SESSION 3 – CAPACITY REMUNERATION
Coordinating European Capacity Mechanisms: Which Way Forward?

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Agenda

- Capacity mechanisms – the new game in town
- A patchwork of national approaches – drivers of capacity mechanisms
- EC guidelines for capacity mechanisms harmonization
- Cross border participation – mapping potential approaches
- Conclusions
Capacity mechanisms – the new game in town
The historical approach for capacity mechanisms in Europe

- **Historical capacity mechanisms dominated by capacity payments/strategic reserve approaches**

- **In most countries without explicit capacity payment, direct tendering remains a fall back option:**
  - Article 3 Directive 2003/54/EC (Directive on internal market in electricity) [repealed by 2009/72/EC]
  - ‘Member states may impose on undertaking operating in the electricity sector, in the general economic interest, public service obligations which may relate to security, including security of supply’
Ongoing reforms for capacity mechanisms in Europe: Toward market based approaches?

- Spain: Reform of capacity payment / discussions on auctions of capacity
- Italy: Discussion of capacity market for Reliability Options
- Germany: Discussions on capacity market / strategic reserves
- Belgium: Strategic reserve & tender for new plant
- United Kingdom: Implementation of capacity market with centralized auction
- Ireland: Capacity payment
- France: Implementation of capacity obligation on suppliers
- Nordics: Strategic reserve extended
- Russia: Capacity market
- Greece: Reform of capacity payment
- Nordics: Strategic reserve extended
- Russia: Capacity market

Ongoing reforms / discussions mark a shift toward market based capacity mechanisms.

Reforms in France, Italy, and United Kingdom share a common structural (and permanent) approach.

Significant differences remain in the design of the different capacity markets.
Key aspects of the different types of capacity mechanisms

- **Capacity mechanisms differ on key aspects such as whether the mechanism is:**
  - **Price-based or volume-based**: in a price-based mechanism, policymakers set price and let the market invest taken into account this stimulus, whereas, in a volume-based mechanism, the capacity requirement is defined and a price will emerge through a market dynamic;
  - **Centralised or decentralised**: contracts can be awarded centrally or though bilateral arrangements;
  - **Market-wide or targeted at specific plants or technologies**: the mechanism can reward all capacities or only a subset of them.
A patchwork of national approaches – drivers of capacity mechanisms
Drivers of capacity mechanisms: the good, the bad, and the ugly...

Drivers of implementation of capacity mechanisms:
- Guarantee politically determined security of supply criteria
- Provide adequate and timely investment incentives
- Address missing money issue and provide fair remuneration to all assets
- Rescue stranded thermal plants
- Smooth power prices to reduce “politically unsustainable” volatility
- Dampen investment and retirement cycles

Drivers of reform depend on many country specific factors:
- Existing generation mix and flexibility
- Market arrangements
- Level of interconnection

Looking forward, member states have different needs:
- Some countries need more dependable capacity, others need flexibility to support renewables, others are over-supplied by all measures...
- One-size-fits-all approach unlikely to work
## Local system issues affecting capacity mechanism design

