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Paper on DSO data exchange relating to flexibility and NRAs' role

Distribution Systems Working Group

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INFORMATION PAGE

Abstract

The utilisation of flexibility services by Distribution System Operators (DSOs) is an emerging but promising approach for enhancing network management and expediting the integration of new electricity capacity and loads. The exchange of flexibility-related data among DSOs and other stakeholders is fundamental for enabling flexibility's effective use.

At the European level, recent legal frameworks, such as the Data Act proposal and the Digitalising the energy system - EU action plan, introduced by the European Commission in 2022, are creating a more harmonised environment for flexibility data exchange. These developments may also influence the involvement of National Regulatory Authorities (NRAs) in this domain.

From the perspective of DSOs, the landscape for flexibility data handling and utilisation is fragmented due to its early stage. Flexibility services are gradually being incorporated into grid planning, primarily through small-scale pilot projects targeting specific national needs. However, challenges persist in terms of the management of distribution networks, market facilitation, and TSO-DSO coordination. The question of whether DSOs should directly procure flexibility or use flexibility platforms remains a topic of discussion.

From the standpoint of NRAs, involvement in DSO data exchange varies, with many anticipating more significant roles in the future due to evolving EU legislation. As data exchange is central to grid digitalisation and flexibility service utilisation, NRAs will monitor DSOs' performance through smart grid indicators.

Overall, flexibility data exchange practices are in their early stages, lacking common standards or generalised practices. CEER's assessment aims to observe the development of this field and the role of regulatory intervention in Europe without necessarily advocating for harmonisation.

Target audience

European Commission, energy suppliers, DSOs, other network operators, traders, aggregators, energy service companies (ESCOs), electricity/gas customers, electricity/gas industry, consumer representative groups, Member States, academics and other interested parties

Keywords

Flexibility, data exchange, distribution networks, electricity, regulation, flexibility procurement, network management, digitalisation, smart grids

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Related documents

CEER Documents

- CEER Paper on Alternative Connection Agreements, 30 May 2023, Ref: C23-DS-83-06
- CEER Paper on DSO Procedures of Procurement of Flexibility, 16 July 2020, Ref: C19-DS-55-05.
- CEER Conclusions Paper on Flexibility Use at Distribution Level, 17 July 2018, Ref: C18-DS-42-04.
- CEER 2022-2025 Strategy Empowering Consumers for the Energy Transition, 10 June 2021, Ref: C21-SSG-06-05.
- Dynamic NRAs to Boost Innovation, 31 May 2022, Ref: C22-RBM-37-04.
- CEER Conclusions Paper on New Services and DSO involvement. 22 March 2019, Ref: C18-DS-46-08.

External Documents

- Internal report 'DSO Flexibility Data Exchange' produced by DNV for CEER, 26 April 2023.
- Connecting the dots: Distribution grid investment to power the energy transition, Molitor Deloitte, 2021.
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EXECUTIVE SUMMARY

Background

While the use of flexibility services by DSOs is still in its early stages, it can act as a tool for DSOs to manage their networks better and accelerate the connection of new generation capacity and loads. In this context, flexibility related data exchange between DSOs and other parties is a basic building block for the use of flexibility.

The European legal framework is also setting a clearer and more harmonised environment for flexibility data exchange through the Data Act proposal and the Digitalising the energy system - EU action plan published by the European Commission in February and October 2022 respectively. The ongoing developments may also shape NRAs' involvement in flexibility related data exchange by DSOs.

CEER acknowledges that DSOs are not always directly responsible for data collection, considering the role of data hubs or other third parties. However, the focus of this paper is on flexibility data exchange practices rather than on the entities directly responsible for it.

Objectives and contents of the document

This paper aims to provide information on the existing flexibility related data exchange that DSOs are involved with and identify possible future involvement which may also require NRAs' attention. More specifically:

- Describe through example countries the existing and future data exchange practices relating to flexibility where DSOs may be involved;
- Summarise NRAs' existing involvement in DSO (flexibility) data exchange; and
- Outline some of the recent and ongoing developments at the EU level that may bring forward new responsibilities for NRAs relating to data exchange and flexibility related data exchange more specifically.

Conclusions

In general, the use of flexibility resources by DSOs is still quite new and targets specific use cases. Dynamic connection arrangements and congestion management are the most frequent use cases. Flexibility procurement by DSOs varies between flexibility market platforms, regulated mechanisms and pilot projects.

From DSOs' perspective:

- There is a scattered landscape of practices relating to flexibility data handling and flexibility usage by DSOs due to its infancy state;
- Flexibility services are being incorporated in DSO grid planning and operating activities but mostly still in early stages and through small scale pilot projects. Use cases focus on certain specific services which correspond to national needs or priorities;
- Flexibility data exchange offers several challenges to DSOs, in three perspectives: distribution network operation, market facilitation, and TSO-DSO coordination; and
- DSOs shall oversee the integration of flexibility resources in their network operation and planning.

From NRAs' perspective:

- Most NRAs are involved in DSO data exchange in some capacity more generally, although the roles and responsibilities are more limited in some cases than others and many do not foresee any additional involvement with flexibility related data exchange in the next three years;
- While specific regulation on flexibility data exchange only exists in very few cases, the ongoing legislative changes at the EU level mean that NRAs may be more involved with DSO (flexibility) data exchange in the future; and
- Given that DSO data exchange is at the centre of digitalisation of the grid and in enabling the use of flexibility services, data exchange will be one of the areas where NRAs need to monitor and report DSOs' performance through a set of smart grid indicators.

