EXECUTIVE SUMMARY

Report (Annex A) - Resolution 282/2020/E/eel

This wholesale electricity market monitoring report has been prepared in accordance with current legislation, with particular reference to article 11, paragraph 1, of the Decree of the Minister of Economic Development of 29 April 2009, containing "Guidelines and directives for the reform of the electricity market regulations pursuant to article 3, paragraph 10, of Law no. 2 of 28 January 2009", as well as the Integrated Text for the Monitoring of the Wholesale Electricity Market and the market for dispatching services pursuant to Resolution ARG/elt no. 115/08 of 5 August 2008 (the so-called "TIMM").

Unlike the usual monitoring reports that analyse the dynamics of the electricity system primarily on an annual basis, offering an overview of the trend of spot, forward and dispatching services markets, this report takes a thematic approach as it intends to explore, over a multi-year horizon, a specific aspect of the dispatching services market (MSD), concerning the implicit procurement of resources for voltage regulation. It is the Authority's intention to continue this line of investigation to examine other specific aspects of the MSD and, in particular, the implicit procurement of resources for frequency regulation.

There are two main reasons for choosing the theme of this report.

Firstly, in the national electricity system, part[1] of the resources for voltage regulation are procured within the MSD.

This approach is different from that which seems to have been consolidated in other European and non-European electricity systems, where resources for voltage regulation are procured through non-market-based instruments, typically applying a cost-based regulation. It is interesting, also in the light of this consideration, to explore this specific market segment, taking into account recent developments in European regulations. Indeed:

- Regulation (EU) 2019/943 (applicable from 1 January 2020) allows for an exemption from the obligation of market-based re-dispatching of generation facilities, where:
    - the number of competing generation facilities is too low to ensure effective competition[2] or
    - the actual network situation involves congestion so regularly and predictably that market-based re-dispatching of generation facilities would lead to regular strategic bidding that would increase the level of internal congestion (and the Member State has adopted an action plan to resolve the congestion or guarantee a minimum capacity for cross-zonal trade of at least 70 % of transmission capacity)[3];
- Directive (EU) 2019/944 (which needs to be transposed into national law) permits an exemption from the obligation of market-based provision of "non-frequency ancillary

[1] Other resources are provided by devices and capabilities directly available to Terna.

[2] Art. 13, paragraph 3, lett. c.

[3] Art. 13, paragraph 3, lett. d.

services"[4], if the regulatory authority assesses that market-based provision is not economically efficient.

Secondly, with Resolutions 342/2016/E/eel, 459/2016/E/eel and 674/2017/E/eel, the Authority has previously highlighted the presence of critical issues in the provision of resources for voltage control in certain portions of the National Transmission Grid (NTG) that have led to significant costs recovered, for the most part, through the "fee for the provision of resources in the dispatching services market" (so-called “uplift”) and, to a lesser extent, through the "fee to cover the costs of units which are essential for system security". In particular, based on the disaggregated data provided by Terna, approximately 60% of the total value of the uplift, in the two-year period 2018-2019, is attributable to the implicit procurement of resources for voltage regulation, i.e. mainly to the re-dispatching of production units (PU) on the MSD *ex ante* (or, more rarely, in real time) due to the constraints on the "presence in service" of a minimum number of equivalent PUs (EPUs)[5] for voltage regulation. Considering also the costs of the essential units (included in the cost reintegration scheme), in the two-year period under consideration, the average annual overall burden linked to the services covered by this report amounts to about 1,300 million euros.
In the light of these considerations, it was therefore deemed appropriate to examine the characteristics of the market segment relating to the procurement of resources for voltage regulation from a structural point of view and, consequently, over a sufficiently long time horizon, assessing the level of competitiveness and possible critical issues, by identifying any situations of pivotality or market power holding by dispatching users (*UoD*), individually (individual *UoD*) and/or collectively (group of *UoDs*).
In this case, market power is expressed in the ability to set the "price" for the "presence in service" of each of the EPUs for which the company is pivotal at a level equal to the maximum price that Terna is willing to pay for the "presence in service" of a EPU. The "presence in service" of a EPU, in fact, is a necessary and sufficient condition for assigning its (injecting or withdrawing) reactive power to automatic voltage regulation. The constraints on the "presence in service" of a minimum number of EPUs for voltage regulation are therefore implicit constraints on reactive power for voltage regulation.

