Roadmap on the Evolution of the Regulatory Framework for Distributed Flexibility

A joint report by ENTSO-E and the European Associations representing DSOs (CEDEC, E.DSO, Eurelectric, GEODE), June 2021

Contents

1. Executive Summary

Power system flexibility is key to a successful energy transition. The advent of variable renewable energies and Distributed Energy Resources (DERs), coupled with the parallel decommissioning of conventional power plants, calls for the development of new approaches to system operation and the sourcing of ancillary services.

The security and stability of the electricity grid will increasingly rely on the contribution of assets connected to the distribution grid. Sound coordination schemes between transmission and distribution system operators (TSOs/DSOs) are thus critical to avoid harmful interferences across voltage levels and competition for accessing resources.

The Clean Energy Package sets a general framework for a redesign of electricity markets that guarantees the fair and equal participation of all flexibility service providers, including active customers. It also acknowledges the evolving role and tools of DSOs and TSOs towards more active system management. Member States are currently adapting their national legislation to integrate these new requirements.

The Electricity Regulation also provides the basis for the development of new EU regulation on demand-side flexibility if necessary (Article 59 of Regulation (EU)2019/944). In this regard, a policy discussion is emerging about the relevance of a network code in the area of demand-side / distributed flexibility. This Roadmap represents the joint contribution of ENTSO-E and the European associations representing electricity DSOs (CEDEC, E.DSO, Eurelectric, GEODE) to this debate. It provides a joint assessment of the regulatory gaps that require addressing to facilitate the participation of DERs in "flexibility services".

The recommendations of the report are summarised in the table below. They are the outcome of 5 months of analysis and discussion between TSO and DSO experts involved in a Joint Task Force on Distributed Flexibility, which was set up in the framework of the Distribution & Transmission Cooperation Platform.

Although diverging perspectives still exist regarding the housing of these new rules, ENTSO-E and the European DSO associations hope that this Roadmap will support the development of concrete regulatory proposals which address the identified gaps under the initiative of the European Commission, with the involvement of the Agency for Cooperation of Energy Regulators and stakeholders.

Topic	Recommendation	Priority	Remark
1	Establish requirements as applicable for data exchanges necessary to enable, for example, market-based congestion management	**High***	The report includes an indicative list of the relevant requirements to facilitate multilateral data exchanges, with split TSO and DSO positions for some. *The development of new roles associated with these data exchanges is considered a low priority.

2	Review the EU framework for standardised functional requirements related to market-based congestion management, taking into account the presence of DSOs in operations	**High**	The report specifies conditions under which the exchange of this information is not deemed desirable or necessary, e.g. mitigate gaming.
3	Introduce the concept of a flexibility resource register as an important tool for TSOs and DSOs in the effective management of flexibility resources	**High**	
4	Provide high-level principles for enabling Flexibility Service Providers to access multiple revenue streams and stack value across different markets	**High**	
5	Do not develop the role of flexibility market operator in EU regulation	**Low**	The report recommends avoiding EU regulation on this topic to enable the development of innovative solutions at national level.
6	Develop a common non-exhaustive list of attributes for new flexibility services (grid capacity management, congestion management, voltage control)	**High** **TSO: Low***	*TSOs agree that the development of such attributes for congestion management is a high priority; however, they deem it a low priority for grid capacity management and voltage control products.
7	Develop principles for the product prequalification of new flexibility services (grid capacity management, congestion management, voltage control)	**High** **TSO: Low ***	*TSOs agree that the development of such prequalification principles for congestion management is a high priority; however, they deem it as low priority for grid capacity management and voltage control products.
8	Develop principles for static grid prequalification of congestion management	**High***	*DSOs deem that principles for static grid prequalification should also be developed for grid capacity management.
9	Introduce telemetry requirements for measurement, validation and settlement purposes for flexibility services	**DSO: High** **TSO: Low**	The report introduces split TSO and DSO positions because of diverging interpretation regarding the applicability of existing SO GL / KORRR regarding provision of real-time information.
10.1	Introduce data exchange requirements for grid assessment	**DSO: High** **TSO: Low**	The report introduces split TSO and DSO positions because of diverging interpretation regarding the applicability of existing SO GL / KORRR.
10.2	Develop principles for TSO–DSO coordination for security	**DSO: High**	The report introduces split TSO and DSO positions because of diverging

		TSO: Medium	perspectives on the need for additional regulatory provisions in this area.
11	Develop principles for facilitating the dynamic grid prequalification of flexibility service providers	**Medium**	
12	Introduce requirements for the availability of data from aggregated portfolios with adequate granularity	**High**	
13	Develop a high-level framework for coordination across market processes	**High**	
14	Develop rules for counterbalancing in the event of activations of flexibility resources	**Medium**	
15	Develop rules for the adjustments of imbalances of balance responsible parties in the event of redispatching activations	**DSO: Medium** **TSO: No gap**	The report introduces split TSO and DSO positions because of diverging perspectives on the need for additional regulatory provisions in this area.
16	Develop a harmonised role model for flexibility services	**DSO: High** **TSO: Low**	The report introduces split TSO and DSO positions whereby DSOs recommend that EU regulation includes a harmonised role model whereas TSOs deem that this is a topic for further discussion between ENTSO-E and the EU DSO Entity.
17	Develop rules for the use of a flexibility resources register for the TSO–DSO coordination process	**Low**	
18	Ensure recovery of costs for data exchanges and coordination platforms	**Low**	
19	Ensure the availability of historical and near real-time data from main meters for settlement and observability purposes	**High**	
20	Ensure the free flow of sub-meter data and interoperability at different Smart Grid Architecture Model layers	**High**	
21	Develop a framework for enabling the use of sub-meter data for settlement and observability processes	**Medium**	
22	Define baseline principles which must be accepted in any Member States and collect a list of best	**Medium**	

	practices of baseline methodologies		
23	Develop harmonised rules for avoiding double counting and splitting the bill between system operators in case of value-stacking or if more expensive bid needs to be activated.	**High**	

2. Introduction

Background

The two fundamental goals of the Clean Energy Package (CEP) are first, to ensure the efficient integration of renewable energy sources through the effective operation and appropriate development of transmission and distribution networks, and second, to create a European market with the non-discriminatory participation of Flexibility Service Providers (FSPs).

In particular, the flexibility potential of Distributed Energy Resources (DERs), such as distributed generators, storage, active consumers, local energy communities or aggregators, is critical as conventional power plants are being decommissioned and their contribution to system security is decreasing. Transmission system operators (TSOs) and distribution system operators (DSOs) are therefore fully committed to integrating DERs into all relevant ancillary services.

These objectives are enabled by several provisions in the Electricity Directive (EU) n°2019/944 ("hereinafter "Electricity Directive") and the Electricity Regulation (EU) n°2019/943 ("hereinafter "Electricity Regulation"), a non-exhaustive list of which is provided below.

Electricity Directive

- Article 15: Active customers
- Article 17: Demand response through aggregation
- Article 31: Tasks of DSOs
- Article 32: Market-based procurement of flexibility for distribution grids ("flexibility markets")
- Article 36: Ownership of energy storage by DSOs
- Article 40: Tasks of TSOs
- Article 54: Ownership of energy storage facilities by TSOs

Electricity Regulation

- Article 13: Market-based (unless otherwise provided) redispatching open to all grid users
- Article 57: Transmission–Distribution cooperation, including
  - exchange and access to relevant data regarding the performance of generation assets and demand side response, the daily operation of their networks and the long-term planning of network investments
  - coordinated access to resources such as distributed generation, energy storage or demand response that may support the particular needs of both the DSOs and TSOs
- Article 59 in its whole and, notably, Article 59(1)(e), the establishment of network codes and, notably, "rules implementing Article 57 of this Regulation and Articles 17, 31, 32, 36, 40 and 54 of the Electricity Directive in relation to demand response, including rules on aggregation, energy storage, and demand curtailment rules".

While the implementation of these provisions is ongoing, a policy debate has emerged regarding the development of a new Network Code (NC) that would facilitate the uptake of flexibility from DERs. In this respect, and in the framework of the Distribution & Transmission Cooperation Platform, ENTSO-E and the European associations representing electricity DSOs, namely CEDEC, E.DSO, Eurelectric and GEODE (hereinafter "EU DSO associations"), decided on 28 February 2020 to assess the regulatory requirements for integrating DERs into grid and system services.

On 1 October 2020, ENTSO-E and the EU DSO associations presented the results of their respective analyses during a stakeholder's workshop organised by the European Commission (DG ENER). Despite a shared assessment of critical issues and the identification of regulatory gaps, two diverging perspectives appeared regarding the necessary evolution of the regulatory framework, whereby TSOs advocated for amendments to existing NCs and guidelines (GLs) and DSOs favoured the development of a new NC. In parallel, the European Commission (DG ENER) commissioned a complementary study, which was released in December 2020[1].

Against this background, the EU DSO associations, ENTSO-E and DG ENER agreed on 28 October 2020 to create a Joint Task Force (JTF) on Distributed Flexibility (DF) that will develop a Roadmap by July 2021 for the development of European rules regarding DF in particular rules on aggregation, energy storage and demand curtailment rules. The JTF was also requested to ensure relevant stakeholders are properly involved in this process. In this regard, ENTSO-E and the EU DSO associations presented preliminary results of the Roadmap and exchanged views with several organisations during a stakeholders' workshop on 20 May 2021. A summary of the discussion is provided in Annex III.

Scope

In the context of this Roadmap, Demand-Side Flexibility (DSF) addresses the ability of distribution-connected assets to deviate from their normal electricity consumption or production profile in response to the needs of system operators.

The analysis applies to all types of distribution-connected assets operated by market parties, individually or in aggregation: residential demand-responsive units (such as active customers), non-residential demand-responsive units (keeping in mind existing, well-functioning rules for e.g. large industries irrespective of their voltage-level), distributed generation (variable and dispatchable), and distributed storage. It should not preclude the possibility for transmission and distribution system operators to involve other types of resources if necessary, e.g. for rebalancing purposes. This approach develops the structure in some current network codes (cf. Requirements for Generators [RfG], Demand Connection Code [DCC]) in the direction of being more technology-agnostic.

Although ENTSO-E and EU DSO associations share a common definition of DSF, perspectives diverge regarding the definition of flexibility services according to existing regulation (Electricity Directive):

[1] https://ec.europa.eu/energy/studies_main/final_studies/regulatory-priorities-enabling-demand-side-flexibility_mt

- From a TSO perspective, this could be considered as: ancillary services (balancing services, non-frequency ancillary services) and services for intrazonal congestion management (sometimes also referred to as "intrazonal redispatching");
- From a DSO perspective, this could be considered as: non-frequency ancillary services (inter alia: voltage control), local congestion management services, and grid capacity management services.

Nevertheless, the following table provides an overview of the relevant markets and products within the scope of this joint analysis.

Organised market	Products	Roadmap
Constraint management	• Congestion management	In
Non-frequency ancillary services	• Voltage control • Island operation • Black start capability • ….	In Out Out
Adequacy	• Capacity payments • National capacity markets • Strategic reserves • Hedging	Out Out Out Out
Wholesale	• Day-ahead optimisation • ID optimisation • Self/passive balancing • Generation optimisation	Out Out Out Out
Balancing[2]	• FCR • Automatic FRR • Manual FRR • RR	Out In In In

In addition, the scope of the Roadmap is further defined as follows:

- **Explicit provision of flexibility to system operators in normal stat**e (i.e. alert and emergency state rules are not covered).
- **EU level harmonisation**, i.e. Member State implementation of existing rules (e.g., CEP, existing NCs) are not covered.
- **Implicit DSF and wholesale markets** (day-ahead [DA] and Intraday [ID] markets) are not covered unless there is a significant interaction with the processes covered by the Roadmap.

