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# **Making State Aid Work for Europe's Decarbonisation**

*Case Studies on Capacity Mechanisms*

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# Objectives of the Project

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based on a decision of the German Bundestag



## Objectives of the project

- **Analyse** the Commission's decision-making practice on State aid cases relating to decarbonisation and the clean energy transition
- Confront the decision-making practice with **realities** of the energy market and the necessary transition to a decarbonised European power system in line with **EU climate and energy targets**
- Raise awareness of the **importance of State aid decisions for decarbonisation** and the need for **consistency**
- Engage with **decision-makers** and **stakeholders** on how to provide that state aid decisions and market-forces work in support of decarbonisation and the clean energy transition



## **Case-Studies on Capacity Mechanisms**



## Relevance of Capacity Mechanisms in context of Decarbonisation



- Power system reliability is often considered a **public good**. The reliable availability of electricity 24/7 is taken for granted, almost anywhere in Europe.
- The clean energy transition modifies the **resource mix**: CO<sub>2</sub> emitting generation is step-by-step replaced by non-emitting capacity (RES, storage, flexible demand). **Safeguarding power system reliability** becomes a more dynamic issue.
- **Incumbent generators** often characterise declining returns for their asset base as failure of the market mechanism and ask to be paid not for electricity delivered but (also) for their availability “to keep the lights on”.
- “**Capacity Mechanisms**” offer providers of “reliable capacity” additional revenues for making electricity available in case of need.
- A key challenge is to determine if a capacity mechanism **is really needed**.
- Any CapM needs to be **consistent with decarbonisation objectives**, add to power **system flexibility**, be accompanied by steps to **improve market-functioning** and a time-line for **phase-out**

## Decisions on Capacity-Mechanisms studied - Overview



- **Italy:** market-wide auctions for reliable capacity in each of the six bidding zones
- **Great Britain:** market-wide capacity mechanism with central auctions
- **Poland:** market-wide capacity mechanism with central auctions
- **Germany:** capacity reserve that is strictly separate from the market



**Italy**

**A Market-Wide Technology  
Neutral Capacity Mechanism**  
(COM Decision of 7.2.2018)



## Main Features of the Mechanism

- Scheme is a volume-based, market-wide capacity mechanism
- The Italian TSO is instructed to determine the amount of capacity to be auctioned and provide fixed regular payments to the beneficiaries selected through capacity auctions.
- **Auctions** are organised per bidding zone. The capacity market is financed through a charge levied monthly on energy consumers, and collected by the TSO.
- **Eligibility**: open to all existing and new capacity providers including demand response and storage, with specific rules applying to DSR.
- The scheme will be open **to foreign capacity** as from 2019.
- A **revision clause** obliges the Italian authorities to ensure the scheme complies with all provisions of the new EU power market design framework, once entering into force.

## Empirical Relevance for energy transition and decarbonisation and specific considerations on decarbonisation applied



- Italy does not have nuclear energy in its power mix and is committed to phasing-out coal by 2025. The share of natural gas in the energy mix in 2018 was at 45% compared to 19% EU-average. Italy already achieved its 2020 GHG reduction and renewable energy targets.
- Decision confirms IT decarbonisation objectives and the planned increase of renewable energies.
- Decision makes an apodictic statement on the existence of a market failure. The need for a market-wide capacity mechanism is justified to avoid a 5% chance of not meeting the 3 hours per year LOLE in 2020 and 2025, respectively not servicing 0.017% of demand.
- The sizing of the CapM suggests over-procurement. This could create a lock-in that makes markets function less effectively.
- The CapM-design raises questions as regards: (i) de-rating applied to RES, (ii) treatment of DSR, (iii) non-application of the 550g rule, (iv) length of contracts (15 years for new, 3 years for existing capacity).
- The CapM is approved for 10 years, although ongoing market reform will change situation.

## What could have been done better?

- **Lack of transparency** about underlying data and calculations
- Strong reliance on **data from incumbent utilities** and state-owned system operators
- Seemingly uncritical approval of (politically) set system reliability values and procurement objectives
- Offering 15 year contracts **could make market failure a self-fulfilling prophecy**
- More open discussion needed on **risks** of and **perverse incentives** from CapM to effective market-functioning
- COM should **review the CapM decision** in light of new Electricity Market Regulation



