Data sharing from system operators

smartEn Spotlight

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INTRODUCTION

An efficient and decarbonised energy system where all digital and decentralised energy resources (DERs) are cost-effectively integrated requires a smart management of grid infrastructures. Data access and sharing from system operators, flexibility service providers, balancing responsible parties, active consumers and prosumers are crucial to achieve this goal.

This Spotlight aims at identifying best practices on how transmission and distribution system operators (T/DSOs) are currently allowing visibility of data to market parties, flexibility providers and asset owners. These developments are in line with the requirements by EU laws and initiatives aiming to set up a European energy data space that unlocks new business models for active consumers, prosumers and communities, to leverage their demand-side flexibility (DSF) and enable a more active participation in local energy markets. This approach is enshrined in two European frameworks:

1) The revised Renewable Energy Directive[1], currently in negotiation, foresees that both TSOs and DSOs make digitally available to third parties information on the share of RES-electricity and the GHG content of the electricity supplied in each bidding zone. Data should be readable via electronic communication devices (e.g., smart-meters and sub-meters, EV charging stations, H&C systems and BEMS). This would enable electricity market participants to help end-users optimise their energy consumption in reaction to external signals and be able to offer their flexibility in various markets. Information should be as accurate and as close to real time as possible, in time intervals of no more than one hour, with forecasting available.

2) The Digitalisation in Energy Action Plan[2], building on the requirements from the Renewable Energy Directive, aims at setting a common European energy data space by establishing an EU data sharing framework for energy that supports innovative energy services. The Action Plan also supports the development of smart grid indicators to monitor smart and digital investment in the grid, as a way to not only enhance the efficiency of the grid but of the energy system as a whole.

Although some progressive system operators have already advanced in their digital transition, this remains a challenge for most of them. In this Spotlight, smartEn has collected a few best practices that aim to inspire other initiatives and steer developments in the sector covering:

- Grid data sharing through open data platforms
- Use of open data standards for System Operators
- DER data access for system services

GRID DATA SHARING THROUGH OPEN DATA PLATFORMS

TSO initiatives

Adapting platforms and services to different interfaces, architectures and sources of information is a major challenge for energy service providers. Therefore, if data are provided through a unique access point and in an interoperable manner, market players can rely on

[1] REDIII, Article 20a

[2] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52022DC0552&qid=1666369684560

harmonised central systems without multiplying their efforts. Centralised data platforms allow the use of harmonised data sets. Some European TSOs have already advanced in building centralised platforms to share data for the European and national electricity markets. In particular:

- The ENTSO-E Transparency platform[3] can be considered the first example of a coordinated effort from all EU transmission system operators. The platform provides historical and forecast data on load, generation, cross-border flows, balancing, outages and congestion management. Data are provided in different granularities, depending on the data format of each TSO.
- Elia, the Belgian TSO, launched in July 2021 a new Open Data Platform[4], which is a remarkable effort to increase transparency of the network and ease access to information from market parties. The platform provides multiple data sets, including detailed information on congestion management (e.g., congestion risks per electrical zone of the grid) and near real-time information, in particular on balancing (e.g., imbalance prices per minute). Data from the platform are accessible through an open API thus supporting the interoperability of data.

Some innovative business models are already active in the market thanks to these initiatives. Particularly interesting is the collaboration between Electricity Maps[5], which pulls electricity generation data sets mainly from the Transparency Platform, and Google to align compute tasks with times of low-carbon electricity supply[6].

While these are positive examples of centralised data sharing, it should be noted that many system operators, both TSOs and DSOs, still lag in data transparency. In particular, data on the DSF capacity available in the system as well as the DSF activated in different markets (e.g., balancing markets, local flexibility markets) are not easy to access or not available in most countries. This should be strengthened both by ENTSO-E and single TSOs.

DSOs initiatives

Digitalisation at distribution level is a bigger challenge than at transmission level. DSOs, especially smaller ones, have often limited capacity to set up advanced data platforms or they rely on legacy processes. Nonetheless, DSO data sharing is fundamental to enable penetration of distributed energy resources and unlock flexibility from active consumers. The European Parliament recognised this aspect in its position on Article 20a of the Renewable Energy Directive. The Parliament specifies that, in addition to what is already proposed by the Commission, DSOs should make available anonymised and aggregated data on the demand response potential and renewable electricity generated by self-consumers and renewable energy communities and injected to the grid.