Methodology

The experts of the JTF (see in Annex IV the full list of contributors) began by identifying issues relevant to the Roadmap from the previous gap analyses, which are themselves based on joint reports co-

[2] Changes to balancing processes as such are not considered but rather the interlinkages with other processes such as congestion management

developed by ENTSO-E and the EU DSO associations (e.g. Active System Management report[3], Task Force Smart Grid Expert Group 3 report on demand-side flexibility[4]).

The JTF identified the relevant issues and clustered them into four categories, which form the basis of the Roadmap:

Cluster	Description
Market access and rules for aggregation	Interaction between system operators and market parties, market structures (ex: access to and interaction between marketplaces)
Product design and procurement	Product prequalification, product design (incl. locational information) and ex ante grid limitations
Market processes and T&D coordination	Short-term grid prequalification, TSO–DSO coordination functions (incl. data exchanges)
Measurement, validation and settlement of flexibility services	Energy and financial settlement, telemetry, observability, baseline calculation, sub-meter data

For each topic identified, the JTF performed a standardised assessment based on the template below. Considering the many interlinkages between each topic, a list of dependencies is provided in Annex II.

Template
Topic X: Does the current EU framework address issue Y?

- Description – High-level view on what the barrier / issue is
- Justification – Why is it important to alleviate this barrier? What are the benefits?
- Geographical relevance – Is the barrier more relevant at national or European level (affect the level playing field)? What is the most appropriate level to address it?
- Regulatory assessment – To what extent is this barrier addressed (or not) by the existing framework? (description of which rules are necessary, and highlight if there are different options for achieving the same result)
- Prioritisation – Ranking between low, medium or high

The Roadmap proposed in Chapter 7 builds on this analysis and summarises the relevant regulatory intervention. The Roadmap also includes a glossary of relevant terms – cf. Annex I.

[3] https://eepublicdownloads.entsoe.eu/clean-documents/Publications/Position%20papers%20and%20reports/TSO-DSO_ASM_2019_190416.pdf

[4] https://ec.europa.eu/energy/sites/ener/files/documents/eg3_final_report_demand_side_flexiblity_2019.04.15.pdf

3. Market Access and Rules for Aggregation

In a world with increasing amounts of (decentralised) variable renewable electricity production, system operators and market parties will have to increasingly cooperate to ensure the electricity grid remains stable, accessible and affordable. Cooperation is built upon trust and the sharing of information. In this view, ENTSO-E and the EU DSO associations endorse the following principles for market access, which underpin all the different topics:

Principle	Description
1	**Easy access and registration of assets for all customers**
2	**Access must be technology agnostic**
3	**Access to all markets for all assets either directly or aggregated**
4	**Equal access for DSOs and TSOs to markets and services**
5	**Optimal use of available flexibility (no lock-in, hoarding)**
6	**Complete and transparent DSO–TSO interaction and collaboration**
7	**Strive for uniform/similar market access in EU countries**
8	**Visibility and transparency of networks and flexibility asset data (see paragraph below)**

These are high-level principles and further details can be found in the topics.

Regarding Principle 8, ENTSO-E and the EU DSO associations acknowledge that transparency should be fostered to facilitate market access and support the development of emerging flexibility markets.

However, data publication could be deleterious in some cases. For these cases, transparency should be carefully calibrated to avoid market and technical failures/inefficiencies. These cases include market power, gaming (considering that the ability to predict congestions or not is a very important aspect that can cause gaming-opportunities) and the sharing of sensitive information on critical/vulnerable infrastructure. When publishing in these cases, the relevant level of data representation could be duly adjusted to neutralise possible criticalities, for example by implementing:

- Spatial aggregation (e.g. verify if information can be aggregated at the regional level)

- Temporal aggregation (e.g. verify if information can be aggregated at the monthly/annual level and thus published ex-post)

Similarly, not publishing data can also create risks and have negative effects on local flexibility markets. For example, not publishing data could risk creating an uneven playing field between utilities and services providers, or indeed between existing and potential service providers. With the advent of millions of additional potential flexible devices connecting to the networks, not publishing data also risks reducing (or at the very least not maximising) liquidity in local flexibility markets. Moreover, a lack of transparency of data could also make it more difficult for networks and regulators to detect inappropriate behaviour by various market parties (e.g., gaming).

Transparency should be the assumed default position. However, a balance between making data available, or not, needs to be reached, and this will involve different requirements in each Member State.

Topic 1: Does the current EU framework address the roles required for facilitating multilateral data exchanges, including the preservation of privacy?

Description

In preparing for a future where we rely largely on decentralised electricity producers and consumers with their small assets – such as electric cars, solar panels, home batteries and heat pumps – to stabilise the grid reliably, sustainably and cost-effectively, new processes and interactions between market parties and system operators and between TSOs and DSOs must be created. Regulations can provide an important basis for working together on operating the grid and facilitating secure and easy exchanges of all relevant data for flexibility provision to all relevant parties.

Justification

Facilitate the secure and easy exchange of all relevant data for flexibility provision to all relevant parties: active customers, market parties, Original Equipment Manufacturers, DSOs, TSOs, etc.

Geographical relevance

Data privacy, as well as the rights to easily access and share data, should be a fundamental principal in the EU. Fragmented solutions are more costly in the longer term and do not enable interoperability between products and processes, including between Member States. However, such harmonisation should only be high-level and should not impose unnecessarily complicated and expensive burdens for national implementation.

Regulatory assessment

Data privacy related to personal data is addressed in the General Data Protection Regulation (GDPR) and partly in the CEP:

- The Electricity Directive:
  - **Article 20(a)** – Functionalities of smart metering systems: "[…] *Validated historical consumption data shall be made easily and securely available and visualised to final customers on request and at no additional cost. Non-validated near real-time consumption data shall also be made easily and securely available to final customers at no additional cost, through a standardised or at the least interoperable interface or through remote access, in order to support automated energy efficiency programmes, demand response and other services."*
  - **Article 20(c)** – Functionalities of smart metering systems: "*The privacy of final customers and the protection of their data shall comply with relevant Union data protection and privacy rules.*"
  - **Article 17(3)(c)** – Demand response through aggregation: *"Non-discriminatory and transparent rules and procedures for the exchange of data between market participants engaged in aggregation and other electricity undertakings that ensure easy access to data on equal and non-discriminatory terms while fully protecting commercially sensitive information and customers' personal data.*"
  - **Article 23(1)** – Data management: "*When laying down the rules regarding the management and exchange of data, Member States or, where a Member State has so provided, the designated competent authorities shall specify the rules on the access to data of the final customer by eligible parties in accordance with this Article and the applicable Union legal framework. For the purpose of this Directive, data shall be understood to include metering and consumption data as well as data required for customer switching, demand response and other services.*"
  - **Article 23(2)** – Data management: "*Member States shall organise the management of data in order to ensure efficient and secure data access and exchange, as well as data protection and data security.*"
  - **Article 23(4)** – Data management: "*Member States or, where a Member State has so provided, the designated competent authorities, shall authorise and certify or, where applicable, supervise the parties responsible for the data management, in order to ensure that they comply with the requirements of the Directive.*"
  - **Article 24(1)** – Interoperability requirements and procedures for access to data: "*In order to promote competition in the retail market and to avoid excessive administrative costs for the eligible parties, Member States shall facilitate the full interoperability of energy services within the Union*."
  - **Article 24(2)** – Interoperability requirements and procedures for access to data: "*The Commission shall adopt, by means of implementing acts, interoperability requirements and non-discriminatory and transparent procedures for access to data referred to in Article 23(1). Those implementing acts shall be adopted in accordance with the advisory procedure referred to in Article 68(2)*."
  - **Article 24(3)** – Interoperability requirements and procedures for access to data: "*Member States shall ensure that electricity undertakings apply the interoperability*

requirements and procedures for access to data referred to in paragraph 2. Those requirements and procedures shall be based on existing national practices."

- Directive (EU) 2012/27 on energy efficiency (hereinafter "Energy Efficiency Directive"):
  - **Article 9(2)(b)** – "*Where, and to the extent that, Member States implement intelligent metering systems and roll out smart meters for natural gas and/or electricity in accordance with Directives 2009/72/EC and 2009/73/EC*: […´] They [Member States] *shall ensure the security of the smart meters and data communication, and the privacy of final customers*."
- Regulation (EU) 227/2011 on wholesale energy market integrity and transparency (hereinafter "REMIT Regulation") for data reporting from market participants to ACER:
  - **Article 11** – Data protection: "*This Regulation shall be without prejudice to the obligations of Member States relating to their processing of personal data under Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data.*"

    NB: Directive 95/46/EC has been repealed by the GDPR

  - **Preamble, Point (19):** "*In order to ensure uniform conditions for the implementation of the provisions on data collection, implementing powers should be conferred on the Commission", reflected in Art. 8, and which led to Commission Implementing Regulation (EU) No 1348/2014 on data reporting* […]".
- Commission implementing Regulation (EU) 1348/2014 on data reporting implementing Article 8(2) and Article 8(6) of Regulation (EU) 1227/2011:
  - **Article 11** – Technical and organisational requirements and responsibility for reporting data: "1. *In order to ensure efficient, effective and safe exchange and handling of information, the Agency shall, after consulting relevant parties, develop technical and organisational requirements for submitting data* .[…]"

Currently, REMIT Regulation only applies to trading in wholesale energy products. If actors are below a certain threshold, they fall out of the reporting responsibilities. Including DF in REMIT could be another method to mitigate the impacts of gaming and market abuse. Any amendment to the REMIT Implementing Act to account for DF would need to consider the impact on these assets in terms of administrative burden vs. their size.

- Electricity Regulation
  - **Article 55(1)** – Task of the EU DSO entity: "*The tasks of the EU DSO entity shall be the following:*
    - […] (**c)** *facilitating demand side flexibility and response and distribution grid users' access to markets;*
    - […] **(e)** *supporting the development of data management, cyber security and data protection in cooperation with relevant authorities and regulated entities."*

Furthermore, interlinkages should be investigated with e.g. GDPR, Directive (EU) 2002/58 concerning the processing of personal data and the protection of privacy in the electronic communications sector (so called "e-Privacy Regulation"), Regulation (EU) 910/2014 on electronic identification and trust

services for electronic transactions in the internal market (so-called "eIDAS Regulation"), on electronic identification and trust services for electronic transactions in the internal market, Regulation (EU) 2017/1485 establishing a guideline on electricity transmission system operation (hereinafter "SO GL") notably Title 2 – Data Exchange, European Data Spaces initiative etc.

A regulatory gap exists for facilitating multilateral data exchange (see table below), whereas further investigation is necessary to determine whether privacy is ensured.

Prioritisation

JTF recommendation:

- **High** on Data Exchanges
- **Low** on new roles

The JTF recommends establishing requirements as applicable for the data exchanges necessary to enable, for example, market-based congestion management, e.g. bids, location, measurements of providers not subject to SOGL data exchange requirements. Introducing new roles has no priority, because the added value is currently unclear.

