacy target is set by TSO (Terna) and reliability option contract is the product which is bought through a central auction in each region

Status:
- Law has been approved by Ministry of Economic Development in 2014
- First auctions in 2015
- First delivery period: 2018-2019

Aim: System Adequacy
- No capacity problem, aim to ensure that not too much of the overcapacity (mainly gas) is retired
- Long-term price signals to support coordinated development
The Italian capacity mechanism: Design

- Regional auction, on grid area where the resources are located
- Adequacy target is a yearly elastic function of volume, loss of load probability and variable costs of marginal technologies

TERNA organizes:
- New and existing programmable generation (e.g. fossil, solar thermal, biomass, pump storage..) not subject to other incentive schemes or dismanteling measures
- 4 years planning period
- 3 years

Descending clock auction:
- Premium payment
  - If $P(\text{strike}) < P(\text{spot})$, option executed (difference paid)
- If $P(\text{strike}) > P(\text{spot})$, contract canceled

Buyer TSO (Terna):
- Reliability option contract
- Strike price is set at variable costs of an efficient peak plant
- Penalty if no delivery in peak periods

Seller awarded producers:
Considerations in Germany

Status quo
- Network reserve
- Discussion: EOM vs. capacity mechanism (Green Paper)
- Strategic Reserve as interim mechanism

Capacity mechanisms proposed
- Comprehensive capacity market
- Focussed capacity market
- Decentralised capacity market

Legislative process
- Consultations on Green Paper
- White Paper as legislative proposal
- 19/01/2015: Gabriel states no intention to introduce CRM in Germany
Cross-border participation

Which product?

Availability

- Capacity providers sell their capacity cross-border
- Responsibility for being available in scarcity situations.

Delivery

- Capacity providers sell their capacity cross-border
- Responsibility for being available in scarcity situations AND actual electricity flows to buyer

Who participates?

Capacity Provider

- Interconnector sells capacity cross-border
- Inteconnector responsible for being available in scarcity situations.

Interconnector

- Interconnector sells capacity cross-border
- Inteconnector responsible for being available in scarcity situations and that electricity flows cross-border to the buyer

Source: Eurelectric 2015
### Cross-border participation and penalties

<table>
<thead>
<tr>
<th>Cross-border participation</th>
<th>French capacity market</th>
<th>Italian capacity market</th>
<th>Comprehensive capacity market</th>
<th>Focussed capacity market</th>
<th>Decentralised capacity market</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Envisaged, consultations ongoing</td>
<td>Envisaged</td>
<td>Advantages discussed, no specific mechanism</td>
<td>Only if in single price zone, (i.e. AU, LU) and if no participation in national CRM</td>
<td>Yes, if physical delivery (PTR) is ensured and if no participation in national CRM</td>
</tr>
<tr>
<td>Penalties</td>
<td>Difference between trigger and strike price</td>
<td>Yes, but not specified further Plus reliability options</td>
<td>Yes, with requirement: at least 90% availability at peak demand Plus reliability options</td>
<td>“Multiple of the certificate price”</td>
<td></td>
</tr>
</tbody>
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Potential questions for discussion

1. **Block (14:00 – 15:00)**
   A. Teilnahme Schweizer Kraftwerke an Kapazitätsmechanismen anderer Länder (technische, rechtliche, institutionelle Fragen)
   B. Verteilungseffekte
   C. Effizienz (Miteinbeziehung des Auslands? Wer kann teilnehmen: Interconnectors vs. Erzeuger? Wer trägt die Strafe?)

2. **Block (15:30 – 16:30)**
   A. Bottom-up: Kapazitätsmechanismen in der Schweiz? Kosten / Nutzen; Was wäre das Ziel?
   B. Top-down: Europa / ENTSO-E
   C. Integration bestehender Marktmechanismen (offizielles „Linking“? Chancen und Grenzen? z.B. penalty design)
THANK YOU VERY MUCH FOR YOUR ATTENTION!