INTERNATIONAL EXPERIENCE IN LOCAL ELECTRICITY MARKETS FOR THE PROCUREMENT OF FLEXIBILITY SERVICES

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Overview

Electricity distribution system operators (DSOs) are expanding their options for contracting flexibility services from distributed energy resources (DER) and active consumers connected to their networks. This can take different forms: individually (most of the existing cases), via a common trading platform that involves several DSOs (e.g. Piclo Flex)[1] or via a common platform for distribution system operators and electricity system operators that can place bids for flexibility services simultaneously (e.g. the Cornwall Local Energy Market in the UK)[2]. Regulation and policies that promote the trading of flexibility services from DER is still a work in progress in many jurisdictions. Many of the current initiatives are still under development, with an important number of pilot projects/trials that aim to evaluate the economic, technical and commercial viability.

The aim of this study[3] is to analyse and evaluate the deployment of local electricity markets in key jurisdictions from Europe, Asia and Australasia that provide flexibility services to network operators (e.g. distribution system operators, electricity system operators). We have identified 13 Use Cases across these jurisdictions. We discuss different smart solutions and main capabilities across the selected Use Cases (many of them demonstrators) and their relationship to business as usual (BAU). A special consideration is given to the way in which economics and technical solutions are combined to maximise the value that flexibility services can provide to network operators and to the users of the grid.

The paper is structured as follows. Section one discusses the introduction. Section two discusses the evolution of smart solutions used in the procurement of flexibility services from DER and an introduction of flexibility markets. Section three introduces and discusses the Use Cases to be evaluated with a focus on type of services, pricing mechanisms, procurement methods, among others. Section four analyses and compares the Use Cases discussed in section three and identifies main limitations related to their implementation and expansion at large scale. Section five sets the conclusions and recommendations.

Methods

The paper reviews a set of Use Cases from different jurisdictions including Australia, France, Germany, Great Britain, Japan, the Netherlands and Norway. A review of different national public funded programmes, demonstration projects required by governments, independent initiatives and those funded by the European Commission, was performed to identify the Use Cases. We have deliberately selected Use Cases that cover diverse perspectives (i.e. different regulatory frameworks, market rules, auction designs). A questionnaire was designed to capture and standardise key information for each one.

Results

- The trade in flexibility services (including ancillary services) between distribution system operators and decentralised energy sources (e.g. flexible demand customers and battery storage owners) is still at an early development stage.
- Many trades are taking place under trials/pilots and arise from regulatory sandboxing.
- Governments play an important role in the deployment of decentralized energy services by funding and/or promoting the development of smart platforms especially in Great Britain, Japan, Australia.

[1] See: https://picloflex.com/
[2] See: https://www.energylivenews.com/2019/11/11/cornwall-local-energy-market-reaches-flexibility-breakthough/
[3] This study is based on our involvement in Merlin Project (with Scottish&Southern Electricity Networks, a distribution electricity utility from Great Britain). For further details see Anaya and Pollitt (2020 a,b).

- Individual jurisdictions are subject to differing energy regulatory frameworks which defines the level of interaction, coordination and participation among the parties[4]. In particular, we find the distribution of the benefits from the trading of similar decentralised energy services varies considerably by jurisdiction (e.g. in the UK regulated DSOs have been procuring local constraint management at very high fixed prices[5]).

Conclusions

- There is an upward trend in the implementation of projects/initiatives for energy trading that involve the participation of network operators for grid management, initially concentrated on Peer-to-Peer (between consumers/prosumers).
- Network operators will have the opportunity to contract flexibility services using decentralised energy resources (i.e. DERs) and to improve the operation and reliability of the electricity system in a more efficient way.
- There is a need to improve the current regulatory framework that supports more flexible tariffs and enhances the coordination between network operators in order to unlock and maximise the value of flexibility services.
- Most of the projects/initiatives are still at an early initial stage and their sustainability over time will be subject not only to their economics and technical development but to an enhanced regulatory framework that facilitates rather than hinders the participation of DERs in ancillary service markets.
- Clear rules need to be adopted for market design for flexibility services, ideally adapted with current ones and ensure consistency, standardisation and stakeholder buy-in.
- A standard cost benefit methodology with the incorporation of social values is required to estimate the value of flexibility.

References

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[4] In general, there is a lack of coordination between distribution system operators and system operators in the trade of flexibility services to solve network constraints, with some initiatives emerging in the UK (ENA, 2018) and Australia (AEMO-ENA, 2018).

[5] This is due to the high level of curtailment that may be required to solve the constraint. The higher the level of curtailment due to constraints, the more the conflicts. This may reduce the effectiveness of the service delivered and the efficiency of the whole system outcome (WPD, 2018).