The table shows in general the information that can be exchanged depending on national characteristics within Member States.

Subject	From	To	Pro	Con/Risk	Gap
Balancing	TSO/DSO	TSO/DSO	Prevent DSO congestion problems caused by balancing action. DSO is involved in the prequalification process.	Could reduce ability to solve problems.	**DSO view:** Realise data access & exchange so that balancing actions will not create a DSO congestion. **TSO view**: These data exchange requirements are already covered by existing regulation (SO GL)
Congestion [5]	TSO/DSO	TSO/DSO	Prevent congestion problems.	Could reduce ability to solve problems.	Realise data access & exchange so TSO–DSO interaction can take place to prevent the situation whereby solving congestion by a TSO or a DSO, creates another congestion or balancing problem at another.
Congestion area	TSO/DSO	FSP	Create aggregated bids in or outside congested area.	Risk of gaming market abuse, data quality	**DSO view:** Realise data access & exchange so that market parties always have access to the current congestion area(s) where their assets are located unless there is a risk of gaming or market abuse. **TSO view:** TSOs share the above view but highlight that, without impairing the transparency

[5] See also Topic 16

					requirements, an ex-ante publication of congested areas as part of the congestion management market design might not be needed in all Member States[6].
Location in relation to relevant grid areas[7]	DSO, TSO, FSP	TSO, DSO, FSP	Obtain combined TSO&DSO (e.g. grid topology related) and Market Party (e.g. contracted assets) necessary information.	Privacy & security sensitive, data quality	Realise data access & exchange so that relevant parties always have access to the current connection location of their assets vis-à-vis relevant grid areas.
Measurements	DSO, TSO, third party, FSP	TSO, DSO, FSP,	Necessary for all related processes and propositions	Privacy & security sensitive	Facilitate measurement data access and exchange. Required from 3rd party. See also cluster measurement, validation and settlement.

Topic 2: Does the EU framework provide standardised requirements to ensure market parties have access to the necessary information from system operators on their needs for the services in this analysis?

Description

This topic addresses the standardised functional requirements to ensure market parties have access to necessary information from system operators about their needs for network services, including technical requirements applicable for the delivery of such flexibility services. Such functional standardised requirements should take due respect of national needs. Of course, sharing information should be reciprocal and market parties should – for example – provide system operators with good schedules with relevant locational information, which is crucial to get a proper forecast. Without this, the system operator cannot accurately define its flexibility needs and perform reliable grid prequalification, resulting in undesirable inefficiencies in the planning and operation of the grid.

Information that could become a part of these standardised requirements: *(level of detail to be determined at the national level)*

- **(pre-)Qualification requirements for offering flexibility services to system operators**
  - (Best effort) obligation for market parties to provide accurate forecast/scheduling data

[6] *In a market-based congestion management, market participants submit bids for upward/downward flexibility (independently of whether their location is congested in a certain moment or not). Bids of participants that can solve the congestion are then selected.*

[7] See also Topic 17

  - See Cluster 2, Topic 10 for more information on pre-qualification requirements (e.g. location, approved capacity limits, duration, ramp rate mode of activation flexibility provider, baseline information).
- **Product definitions of flexibility services**
- **Congestion management**
  - Relevant geographical grid areas
  - Historic, dynamic and forecasted load of congested assets on the grid
  - Geographical location of congested area and/or assets and related infrastructure
  - Requests from system operator for flexibility services
- **Balancing**
  - Real time frequency "display"
  - Frequency Restoration Control Error
  - Requests from system operator for flexibility services
- **Historic market prices paid for flexibility services**

When writing down these requirements, ample attention should be paid to possible gaming opportunities that arise with increased information flows as this can threaten the stability, accessibility and affordability of the grid. If it is decided that information cannot be made transparent, (e.g.: due to gaming) it should be reasonably justified.

Justification

Increased information on system needs should lower entry barriers and increase the liquidity of flexibility markets. This should translate into lower prices for those purchasing their services (system operators) and preserve the affordability of the electricity grid. Increased information and associated rules can also be used to mitigate gaming. Some of these rules could include, for example: maximum (ceiling) prices for investment deferral, implementation of multiple/minimum independent bidders, penalties for gaming, etc.

It is a specific TSO perspective that the exchange of this information may not be a requirement in all Member States, for instance in the case where a mature congestion management market for both transmission and distribution networks exists, and market parties / providers are proactively participating in the congestion management market, independently of whether their zone is congested at a certain moment or not.

Geographical relevance

Discussion at EU level on the need to publish information on system operator flexibility needs, and on the need to harmonise/standardise access to different data from different system operators, could contribute to market integration and the development of FSPs. Implementation should be done at the national level to respect different needs, market development situations and regulatory frameworks. Market power is a key aspect to consider here.

Regulatory assessment

ENTSO-E and the EU DSO Associations agree to find a balance between transparency regarding flexibility needs and offers on the one hand and the risk of creating gaming opportunities on the other.

In addition, agreed principles about data accessibility, (online) availability and legibility based on common international standards (where possible) should be duly addressed.

- Electricity Directive**:**
  - **Article 3(4)** provides some general provisions regarding "[…] *transparent, proportionate and non-discriminatory rules, fees and treatment* […]" specifically mentioning access to wholesale markets and balancing responsibility.
  - **Article 13(3)** states that final customers should "[…] *receive all relevant demand response data or data on supplied and sold electricity free of charge at least once every billing period if requested by the customer*."
  - **Article 41(3)** obligates TSOs to make public any information necessary "[…] *for effective competition and the efficient functioning of the market* […]".
- Electricity Regulation:
  - **Article 30(1)(k)** obligates ENTSO-E to: "*contribute to the establishment of interoperability requirements and non-discriminatory and transparent procedures for accessing data as provided for in Article 24 of EU Directive 2019/944* ['interoperability requirements and procedures for access to data']".
  - **Article 50(4)** obligates TSOs to: "*publish relevant data on aggregated forecast and actual demand, on availability and actual use of generation and load assets, on availability and use of the networks and interconnections, on balancing power and reserve capacity and on the availability of flexibility* […]"
- Regulation (EU) 2017/2195 establishing a guideline on electricity balancing (hereinafter "EB GL"):
  - **Article 12(3)** obligates TSOs to publish a list of information requirements with regards to balancing.
- Regulation (EU) 2013/543 on the submission and publication of data in electricity markets:
  - **Article 3** establishes a central information transparency platform.
  - **Article 4** addressed the submission and publication of data to ENTSO-E (and **Article 5** with the development of a manual of procedures for this), for example information on total load (**Article 6)**, the unavailability of consumption units (**Article 7)**, year-ahead forecast margin (**Article 8**), transmission infrastructure (**Article 9)**, the unavailability of transmission infrastructure **(Article 10)**, the estimation and offer of cross zonal capacities **(Article 11)**, the use of cross zonal capacities **(Article 12)**, congestion management measures (**Article 13**), forecast generation (**Article 14**), the unavailability of generation and production units **(Article 15)**, actual generation **(Article 16**), and finally balancing **(Article 17).**

The topic is partially, but not fully covered in European legislation (e.g. Electricity Directive, SO GL). Most of the regulation focuses on what must be provided to the TSO/DSO by flexibility providers.

It is likely that a regulatory gap exists regarding standardised functional requirements to ensure market parties have access to the necessary information from system operators of their needs. As most of the current regulatory framework focuses on the transmission level, a revision is required

which considers the presence of DSOs in system operations as well as the newly founded EU DSO Entity. Both should be incorporated into the regulatory framework. This should foster TSO–DSO cooperation and increase overall market transparency.

Prioritisation

JTF recommendation: **High**

Topic 3: Does the EU framework address the concept of the Flexibility Resources Register and related functionalities?

Description

The Flexibility Resources Register and related functionalities collect all the significant data/information about the resources/assets which seek participation in flexibility services, including aggregators and associated assets.

The Flexibility Resources Register and related functionalities could include the following high-level groups of information, whereas more detailed information would be determined at Member State level:

- **Identification information** (e.g. location, type of connection, competent TSO/DSO/FSP, supplier, asset owner).
- **Prequalification information** (e.g. telemetry measurement). Can be different for different products.
- **Deliverable flexibility** including static data and, possibly, the dynamic status of the asset (e.g. representing the resources availability, other asset performance-related information).
- **Contractual information for relevant parties** (e.g. agreement duration, responsible D/T-system operator), respecting who has access to any sensitive data. Market parties should not have access to data from other market parties.
- **Settlement-related information** (e.g. baseline, value stacking, financials).

Data formats and procedures should be interoperable across the European Union following the European Regulation/Guidelines as demanded by Article 24(2) of the Electricity Directive. Interoperability requirements and non-discriminatory and transparent procedures shall be provided by a specific implementing act based on the provisions from the generic implementing act on interoperability. Options should be available to ensure interoperability with existing registers / platforms in certain Member States.

The Flexibility Resources Register should be realised in a way that respects unbundling principles in order to avoid sharing sensitive data (DSOs, TSOs, FSP, balance responsible parties [BRP]) that could favour unwanted competitive advantages.

Potential functions associated to a Flexibility Resources Register functionalities could be adapted case-by-case for different ancillary services.

The Flexibility Resources Register enhances the visibility by TSOs and DSOs of registered assets that may be providing flexibility which are connected to their grids, so they know what resources are available. Features can also ensure that the use of flexibility does not jeopardise system stability or does not create local challenges through the implementation of a traffic concept, or different coordination functions could cover that coordination need.

Regulation could also describe high level principles on how the Flexibility Resources Register is accessed, keeping at national level the details or decisions, including how to deal with the registration of assets that are aggregated.

FSPs should not be able to access the market without being registered. It should only be required to register assets once for all relevant flexibility markets in a Member State, noting that additional information and requirements may have to be provided in the future depending on the service and the associated pre-qualification requirements. Thus, where applicable, data should be made visible and interoperable among registers referring to different ancillary products, i.e. service providers should not register information twice that is already enrolled for the same asset.

Justification

The Flexibility Resources Register offers a possible solution to ensuring seamless TSO–DSO data exchanges, providing visibility of flexibility potential (benefiting TSO/DSOs). It will avoid the lock-in of assets for one purpose (benefiting flexibility providers and system operators). In fact, this would improve competition as the flexibility resource will be visible to all system operators to which they can provide a system.

It will also make the process for pre-qualification smoother, especially because there will be a minimum set of data and requirements that will be provided for all services (e.g. capacity, location, etc). This will be a uniform set of principles across the European Union, making information available to easy market access.

Geographical relevance

The Flexibility Resources Register should be user friendly, where users are the FSPs and the relevant information accessible by TSO/DSOs and market parties themselves (incl. end customers). The Flexibility Resources Register could be defined with different potential functionalities, from basic to advanced (data exchange from static to dynamic types of data, prequalification of assets, settlement of bids, coordination functions, etc), leaving room for national implementation to set different solutions as the functionalities can be associated with the concept of a “flexibility register” or with the concept of the existing market platform/interface with market parties.

Interoperable ways across the EU for making information available for market parties and T&D system operators contributes to easy market access.

Specific design choices of the Flexibility Resources Register, and how it interacts with existing platforms and tools, should be developed in cooperation with TSOs, DSOs and market parties, involving national authorities at the national level. Common principles on the fundamental features are to be developed at the European level to ensure interoperability.