CEER's assessment of the current flexibility data exchange practices by DSOs or other designed third parties reveals that it is still in its early stages. No common standards or generalised practices emerged from the use cases or procedures implemented by DSOs. CEER does not intend to suggest that such harmonisation is needed, but rather investigates how this new area of work of DSOs is developing and how regulatory intervention is playing out in Europe.

1 Introduction

The use of flexibility services by DSOs is still in its early stages but is already established in the internal electricity market design. In that context, this paper was set to scan how this new area of work of DSOs is developing and how regulatory intervention is playing out in Europe.

For the purposes of this paper, flexibility data is defined as data collected or handled by DSOs (or other body responsible for a data hub) relating to the use of flexibility to manage their network or to enable the use of flexibility by third parties. Flexibility resources to be considered include technical solutions from DSOs' own assets, connection agreements, dynamic network tariffs and market-based flexibility procurement including flexibility services and smart solutions for example related to charging and energy communities that can use real-time data to manage local flexible resources for their own benefit or to provide grid services.

Procuring flexibility services from users or engaging with them to secure an adequate response to grid circumstances (contractually or through implicit tariff signals) can be seen as an optimisation tool for grid operation and development, especially in the context of the energy transition, whereby DSOs make use of distributed energy resources and of increased grid visibility and controllability to postpone or avoid some part of network reinforcements, thus reducing the impact of the energy policy relating to the energy transition on grid costs. It is worth noting that European DSOs estimate the needed investment in distribution grid assets to be around 400 billion euros between 2020 and 2030, representing an investment effort 50-70% higher than historical data[1].

Flexibility usage by DSOs does not avoid grid reinforcements altogether but provides a means to accelerate the connection of new generation capacity and demand in already saturated areas and to provide this service efficiently. With the acceleration of the decarbonisation policy and in a disrupted environment of global trade and supply chains, DSOs may also look at flexibility procurement as a tool to cope with the pace of change of the energy system[2,3]. The significant increase in grid investments coincide with an even greater increase in renewable generation investment, competing for all kinds of resources (materials, products, contractors, or human resources). Hence, flexibility may enable DSOs to anticipate and increment grid connection capacities, contributing to meeting the goals of renewable generation in the energy mix.

[1] Connecting the dots: Distribution grid investment to power the energy transition, Molitor Deloitte, 2021.
[2] CEER Paper on DSO Procedures of Procurement of Flexibility, CEER, 2020, outlines the possible procedures for DSOs to access flexibility.
[3] CEER Paper on alternative connection agreements, CEER, 2023, analyses alternative connection agreements as a solution to cope with slower than needed grid development.

The use of flexibility resources by DSOs can compete, overlap, or even aggravate the electricity system's needs of flexibility, for example for balancing. Therefore, TSO-DSO coordination is increasingly critical when discussing the provision of flexibility by network users. Exchanging flexibility data is a basic need for such coordination. Another potential challenge is that local flexibility may incite strategic bidding such as increase-decrease gaming[4] that could steer away from a well-functioning market and could increase grid congestion. While well-functioning flexibility markets are not a focus of this report, it is interlinked with flexibility data exchange through transparency of information and ensuring that all involved parties are able to make informative decisions.

Data exchange between DSOs and flexibility resources is a basic building block for the use of flexibility. CEER's approach to DSO flexibility data exchange investigates current advanced practices, in order to formulate initial views on whether regulators should promote or champion certain practices or even actively regulate towards the harmonisation of such practices.

CEER acknowledges that DSOs are not always directly responsible for data collection, considering the role of data hubs or other third parties. However, the focus of this paper is on flexibility data exchange practices rather than on the entities directly responsible for it.

[4] Strategic behaviour of market participants in anticipation of grid congestion that first increases the congestion (and the need for flexibility), then decreases the congestion by selling the flexibility.

2 Existing and future data exchange needs relating to flexibility where DSOs may be involved

The environmental agenda is at the forefront of EU legislation, with renewable consumption targets recently rising to 45% by 2030 with the REPowerEU plan. Flexibility services have been identified as the key to a more cost-efficient integration of renewables.

In this context, CEER commissioned DNV to conduct a study with the objective to analyse the current and future DSO data exchange practices where the DSO is involved (either directly or through data hubs); and needs relating to the use of flexibility to manage the DSO network, as well as flexibility services in general. With increased stakeholder participation in EU electricity markets and systems, it is fundamental to i) assess the role and responsibilities of the DSOs with regards to flexibility data management; and ii) examine how its current and future data needs differ.

Below is the executive summary of the internal study conducted by DNV, followed by CEER's reflections on the analysis in subsection 2.2.

2.1 DNV's analysis

The DSO data needs were assessed based on input from a set of industry stakeholders, categorising the flexibility use cases in the following three domains:

- Management of distribution networks;
- Market facilitation; and
- TSO-DSO coordination.

At present, in most European countries, flexibility mechanisms and markets for the flexibility use of DSOs are not fully developed or are still at an infancy stage. Consequently, there are very few examples of DSOs engaging in advanced data exchanges. For this study, four European markets were researched, Germany, Great Britain, Italy, and Norway; strategically chosen to address countries with advanced provisions for the various use cases and different data exchange models and regulatory approaches.