**Great Britain**  
**A Market-wide Technology**  
**Neutral Capacity Mechanism**  
(COM Dec of 23.7.2014)



## Main Features of the Mechanism

- **Generation adequacy:** critical levels expected around 2017/2018
- **Financing:** levy on electricity supply, on customers
- Contracts for difference
- **Auctions:** descending-clock, pay-as-clear auction pursuant to which successful bidders receive the same clearing price; T-4 main auctions and T-1 adjustment auctions
- **Eligibility:** domestic generators, demand response management providers and storage operators. Foreign operators are excluded. Interconnectors included since 2015. RES are considered (reform)
- **Contract length:** 1 year (all capacity); 3 years (refurbishing plants); 15 years (new plants)

## Empirical Relevance for energy transition and decarbonisation and specific considerations on decarbonisation applied



- The UK has a significant share of gas (40%) and nuclear (20%) in its power mix. Wind provides 17% but still remains well below potential. The UK imported 6% of its electricity in 2018. Plans are to increase the share of nuclear as a non-emitting power source.
- The CapM has been successful in procuring sufficient capacity to meet the reliability standard.
- Auctions were **over-subscribed and clearing prices low**. Cheap gas and diesel-fired peaking capacity and interconnection were out-bidding new high-efficiency CCGT plants.
- Existing plant, mostly coal-fired, failed to win contracts, resulting in faster than **anticipated retirement of coal plants**. Coal was replaced in part by small polluting gas and diesel plant.
- **Demand response capacity** is not able to access longer term contracts and is also hindered by the capacity contract cost recovery mechanism.
- As **onshore wind** in Great Britain is no longer subsidised, it should be allowed to participate.
- Overall, **new flexible capacity** is **not economically viable** in context of the CapM.

## What could have been done better?

- *Tempus* case: annulment of the decision by the General Court on 15 November 2018 (under appeal)
- Commission's formal investigation ("phase II") opened on 21 February 2019 (ongoing)
- UK: re-organisation of auctions, suspension of contracts, reforms (inclusion of RES, EPS?)
- Barriers to entry for DSR: contract length; 2MW participation threshold
- Direct participation of foreign capacity is still excluded
- How to incentivize new flexible capacity?



**Poland**  
**A Market-wide Technology**  
**Neutral Capacity Mechanism**  
(COM Dec of 7.2.2018)



## Main Features of the Mechanism

- **Generation adequacy problem** identified in 2020, 2025, 2030 ≠ ENTSO-E's MAF: 2020 and 2025
- **Auctions:** descending-clock, pay-as-clear auction pursuant to which successful bidders receive the same clearing price; T-5 main auctions, T-1 adjustment auctions
- **Financing:** levy on electricity supply to final consumers
- **Eligibility:** all providers, domestic and foreign; RES that opt-out from RES support schemes
- **Contract length:** 1 year (all); 3 years (domestic, new); 15 years (domestic, new generation)
- **Decarbonisation:** “green bonus” (< 450 KgCO<sub>2</sub>/MWh; for CHP, 50% of heat dedicated to district heating) and preference to low-carbon generators

## Empirical Relevance for energy transition and decarbonisation and specific considerations on decarbonisation applied



- **Highest share of fossil fuels** in its energy mix among all Member States. In 2018, 76% of power production was based on lignite and hard coal, another 9.5% on gas and other fossil fuels, while biomass contributed about 5%, wind about 7.5%, and solar PV was non-existent.
- Between 2020 and 2035, about 60 power plants are expected to retire: > 50% of installed capacity
- **Challenge:** establish the existence of a market failure in the presence of regulated prices in the day-ahead, intra-day and balancing markets; reforms will apply as from January 2021 *after* T-5 auctions for delivery in 2021, 2022, 2023 and 2024
- **Political influence** over the continuity and the sizing of the mechanism; government owns more than 50% of all Polish utilities and therefore has a clear incentive to maintain their asset value by systematically over-procuring “reliable” capacity through the mechanism
- **Decarbonisation:** “green bonus” seems mostly irrelevant for 15 year contracts and will somewhat improve the position of gas plants for 5 year contracts
- T-5 auctions in Feb. 2019: **80%** of the **capacity contracts** awarded to **coal** and **lignite** plants

## What could have been done better?

- *Tempus 2* case: action for annulment filed in March 2019 (in progress)
- Could the dual objectives of maintaining security of supply and modernising the PL power system be easier to achieve by **combining a strategic reserve with power market reforms?**
- Incentive effect: **retroactivity** for plants built after 2014 and generating since July 2017
- **Technology neutrality**: strong support to coal and lignite
- **Barriers to entry for DSR**: contract length, 2MW participation threshold, no “green bonus”
- Aid to compensate **retrofit to BAT** > violation of EEAG (aid for meeting Union standards)
- *New*: phase II on **reduction of capacity surcharge for energy intensive users** opened on 15 April 2019. Commission’s concerned about risks of inefficiently higher demand of electricity in periods of scarcity, if certain users are exempted from these costs; and higher needs for extra generation capacity to ensure security of supply in these periods will be also higher