Regulatory assessment

SO GL (and the Key Organisational Requirements, Roles and Responsibilities methodology, hereinafter "KORRR") address(es) some functionalities; however, further definitions and details are required (see also Topics 9, 10 and 12).

- SO GL:
  - **Article 48(1)** provides minimum sets of information that Significant Grid Users (SGUs) as well as the aggregation of SGUs, should exchange with competent TSOs and DSOs.
  - **Article 49** provides minimum sets of scheduled data that SGUs, and the aggregation of SGUs, should exchange with competent TSOs and DSOs.
  - **Article 50** provides minimum sets of real-time data that SGUs, and the aggregation of SGUs, should exchange with competent TSOs and DSOs.
  - **Article 51** sets high-level principles on SGUs data exchange between TSOs and DSOs.
  - **Article 53** provides minimum sets of information that TSOs and distribution-connected demand facilities (or third parties participating in demand response) should exchange with competent TSOs and DSOs.
- KORRR:
  - **Article 14(2)** allows TSOs and DSOs to obtain the structural data they need from SGU users (including DSF and aggregation), in line with article 48 and 53 of SOGL Regulation.
  - **Article 16(2)** allows TSOs to request from SGU the schedule data.
  - **Article 12(2)** grants DSOs access to the schedule data DSOs require for their process.
  - **Article 17(2)** requests that SGU connected to the distribution network provide real time data directly to the TSO or through the DSO they are connected to.

SGUs are defined in Article 2 of SO GL, meaning that the information exchange is also defined in there, but:

- In the view of DSOs, KORRR applies only to some certain customers, and SGUs are not defined with DSOs in mind. What is "significant" for DSOs is not necessarily "significant" for TSOs.
- In the view of TSOs, KORRR applies for aggregates of units participating in redispatching services. The "significance" not only depends on the individual size of one aggregate but on the total volume of the aggregates. Focused intervention aimed at adapting existing regulation to the scope of flexibility services would be sufficient to fill the regulatory gap.

See Topic 10 for more details.

Specifically, regarding pre-qualification, for which the Flexibility Resources Register(s) will be relevant, it is currently only defined for balancing services. However for other flexibility services for both TSOs and DSOs, there might be a need for additional regulation regarding prequalification, and hence the Flexibility Resources Register(s) – for example, the requirement to be registered to provide services. Please see Topic 7 for more details.

Prioritisation

JTF recommendation: **High**

The Flexibility Resources Register represents an important tool in the hands of both TSOs and DSOs for the effective management of all the (flexibility) resources in the availability of the T&D system operators. The sharing of sensitive information represents a critical point that should be carefully managed to avoid emerging opportunities for gaming, market abuse and the sharing of sensitive information on critical/vulnerable infrastructure.

Topic 4: How can FSPs access multiple revenue streams for their assets and stack value across different markets?

Description

This topic describes how Flexibility Service Providers (FSPs) can access multiple revenue streams for their assets and stack value across different energy markets. This section will investigate the ability to stack value purely from a market access perspective, whereas other sections will investigate how it can be done from a procurement, dispatch and settlement perspective.

In line with our overarching market access principles, every customer or market party (FSP) that provides flexible services should be able to unlock and monetise its value at any point in time and in any market, where technically feasible. In other words, FSPs should be able to use their asset(s) to provide services to multiple markets and hence access multiple revenue streams. This relates not only to balancing and congestion markets but also other energy markets such as wholesale markets, capacity markets, peak-shaving/energy efficiency business models and peer-2-peer energy trading. Sometimes there are reasons why services cannot be stacked across markets, for example technical reasons when assets cannot provide two services concurrently; however, these should be minimised and commercial barriers to stacking removed as far as possible.

The market access principles are critical enablers to value stacking, and these should be embedded across DSO and TSO markets. There are also a range of areas of market access that will need to be addressed at the European level to enable value stacking[8] while allowing sufficient freedom to adjust to locational conditions at a Member State level. We envisage that these areas will include:

- **Data visibility:** Market participation shall be promoted by transparent information of the network needs; the conditions for this publication shall follow existing EU rules and include locational information. In line with the principles, when network congestion is published to request FSP bids, the data must be visible, easily accessible, interoperable and machine-readable. Gaming, market abuse and system security must be considered by networks when making data transparent as it is important that market parties and National Regulatory Authorities (NRAs) have trust in the flexibility market. Care will need to be taken when making data transparent, especially at lower voltage levels where there would be typically fewer

[8] The possibility to offer a variety of services that allow them to receive forms of revenue and compensation by providing benefits to customers, DSOs, TSOs and services providers.

market participants. This transparency, along with the analysis of offer and bid data by the networks and/or market operators in combination with clear market rules for parties providing services, will make it possible to reveal and follow up unwanted market behavior, and hence minimise but not necessarily eliminate the gaming risk.

- **Exclusivity:** Where technically feasible, exclusivity in market contracts must be minimised to allow assets to participate in multiple markets. Consideration must be given to the different timescales for different markets and how these services could be stacked. This will not only avoid lock-in so that FSPs can access multiple revenue streams, but from a networks perspective it will also increase liquidity in markets. Technical feasibility will be dependent on the different products being procured in the different markets, and it is recommended that product definitions are created collaboratively across transmission and distribution, and that they are made as compatible as possible.
- **Contracts:** More broadly than exclusivity, the Terms & Conditions (T&Cs) of different markets should be made as compatible as possible. A range of options are available, including one contract for all network services, but this will ultimately be dependent on the market and will be determined at a national level. At a European level, it will be sensible to have best practices and principles for compatibility of T&Cs in contracts. With FSPs likely to be participating in different countries, this will help to increase liquidity.
- **Market platforms and all relevant interfaces:** The platforms or interfaces that FSPs will need to use to access markets is critical to ensuring participation across markets. Stakeholders regularly mention that a common barrier to providing network services is the need for multiple IT/Communications systems to participate in multiple markets. Generally speaking, any platform or interface arrangement must enable easy access to data and market information, be secure and allow easy access to multiple markets, of which interoperability will be a key aspect. A range of different options exist, which will depend on the national framework. These could include a combination of a single platform for providing multiple services to different buyers, multiple platforms which are interoperable (for example with common protocols and standards), direct access via common application Is, multiple market places but with a common co-ordination platform, etc. This section will explore options and describe high-level principles, with the implementation model being determined at a national level.
- **Standards:** Where possible, international standards and open APIs should be used. This includes between the FSPs and the market places/platforms, between FSPs and the networks, between different market places/platforms, and between transmission and distribution.
- **T&D co-ordination:** TSO and DSO markets must be coordinated to allow value stacking (see T&D co-ordination cluster – Topic 18).

Justification

Allowing FSPs to stack value and access multiple markets will provide benefits to customers, FSPs and networks. It will enable the most efficient use of available flexibility in a free market – keeping bills low for grid users and creating additional revenue streams for FSPs.

Geographical relevance

European-wide guidelines ensuring the accessibility of FSPs are provided in The Electricity Directive but not specifically for value stacking. Member States should be able to choose the aggregation model and it is the NRA's responsibility to monitor developments and performance in the retail market. Providing high level principles on customer participation at the EU level[9] could mean that it is easier for market parties (and investors) to unlock flexible assets in different countries and regions. A common approach could enable more flexible assets to be deployed and could increase liquidity in markets across Europe.

We do expect potential EU rules to be relatively high-level as the structure of markets and individual T&D interactions at a national level is very different across the EU. Hence, this section will focus on principles and best practice. It will also likely evolve over time, as markets at the distribution level in particular become more mature.

Regulatory assessment

Accessing multiple revenue streams and stacking value across different electricity markets within a Member State or potentially for operators with assets in multiple countries is not explicitly covered in the current EU Regulatory framework. As this is neither explicitly mentioned nor forbidden by exiting regulation, it is currently being addressed at the national level. Hence, our recommendation is that new NC(s) be created or existing EU codes further developed to include high level principles on value stacking, in line with the description of this topic.

Prioritisation

- DSO view: **High**
- TSO view: **Medium**

Topic 5: Does the current EU framework address the role of flexibility market operator and how it interacts with other entities?

Description

The rules for using DF (included demand, storage and generation) for balancing use are well covered by several codes and regulations, but the use of DF for intra-zonal congestion management (at both, transmission and distribution level) is covered only at a high level[10]. There is, in addition, a general reference that redispatch should be market based (Electricity Regulation Article 13 "Redispatching").

Despite this, some Member States are trialling, developing and implementing such cross-voltage-level coordination processes already. These reflect respective characteristics on the operational level, as well as the legislation and national structures of DSOs and TSOs. Development shall be compatible with existing working rules on national levels.

[9] See also Topic 18

[10] See topic 10.1 – ENTSOE views, and topic 16 – EU framework for FSPs

This topic will thus look to discuss the need or not for a specific separate role of the Flexibility Market Operator (FMO), differentiated from existing roles such as market operators for system services.

Justification

The frontier between regulated and commercial domain for this role is not clear. The reference to a Nominated Electricity Market Operator (NEMO) in the energy markets (DA and ID) is defined as within the competitive domain, whereas on the other hand system services markets are defined within the regulated domain. However, the interaction between FMO for DF and balancing, as well as how the FMO would be regulated, is not defined.

There must be an interaction between the T&D system operators and the FMO to facilitate the effective trading of flexibility services that the T&D system operators can use and that the service providers can offer with as low transaction costs as possible. This interaction will have to include services that the DSOs need and the services that the TSOs need for its own use and services that can be traded with neighbouring countries. Thus, the interface and coordination between the TSOs and DSOs need to be established as a basis for their communication with service providers through the FMO.

Geographical relevance

It is unclear whether FMOs would facilitate flexibility trading between countries, although FMOs might operate in several countries as is the case for the NEMOs, and FSPs could operate in several countries. It would be an advantage for FMOs and the aggregators if some elements in the trading interface between T&D and the FMO, and between the FMO and the aggregators had been standardised. To the extent this is regulated on an EU level, it should be considered that DF services delivered to TSO and DSOs is an immature market, and excessively detailed regulation could hamper the innovation that this market requires.

Regulatory assessment

The FMO role for DF is currently not addressed in the EU framework, which covers only the functions of the balancing market operator, and wholesale market, and not that existing for congestion management.

EU regulation should not be a barrier to having such roles, which are then implemented at the national level.

The current framework addresses the issue of market based redispatch, but not the details of a FMO role, where this exists, and its interaction with T&D and with providers of flexibility.

At present, the EU framework should not define rules or definitions on this topic. We need to innovate and not (yet) let regulations stand in the way.

Prioritisation

JTF recommendation: **Low**

We advise against defining any more roles. In practice it will probably be the same companies that will fulfil these roles, and more definitions only make things more complex. We could simplify these roles and consolidate them.

ENTSO-E/DSO Associations are open to further discussing how the Harmonised Role Model (HRM) can evolve to integrate this role based on TSO–DSO Active System Management (ASM) report models. the HRM should not intend to be a binding reference model.

4. Product Design and Procurement

Definitions

Flexibility product design is an essential task to enable a wide participation of actors. This chapter provides guidelines for key product attributes that could be used across the EU but is not meant to prescribe standard products. The final choice on how to design products should be left to Member States and their NRAs to take into account local circumstances inherent to local services, such as intra-zonal redispatching.