From a methodological point of view, the pivotality analysis can be carried out effectively by performing appropriate "what-if" analyses with a simulator for the dispatching services market. This approach has the considerable advantage of incorporating the possible technological inflexibilities of PUs (e.g. start-up times, out-of-service or in-service times, etc.) as well as capturing all existing interactions in the simultaneous provisioning of different ancillary services, ensuring a precise assessment of the pivotality of each specific service.
A simulator for the dispatching service market capable of carrying out massive processing is currently being developed by Terna and, pending its completion, a conservative approach has been adopted for the analysis of this report, which aims to reconstruct the supply and demand of the "presence in service” of PUs for voltage regulation at every hour and in every area: it has therefore

[4] These include the services covered by this report.

[5] To transform a PU into an EPU it is sufficient to assign an appropriate transformation coefficient to the PU.

been possible to calculate the so-called residual demand for "presence in service" for each single *UoD*/group of *UoDs* - i.e. the demand for "presence in service" net of the "presence in service" supply of competitors - and identify the so-called "residual" or "pivotal" suppliers, where the residual demand is positive[6].
In any case, it is an analysis focused exclusively on the "structure" of the market and not on the "conduct" of the market operators. In other words, the report identifies the precise situations of market power holding and analyses their extent and frequency. On the other hand, the assessment of the degree of exercise of market power by the *UoDs* who may hold it is beyond the scope of the report. If anything, the report highlights (qualitatively) the technological and dimensional symmetry that characterises specific groups of *UoDs* and which, all other factors being equal, favours cooperation between the components in an endlessly repeated game such as MSD *ex ante.*

The analysis covers 9 years (from 2011 to 2019) and extends geographically to the whole of Southern Italy, as the main critical issues regarding the market structure were observed in portions of the national transmission grid within this geographical perimeter.
Due to the small number of *UoDs* that contribute to the supply of voltage regulation resources in Southern Italy, the pivotality tests were applied considering possible combinations of *UoDs* up to a maximum number of 3 for each group. Each test (single *UoD* , group of 2 *UoDs* and group of 3 *UoDs*) was carried out for each area and every hour. A series of indicators have been calculated to summarise these outcomes, including in particular:

- the *frequency of pivotality* (number of hours in which the single *UoD* or group of *UoDs* is pivotal in the area under examination, i.e. the hours of pivotality);
- the *extent of pivotality* (average number of EPUs for which the single *UoD* or group of *UoDs* is pivotal in the hours of pivotality in the area under examination);
- the *requirement underlying the pivotality* (average minimum number of EPUs for which Terna requires the "presence in service" during the pivotal hours in the area under examination).

In addition, an attempt was made to evaluate the distribution of pivotal hours between peak and off-peak hours as well as the main cause of pivotality. The latter may be due to the unavailability of production units owned by competitors (supply side) or to the requirement for "presence in service" (demand side).

Analysing the evolution of pivotality over time, it has emerged that the competitive structure in the implicit procurement of reactive power for voltage regulation is structurally critical in Southern Italy, at least since 2011.
In fact, based on the results of the pivotality tests, the areas of Southern Italy are, in a high number of hours, vulnerable to the potential exercise of market power by individual *UoDs* and/or groups of 2 or 3 *UoDs*. The high degree of symmetry, in terms of production capacity and/or costs, which characterises some groups of *UoDs,* further strengthens the probability that a hypothetical cooperation within the group actually materialises.

[6] That is, those *UoDs* that have a monopoly on residual demand.

The following tables summarise the main quantitative results of the pivotality analysis, expressed in terms of *frequency of pivotality* (total number of hours/days) and *extent of pivotality* (average number of EPUs) over the entire survey period.

Table 1 - Most significant results of the pivotality tests for individual UoDs (period 2011-2019)

		PIVOTALITY		
Area	**Single UoD**	**Nr. hours**	**Nr. days**	**Average Nr. EPUs**
Brindisi	Enel	41.755	1.883	1,2
Calabria	Axpo	2.450	146	1,0
Campania	Tirreno Power	5.187	469	1,0
	Axpo	1.148	117	1,0
Foggia	Sorgenia	1.259	114	1,0
	A2A	318	29	1,0
Lazio	Enel	1.630	132	1,0
	Tirreno Power	491	48	1,0
	Sorgenia	349	28	1,0
Brindisi-Campania-Foggia	*First 2 UoDs*	293	26	1,1