<table>
<thead>
<tr>
<th></th>
<th>FRANCE</th>
<th>GERMANY</th>
<th>UK</th>
<th>SPAIN</th>
<th>ITALY</th>
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<tbody>
<tr>
<td><strong>Local specificities</strong></td>
<td>- Thermo sensitivity of power demand (electric heating)</td>
<td>- Grid constraints in the South</td>
<td>- Large retirements of thermal plants</td>
<td>- Weak demand</td>
<td>- Internal zones and grid constraints</td>
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<td>- Growth of peak demand</td>
<td>- Nuclear phase-out</td>
<td>- Limited interconnection</td>
<td>- Strong RES growth</td>
<td>- Strong RES growth</td>
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<td></td>
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<td>- Strong RES growth</td>
<td>- Strong RES growth</td>
<td>- Quasi-obligatory pool</td>
<td>- Central dispatch</td>
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<td><strong>Key issues</strong></td>
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<td></td>
<td>- Peak demand growth (+25% in 10 yrs.)</td>
<td>- Capacity needs in the south</td>
<td>- Major investment needs (‘capacity gap’)</td>
<td>- Overcapacity and low profitability of CCGTs</td>
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<td>- Missing money for peaking plants</td>
<td>- Need for flexibility</td>
<td>- Retirements driven by LCPD and IED</td>
<td>- Need generation back-up due to RES penetration</td>
<td>- Coordination of generation and network investment</td>
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<td></td>
<td>- Low profitability of CCGTs</td>
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<td>- Need for flexibility</td>
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<td><strong>Main objectives of CM</strong></td>
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<td></td>
<td>- Maintain generation adequacy</td>
<td>- Retain existing capacity in the south &amp; drive new investment</td>
<td>- Maintain generation adequacy</td>
<td>- Incentivize availability and flexibility of existing plants</td>
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<td>- Development of demand-response</td>
<td>- Ensure availability of flexible back-up generation</td>
<td>- Drive new investment in CCGTs</td>
<td>- Manage smooth rebalancing / avoid massive retirements</td>
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<td>- Robust to exercise of market power</td>
<td></td>
<td>- Ensure availability of flexible back-up generation</td>
<td>- Limit price spikes &amp; volatility</td>
<td>- Robust to exercise of market power</td>
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Other elements of energy market design affect capacity mechanism choice

<table>
<thead>
<tr>
<th>Forward Market</th>
<th>Day Ahead</th>
<th>Intraday</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>Ireland</td>
<td>ES, PT, IT</td>
<td>Nordic, CWE</td>
<td>GB</td>
</tr>
<tr>
<td>• No meaningful forward market</td>
<td>• Financial forward market</td>
<td>• Financial and physical forward markets</td>
<td>• Mainly physical forward market</td>
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<tr>
<td>• Central dispatch</td>
<td>• Quasi-mandatory day-ahead auction</td>
<td>• DA auction with strong market support</td>
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<td>• Traded volumes/prices not firm</td>
<td>• Locational bidding</td>
<td>• Portfolio bidding</td>
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<tr>
<td>• Locational bidding</td>
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<tr>
<td>• D-1 gate closure</td>
<td>• Intraday auction slots</td>
<td>• Continuous trading</td>
<td></td>
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<tr>
<td>• No intraday market</td>
<td>• H-4 gate closure or more</td>
<td>• H-1 gate closure (or less being considered)</td>
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<td></td>
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<td></td>
<td>• Strategic reserve (Nordics, Be, De?)</td>
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<tr>
<td>• Fixed capacity payment</td>
<td>• Capacity and availability payment</td>
<td>• Decentralized capacity market (Fr)</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• Centralized forward capacity market</td>
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Convergence?
EC guidelines for capacity mechanisms
## Where to start to harmonize / coordinate CRMs?

### Key issues

- **Will there be capacity leakage – i.e cross subsidization of capacity across borders?**

- **Will capacity mechanisms affect the location of new investments?**

- **What will be the energy price effects of capacity mechanisms on neighbouring markets?**

- **What will be the impact on interconnection flows, and on the utilisation of interconnectors?**

### Steps for an integrated approach

- **Define a common reliability standard criteria (e.g. loss of load probability)**

- **Common methodological framework for resource adequacy assessment (ENTSOE work underway)**

- **Define common certification & verification procedures for plants & DSM by harmonizing TSO’s practices**

- **Develop a cooperation framework, including operational rules, to deal with situations of system stress**

- **Identify best practice and define guidelines for design of CMs**
According to articles 107 and 108, a measure amounts to State aid, if the following criteria are met:

- involve a transfer of aid through State resources;
- entail an economic advantage for undertakings;
- distort competition by selectively favouring certain beneficiaries; and
- produce an effect on intra-Community trade.

Certain categories of aid may be considered compatible with the internal market, when meeting certain criteria (such as regional development, R&D, environmental protection and rescue/restructuring of failing firms).

Where aid is not automatically exempted, it is necessary to notify aid to the Commission, who then balances the necessity and the proportionality of the aid measure versus the distortion of competition brought about by it. The process to be followed to assess potential state aid measures is depicted in the Figure below:
Criteria introduced by the EC Guidelines on State aid for environmental protection and energy (April 2014)

- Contribution to a well-defined objective of common interest
  - The objective of the measure may vary but needs to be consistent with ENTSO-E adequacy analyses; and
  - It should not contradict the objective of phasing out environmentally harmful subsidies.