Flexibility products for DSOs and TSOs are mainly based on system, transmission or distribution networks needs such as:

(1) To optimise infrastructure investment needs;
(2) To defer or avoid asset reinforcement;
(3) To carry out more efficiently planned maintenance, asset replacement and connection works;
(4) To deal with unplanned interruptions by mitigating the effect of network outages when they occur, and therefore minimising the impact on customers;
(5) To improve quality of supply;
(6) To reduce network implementation timescales;
(7) To optimise infrastructure use; and
(8) To increase the capacity of the current grid for new renewable generation.

The aforementioned needs have different timeframes: they are either short term (e.g. flexibility to carry out more efficiently planned maintenance) or long term (e.g. flexibility to optimise infrastructure investments). These different time horizons make the requirements and thus the conditions for market parties very different. In particular, there are clear differences between the use of flexibility to avoid investments in grid reinforcement, to defer investment, or as a bridge to the reinforcement of the grid.

According to Article 32 of the Electricity Directive, market products for such services or DSO needs should be designed in a dialogue with stakeholders to assess possibilities and needs, at least at national level. Special attention should be given to avoiding too numerous and diverse products, while considering local specificity.

According to Article 32(2) of the Electricity Directive, DSOs shall, in a transparent and participatory process that includes all relevant system users and TSOs, establish the specifications for the flexibility services procured and, where appropriate, standardised market products for such services, at least at national level.

According to Article 40(6) of the Electricity Directive, TSOs shall, in a transparent and participatory process that includes all relevant system users and the DSOs, establish the specifications for the non-frequency ancillary services procured and, where appropriate, standardised market products for such services, at least at national level.

Compared to the products currently used by the TSO, the DSO will need flexibility products that are more granular and that can be used over a wider time span. Voltage control becomes more complex with the increasing penetration of DERs.

For the purpose of this report, the following services are analysed:

- **Grid capacity management services**:

For DSOs, a mechanism where flexibility is deployed to optimise network planning is becoming increasingly relevant. There is a need to find cost efficient alternatives to grid reinforcements, mainly in deferring investments for a certain period (i.e. 5 years). These activities will require long term flexibility products and contracts with high reliability. Long term contracts will be required.

However, the design of such a contract should consider the ability of the units to participate in several ancillary markets. The use cases for these products will vary considerably between Member States and networks; however, the design should avoid a decrease in market liquidity due to the non-activation of contracted products. To ensure the right balance between availability and market liquidity, DSOs and TSOs will agree on how to coordinate on this. These products will be required by DSOs to fulfil Articles 32(1) and 32(3) of the Electricity Directive, including long term network development planning requirement.

TSOs have similar obligations (Article 51(3) of the Electricity Directive] for the ten-year development plan. However, when comparing the provisions on plans for TSO and DSO, it should be noted that whereas Article 51 applicable to TSO has not changed significantly from the 3rd package (the meaning of the provisions has remained the same), the provisions for DSOs (Article 32) are completely new. DSOs consider that the creation of an appropriate regulatory framework could speed up the effective implementation of Article 32 of the Electricity Directive.

When long term products are defined, coordination in the usage of the offers of these products between TSO & DSO but also between DSO & DSO (on different levels) should be possible.

When a TSO or DSO contracts flexibility in a lower grid, e.g. to solve congestion, the system operator in that lower grid can also benefit from this option. If a TSO or DSO has contracted units with long-term contracts in a lower grid, the lower DSO could, for instance, also use these resources for the deferral of grid investments. Coordination is then, of course, required. This could lead to the deferral of grid extension, which is coordinating the use of flexibility to avoid grid extension. Grid extensions are usually planned well in advance (long-term planning). Therefore, only long-term contracts of flexibility are useful for the coordinated use of flexibility for the deferral of grid extensions.

- **Congestion management services:**

With more distributed generation and different energy flows, congestion in the grids is expected and this requires new tools or mechanisms to manage it. TSOs and DSOs already have some tools in place to manage congestion in their grids and, in some cases, there are national mechanisms that allow TSOs to solve congestions in distribution grids. Furthermore, efforts are being made in some Member States to allow for the use of standard balancing energy bids for congestion management in the context of the EU Balancing Platforms only if there is locational information available in the balancing bids. DSOs need to take action to respect network operational security limits. It is important that the DSOs are allowed and properly incentivised to use flexibility when this is the most efficient solution for the grid, considering the cost efficiency of the whole system.

- **Voltage control as one non-frequency ancillary services:**

DSOs and TSOs also have the right to procure other non-frequency ancillary services that, according to Article 2(49) of the Electricity Directive, refer to a service used by a TSO or DSO for steady state voltage control, fast reactive current injections, inertia for local grid stability, short-circuit current, black start capability and island operation capability.

One of the services that is gaining more importance, at least in the short- to medium-term, is the voltage control. The scope of the services would be focused only on such a service.

- Some generators tend to be inverter based and so have reactive power capabilities. Where there is a local constraint in which voltage is the binding limit, such resources may be used to alleviate the constraint.
- In such cases, non-frequency ancillary service may be procured by DSOs as an alternative to installing reactive power sources.
- It can be effective for such distribution connected resources to also provide voltage support to the TSOs, where this practice exists.
- Currently, there are minimum mandatory reactive power requirements in some Member States' NCs for some generators (type A and B). European NCs set Reactive Power/Voltage requirements for generators type C and D. Reactive Power/Voltage control products may be defined as such to reward/pay for either all delivered product or only the excess beyond such minimum capabilities.

Due to the specific nature of the voltage variations, it is very important to have a proper procedure and approach to voltage control. It is critical to identify and determine when corrective actions are required to avoid a situation that poses a threat to network operation. Slight and temporary deviations are acceptable and not considered by the operators as some of the voltage disturbances are transient, returning to stable and admissible values after a short time (seconds).

The conventional voltage control tools and DSO assets were designed to control voltages in typically radial Medium Voltage (MV) and Low Voltage (LV) networks with unidirectional power flows, from supply to consumption nodes. However, the large-scale integration of RES-based generation, together with meshed topologies, imposes additional challenges on voltage regulation, requiring a more coordinated voltage control and also considering additional resources connected throughout the MV and LV feeders. However, the flexibility of DERs can also be exploited to provide grid support and ensure adequate voltage control in all networks, avoiding the need to install additional equipment.

Voltage and reactive power control become more complex with the increasing penetration of DERs. Voltage is a locational issue but it also has to be managed by the DSOs as well as by TSOs within their own control area such that it will not contribute to voltage instability in the neighbouring and the upper distribution and transmission grids.

A common approach to voltage control from TSOs and DSOs can bring savings through e.g. operating a common optimising algorithm to optimally utilise reactive power capabilities in the grid to minimise losses in the whole grid. The following high-level principles are recommended for consideration:

- Voltage is a locational issue.
- The TSO or DSO to whom the resource is connected to shall have the right to specify, in consistency with the voltage control/reactive power parameters specified at national level, together with providers and in cooperation if applicable with the TSO, voltage control/reactive power-related products for use on their network only, in order to match all the system operator needs in the concerned area.
- Any such specification of the products parameters shall match the characteristics of the SO's network to whom the resource is connected to or parts thereof and may be tailored to address specific topological or locational issues such as, for example R/X ratios.
- The TSO or DSO to whom the resource is connected to shall have the sole right to send power reactive or voltage set-points directly to the resources connected to its grid based on the applicable national data exchange scheme. Alternative arrangements may be agreed between the connecting operator and any other operator (e.g. TSO).
- Use of DSO-connected reactive power resources to address technical issues on the TSO network with which the DSO is connected shall be governed by Article 29 of SO GL (as well as Article 15 of the DCC).
- Where agreed between TSOs and DSOs, a common approach to voltage control from TSOs and DSOs can bring savings through, e.g. operating a common optimising algorithm to optimally utilise reactive power capabilities in the grid to minimise losses in the whole grid.
- Furthermore, we should distinguish between the mandatory connection requirements (required for grid connection by RfG and DCC to mitigate that unit's influence on the grid) and paid capability (going beyond the mandatory requirements). Mandatory capability shall be free and, therefore, shall be utilised before obtaining further (paid) capability.

Topic 6: Common list of attributes for flexibility products

Description

Following the above reasoning, we describe here a common list of attributes for flexibility products to be used by TSOs and DSOs for the services described above: (1) **grid capacity management**, (2) **congestion management** and (3) **voltage control.**

Balancing services which are already addressed by the EB GL could also be considered as flexibility if they align with the system operator's needs.

Flexibility products must comply with the system operator's needs (i.e.: peak times or unplanned event / fault (short-term); peak times or planned outage, maintenance operations (medium term); investment deferral in network planning scheduled to manage foreseen network constraints (long-term) to perform economically efficient grid operation. The characteristics of the needs are different for DSOs and TSOs (range, voltage level, product size, duration, location). These requirements should be clearly specified at the national level to enable successful product design, development and a high volume of potential providers to guarantee flexibility markets perform efficiently. This cannot be successfully performed without a sufficient degree of transparency to enhance the mutual understanding of system operators' requirements and market parties' capabilities.

Flexibility products for different purposes should be sufficiently aligned (interoperable), to permit the market-based allocation of flexibility services, with the objective of an efficient allocation that maximises the value of the flexibility to enable bids by market parties. Such flexibility products can either be an option (availability) or a direct activation. As a first step to designing products, a common defined list of attributes could be used, from which all Member States can choose only those attributes required for the specific product definition.

Justification

Pursuant to the provisions of Articles 32(1) and 32(3) of the Electricity Directive, there is a need to standardise the products used for congestion management in the short term, with products on the basis of which plans for long-term congestion management will be developed, where these exist, at least on a national level.

Without uniform assumptions for both types of products, it will not be possible to prepare development plans that reflect the real needs of the network. Product standardisation must be limited to keep flexibility products open to innovation and future development. It is worth noting that there are many ongoing Research and Development projects that seek innovation flexibility use. Such dynamic product development will be the result of the joint activities of system operators, market participants, market operators and regulatory authorities. Nevertheless, standards must not only be open to evolution but also to certain trials that are currently happening by all involved parties, which could then, in turn, lead to a modification of the product standard. This implies that any standard must be sufficiently rigid to provide a common base for products but should also enable a dynamic development.

A first step is to design the products that will be offered by FSPs based on the T&D system operators needs. For that, a common and non-exhaustive defined list of attributes could be used, which all Member States could choose from when defining the specific product. A list of attributes is presented later on this report. The list is non-exhaustive and is based *on the TSO-DSO report "An integrated approach to active system management' (ASM report)" and* Electricity Balancing Guideline (EB GL).

Geographical relevance

In general, some flexibility services, and concretely congestion management, are addressed through different mechanisms in different Member States; therefore, a European harmonisation of the products for congestion management is not required. However, some principles and a list of attributes could be designed at the EU level to reduce barriers for market parties who want to provide flexibility in different EU markets and gain sufficient alignment with balancing and wholesale markets. Minimal

common definitions are also important to avoid complexity while always considering national specifications.

EB GL sets a list of "*characteristics for standard product bid*" (Article 25(4)) and a list of "*variable characteristics of a standard product to be determined by the balancing service providers during the prequalification or when submitting the standard product bid*" (Article 25(5)). They could serve as a reference for the definition of a common list of flexibility products to make them interoperable. This does not necessarily require identical products, but interoperability between the products that enables the exchange between markets.

