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The Italian capacity remuneration mechanism: Critical review and open questions

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ABSTRACT

Italy is currently implementing a Capacity Remuneration Mechanism (CRM) in a power sector that is paradoxically characterised, at least for the time being, by a significant overcapacity. This article aims at building a critical review of the Italian CRM design. It first presents the Italian context, explaining how the discussion started more than a decade ago and how it evolved since then. Then, it provides an in-depth description and critical analysis of the mechanism under proposal, based on its main design elements, keeping always as a reference the guidelines issued by the European Commission on CRMs. Many valuable lessons can be extracted from the Italian experience to shed light on other similar processes currently under development.

1. Introduction

1.1. The regulatory path towards the current CRM

The process of designing a CRM in Italy is everything but recent. As described in this introductory section, it started early after the original liberalisation and restructuring. Two separate phases can be distinguished.

1.1.1. The original initiative

The original market design following the liberalisation of the Italian power sector, implemented in 1999 (through the Legislative Decree 79/1999, known as *Decreto Bersani*), did not consider a capacity mechanism. In 2003, a very hot summer significantly increased electric demand for air conditioning, stressing the grid and leading to the application of rotating blackouts to guarantee system stability. Later on 28 September 2003, an outage of an interconnection with Switzerland, due to a storm, initiated a cascade of failures on the other cross-border lines, which were suddenly overcharged. The abrupt disruption of imports caused the entire Italian grid to trip, starting one of the most severe power outages registered in Europe in the last decades.

This concatenation of events triggered the Legislative Decree 379/2003, in which the Government required the Regulator (AEEG, from the Italian *Autorità per l'Energia Elettrica ed il Gas*, the Authority for Electricity and Gas, later called AEEGSI and now called ARERA) to design a mechanism for the remuneration of generation capacity. This Decree was soon followed by AEEG Resolution no. 48/2004, which introduced a provisional capacity payment[1] that was supposed to remunerate the generation capacity during a transitional period, until the introduction of a permanent CRM.

In the first years after the publication of Resolution no. 48/2004, in part due to the capacity payment, but more importantly due to the period of economic expansion and the optimistic expectations on load growth, a large number of new investments in generation were registered (mainly Combined Cycle Gas Turbines, CCGTs, and, after the introduction of significant subsidies, solar photovoltaics). At the same time, the process of implementation of the permanent CRM, in the form of the so-called reliability option mechanism, entered into a dormant state that lasted until 2011.

1.1.2. The second and not yet closed push

On that year, at the time when, as illustrated in the next section, the installed capacity in the system approached its historical peak and demand had already started decreasing, the process experienced a new

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[1] The Italian capacity payment has two components, one that remunerates the capacity available during critical hours (identified by Terna in advance and announced at the beginning of the year), and one that integrates the remuneration of those plants which did not earn a reference income from the market. These payments are not fixed, since they depend on the total budget assigned to the mechanism, which varies each year and is defined in a resolution from the Regulator. Only power plants that can participate in the balancing market are eligible for the capacity payment. A more detailed description of the Italian capacity payment exceeds the scope of this article and can be found in Benini and Pasquadibisceglie (2011). However, it must be remarked that the economic impact of the capacity payment has been historically low.

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momentum. AEEG issued Resolution no. 98/2011 (AEEG, 2011), containing an initial outline of the reliability option mechanism, and mandated the System Operator (Terna) to elaborate the detailed design. The final proposal by Terna was ratified by AEEG through Resolution no. 375/2013 and was sent to the Ministry concerned (MSE, from the Italian *Ministero dello Sviluppo Economico*, the Economic Development Ministry) for approval. On June 2014 the Government finally approved the proposal presented by AEEG (MSE, 2014). Nonetheless, the Ministry imposed some conditions to be included in the final design, mainly focused on a proper and explicit consideration of contributions from neighbouring countries, and on an active participation of demand response and renewable technologies to the mechanism. These modifications were required to adapt the CRM design to EU Commission guidelines on capacity mechanisms, before the official notification to the DG for Competition.

After the approval, AEEGSI issued Resolution no. 95/2015 (AEEGSI, 2015), which imposes an acceleration to the implementation process. In order to fulfil the tight schedule towards the first auction for reliability option contracts, the Regulator proposes to distinguish between a First Implementation Phase and a Full Implementation Phase, with specific amendments and simplifications applying only during the former period. Furthermore, the Regulator launched two consultations to modify the CRM design in the direction defined by the Ministry (AEEGSI, 2016, 2017).

In August 2017, the capacity mechanism was eventually notified to the European Commission, who finally approved it on 7 February 2018, through the Commission Decision SA.42011 (EC, 2018a). After the approval, Terna published for consultation the final design documents (Terna, 2018a and 2018b, which include some elements discussed during the negotiation with the Commission), while the Regulator issued Resolution no. 261/2018 (ARERA, 2018) to modify the original design as presented in Resolution no. 98/2011.