**Germany**  
**Capacity Reserve that is kept**  
**separate from the market**  
(COM Dec of 7.2.2018)



## Main Features of the Mechanism

- The capacity reserve is part of a broader effort to make the DE electricity market fit for higher shares of variable renewable power, while baseload capacity is retiring from the system (nuclear phase-out by 2022, coal phase-out by latest 2038).
- The four German TSOs shall jointly procure capacity for the reserve based on competitive tenders that are organised every two years for a two-year delivery period.
- The maximum demanded volume of the capacity reserve is set at 2 GW.
- The reserve is **kept separate from the electricity market**: capacity providers cannot sell reserve capacity at the electricity market; they cannot sell on rights and obligations arising from the reserve; they are not allowed to return to the market once their reserve contract ends (**no-return clause**).
- Capacity under contract may have an activation time of up to 12 hours
- The reserve is designed as **last-resort measure**: it is dispatched only when the market does not clear, i.e. when there is insufficient supply to meet demand (indicator: EUR 3000/MWh bids at day-ahead, respectively EUR 10000/ MWh bids in intraday are not fully met within one hour)

## Empirical Relevance for energy transition and decarbonisation and specific considerations on decarbonisation applied



- The energy transition completely changes the DE power system: in 2018, RES-e had a share of 38.2% in electricity production, hard coal and lignite combined of 38.2%, gas 13%, nuclear 11.7%. By 2022 DE will phase-out nuclear; by latest 2038 lignite and coal; by 2030 RES will be at 65%.
- Germany will miss its domestic 2020 ghg-target. If the proposals by the German “coal phase-out commission” are fully implemented, the 2030 power-sector target will be met.
- **Concerns about power system reliability are a continuous issue in the energy transition.** To lean against pressure for introduction of a market-wide capacity mechanism, the DE government in 2014-2015 initiated a green book/ white paper consultation process on the “Energy Only Market 2.0”.
- As a result DE: (i) took several measures to strengthen market functioning and the market signal, (ii) adopted measures to enhance power system flexibility, and (iii) proposed additional measures for ensuring power system reliability in the transition.
- The Capacity Reserve is explicitly introduced as „suspender“ to the „belt“ (the strengthened EOM), as insurance against the unlikely failure of the improved EOM to ensure power system reliability

## What could have been done better?

### Positive:

- COM accepted the fundamental choice of Capacity Reserve and the design options (in particular no-return) as a safety net for ongoing market reforms
- Adjustments made to the mechanism have improved standing of demand response
- Decision has helped to clarify why foreign capacity providers should be excluded from such mechanism

### Critique:

- DE accepted to also include variable costs in the bids of capacity providers that seek to participate in the reserve. As variable costs only arise through the **use** of the reserve and since both frequency of use and the amount of variable cost are difficult to anticipate, bidders will price-in the risk of estimating these costs incorrectly. This makes the reserve more expensive than necessary.



**Recurring issues across the decisions studied – What could be done better?**



## Recurring Issues across decisions studied and scope for improvement



Issue	What could be done better
Is there really a need?	This will improve in the future – EU wide adequacy assessment and harmonised methodology
Reliance on information provided by interested party	Always a challenge in cases of information asymmetry. Particularly problematic if no formal investigation with stakeholder consultation is opened
Duration of approval decisions	10 years in dynamically changing systems is too long. Entry into force of new EMR should be used for review of existing CapM decisions
Duration of capacity contracts	15 year contracts are too long. 1 year is best practice and more in line with future demands on power system flexibility
No preference to out-of-market-reserves	EMR requires that strategic reserves be contemplated first
CO <sub>2</sub> -concerns treated as secondary to market concerns	Give preference to low-/zero-carbon options that deliver the same reliability result

## Recurring Issues across decisions studied and scope for improvement (cont.)



Issue	What could be done better
Technology neutrality	Technology neutrality is a smokescreen. Any auction design will favour certain technologies. Let's be explicit about what is the real objective.
Upcoming entry into force of the EMR	<p>Anticipate the new rules in decisions taken in 2019</p> <p>Revision of existing CRMs: Commission should guide MS as part of the monitoring</p> <p>Market reforms plans; adequacy assessments / harmonised methodology; strategic reserve first; EPS</p>
Incentivizing power system flexibility?	
Referring to „resources“ not „capacity“	In all new decisions and in future EEAG?



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**Thank you for your attention**

**Do you have further questions or comments? Please contact us at:**

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