The following table contains the list of potential attributes for flexibility products and, concretely, for grid capacity management, congestion management and voltage control. In this manner, DSOs and TSOs could choose any of the attributes below to create their own products based on their different needs (referred as T&D system operator's Needs). They may also help to best inform FSPs to build their bids offered on the market (referred as Bid Offers). In many cases, such attributes can be used for both T&D system operators Needs and Bids Offers. The list is non-exhaustive, but most relevant attributes are included. There are some attributes, however, that could be mandatory for each flexibility product, such as locational information, recovery time and duration of the contract, depending on the type of flexibility products and on whether an alternative means to obtain this information exists.

ATTRIBUTE	DESCRIPTION/ DEFINITION	IS THERE A DEFINITION IN REGULATION? NO, PARTIAL[11]	EXISTING DEFINITIONS IN REGULATION	NEED FOR REGULATORY INTERVENTION	ATTRIBUTE FOR BID OFFERS or TSOs and DSOs NEEDS
Mode of activation	*"…means the mode of activation of balancing energy bids, manual or automatic, depending on whether balancing energy is triggered manually by an operator or automatically in a closed-loop manner"*	**PARTIAL** Lack of definition for flexibility products other than Balancing	For Balancing products EU Reg. 2017/2195 EBGL, Article 2(34). In EU Reg. 2017/2195 EBGL Article 25(4)(h) as part of the list of variable characteristics of a standard balancing product bid.	Several options: - New definition in new NC for flexibility products (other than Balancing) - Extending the EBGL definition to all flexibility products as well as the definition of "standard product" to include them.	Both

[11] Partial indicates that there is a definition for some flexibility products (namely for Balancing in EBGL)), but not for other flexibility products (congestion management, grid capacity management, non-frequency ancillary services)

Availability Window	Availability window (e.g. per hour, per day, per week, per year) is the time period required by a DSO when the resource shall be available to provide a service.	**NO** Lack of definition for flexibility products	N/A	New definition	system operators need
Validity period	*"...means the period when the balancing energy bid offered by the balancing service provider can be activated, where all the characteristics of the product are respected. The validity period is defined by a start time and an end time"*	**PARTIAL** Lack of definition for flexibility products other than Balancing	For Balancing products EU Reg. 2017/2195 EBGL, Article 2(33). In EU Reg. 2017/2195 EBGL Article 25(4)(g) as part of the list of variable characteristics of a standard balancing product bid.	Several options: - New definition in new NC for flexibility products (other than Balancing) - Extending the EBGL definition to all flexibility products as well as the definition of "standard product" to include them.	Bid offer
Duration of the contract	The duration of a given contract between the TSO/DSO and the market participant. The duration may vary from hours to years	**NO**	Not explicitly defined but there are many references in the definition of "balancing capacity" EU Reg. 2017/2195 EBGL, Article 2(5) & EU Reg. 2019/943 Article 2(13)	**NO** No specific features for which an explicit definition is needed.	Both
Locational information	Where (electrical localisation, at the metering point) the product is available.	**NO**	Not explicitly defined but there are references in EU Reg. 2017/2195 EBGL Article 18(5)(c)(g) and Article 25(5)(c) as part of the list of variable characteristics of a standard balancing product bid	This attribute or a mechanism to match bids with location should be mandatory for all flexibility products since their use is strongly locational.	Both
Minimum duration between the	Minimum duration between the	**NO**	Not explicitly defined but there is a reference in	No specific features for which an	Bid offer

end of deactivation period and the following activation (recovery time)	end of deactivation period and the following activation		EU Reg. 2017/2195 EBGL Article 25(5)(d) as part of the list of variable characteristics of a standard balancing product bid.	explicit definition is needed.	
Minimum and maximum quantity	Minimum and maximum quantity of a bid traded on the market and it may be capacity or energy based depending on the nature of the product	**NO**	Not explicitly defined but there is a reference in EU Reg. 2017/2195 EBGL Article 25(4)(d) as part of the list of characteristics of a standard balancing product bid	**NO** No specific features for which an explicit definition is required	Both
Direction of activation (up/down)	If the unit is activated in one direction or another (up/down)	**NO**	Not explicitly defined but there are many references in EU Reg. 2017/2195 EBGL and EU Reg. 2019/943 Article 2(16)	**NO** No specific features for which an explicit definition is required	Both
Divisibility	*"...means the possibility for a TSO to use only part of the balancing energy bids or balancing capacity bids offered by the balancing service provider, either in terms of power activation or time duration"*	**PARTIAL** Lack of definition for flexibility products other than Balancing	For Balancing products EU Reg. 2017/2195 EBGL, Article 2(35). It is also one of the characteristics for standards product EU Reg. 2017/2195 EBGL Article 25(5)(b)	Several options: - New definition in new NC for flexibility products (other than Balancing) - Extending the EBGL definition to all flexibility products as well as the definition of "standard product" to include them.	Both
Preparation period	*"...means the period between the request by the connecting TSO in case of TSO-TSO model or by the contracting TSO in case of TSO-BSP model and*	**PARTIAL** Lack of definition for flexibility products other than Balancing	For Balancing products EU Reg. 2017/2195 EBGL, Article 2(29). It is also of the characteristics for standards product in EU Reg 2017/2195 EBGL Article 25(4)(a)	Several options: - New definition in new NC for flexibility products (other than Balancing) - Extending the EBGL definition	Both

	the start of the ramping period"			to all flexibility products as well as the definition of "standard product" to include them.	
Ramping period		**NO**	Not explicitly defined but there is a reference in EU Reg. 2017/2195 EBGL Article 25(4)(b) as part of the list of characteristics of a standard balancing product bid	**NO** No specific features for which an explicit definition is required	Both
Full Activation Time (FAT)	*"...means the period between the activation request by the connecting TSO in case of TSO-TSO model or by the contracting TSO in case of TSO-BSP model and the corresponding full delivery of the concerned product;"*	**PARTIAL** Lack of definition for flexibility products other than Balancing	For Balancing products EU Reg. 2017/2195 EBGL, Article 2 (30). There is a reference in EU Reg. 2017/2195 EBGL Article 25(4)(c) as part of the list of characteristics of a standard balancing product bid	Several options: - New definition in new NC for flexibility products (other than Balancing) - Extending the EBGL definition to all flexibility products as well as the definition of "standard product" to include them.	Bid offer

The following table contains the potential list of attributes specific to voltage control.

ATTRIBUTE	**DESCRIPTION/ DEFINITION**	**IS THERE A DEFINITION IN REGULATION YES, NO**	**EXISTING DEFINITIONS IN REGULATION**	**NEED FOR REGULATORY INTERVENTION**	***ATTRIBUTE FOR BID OFFERs or TSOs and DSOs NEEDS***
Setpoint set in real time or offline	Whether the setpoint is issued offline as part of a Connection Agreement or is issued in real-time.	Yes	RfG Article 21(1)	Only as part of menu – not mandatory	system operators need

V-Q or PF mode.	Operating mode				
Voltage setpoint [Reference Voltage or Vref]	Whether Voltage setpoint or Reference Voltage for droop characteristic.	Yes	RfG Article 21 (1)(d)	Only as part of menu – not mandatory	system operators need
Q setpoint	Q setpoint in MVArs	Yes	Yes– RfG Article 21(1)	RFG NC	
PF setpoint	Power Factor setpoint	Yes	Yes RfG Article. 21(1)	RFG NC	
Voltage droop % V/Q	Slope of V-Q droop characteristic (if used).	Yes	RfG Article 21(1)	Only as part of menu – not mandatory	system operators need
Response time for change in Vref [if in real time]	Response time where a new voltage reference setpoint is issued in real-time.	Yes	RfG Article 21(1)	Only as part of menu – not mandatory	system operators need
Response time for change in connection point voltage [if in real time]	Response time for a change in Q for a change in connection point voltage.	Yes	RfG Article 21(1)	Only as part of menu – not mandatory	system operators need
Bespoke V-Q characteristics – product by product	Placeholder to allow for V-Q characteristics other than droop to be specified by the system operator. For example, deadbands.	NO	NO	Only as part of menu – not mandatory	system operators need

Regulatory assessment

Products for grid capacity management, where they exist, and congestion management are required for DSOs to fulfil Articles 32(1) and 32(3) of the Electricity Directive, including long-term network development planning requirements. For TSOs, some provisions are stated in Articles 52(1) and (3), although these are not new but derived from previous regulation (old 2009/72/EC) During these years, TSOs have seen no need for further legislation on this topic. This approach allows TSOs to be more creative in using current flexibility development.

Product standardisation must be limited to keep flexibility products open to innovation and future development. A European harmonisation of the products for congestion management is not required. However, some principles and a list of attributes could be designed at the EU level to avoid discrimination among market parties and gain sufficient alignment with balancing and wholesale markets. Minimal common definitions are also important to avoid complexity, always considering national specifications.

The only characteristics for products defined at the EU level are for balancing products, concretely in Article 24(4) and (5) of the EB GL, and they are referred to as "standard products".

With regards to voltage control, there are some technical requirements for generators and demand connected to the grid to be fulfilled in Article 28 of the Regulation 2016/1388 establishing a Network Code on Demand Connection (hereinafter "DC NC") and Regulation (EU) 2016/631 establishing a network code on requirements for grid connection of generators (hereinafter "RfG NC").

- SO GL
  - **Article 23** includes general requirements for the coordination of remedial actions
  - **Article 29** includes general requirements for voltage control and TSO–DSO cooperation
- DCC NC
  - **Articles 15** and **16** includes requirements for transmission-connected DSOs and demand facilities
  - **Article 28** includes requirements for demand units with demand response reactive power control
- RfG NC
  - Title II includes requirements for generators
  - For storage – a future update to RfG NC is already foreseen (see Grid Connection European Stakeholder Committee, EG Storage here).

DSO position:

As voltage and reactive power control is becoming more complex with increasing penetration of DES and voltage is mainly a locational problem, DSOs believe that some high-level principles, as listed above, require establishing at the EU level.

TSO position:

Voltage is a locational problem; there is no need to solve it at the EU level and, therefore, TSOs believe that the high-level principles listed above need to be established at the national level.

TSOs and DSOs agreed that suitable voltage control attributes may still be listed non-exhaustively for DSOs to use. The flexibility to use more bespoke characteristics to reflect local DSOs needs is also noted.

Article 59 of the Electricity Regulation regarding the establishment of NCs states that:

> *1. The Commission is empowered to adopt implementing acts in order to ensure uniform conditions for the implementation of this Regulation by establishing network codes in the following areas:*
>
> *(d) rules implementing Articles 36, 40 and 54 of Directive (EU) 2019/944 in relation to non-discriminatory, transparent provision of non-frequency ancillary services, including rules on*

steady state voltage control, inertia, fast reactive current injection, inertia for grid stability, short circuit current, black-start capability and island operation capability;

(e) rules implementing Article 57 of this Regulation and Articles 17, 31, 32, 36, 40 and 54 of Directive (EU) 2019/944 in relation to demand response, including rules on aggregation, energy storage, and demand curtailment rules.

Prioritisation

- DSO view: **High** for all the products
- TSO view: **Low** for grid capacity management and voltage control

Topic 7: Product prequalification for flexibility services

Description

Market access could be limited (through prequalification or bid limitation) depending on the location, the voltage level of the connection, the service offered or the type of asset (generation, storage, demand side response).