Flexibility data exchange differs among countries partly because of different stages of maturity and implementation approaches of flexibility mechanisms. Table 1provides an overview of the status of each use case of the three domains in the four selected countries, colour coding to also illustrate the level of DSO involvement. This involvement describes any additions to the conventional DSO role, which relates to smart meter data and wholesale settlement (and that differs across countries). Commonly for all countries, most of the use cases where the DSO role goes beyond its conventional role are in the domains of DSO flexibility for network management and TSO-DSO coordination. The most advanced information exchange can be found in Great Britain (market-based congestion management mechanism) and Germany (regulated re-dispatch). However, the involvement of the DSOs in the market facilitation domain is limited to the facilitation of energy communities and the contribution to the flexibility registry.

Table 1 – Use case status quo for the three domains and four selected countries, colour coded to indicate the level of DSO involvement.

Domain	DSO flexibility for network management					Market facilitation							TSO-DSO coordination on flexibility use	
	Regulated congestion mgmt/ redispatch	Market based congestion mgmt/ redispatch	Flexible conn. agreements	Grid tariffs (incentive-sing grid-friendly behaviour)	Emergency (RfG: direct disconnection of DERs)	Energy communities - collective self-consumption	Independent aggregation	Balancing services	Sub-metering	Dynamic retail tariffs/ ToU retail tariffs	Split supply	Flexibility registry	TSO Congestion mgmt. vs DSO congestion mgmt.	TSO balancing vs DSO congestion mgmt.
Germany		N/A	N/A											
Great Britain	N/A										N/A	N/A	N/A	N/A
Italy	N/A	N/A												
Norway	N/A	N/A			N/A	N/A						N/A		

DSO not involved in information exchange / DSO is involved but limited to conventional role
DSO is involved – low/moderate information exchange (generally master or planning data)
DSO is involved – high information exchange (e.g. master, planning and operational data)

The differences in information exchange are partly due to different responsibilities that the DSO has in each country. The DSO conventional responsibilities include (among others) grid planning, maintenance, connection, and disconnection of DERs and market facilitation. The main differences relate to the latter, more specifically to smart metering and wholesale settlement. DNV differentiated two types of DSOs with responsibilities on opposite sides of the spectrum.

- Type A: DSOs that are responsible for meter data collection and facilitate settlement (e.g., Italy); and
- Type B: DSOs that are not responsible for meter data collection nor facilitate wholesale settlement (e.g., Great Britain).

Looking into the future, stakeholders interviewed by the consultant agree the DSO role will further develop to include:

1. Use of flexibility solutions in grid planning activities;
2. Active management of distribution grid by making use of flexible resources;
3. Coordination with TSO on distributed flexibility use; and
4. Facilitation of energy communities – esp. validating grid topology requirements.

Stakeholders also agree that the DSO role will not further expand for the following use cases:

1. Facilitation of balancing services; and
2. Facilitation of flexibility markets in general, such as time of use (ToU) / dynamic retail tariffs and asset monitoring and dispatch (market functions that can be performed by market parties themselves). With some exceptions, such as those where grid topology information is needed (energy communities) and the flexibility register.

Stakeholders have different views on:

1. Flexibility register. There are different views on the need, content and purpose of such a register. Most stakeholders argue that it should be limited to master data and exclude operational data; and
2. Submetering – roles and responsibilities.

To obtain key findings and recommendations, based on the information needs identified by the stakeholders for the different use cases, DNV assessed:

1. What are the agreed data need gaps against current practices and upcoming regulation;
2. What data exchange needs are subject to regulation or implementation;
3. What data needs are only applicable for the identified types of DSOs; and
4. The elements that need further assessment due to either divergent stakeholder views or lack of evidence to position current practices as best practices.

Table 2 below shows a summary of the data need gap per use case. These are colour coded, using a blue font to show the recommendation is only applicable for DSOs of type A.

Table 2 – Overview of the data need gap for each use case, colour coded to show in blue recommendations only applicable for DSOs type A.

Domain	Use case	Data need gap
DSO Network management	Regulated congestion management	Only implemented in Germany.
	Market-based congestion management	Depends on regulation and implementation, e.g. Great Britain (long-term contracts) or Netherlands market (intra-day trading). The DSO needs to communicate long-term flexibility needs. An example of implementation (best practice) can be found in Great Britain.
	Non-firm connection agreements	Depends on regulation and implementation (example Norway and Great Britain).
	Grid tariffs (incentivising grid friendly behaviour)	Depends on regulation. For example, subscription model (to be implemented in Luxembourg) only requires the specification of the contracted capacity and the fees associated with it, however, dynamic tariffs would require a constant information provision by the DSO.
	Emergency – DER direct control	Emergency (and disconnection and reconnection) notice to network users.
Market facilitation	Energy communities, collective self-consumption, peer-to-peer trading	Facilitation of set-up: If it involves collective self-consumption, energy communities / consumers need to inform the DSO of the location, meter ID, among others. Facilitation of settlement: meter data of consumers and generation, sharing coefficients from generation to consumers. Example: Austria
	Independent aggregation	Depends on regulation. The DSO would potentially be involved in correcting metering data (in case of corrected model, e.g., NEBEF[5] in France) but it would not be involved in models where a central entity is in charge of the settlement.
	Balancing services	None. DSO has no role to play in facilitating balancing services except for the aspect of TSO-DSO coordination (prequalification and operation, according to the Energy Balancing Guideline (EBGL)) which is covered in the following domain.
	Submetering	Depends on regulation, esp. the role of the DSO in the sub-meter data chain.
	Dynamic retail tariffs / ToU retail tariffs	None (part of conventional role for smart meter data and wholesale settlement).
	Split supply or multi-supplier models	Assign energy volumes to the relevant suppliers based on main- and submeter data.
	Flexibility registry	Flexibility resources master data (Data act can be augmented to reflect this).
	TSO-DSO congestion management	Depends on regulation and implementation. The dynamics of the rules governing the coordination will greatly impact the type of data.