- Need for State intervention to be demonstrated
  - Impact of RES development, but also on remaining regulatory and market failures.

- Appropriateness of the aid measure
  - The CM should be open to both existing and future generators, as well as storage or DSR; and should take into account the potential contribution of interconnection.

- Incentive effect
  - The aid should not change the behaviour of the market players.

- Proportionality of the aid (aid to the minimum)
  - A competitive bidding process is recommended to lead to reasonable rates or return; and
  - The measure should be designed so that the price paid tends to zero when the level of capacity supplied is adequate.

- Avoidance of major undue negative effects on competition and trade between Member States
  - There should be no discrimination aside technical performance required
  - Operators from other member states should be allowed to participate where it is physically possible;
  - Negative effects on the internal energy market should be avoided, e.g. price caps or bidding restrictions; and
  - The measure should not reduce incentives to invest in interconnection or undermine generation investment.

- Transparency of aid:
  - Need for easy access to all relevant acts and to pertinent information about the aid awarded thereunder.
Cross border participation – mapping potential approaches
Rationale for participation of interconnected capacity in capacity mechanisms

**Operational (dispatch) efficiency**

- **Impact of CM on power prices depends on price setting behavior**
  - If price-setting behaviour is based on SRMC + markup) and consistent across the two markets
    => no distortion to plant dispatch
  - If one market has prices based on SRMC whilst the other market has prices clearing at SRMC + markup
    => distortions of merit order leading to a welfare loss

- **Impact of including interconnection capacity in the CM depends on generator’s incentives**
  - Interconnector owner / operator will capture part (or all) of the value

**Dynamic (investment) efficiency**

- Not taking into account interconnectors in the capacity assessment would result in more domestic generation than necessary to meet peak demand
- Capacity payment in one country may favour investment in new generation units in this country, at the detriment of neighbouring countries without CM
- Excluding interconnectors from the CM revenues will result in underinvestment in interconnection and over investment in domestic capacity (assuming investment in interconnection is merchant)
Alternative approaches for cross border participation in CM

<table>
<thead>
<tr>
<th>Key features</th>
<th>No participation by interconnectors</th>
<th>Interconnection specific capacity payment</th>
<th>Participation by non-GB generation</th>
<th>Participation by interconnectors</th>
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<tbody>
<tr>
<td></td>
<td>Interconnector contribution to security of supply assessed</td>
<td>As per first option albeit interconnector remunerated</td>
<td>Non GB generation can participate</td>
<td>Interconnector participates in CM</td>
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<td></td>
<td>Netted off overall volume required to be procured</td>
<td>May be based on CM clearing price (or other)</td>
<td>Must demonstrate that has sufficient interconnection rights</td>
<td>Acts as intermediary between CM and non-GB generation</td>
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<tr>
<td></td>
<td>No payment to interconnectors</td>
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<tr>
<th>Assessment</th>
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<td></td>
<td>Easiest implementation</td>
<td>Same as first option with improved investment incentives in interconnection</td>
<td>Complex implementation</td>
<td>Potentially easier implementation</td>
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<td></td>
<td>Undermines dynamic efficiency (underinvestment in interconnection)</td>
<td></td>
<td>Investment incentives in interconnection depend on split of revenues with generators</td>
<td>Strong investment incentives as interconnection captures full value of CM</td>
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<td></td>
<td>Need for mechanism to allocate interconnection capacity</td>
<td>Key issue lies in ability of interconnector operator to control power flow</td>
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Impact of cross border participation on capacity prices depends on bidding behaviours

Direct foreign generators’ or interconnection participation in CM
- Does not necessarily lead to higher competition
- Does not necessarily lower costs for consumers
- Bidding rules may influence the outcome (e.g. price taker / price maker rules in GB CM)

BUT
- May give long-term signals to drive investments and limit dynamic investment inefficiencies
The devil is in the implementation details

- The key challenge with interconnection’s or foreign generators’ participation is to make sure they actually provide capacity products comparable to national capacity providers, while:
  - having no / limited negative impact on the energy market efficiency
  - being compatible with the target model: e.g. flows are determined by energy price differentials
  - not being discriminatory with them by putting too burdensome constraints they cannot manage