Product prequalification is concerned with checking whether the unit can (technically) deliver the product it wants to sell/deliver.

One of the barriers for market participants linked to the process of product prequalification is the implementation of different prequalification methods and requirements across Europe. Such standardisation may help to alleviate this barrier, but system operators should still be allowed to apply additional technical requirements if necessary to ensure system security and consider national specificities.

Having different technology requirements within a country, especially if not designed in terms of flexibility services provided but in terms of technology used, means having to develop a new device and system for each market. In many cases, this might not be worth it, which puts customers from different countries at a disadvantage, not giving them access to the same services and opportunities.

FSPs should not be able to access the market without being registered in the Flexibility Register referred to in topic 3. The registration should be done in parallel with the product prequalification process.

Justification

The pre-qualification process should be user friendly, striving to minimise the different steps and standardise them when possible. However, the main goal of the prequalification is to check that the FSP can provide the service in order to guarantee the operational security. Streamlined and efficient prequalification processes would reduce market entry barriers to providing flexibility services to the system operators. For example, see also the TSO–DSO report on Active System Management (2019), where steps of the process are proposed. In that report, TSOs and DSOs agreed that the party

performing this product prequalification is the system operator that needs this product and will eventually be the party purchasing the product.

In the event that multiple system operators are buyers of the same product, the product pre-qualification process should be agreed between the system operators wanting to buy this product to avoid the pre-qualification being done twice: once for the TSO and once for the DSO.

Prequalification for actors and products is defined in the SO GL and EB GL. However, this constitutes an additional process for market parties to follow and could lead to the limitation of bids: the process should be clarified, and limitations applied to bids should be justified.

The Electricity Regulation, Article 2(18): "prequalification process" means the process to verify the compliance of a provider of balancing capacity with the requirements set by the transmission system operators.

In other words, it means that the product prequalification process is regulated at the EU-level only for TSO balancing services and partly for voltage services, in DC NC.

In addition, the following issues should be considered:

- Alignment of the prequalification process per product.
- Feasibility of the prequalification process at an aggregated pool level rather than for each end-point individually (the location used would then be the highest level of the aggregated pool, e.g. substation). However, for DSO services, the prequalification could be done at the end-point individually, if the product requires it. Product prequalification would then assess whether the pool of assets can deliver the product, whereas grid prequalification would assess whether the grid can transport the delivered energy.
- In the event that multiple system operators are buyers of the same product, the product pre-qualification process should be agreed between the system operators wanting to buy this product to avoid the pre-qualification being done twice, once for the TSO and once for the DSO.
- Product prequalification shall ensure that units (individually or aggregated) are feeding data as required in the to-be-established grid prequalification processes (either conditional or dynamic).
- Product prequalification shall ensure that units (individually or aggregated) can receive and react upon signals sent by the DSO and TSO. Some rules for demand units are stated in Article 28(2)(e) of DC NC.
- Monitoring the unit(s) directly or via the relevant metering points to check if it is available at certain threshold may be also relevant for the DSO (see next chapter).

Geographical relevance

An EU-level framework would allow a minimum level of standardisation of the prequalification process (similar to SO GL and EB GL requirements for flexibility products) and the accompanying requirements for the DSO.

To develop appropriate prequalification processes, best practices in relation to the analysis and processes establishment should be considered to minimise the requirements of service providers while still maintaining system security on transmission and distribution networks. Flexibility products would be designed at national level and, therefore, a processes for their prequalification would consider national specifications.

Regulatory assessment

- Electricity Regulation:
  - **Article 2 (18)**: *"prequalification process" means the process to verify the compliance of a provider of balancing capacity with the requirements set by the transmission system operators;*
  - **Article 6(1) and (8)** - balancing markets: *"The procurement of balancing capacity shall be market-based and organised in such a way as to be non-discriminatory between market participants in the prequalification process in accordance with Article 40(4) of Directive (EU) 2019/944 whether market participants participate individually or through aggregation."*
- SO GL:
  - For balancing, the prequalification process is already addressed in **Article 155 (FCR), Article 159 (FRR) and Article 162,** but for other flexibility services for both T/D there might be a need for additional regulation
- DC NC:
  - Apart from the prequalification processes defined in the EB GL and in the SO GL which are valid for demand, generation and storage, there are other requirements in DCC NC that cover only demand-response units which provide services to the relevant system operators, called "operational notification procedures". **Title III** of NC DC is dedicated to DEMAND RESPONSE SERVICES. **CHAPTER 2** of this title handles the operational notification procedure.
  - **Article 32** describes procedures for demand units within a demand facility or a closed distribution system connected at a voltage level of or below 1,000 V.
  - **Article 33** describes procedures for demand units within a demand facility or a closed distribution system connected at a voltage level above 1,000 V.
  - Compliance tests and use of equipment certificate and simulation is left to the relevant system operator according to **Article 41** (Compliance testing for demand units with demand response active power control, reactive power control and transmission constraint management) and **Article 45** (Compliance simulations for demand units with demand response very fast active power control).
  - The services provided in the NC DC are described in **Article 27** :
    - Remotely controlled ones:
      (1) Demand response active power control
      (2) Demand response reactive power control
      (3) Demand response transmission constraint management
    - Autonomously controlled ones:
      (4) Demand response system frequency control
      (5) Demand response very fast active power control

As stated in the DC NC, these services may be provided to relevant system operators and the relevant TSO. As is stated, services (3), (4) and (5) are for services provided only to TSOs, and services (1) and (2) can be used for DSO and TSO services. It is also stated in the DC NC that *"The categories referred to in NC DC are not exclusive and NC DC does not prevent other categories from being developed."*

The RfG NC also describes an operational notification procedure and compliance testing/simulation for generators, but only for their connection to the distribution or transmission networks. RfG NC does not provide any requirements on flexibility services to relevant system operators, only on technical capabilities of generators. Thus, the operational notification procedure and compliance testing/simulation cannot be considered as a "prequalification process" for flexibility services offered to the system operator by generators. A similar statement is applicable to DC NC, with the exception of the requirements included for services (1) to (5) above that, regardless, do not prevent demand facilities from complying with the operational notification procedure for connection to the grid.

Technical requirements for demand units with demand response are provided in NC DC in Article 28 *Specific provisions for demand units with demand response active power control, reactive power control and transmission constraint management.*

Technical requirements of generation units are described in RfG. These requirements are checked during the connection phase of the unit to the grid and are not directly related to the services which the unit can provide to the system operators.

From the above, we may conclude that there are EU regulations for balancing product prequalifications as well as other requirements in NC DC that cover only demand-response units which provide services to the relevant system operators, called "operational notification procedures". Product prequalification for other flexibility products, as opposed to balancing services and demand units, is necessary at the EU level to allow a minimum level of standardisation of the prequalification process. Flexibility products, as is currently the case with balancing products, would be designed at the national level and, therefore, processes for their prequalification would consider national specifications.

Prioritisation

- Congestion management: **High** for DSOs and TSOs.
- Grid capacity: TSO **Low**, DSO **High**.
- Voltage Control: TSO **Low**, DSO **High**

Topic 8: (static or long term) Grid prequalification for congestion management

According to the DSO view, this process can also be applied to long-term products.

Description

Grid prequalification is concerned with checking from the connecting system operator whether the grid can (technically) accept the delivery of the product from the market and whether the telemetry and measurement requirements are fulfilled according to the agreed framework between the different system operators on prequalification. Concretely, "static grid prequalification" grants conditional grid access for flexibility resources according to criteria clearly specified in advance. Such conditional grid access would be reviewed later on in the "dynamic" or "short-term" grid prequalification.

The long term/static grid prequalification is based on the system operator's right to set general limits or exclude the delivery of active power based on local grid technical constraints.

Grid prequalification shall be as simple as possible while ensuring secure system operation.

Justification

Clear rights, responsibilities and technical requirements are required to allow the efficient use of flexibility potential in the DSO and TSO grids while respecting technical limits and avoid the use of DF creating network issues. At the same time, the participation of distributed assets should not be overly restricted. Restrictions shall not exceed the level necessary to ensure the DSO and TSO security and grid operation.

Geographical relevance

A European framework would ease the process for static grid prequalification. However, it would make it difficult to consider Member States' specificities in congestion management.

Grid Prequalification shall be compatible with existing national grid connection conditions, because these are consistent with the existing physical infrastructure.

The grid prequalification process shall ensure that units are feeding data as required in the to-be-established grid prequalification processes (either conditional or dynamic).

Regulatory assessment

For balancing, both the "static" and "dynamic" grid prequalification and TSO–DSO cooperation process is already addressed in regulation Article 182(4) and Article 182(5) of the SO GL but for congestion management services for both TSO & DSO, there might be a need for additional regulation. The principles applied to balancing services grid prequalification may be extrapolated to flexibility services at the EU level, respecting national solutions and specifications.

- Article 182(4) During the prequalification of a reserve providing unit or group connected to its distribution system, each reserve connecting DSO and each intermediate DSO, in cooperation with the TSO, shall have the right to set limits to or exclude the delivery of active power reserves located in its distribution system, based on technical reasons such as the geographical location of the reserve providing units and reserve providing groups.
- Article 182(5) Each reserve connecting DSO and each intermediate DSO shall have the right, in cooperation with the TSO, to set, before the activation of reserves, temporary limits to the delivery of active power reserves located in its distribution system. The respective TSOs shall agree with their reserve connecting DSOs and intermediate DSOs on the applicable procedures.

Prioritisation

JTF recommendation: **High**

Topic 9: Telemetry requirements for measurement, validation and settlement purposes for flexibility services

Description

The assets delivering flexibility services should provide the required data at the right time interval, depending on the product definition. This information could be collected from the main meter or, in the event the meter is not able to provide data in the required interval, other devices may be required (an example could be a separate "add-on device" connected at the main meter).

The telemetry requirements as part of the technical requirements set by T&D system operators depend on the product definitions. Telemetry requirements should not impose any unnecessary barriers for flexibility service providers. Indeed, the telemetry requirements are typically established according to capacity thresholds (MW/kW) as, especially for lower power grid users, additional telemetry requirements and the need to install additional equipment could not be cost-efficient. Other equivalent solutions could be implemented (where possible) for smaller units or aggregators so that real-time information about these units, in a sufficiently aggregated manner equivalent to telemetry, is available to TSOs and DSOs, if required.

The Main Meter, i.e. the one directly connected to the system operator's grid, is the only one that guarantees the actual measurement of the energy / capacity requested to the grid or injected in to the grid. Therefore, the main meter is the one than can be used for the system observability and the imbalance settlement (validated data). However, if the flexibility product (e.g. Manual Frequency Restoration Reserve [mFRR], voltage control..) requires more granular or real time data, other meters can be required as long as they respect minimum technical requirements, and they could also be used for settlement (non-validated data) and observability purposes.

Justification

Telemetry requirements are part of the product design and prequalification process. Requirements for flexibility products would accompany the prequalification process, defined to allow a minimum level of standardisation.

At EU level, general high-level rules clarifying the role of the current smart meters (main meters) are necessary to lower the barriers for smaller assets to join the future flexibility markets. This topic is interlinked with the becoming Implementing Acts on Data Interoperability.