[5] Block Exchange Notification of Demand Response (NEBEF)

TSO-DSO coordination	DSO congestion management and balancing	Depends on regulation and implementation. A coordinated approach between the balancing mechanism and congestion management, esp. on distribution level, will be necessary when more distributed assets will start participating in balancing services.

Based on stakeholder feedback, DNV's main recommendations are as follows:

On DSO role and responsibilities:

- Assess the future DSO role and responsibilities with respect to the use and facilitation of flexibility services.

On DSO network management:

- Grid observability and monitoring by DSOs were identified by stakeholders to be a priority and a key concern. It is perceived as a prerequisite for future DSO network management and the TSO-DSO coordination use cases, yet it is considered to be insufficient in the current status quo. There were conflicting views on the data that the DSO may need from other parties, to enrich the data obtained from the DSO's monitoring equipment. Therefore, it is recommended to further assess the need for both planning data and operational data from customers for the DSO; and

- Assess the eligibility of submeter data for the validation and settlement of DSO flexibility services. This is independent from the choice how submeter data is collected and validated (see next recommendation) but determines if the validation and settlement of DSO services are only based on smart meter data (i.e., connection-level data), or whether sub-meters / embedded meters can be used, even in case a smart meter is installed at a location.

On market facilitation:

- In case submetering is considered for flexibility services, assess how submeter data can be used for the validation and settlement of such flexibility services. This includes requirements for the submeter (e.g. accuracy, MID compliance), but also roles and responsibilities with respect to the collection, validation and estimation of meter data. It applies to all use cases within DSO network management and market facilitation; and

- Harmonisation of flexibility registry. Assess the need and use of a flexibility register, and whether the Data act can be augmented to include flexibility data. This is likely limited to master data.

On TSO-DSO coordination:

- Assess how potential conflicts can be avoided / resolved between TSO and DSO congestion management on one hand, and between balancing services and DSO congestion management on the other hand. Determine the required information exchange for the conflict resolution, both master and operational data.

2.2 CEER's reflections on the DNV's analysis

The section below summarises CEER's reflections on the DNV's analysis on DSOs' existing and potential future responsibilities relating to flexibility related data exchange. It bridges the discussion into later sections where the current and potential future role of the NRAs is evaluated in relation to (flexibility) data exchange.

Case studies of advanced solutions for flexibility services used by DSOs
The consultancy study presented a detailed analysis of four selected European countries, based on their more advanced state of play on flexibility data handling by DSOs and representing different European market models in terms of centralised / decentralised data handling and different power sector realities.

This in-depth analysis of the selected countries revealed a scattered landscape of practices relating to flexibility data handling and flexibility usage by DSOs in general. Flexibility services are being incorporated in DSO grid planning and operating activities but mostly still in early stages and through small scale pilot projects. Also, in each case, flexibility is focusing on certain specific services which correspond to national needs or priorities.

Flexibility services
For example, Germany is very focused on grid congestion management and specifically on flexibility services offered by local generators. Its 'Redispatch 2.0' program followed a coordinated and integrated approach between different DSOs and TSOs, to facilitate congestion management. In the German model, DSOs handle flexibility data of their own grids.

In Great Britain, new grid connections through flexible arrangements are an important feature as well as demand response for congestion management at distribution level, integrated in grid reinforcement decisions. Smart metering data handling, including flexibility data, is centralised by the Data & Communications Company (DCC), a regulated data operator.

The Italian case explores current and future DSO services related to emerging flexibility needs and providers, including for example self-consumers, distributed generation, and storage resources, also through aggregation. The data handling is centralised in a hub – Sistema Informativo Integrato (SII). SII was set in 2010 with the aim of managing information flows relating to the electricity and gas markets on the retail side, it contains a database of consumption points and a register of end customers. The DSOs are responsible for collecting the metering data of their own network and upload them on the hub. Italy is also developing pilot-projects for flexibility services on a voluntary basis by BRPs that are not obligated to offer ancillary services to the TSO. The DSO does not currently purchase ancillary services for its own use, this is expected to start in 2024 and only in a limited number of pilots (Romeflex and Edge), involving two DSOs (Areti and Enel Distribuzione) and, in the first case, the Power Exchange (GME).

Norway mostly uses implicit flexibility schemes, based on detailed and timely consumption and price data that provide incentives for demand response. A data hub (Elhub) is set up. Flexible connection agreements and interruptibility contracts are also used. Explicit flexibility services to DSOs are being implemented through the NorFlex pilot project, which also includes balancing services offered to the TSO.

Flexibility market tools

In Germany, flexibility is used mostly through regulated mechanisms with mandatory participation by generators (from 100 kW). The DSO can intermediate flexibility resources to the TSO.