Some positive initiatives from DSOs grid data sharing can be observed in Great Britain and France. DSOs like UKPN and NGED in GB and Enedis in France make available different data sets on the assets and status of the grid at substation level. This allows the development of innovative business models from flexibility service providers. For example, Octopus' Winder

[3] https://transparency.entsoe.eu/
[4] https://www.elia.be/en/grid-data/open-data
[5] https://app.electricitymaps.com/map
[6] https://www.electricitymaps.com/blog/announcing-our-partnership-with-google

platform, which matches communities who want wind turbines, with landowners, overlays other data set like congested or free substations.

In regard to consumption data, two best practices can be observed in Spain. The DSOs' initiative Datadis[7], a platform that shares monthly data on consumption and self-consumption of communities, or the Regulator's initiative SIPS[8], which makes available to market parties a database of the supply points communicated monthly to the agency by the distributors. This is fundamental to help develop innovative business models based on 24/7 carbon free electricity.

USE OF OPEN DATA STANDARDS FOR SYSTEM OPERATORS

Open standards for data are documented, reusable agreements that help organisations to publish, access, share and use better quality data.
The IEC CIM 62325[9] is a series of open standards developed for the exchange of data in deregulated energy markets. Its use is fundamental to improve interoperability and exchange of grid and market data between system operators and market parties. It is strongly supported by ENTSO-E to harmonise and implement standardised electronic data interchange and it is the reference data format in the ENTSO-E Transparency Platform.

Despite the great improvement in interoperability that CIM provides, some practical issues may arise when developing a system based on this model. These issues can be related to CIM extensions, the harmonisation with other standards when connecting multiple systems or applications, and the validation of the model instances[10]. The use of CIM has been analysed and demonstrated by Horizon2020 innovation projects like INTERRFACE, OneNET, EU-SysFlex and Coordinet. These projects have identified through gap analyses which aspects of the CIM architecture need to be improved (e.g., coverage for flexibility services and products not sufficient for congestion management, all the data flows which are required for baseline calculation are not covered by CIM).

While some developments to tackle the issues described above are necessary, the CIM standard should be considered as a reference model for all system operators, including DSOs.

DER DATA ACCESS FOR SYSTEM SERVICES

In addition to the real-time network information shared by system operators (e.g. renewable energy, carbon content of the grid, congestion), it is crucial that energy assets in the network are visible and accessible for connection to different services. This would create a digital ecosystem that allows the exploitation of flexibility services in addition to enabling participation of households and other small market participants in local energy markets, as well as improving access of smaller renewable generation to wholesale markets. Flexibility registers, with a single national registration point, allow greater transparency over the

[7] https://datadis.es
[8] https://www.cnmc.es/ambitos-de-actuacion/energia/sips
[9] The Common Information Model (CIM) is defined by IEC as "an abstract model that represents all the major objects in an electric utility enterprise typically involved in utility operations". The exchange of information is based on XML files.
[10] https://onenet-project.eu/wp-content/uploads/2022/09/TSG3206092_acceptedVersion.pdf

resources in the networks and ensure that owners of flexible assets can freely opt-in to markets, directly or through aggregation. Flexibility registers should be bi-directional tools for service providers and system operators, with data access management rights. They should include not only information on the flexible assets but also data on flexibility needs by system operators and detailed information on congestion.

Such registers are already used by system operators in Australia and the USA, while some functionalities are also applied in Europe. For example, AEMO, the Australian Energy Market Operator, assigns Decentralised Identifiers (DIDs) to distributed energy resources via a decentralised register[11] making it possible for aggregators and prosumers to engage in grid services at distribution level. Also, Stedin, a Dutch DSO, is piloting the use of DIDs to provide a secure communication solution between their assets and backend systems via cryptographically signed messages. Through this decentralised, open-source register system, developed by the Energy Web Foundation, each asset is identified but operates independently and it helps the DSO to optimise grid management while safeguarding data rights and facilitating interoperability with multiple services.

[11] https://switchboard.energyweb.org/welcome

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