- What is capacity? Two types of capacity products are often considered:
  - capacity associated with delivery of energy during specific periods (e.g. UK)
  - capacity associated with delivery or option to deliver energy during specific periods (e.g. France, Italy)

- Meeting the obligation associated with participation in the CM depends on different aspects, including:
  - Availability of interconnector (depends on the interconnector)
  - Availability of generation in the foreign country (depends on foreign generators)
  - Direction of flows (depends on market rules and prices in both countries)

- In the case of direct foreign generators participation, different approaches are possible for the allocation of interconnection capacity and remuneration of interconnection
  - Explicit reservation of interconnection capacity (US approach) – not compatible with EC Target Model
  - Non GB participants acquire interconnection rights after bidding in CM
  - Non-GB generators acquire interconnection “tickets” through an auction before bidding into CM

  => Process and timing for allocation of interconnection capacity will have a large impact on split of revenues between generators and interconnector as well as economic efficiency
### Possible approaches for foreign generators’ reservation of interconnection capacity

<table>
<thead>
<tr>
<th>Key features</th>
<th>No constraints on interconnection access</th>
<th>Acquisition of transmission rights</th>
<th>Acquisition of specific interconnection “tickets”</th>
<th>Reservation of transmission capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Same obligation as national generators:</strong></td>
<td>Same obligation as national generators</td>
<td>Foreign generators have to acquire specific “tickets” to allow them to participate in the CM (&quot;explicitly&quot; or &quot;implicitly&quot;)</td>
<td>I/c capacity withdrawn from the market and reserved for SOS situations</td>
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<tr>
<td>either be available or generate</td>
<td>In addition, obligation to acquire transmission rights (and potentially nominate them)</td>
<td>Same obligation as national generators with adapted penalty regime</td>
<td>Delivery on energy possible through the reserved i/c capacity</td>
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<tr>
<td>No constraint on the interconnection access / use</td>
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### Assessment

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<tr>
<th></th>
<th>All capacity revenues on foreign generators: no incentives to build new i/c + additional risk on i/c</th>
<th>Same as previous options:</th>
<th>Complex implementation:</th>
<th>Inefficiencies in the energy market (reduced social welfare, higher prices in tight margin country)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No guarantee (neither physical nor financial) that contracted foreign generators contribute to national SoS</td>
<td>Obligation to acquire TRs likely to have limited impact on i/c revenues</td>
<td>needs certification and monitoring procedures</td>
<td>Not compatible with target model</td>
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<td></td>
<td></td>
<td>Obligation to acquire / nominate TRs has no / limited impact on effective cross-border flows</td>
<td>question of geographical scope (only neighbouring countries?)</td>
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<td></td>
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<td></td>
<td>No physical guarantee</td>
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<td></td>
<td>Investment incentives in interconnection OK</td>
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<td>“implicit” approach efficient</td>
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Conclusions
Conclusions

Drivers for implementation of CMs differ across member states and explain patchwork of approaches
- Concerns about resource adequacy, intermittency, & stranded assets drive different design choices
- “One-size-fits-all” approach unlikely to work, but potential for regional harmonization

EC State Aid guidelines a first (insufficient) step toward coordination of CMs
- Non discrimination between generation and DSR, as well as inclusion of cross border capacity
- Need to define a common security standard, and a common methodological framework
- Need for TSO cooperation to define common certification and verification procedures, as well as operational procedures in situations of system stress

Inclusion of foreign resources into national CM yields potential benefits
- Operational (dispatch) efficiency: impact of distortions on energy prices unlikely to be significant
- Dynamic (investment) efficiency: potentially large welfare gains as exclusion of interconnectors from CM would lead to underinvestment in interconnection and over investment in domestic capacity

Options for cross border participation in CM: direct or indirect interconnector participation?
- In the case of direct interconnection participation in CM, key issue is estimating potential sources of interconnector unavailability for derating assessment and defining appropriate penalty
- In the case of direct foreign generators participation, different approaches are possible for the allocation of interconnection capacity and remuneration of interconnection
Thank you for your attention

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