Flexibility services in Great Britain use flexibility market platforms, such as Picloflex, along with direct connection arrangements. Flexibility contracts follow an industry led template, however the contracts can be further customised by the DSOs.

For Italy, the pilot-project is still the major tool for flexibility services, towards the TSO and, in the future, towards the DSOs. Currently, DSOs facilitate the procurement of ancillary services by the TSO through the exchange of information (at present, occasionally, and in the future, in real time) regarding the compatibility between the flexibility offers of the service providers and the needs / limitations of the local network.

In Norway, regulated flexibility arrangements such as connection contracts and wholesale and grid price signals are used. Through the NorFlex pilot-project, a market platform for flexibility and balancing services is implemented.

This state of play impacts flexibility data exchange by DSOs. While different models are used more generally for data handling (centralised or hub centric / decentralised or DSO centric), data exchange is still very much customised to specific purposes of the flexibility services in each case. Moreover, because many projects are in a pilot stage, most of the solutions are not stabilised nor proven enough to consider making a best practice exercise.

Stakeholders' views and expectations

The consultancy study reached out to stakeholders to collect their views on the DSO role concerning flexibility data exchange. This exercise allows to confront stakeholder expectations with the status quo and identify the gaps between the two.

It is not straightforward to draw a picture of the stakeholders' views. Firstly, the DSO landscape is quite varied, regarding size, voltage levels or their responsibilities. Secondly, because the use of flexibility in distribution network operation is still very new and because it is still not a reality in many countries, the shared views on it are quite generic. Nevertheless, DSOs shall be in charge of integrating flexibility resources in their network operation and planning, if those resources are deemed optimal[6].

Another topic that requires further discussion is the use of submetering by DSOs. This cannot compromise any of the metering requirements implemented by DSOs, nor reduce the quality or the performance of metering data collection and deployment. Furthermore, there may be no secure transmission of data or no way of communication between customer installation and a DSO. Therefore, the possibility for DSOs to use such devices, or data collected and delivered to DSOs by third parties, shall first be assessed through the capabilities and impact on data management by the network operators.

Flexibility data exchange offers several challenges to DSOs, in three aspects: distribution network operation, market facilitation, and TSO-DSO coordination. These challenges were identified by the stakeholders in the context of the consultancy study.

[6] CEER's earlier work from 2020 identifies the four main approaches for DSOs to access flexibility and a more recent paper from 2023 discusses the use of alternative connection agreement in comparison to market-based mechanisms.

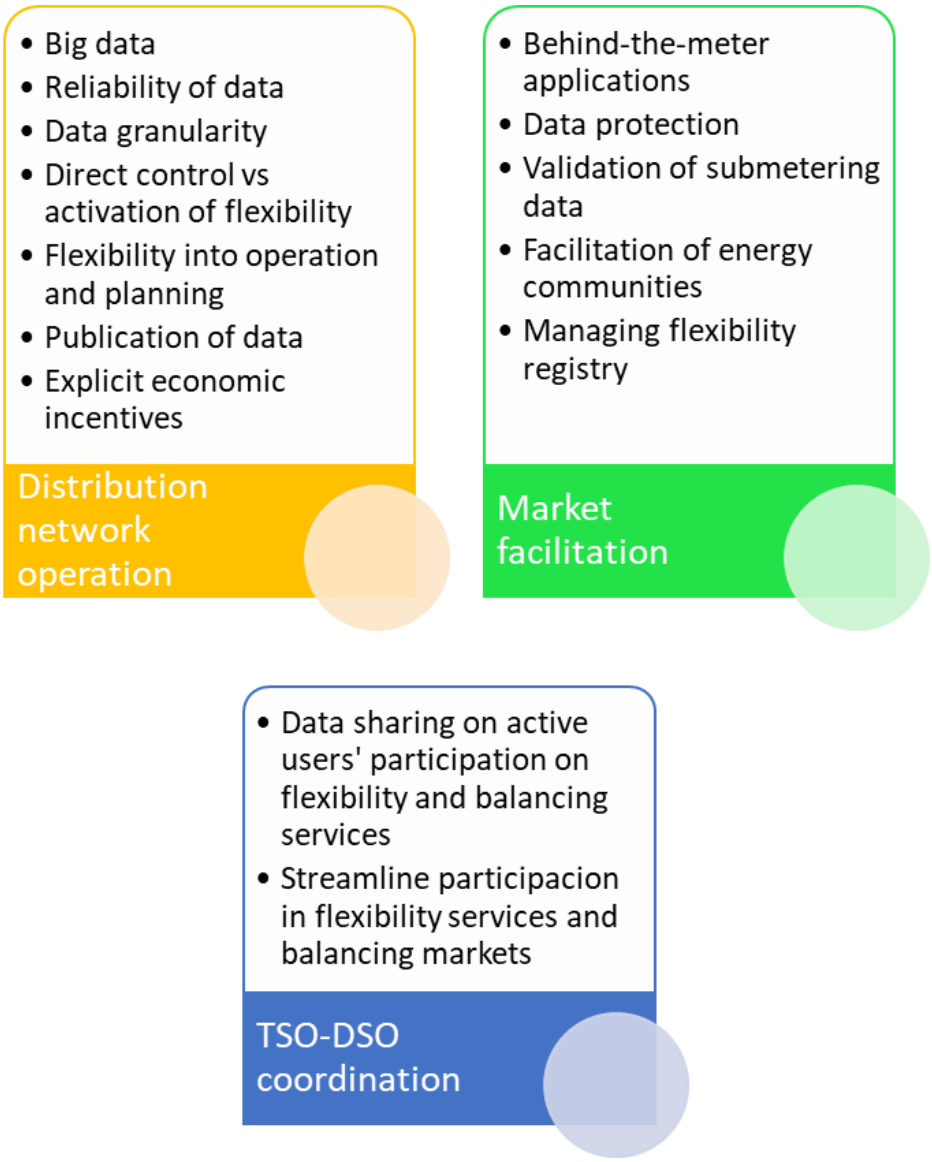

Figure 1 – Main challenges that flexibility data exchange offers to DSOs.

