

To Pool or not To Pool? A Level Playing Field for Distributed Energy Resources in European Balancing Markets

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Democratizing balancing markets for electricity

Stimulated by technological advances as well as EU policy objectives, distributed energy resources (DER), such as distributed generation, storage and demand response, have been transforming the power sector. DER can contribute to more efficient system balancing, a task that has been gaining more impetus with the growing shares of variable renewable energy sources (vRES). In the EU, each TSO manages a balancing market, in which they procure balancing services for maintaining system frequency similar to American real-time markets. The EU Guideline on Electricity Balancing (GL EB), adopted in late 2017, strives to create a level playing field for all potential participants in the balancing markets. However, even if new resources are formally accepted, their actual entry can still be hampered by too high transaction costs or stringent market rules.

Pooling can help to lift these restrictions and has been deemed key in enabling DER participation in the market (e.g. [1], [2]). Pooling in this context means aggregation of multiple units on the supply and/or demand side operated together with the help of an IT infrastructure and used to provide system services or to participate in electricity markets. Besides the rules for the procurement of balancing services, requirements for formal access and pooling play a significant role when it comes to DER participation. These vary from country to country and balancing service providers (BSPs) are subject to strict prequalification criteria before they even enter the market. Since balancing market integration and the harmonization of rules constitutes a major EU policy goal, these aspects should be addressed as an integral part of harmonization efforts.

To pool, but who and how?

European countries apply different criteria regarding 1. the type of units that are expected to provide balancing services, 2. how big the pool or the units in it can be or 3. who can aggregate balancing resources (e.g. [3]). This raises the question how specific design choices affect the creation of a level playing field for DER in the balancing market.

The review of different markets in the EU shows that a lack of appropriate conditions for aggregation is one of the main reasons for its still-underdeveloped status. For instance, in some countries formal access criteria may bar specific types of providers from the balancing market, as is the case with demand response in Spanish, Portuguese and, until very recently, Italian balancing markets. This also makes it impossible to include these resources in a pool. Another example is

one where only large industrial loads may be allowed to participate, rather than all consumers, which can be either explicitly specified or de facto through high minimum bid sizes. If only large generators are given a chance to submit their bids in the balancing market, as until recently used to be the case with power plants with 60 MW installed capacity in the Netherlands, making providers at the distribution level unable to compete.

Similarly, portfolio requirements should not explicitly prohibit the inclusion of different technology types in the same pool, such as storage, biomass, small hydro power plants and other vRES. Variable RES are mostly insulated from the markets, including the balancing market, due to the widely applied support mechanisms. Besides, both their individual size and variable nature make it challenging to technically qualify for participation, where a BSP has to demonstrate its ability to deliver neat supply or load curves. Operators of vRES then either need to significantly oversize the pool or combine it with other types of resources. Prohibiting this would violate the principle of non-discrimination, pursued in the GL EB [4], the principle applicable irrespective of size or type of technology.

Obliging generators to reserve capacity for potential balancing clearly foregoes price efficiency and runs contrary to the market-based procurement of balancing services (GL EB [4]). While some countries such as, Germany, Austria, the Netherlands and the Nordics are characterized by well-developed, organized balancing markets, a number of EU countries still apply mandatory provision of balancing services for a number of products, such as for example France or Hungary.

To effectively allow joint service provision from a pool, it is important to consider whether any restrictions are placed on the size of the pool, i.e. the number of technical units, it can contain. For instance, if a BSP would need 5 MW of capacity to be able to submit a minimum possible bid in the balancing market, this would mean pooling about 710 7kW-PV systems, 5000 1kW-washing machines, 2500 2kW-electric boilers, a fleet of 65 medium-sized electric vehicles or a few onshore wind turbines to provide a service. This is the ideal case, while in reality RES variability and the actual consumption patterns will significantly reduce the available capacity.

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If the prequalification requirements refer to a pool, i.e. are pool-based, and not to individual units within it, i.e. unit-based, this would greatly facilitate the participation of DER. The Netherlands among others, for instance, are still applying unit-based criteria for providers of the fastest balancing service, frequency containment reserve. In contrast, recent policy developments in Germany and Austria show both extensive efforts to design flexible pooling concepts for all types of balancing services and to allow balancing services provision from vRES, specifically from wind parks, following the requirement in the GL EB [4]. In this way, vRES might get actively involved in system support instead of being the source complicating system balancing.

Finally, independent aggregators, supported by the European Commission [1], that can ensure market entry of DER on par with existing well-established market actors. According to [1], “independent aggregator” means an aggregator that is not affiliated to a supplier or any other market participant”. Some countries, like Germany and Austria, already formally recognize independent aggregators and allow them on the balancing market. Finland is looking into allowing independent aggregation and so are Denmark and the Netherlands, which so far require the intermediation of balance responsible parties. Among others it is important to ensure that independent aggregators can pool resources across balancing portfolios to create a larger and more flexible pool. Conflict situations may yet arise specifically if independent actors provide aggregation services to consumers that have different electricity suppliers. So, in most European countries such questions as balancing responsibility and the settlement of imbalances between aggregators and other market parties involved still have to be clarified.

A level playing field – a more flexible system

The principle of a level playing field, widely promoted in the EU energy policy, refers to applying the same rules and granting the same rights and obligations to all BSPs, existing and prospective. The flexibility potential is yet to be assessed and quantified based on how much more flexibility is needed to back up volatile renewable generation. What is clear is that flexible pooling options are likely to improve DER integration and vRES own contribution to system balancing, while harmonized pooling requirements are instrumental for all market actors to participate in the balancing market on the same footing. The concept of a level playing field should therefore refer not only the same rights and obligations for all BSPs in a balancing market but also across European markets to create similar opportunities. All the above shows that even if pooling is allowed and practiced, the actual requirements placed on pools vary, which may have implications especially for those market participants that intend to expand their geographical outreach.

What kind of changes to balancing market design

are needed to fully exploit the value of pooling? An explicit permission to pool resources to participate in the market does not just create regulatory certainty but also prepares ground for new innovative solutions in the long term. If potential market participants have sufficient freedom in determining the size and composition of the pool, they can to accommodate technical constraints of DER, fulfill prequalification criteria unrestricted by minimum unit sizes as well as to ensure optimal service procurement through portfolio management. Other solutions include authorizing all types of resources, including demand side, to provide their services and independent aggregators to harvest flexibility. Instead of finding fault with vRES for creating system challenges, it is crucial to allow them into the balancing market together with service delivery from a mixed-technology pool. Creating a level playing field technically does not exclude a transition period during which those technologies that were initially disadvantaged targeted support necessary as a provisional arrangement towards a “level starting point”. Later on, it is the market that should be left to decide which of the balancing resources is the most economically viable since the main yardstick is not the origin of the service but the technical capabilities and economic efficiency of its provider.

This work is part of the overall comprehensive framework developed to assess the level of integration of DER in any European balancing market. Aggregation is key to enabling such integration.

References

- [1] European Commission, “Proposal for a Directive of the European Parliament and of the Council on common rules for the internal market in electricity,” Brussels, COM (2016) 864 final, 2016.
- [2] EG3 Smart Grids Task Force, “Regulatory Recommendations for the Deployment of Flexibility,” European Commission, Brussels, EG3 Report. Smart Grid Task Force, 2015.
- [3] ENTSO-E, “Survey on Ancillary Services Procurement, Balancing Market Design 2016,” ENTSO-E, Brussels, 2017.
- [4] European Commission, *Commission Regulation (EU) 2017/2195 of 23 November 2017 establishing a guideline on electricity balancing*. 2017.