Table 2 - Most significant results of the pivotality tests for groups of 2 UoDs (period 2011-2019)

		PIVOTALITY		
Area	**2 UoDs Group**	**Nr. hours**	**Nr. days**	**Average Nr. EPUs**
Brindisi	Enel-Sorgenia	43.300	1.841	1,5
	A2A-Enel	5.786	281	0,9
Calabria	Axpo-EDF	5.322	385	1,1
	A2A-Axpo	2.649	187	1,0
	A2A-EDF	2.253	142	1,1
Campania	Axpo-Tirreno Power	8.405	830	1,1
	Axpo-Repower (SET)	7.444	687	1,1
Foggia	Alpiq-Sorgenia	7.779	478	1,1
	EDF-Sorgenia	5.375	341	1,1
	A2A-Sorgenia	1.252	134	1,1
	Alpiq-EDF	1.241	87	1,0
Lazio	Enel-Tirreno Power	46.451	2.392	1,3
	Enel-Sorgenia	7.560	500	1,1
	Sorgenia-Tirreno Power	1.347	83	1,2
Campania-Foggia	*Different groups of UoDs*	955	78	1,1
Brindisi-Campania-Foggia	*Different groups of UoDs*	3.110	257	1,4

Table 3 - Most significant results of the pivotality tests for groups of 3 UoDs (period 2011-2019)

		PIVOTALITY		
Area	**3 UoDs Group**	**Nr. hours**	**Nr. days**	**Average Nr. EPUs**
Brindisi	A2A-Enel-Sorgenia	5.242	228	1,6
Calabria	A2A-Axpo-EDF	31.742	1.555	1,3
Campania	Axpo-Repower (SET)-Tirreno Power	20.910	1.755	1,3
Foggia	Alpiq-EDF-Sorgenia	20.276	1.130	1,1
	A2A-Alpiq-Sorgenia	3.572	299	1,1
	A2A-EDF-Sorgenia	692	47	1,0
Lazio	Enel-Sorgenia-Tirreno Power	61.761	2.599	1,8
Campania-Calabria	*Different groups of UoDs*	272	19	1,4
Campania-Foggia	*Different groups of UoDs*	2.505	175	1,3
Brindisi-Campania-Foggia	*Different groups of UoDs*	8.572	550	1,7

In the Campania and Foggia areas pivotality is concentrated mainly in off-peak hours[7], while in the Brindisi, Calabria and Lazio areas there is a more uniform distribution between peak and off-peak hours.

Furthermore, in some areas (in particular in the Brindisi, Foggia and Lazio areas) a growth trend was identified in the requirement for "presence in service", i.e the implicit requirement for reactive power. If appropriate countermeasures are not taken, the structural issues highlighted would seem destined to worsen over time.

This trend would also be confirmed by the expected reduction in the number of PUs suitable for voltage regulation (also reported by Terna in its 2020 Development Plan) - due to the increasing penetration of renewable generation and the concomitant reduction in thermoelectric plants - as well as in consideration of the expected timing for the installation of synchronous compensators.

In this regard, it should be remembered that voltage regulation can also be provided by Terna's grid devices (reactors, capacitors, synchronous compensators, etc.) suitably installed in the areas. In fact, Terna is the sole buyer of reactive power for voltage regulation but, at the same time, it is also a supplier (or rather, self-producer) of reactive power for voltage regulation via its own grid devices. The latter may replace PUs and limit or zero the pivotality of *UoDs* or groups of *UoDs* in the supply of reactive power ("presence in service"). It is therefore essential that the gross reactive power requirement is always "provisioned" at the lowest cost, with transparent planning procedures and on appropriate time horizons for "make or buy" decisions. The interventions carried out so far on this front do not seem to have significantly mitigated the critical issues highlighted, with reference to the market structure, over the time horizon of the pivotality tests (2011-2019).

Taking also into account that the requirement for "presence in service" is completely inflexible with respect to the price of "presence in service" and that Regulation 2019/943 prohibits the imposition of explicit or implicit ceilings on market prices, there is no limit to the share of net surplus that could potentially be transferred, through the uplift fee, from end customers to companies that hold (individually or collectively) pivotal positions.

[7] Overall, in the period from 1 February 2011 to 31 December 2019, off-peak hours (34,832) amounted to approximately half of total hours (78,144). There were 3,256 total days in the same period.