While there is no 'one size fits all', there seems to be room for increased efficiency for DSOs by using best practices and standard tools for operation, planning and data handling.

Learning and sharing approach

Many DSOs are conducting pilot-projects on flexibility services and many challenges are still to be fully addressed. For instance, the potential of aggregation of flexibility assets, consumer participation or EV charging is only starting to be addressed and best fit solutions are yet to be identified. Energy regulators agree with the need for a friendly environment for innovation and trials while opening the flexibility market to new actors and business cases[7].

[7] CEER 2022-2025 Strategy Empowering Consumers for the Energy Transition, CEER, 2021.

Even in the same country, different DSOs can address flexibility in their own way and have unique experiences from their own projects. In this context, regulators should promote this innovation friendly environment, give visibility to pilot-projects and experiences in this area, and share the lessons learned with the regulatory community and with stakeholders in general[8]. This way, successful examples can be replicated faster, and the learning curve is accelerated. At the same time, regulators must embrace that local grid challenges justify different approaches to flexibility services and the underlying data exchange.

Converging paths?

Standardisation of data exchange may contribute to a more holistic use of flexibility and there are examples where distribution network services and system balancing services converge. Behind-the-meter solutions for flexibility management will appear in the market (there are examples already[9]) but clear data standards may facilitate this. Market platforms for flexibility services also require standardisation of data exchange or even of the flexibility services and relevant concepts such as baseline consumption, peak time and lead activation time. This relationship between standardisation and market facilitation shall be considered by regulators while monitoring the development of the flexibility market.

The legal framework is also setting a clearer and more harmonised environment for flexibility data exchange. The European Commission published the Data Act proposal on 23 February 2022, opening opportunities for data-driven innovation and making data more accessible for all. The Commission also issued the Digitalising the energy system - EU action plan (DoEAP), in October 2022, focussing on the energy sector and putting digitalisation at the service of the energy transition. As the first published deliverable under the DoEAP, the European Commission adopted its first Regulation[10] in a series of implementing acts on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data. The first Regulation lays down rules enabling final customers in the retail electricity market and eligible parties to access metering and consumption data, in a timely, simple and secure manner whereas the second Regulation is expected to cover the same for data required for customer switching, demand response and other services.

In the context of the electricity network codes, flexibility services are at the heart of some of the ongoing changes, especially the approval of a new network code for demand response[11] and the review of the grid connection network codes[12].

While pilot-projects and local experiences shall be promoted and stimulated to advance the discovery of the most effective ways to accelerate the energy transition and for DSOs to cope with the speed of change that the distribution networks are required to respond to, it is also true that EU level rules are being drawn and regulators are being asked to assess how and how fast DSOs (and TSOs) are adopting the digitalisation of network operation and increasing network capacities to enable the energy transition. In this context, CEER shall keep monitoring how DSOs are developing the flexibility data exchange and if this development is aligned with the European trends, the best practices and new requirements.

[8] Dynamic NRAs to Boost Innovation, CEER, 2022.
[9] New Services and DSO Involvement, CEER, 2019, discusses the role of DSOs and new actors.
[10] Implementing Regulation on interoperability requirements and non-discriminatory and transparent procedures for access to metering and consumption data, European Commission, 2023 [link].
[11] On 21 December 2022, ACER submitted the framework guideline on demand response to the European Commission [link].
[12] On 26 September 2022, ACER launched an initial Public Consultation on the amendments to the grid connection network codes [link].

NRAs' involvement in DSO (flexibility) data exchange across countries

As part of this workstream, CEER's Distribution System Working Group also conducted a survey of NRAs to better understand NRAs' current involvement in DSO (flexibility) data exchange across countries. The survey received responses from 22 NRAs.

In terms of NRAs' current involvement in data exchange, most NRAs (16 out of the 22) are involved in some capacity[13]. Most often it means involvement in developing data exchange practices, however regulating data exchange procedures[14] and supervising data exchange are also roles where NRAs are often involved in. The prevalence of these roles among the surveyed NRAs signifies that some NRAs already have a formed role in regulating the new practices of DSOs involved in new flexibility data needs and data exchange responsibilities.

When narrowing down to flexibility related DSO data exchange, a general finding from the survey is that most NRAs are in very early stages in their discussions on how each Member State will treat flexibility data exchange in contrast to, for example, consumption data exchange. More specifically, only five of the 22 respondents said that flexibility related data exchange is currently treated separately from consumption related data exchange. As was established, not all NRAs are involved in regulating any aspects of DSO data exchange and therefore even fewer are involved in regulating data exchange relating to flexibility. Only three NRAs (from Belgium, Germany and Latvia) reported to currently have specific regulation on some flexibility related DSO data exchange.