The design described and discussed in this article is the one proposed in Terna (2018a) and (2018b), but includes also elements from recent Resolutions issued by the Regulator (AEEGSI, 2016, 2017; ARERA, 2018) and from the decision of the European Commission (EC, 2018a).

Before entering into the analysis of the specifics of the design, it is worth briefly introducing the current situation of the generation mix, since, as hinted in this subsection, the current regulatory developments are taking place in a completely different context than the one that initially motivated it back in 2003.

1.2. Current power system statistics

As already mentioned, after a slow start in the years that followed the liberalisation, in the period from 2003 to 2012, the reserve margin in the Italian power system kept increasing dramatically. Two phases can be clearly identified: the first phase, until 2008, registered many new investments in CCGT units, based, as explained in the previous subsection, on the expected growth of the economy and the electricity demand and on the need to substitute old and inefficient steam turbine plants. The second phase, from 2008 onwards, showed a sudden and dramatic growth of non-conventional Renewable Energy Sources for Electricity (RES-E) generation, driven by the support mechanisms implemented by the Italian Government.[2] At the same time, mainly due to the economic crises that affected the country, electricity demand suffered a first collapse in 2009, with a partial recovery in the following two-year period, and then it faced a second plunge from 2012 to 2014 (as it can be seen in the right chart in Fig. 1, in terms of energy, demand levels are today still far below the ones reached in 2008[3]). This combination of factors resulted in a very relevant overcapacity (left chart in Fig. 1).

The market agents more affected by this situation were combined cycle plants (Fig. 2). Between 2010 and 2014, while the installed capacity of these units was quite constant, the energy production almost halved; the average load factor, which was 44% in 2010, went down to 26% in 2014. Nonetheless, the mothballing of some of these units together with a small increase in demand in 2015 and 2016 has resulted in a sustained recovery of CCGT load factors in the last two years (also favoured by hydrological conditions and reduced imports from France).

The overall picture coming out from the figures presented so far shows how thermal generation has been gradually “cornered” by renewable units taking advantage from support mechanisms and by the shrinkage of electricity demand, a situation shared by other European countries (Spain, above all). The profitability of certain technologies, in particular CCGT units (Benini and Pasquadibisceglie, 2011), is being affected and some plants reported to be facing financial conditions which are not sustainable. According to Terna (2017), between 2012 and 2016, 15 GW of thermal power were decommissioned; the same document states that other 5 GW of thermal capacity are mothballed. This strong descending trend in thermal installed capacity was also observable in Fig. 1. Nonetheless, it must be remarked that most of these closures were old steam turbines (Terna, 2015a). Furthermore, as highlighted in this subsection, Italy still has a significant overcapacity (only thermal plants totalled 64.9 GW in 2015, compared to an average peak demand equal to 54.7 GW). Thus, the question that remains is to what extent the new CCGTs, installed in the early 2000s, will actually be decommissioned and in which amount. As discussed next, this fear, together with the alleged need to guarantee a certain amount of flexible generation in the system, are the two main arguments held to justify the full implementation of the capacity mechanism, whose design is described in the next section.

2. Reviewing the design elements of the CRM proposal

The new Italian CRM will be a quantity-based market-wide scheme for the procurement by the System Operator of reliability option contracts. This mechanism, currently being introduced also in Ireland (SEM, 2015, 2016a, 2016b), was originally implemented in Colombia (Firm Energy Obligations, Cramton and Stoft, 2007) and ISO New England (Forward Capacity Market; FERC, 2014). This section follows the structure proposed in Batlle et al. (2015), who listed the main design elements of capacity mechanisms (selling side and demand side in the CRM market, procurement process, reliability product, and sanctions for non-fulfilment).

2.1. Selling side

The identification of the selling side in the Italian CRM evolved substantially from the original to the final design. Even if the original design claimed to be technology-neutral (AEEG, 2011), several restrictions were applied. In particular, the participation of RES-E resources was *de facto* impossible, since these power plants were not able to participate in one of the markets used for the settlement of the reliability option. On the other hand, the contributions from demand-response and cross-border resources were going to be considered

[2] In Italy, several RES-E support mechanisms were made available by the Regulator to project developers, who, in some cases, could decide under which scheme they wanted to be included (see Antonelli and Desideri, 2014, and Marcantonini and Valero, 2017, for details). Basically, a specific feed-in premium or tariff, depending on thresholds and plants characteristics (*Conto Energia*) was created to support solar photovoltaic, while other technologies could choose between trade of green certificates and a fixed feed-in tariff. According to data for 2015, more than 18 GW of solar PV and more than 8 GW of wind turbines are connected to the Italian grid.

[3] It is worth mentioning that the time of the year during which peak demand takes place evolved over time. Italy historically faced winter peaks, commonly in mid-December; however, due to the fast-paced deployment of air conditioning, since 2006, peak demand started being registered in summer, between June and July.