Additional examples of flexibility related data exchange to support DNV's analysis

The DNV's study identified several existing flexibility related data exchange practices where DSOs are involved in the four countries that were analysed (Germany, Great Britain, Italy and Norway; see Table 1).

Additionally, CEER expanded the DNV's analysis via the survey of NRAs to also cover other European countries. These are discussed in turns below.

<u>Energy communities and collective self-consumption</u>

DNV's analysis identified energy communities and collective self-consumption as one of the existing flexibility related data exchange practices that DSOs are currently involved with, as a well-established new actor, which often aims to optimise its local portfolio of flexible resources for the benefit of the community. Two NRAs (Portugal and Finland) noted that their DSOs were involved in data exchange related to energy communities and collective self-consumption.

In Portugal's case, the regulation requires DSOs to handle data relating to energy communities and collective self-consumption. The DSO collects consumption and generation data of every participant in a collective self-consumption (or energy community) and exchanges this data with the representative of the collective self-consumption. The DSO also computes one of several options for energy sharing rules and determines the energy which is shared with each participant in every 15-minute period. This amount is subtracted from the metered amount to determine the net consumption to be supplied by the supplier of each participant, in each 15-minute period.

[13] In a related topic, customer complaints are often focussing on billing and metering issues which, in turn, comes down to data provided by suppliers or DSOs. Even if NRAs are not directly involved in regulating DSO data exchange, their oversight on data issues more generally is a given.

[14] For example, overseeing in some capacity the process of data exchange between parties, determining what type of data is exchanged by which standards and who has access to that data and who is responsible for that data.

In Finland's case, DSOs collect structural information regarding energy communities and deliver the information to the data hub. DSOs also deliver the metered data of consumption and production from the community, but in contrast to Portugal, all calculations are done by the data hub.

Electricity DSOs' network development plans

Three of the surveyed countries (Denmark, Finland and Portugal), noted that the network development plans, which are submitted by DSOs to the NRA, include information on flexibility and can therefore be considered as flexibility data exchange. In Finland's case, from 2022 onwards, data is provided on the types of flexibility related pilot-projects and consultations that DSOs have done over the past two years. In the next rounds of network development plans in 2024 and 2026, DSOs must provide more detailed plans about the use of flexibility resources as an alternative to grid reinforcements and the cost-benefit analysis of these options. A similar framework is established by Portuguese law and implementation by NRA and DSO is under way.

3 Looking ahead: future regulatory landscape concerning DSO data exchange

In this section the upcoming developments in the regulation of DSO (flexibility) data exchange are discussed partly based on the input from NRAs and partly by evaluating emerging EU level developments such as the European Commission's proposal for the revision of the Electricity Market Design.

3.1 Upcoming developments in the regulation of flexibility data exchange

Despite the EU level developments concerning flexibility related data exchange via the European Commission's Data Act proposal and the published action plan on digitalisation of the energy system, half of the NRAs do not envisage concrete proposals for developing regulation of flexibility data exchange in the next two years. However, one NRA did explain that development concerning data exchange was in their case the responsibility of the acting government instead of the NRA. Priorities for the moment seem to be directed towards participation in ongoing EU level tasks, such as the network code on demand side response and the new electricity market design, as well as implementation of the Clean Energy Package from 2019.

Seven NRAs anticipate engaging on new developments in the near future. These included potentially having a framework on flexibility data exchanges to be included in the next version of the regional grid code or potentially including an incentive mechanism to facilitate and increase the quality of data exchange, and planned changes in market communication regulation.

In three cases, the NRAs envisioned the possibility of being further involved in regulating flexibility related data exchange in the future, and in one case this depended on the specific details of the national legislative changes that were being introduced.

It should be noted that where flexibility services use third-party market platforms such as Piclo Flex or Nodes, flexibility data exchange is somewhat self-regulated, in the sense that these platforms already set requirements for data and data exchange in a standardised way.

Under the European Commission's proposal for the revision of the Electricity Market Design[15], several new market features point to flexibility usage by network operators. As a possible example, depending on the existing country practices, submetering under certain validation conditions could unlock flexibility resources behind-the-meter and facilitate new business models that include third-party providers managing those resources. These solutions allow to share the risk of investment in flexible assets and to externalise the engagement in market platforms for flexibility or system services. To enable this, DSOs shall collect and handle data from submeters, providing the necessary input for validating the contracted services. However, current views and practices on submeter data handling differ greatly between countries, therefore in some Member States DSOs involvement in submetering may not be a relevant example.

[15] European Commission (2023) Electricity Market Design revision: Proposal to amend the Electricity Market Design rules

The proposal also includes a regular assessment of the national flexibility needs, using data and analysis by TSOs and DSOs in coordination. This would imply having a benchmark for the actual availability and usage of flexibility services by DSOs and clearing some uncertainty in investors' risk assessments. Also, there are new measures to support investment in flexibility resources, either national targets for demand response or energy storage or specifically designed support schemes.

Based on the proposal, network capacity shall be determined by DSOs with increasing regularity and transparency, and even in congested areas DSOs shall offer capacity when flexibility services allow to address congestion.

Finally, energy sharing is also promoted by the new market design proposals, by extending the concept of self-consumption. DSOs or other designated parties are key to provide data handling that supports these sharing agreements.

3.2 DSO data exchange's relevance to smart grid indicators (Article 59.1)

The smart grid concept is associated with a more digital and communicating grid, where DSOs will operate and plan the physical grid with the help of its "digital twin"[16]. A smart grid is the enabling technology for flexibility services, because i) it is key for DSOs to manage their networks dynamically and with real time data rather than with traditional forecasting techniques and worst-case assumptions; and ii) it is also key for DSOs to engage with users and to verify and reward flexible behaviour. Furthermore, the smart grid is very much linked with integrating external resources (from network users) in network management. Hence, data exchange between DSOs and flexibility resources is a basic requirement.

The internal electricity market directive, Directive (EU) 2019/944, mandates regulators to monitor and assess the performance of TSOs and DSOs in relation to the development of a smart grid that promotes energy efficiency and the integration of energy from renewable sources (Article 59(1)(l)). This way, using flexibility services in network operation and planning will be assessed and benchmarked across the EU. Moreover, the recent proposal by the European Commission for the reform of the Electricity Market Design, on 14 March 2023, includes, for example, the regular assessment of the system's flexibility needs, by regulators. These examples show that flexibility resources, services and data will be under focus by legislators and regulators, with a new sense of urgency.

Additionally, European DSO associations have presented a proposal for the design of smart grid indicators that represent the degree of smartness of a given distribution network[17]. DSOs are expected to include data exchange in the set of indicators as well as enabling local flexibility markets. Therefore, overall, NRAs will most certainly have new duties relating to these smart grid KPIs and one of the areas being data exchange.

[16] ENTSO-E and EU DSO Entity have signed a Declaration of Intent to jointly develop the Digital Twin of the EU electricity grid as suggested in the EU Action plan, 2022 [link].
[17] Smart Grid Key Performance Indicators: A DSO perspective, 2021 [link].

4 Conclusions

This paper evaluated the DSOs' and NRAs' existing and potential future roles and responsibilities relating to flexibility data exchange by first summarising an externally commissioned report and then evaluating the responses to a CEER survey for NRAs.

CEER acknowledges that DSOs are not always directly responsible for data collection, considering the role of data hubs or other third parties. However, the focus of this paper is on flexibility data exchange practices rather than on the entities directly responsible for it.

In general, flexibility resources' usage by DSOs is still quite new and targeting specific use cases. Dynamic connection arrangements and congestion management are the most frequent use cases. Flexibility procurement by DSOs varies between flexibility market platforms, regulated mechanisms and pilot projects.

From DSOs' perspective:

- There is a scattered landscape of practices relating to flexibility data handling and flexibility usage by DSOs due to its infancy state;
- Flexibility services are being incorporated in DSO grid planning and operating activities but mostly still in early stages and through small scale pilot projects. Use cases focus on certain specific services which correspond to national needs or priorities;
- Flexibility data exchange offers several challenges to DSOs, in three perspectives: distribution network operation, market facilitation, and TSO-DSO coordination; and
- DSOs shall oversee the integration of flexibility resources in their network operation and planning.

From NRAs' perspective:

- Most NRAs are involved in DSO data exchange in some capacity more generally, although the roles and responsibilities are more limited in some cases than others and many do not foresee any additional involvement with flexibility related data exchange in the next three years;
- While specific regulation for flexibility data exchange only exists in very few cases, the ongoing legislative changes at the EU level mean that NRAs may be more involved with DSO (flexibility) data exchange in the future; and
- Given that DSO data exchange is at the centre of digitalisation of the grid and in enabling the use of flexibility services, data exchange will be one of the areas where NRAs need to monitor and report DSOs' performance through a set of smart grid indicators.

CEER's assessment of the current flexibility data exchange practices by DSOs or other designated third parties reveals that it is still in its early stages. No common standards or generalised practices emerged from the use cases or procedures implemented by DSOs. CEER does not intend to suggest that such harmonisation is needed, but rather investigates how this new area of work of DSOs is developing and how regulatory intervention is playing out in Europe.

Annex 1 – List of abbreviations

Term	Definition
BRP	Balance Responsible Party
CEER	Council of European Energy Regulators
DCC	Data & Communications Company
DoEAP	Digitalising the energy system - EU action plan
DSO	Distribution System Operator
EV	Electric Vehicle
MS	Member States
NRAs	National Regulatory Authorities
ToU	Time of Use
TSO	Transmission System Operator

Annex 2 – About CEER

The Council of European Energy Regulators (CEER) is the voice of Europe's national energy regulators. CEER's members and observers comprise 39 national energy regulatory authorities (NRAs) from across Europe.

CEER is legally established as a not-for-profit association under Belgian law, with a small Secretariat based in Brussels to assist the organisation.

CEER supports its NRA members / observers in their responsibilities, sharing experience and developing regulatory capacity and best practices. It does so by facilitating expert working group meetings, hosting workshops and events, supporting the development and publication of regulatory papers, and through an in-house Training Academy. Through CEER, European NRAs cooperate and develop common position papers, advice and forward-thinking recommendations to improve the electricity and gas markets for the benefit of consumers and businesses.

In terms of policy, CEER actively promotes an investment friendly, harmonised regulatory environment and the consistent application of existing EU legislation. A key objective of CEER is to facilitate the creation of a single, competitive, efficient and sustainable Internal Energy Market in Europe that works in the consumer interest.

Specifically, CEER deals with a range of energy regulatory issues including wholesale and retail markets; consumer issues; distribution networks; smart grids; flexibility; sustainability; and international cooperation.

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More information is available at www.ceer.eu.