Geographical relevance

Some general provisions at EU level state that technical capabilities are necessary to comply with the telemetry requirements of each product (see regulatory assessment).

At national level, depending on the product prequalification or requirements to participate in the markets, it shall be decided whether they want to use the main meter for system observability or settlement or whether they are allowed to use additional devices. In any case, decisions of market

parties and customers to install additional metering (e.g. sub meters) shall be decided at the national level.

Regulatory assessment

TSO view:

TSOs believe that providers of redispatching of power generating modules or demand facilities by means of aggregation are SGUs in line with Article 2(1)(e) and, therefore, data exchange requirements in SOGL and KORRR are applicable to them (see Topic 15.1 – TSOs views). In addition, we understand that "redispatching" covers the activation of flexibilities to solve congestion or ensure system security (as is stated in Regulation 2019/943). Consequently, telemetry requirements for flexibility services should be defined as part of the requirements for system service markets participation, based on the national implementation of the existing EU as well as other applicable national framework.

- SO GL:
  - **Article 51** sets high-level principles on SGUs data exchange between TSOs and DSOs.
  - **Article 53** provides minimum sets of information that TSOs and distribution-connected demand facilities (or third parties participating in demand response) should exchange with competent TSOs and DSOs.
- KORRR:
  - KORRR allows TSOs to request from SGU the schedule data (**Article 16(2)**);
  - It also grants DSOs access to the schedule data DSOs require for their process (**Article 12(2)**);
  - KORRR **Article 17(2)** requests SGU connected to the distribution network to provide real time data directly to the TSO or through the DSO to which they are connected.
- DC NC:
  - **Article 28** sets specific provisions for demand units with demand response active power control, reactive power control and transmission constraint management.
  - According to **Article 28(2)(e)**, such demand facilities and closed distribution systems shall be equipped to receive instructions, directly or indirectly through a third party, from the relevant system operator to modify their demand and to transfer the necessary information. Demand units with demand response active power control, demand response reactive power control, or demand response transmission constraint management shall comply with the requirements, either individually or, where it is not part of a transmission-connected demand facility, collectively as part of demand aggregation through a third party.
- Electricity Directive:
  - **Article 23(1)**: *Authorities shall specify the rules on the access to data of the final customer by eligible parties in accordance with applicable Union legal framework. Data shall be understood to include metering and consumption data as well as data required for customer switching, demand response and other services.*
  - **Article 24(1)**: *In order to promote competition in the retail market and to avoid excessive administrative costs for the eligible parties, Member States shall facilitate the full interoperability of energy services within the Union.*

- **Article 24(2)**: *The Commission shall adopt, by means of implementing acts, interoperability requirements and non-discriminatory and transparent procedures for access to data referred to in Article 23(1). Those implementing acts shall be adopted in accordance with the advisory procedure referred to in Article 68(2).*
- **Article 24(3)**: *Member States shall ensure that electricity undertakings apply the interoperability requirements and procedures for access to data referred to in paragraph 2. Those requirements and procedures shall be based on existing national practices.*

DSO view:

- DSOs believe that the product definition and the product prequalification will define the telemetry requirements independently if you are a SGU or not. It is not relevant for DSOs if units are SGUs or not.
- In any case, a following assessment of the SGUs has been done to clarify what is regulated for SGUs and telemetry requirements (especially real-time information).
- DSOs do not believe that the SO GL defines real time telemetry requirements for units that provide congestion management and grid capacity management services to the DSOs.
- It is true that Article 2(1)(e) of the SO GL define as SGUs the following: "*providers of redispatching of power generating modules or demand facilities by means of aggregation and providers of active power reserve in accordance with Title 8 of Part IV of this Regulation"*. However, DSOs consider that redispatching is a different service than dispatching or activating flexibility at first instance for solving congestion management or grid capacity management.
- Even in the case where the definition of redispatching covers the DSO flexibility needs and providers of redispatching may be considered SGUs, only power generating modules (type B, C and D – existing or new and providers of redispatching) are obliged to provide real-time information according to the following articles:
  - **Article 50(1)** of the SO GL. "Unless otherwise provided by the TSO, each power generating facility owner of a power generating module which is a SGU in accordance with Article 2(1)(a) and (e) connected to the distribution system shall provide the TSO and the DSO to which it has the connection point, in real-time, at least the following data: a) status of the switching devices and circuit breakers at the connection point; and (b) active and reactive power flows, current, and voltage at the connection point.
    - **Article 2(1)(a)** existing and new power generating modules that are, or would be, classified as type B, C and D in accordance with the criteria set out in Article 5 of Commission Regulation (EU) 2016/631 (2);
    - **Article 2(1)(e)** providers of redispatching of power generating modules or demand facilities by means of aggregation and providers of active power reserve in accordance with Title 8 of Part IV of this Regulation;
- From the above, we may understand that demand and storage directly or aggregated which provide redispatching services do not necessarily have to send real-time information. Only generators units (type B, C and D – existing or new; and providers of redispatching) are obliged to send real-time information. The rest of the resources which provide other flexibility services beyond redispatching (such as congestion management or grid capacity management) do not have such an obligation, unless required by the product definition.

Prioritisation

- TSO view: **Low**
- DSO view: **High**

5. Market Processes & T&D Coordination

Introduction

To successfully integrate the growing amounts of demand side flexibility into the European electricity system, both aggregated and individually, coordination between TSOs and DSOs is required to avoid harmful interference in each other's grids. This pertains especially to cases in which one grid operator contracts resources connected to a grid other than their own. Considering the many different market architectures and historically grown networks with their roles and responsibilities in different Member States, the topics covered in Chapter 5 illustrate the regulatory status quo and identify gaps to enable such coordinative processes.

First and foremost, TSOs and DSOs are responsible for the secure operation of their grids and thus need to cooperate and coordinate to ensure DSF is appropriately considered during various processes. Thus, **Topic 10** dives deeper into the data exchanges required for grid assessment **(Topic 10.1)** and coordination for security **(Topic 10.2).** Necessary regulation and gaps with regards to principles for grid-prequalification, and the process of verifying the ability of the grid to receive the flexibility service to be delivered (before activation), are dealt with in **Topic 11**. As DSF may be offered through aggregates, **Topic 12** pays special attention to existing and missing requirements in regulation regarding aggregates to ascertain that grid operators dispose of data in necessary granularity if flexibility services are provided through aggregation. As market liquidity is a necessary precondition to efficient prices, lowering fragmentation and enabling FSP to offer their services where they bring most value to the system is addressed in **Topic 13**. As the activation of flexibility resources may create imbalances, processes for the counterbalancing of these physical imbalances need to be considered **(Topic 14)**. Furthermore, the adjustment of imbalances by responsible parties is addressed in **Topic 15** "Responsibilities, rules and data exchange requirements with respect to adjustments of imbalances of balance responsible parties in case of redispatching activations (by DSOs and TSOs)". Other topics in this cluster provide a background for the aforementioned processes and include a framework for flexibility service providers **(Topic 16)**, the use of a Flexibility Resources Register for TSO–DSO coordination purposes **(Topic 17)** and costs for coordination and data exchanges **(Topic 18).**

Topic 10: Principles for grid assessment and coordination for security:

There is divergent opinion between the European DSO Associations and ENTSO-E. Therefore, two differentiated subchapters have been inserted.

10.1 Data exchange for grid assessment – ENTSO-E's view

Description

Existing EU legislation integrates a wide set of data exchange requirements for grid users to be ultimately implemented at national level. Because of diversity in the European system, the European framework ensures a minimum degree of harmonisation and necessary provisions for distribution network connected users that may affect the operational security of the control area.

At the same time, EU requirements address to national authorities a responsibility to assess the evolution of system requirements and, on cost-benefit assessment, to ultimately define the applicability and the scope of data exchange requirements to "small units" (typically below 1 MW), or to ultimately define specificities, in line with EU criteria.

For TSOs, it is essential to monitor the power system status of its entire control area all the time, to ensure the operational security of the interconnected system. The real-time monitoring of the grid is also important in uncongested areas or at locations where no voltage problems occurs as sum of flexibilities on a DSO grid could have a significant impact globally in the control area under the TSO responsibility. Data from DSOs/TSOs should be shared on a large scale between system operators, in line with SOGL and KORRR requirements.

According to ENTSO-E, the implementation of existing EU requirements at the national level should normally allow both DSOs and TSOs to obtain the data they require for grid assessment. In the JTF DSF, DSOs have expressed the opinion that this is not the case and that gaps exist in the EU legislation.

ENTSO-E argues that the national implementation of the requirements to grid users as integrated in several NC/GLs should allow DSOs and TSOs to perform their responsibilities. Any potential gap in EU legislation should be discussed as amendments to existing NCs/GLs to ensure a coherent and coordinated approach.

Justification

1) Existing NCs/GLs form a well-balanced framework with sufficient technical and organisational standards to be finally applied by national authorities after a proposal made by TSOs in coordination with DSOs and users.
2) Discussing separate requirements specific only to distribution-connected users is concerning to TSOs as it could lead to an insecure solution for the overall system. ENTSO-E thus considers it of the highest importance to ensure a coherent and coordinated approach and to ensure a secure operational framework for data exchange, grid assessment and security coordination.
3) The use of smart meter data is regulated in Article 23 of the Electricity Directive. Access of system operators to smart meter data for operational security assessment shall be regulated at the national level, and applicable rules to respect customer privacy should apply.

Geographical relevance

There are advantages to leaving the applicability of certain requirements up to national implementation as the impact of users on the control area security and performance is best assessed by national authorities. In addition, providers that voluntarily participate in the provision of flexibility services shall apply data exchange requirements.

Regulatory assessment

With regards to the applicability of data exchange requirements in NCs/GLs:

1. [SO GL] Requirements apply to existing or new facilities connected to the distribution network when they are of a certain size or when they provide [demand response, redispatching, …] services to the relevant system operator and the relevant TSO.
2. [RfG, Article 28(2) NC DC] Requirements to new or modernised installations (unless otherwise assessed at national level).

The applicability and scope of data exchange requirements to small generators (e.g. below 1 MW) or to demand connected to distribution shall be ultimately established at the national level – typically in national grid code or other national legislation approved by the relevant national authority in line with relevant national legislation.

It is important to mention that SGUs can fulfil requirements individually or in aggregation.

Specifically, it is of interest to highlight the following requirements in Article 2(1)(e) of SO GL, defining as SGUs for which SO GL data exchange requirements apply are also:

"providers of redispatching of power generating modules or demand facilities by means of aggregation and providers of active power reserve in accordance with Title 8 of Part IV of this Regulation."

It is ENTSO-E's understanding that the aggregation of power generating modules or demand facilities can be considered SGUs if they provide redispatching services. Redispatching is defined in the Electricity Regulation as:

"a measure, including curtailment, that is activated by one or more transmission system operators or distribution system operators by altering the generation, load pattern, or both, in order to change physical flows in the electricity system and relieve a physical congestion or otherwise ensure system security;"

- Article 40(5), together with Article 6(4)(b), on the ultimate national authority decision of the precise national scope and applicability of data exchange requirements, following a coordinated proposal between TSOs, DSOs and SGUs.

In coordination with the DSOs and SGUs, each TSO shall determine the applicability and scope of the data exchange based on the following categories: (a) structural data in accordance with Article 48; (b) scheduling and forecast data in accordance with Article 49; (c) real-time data in accordance with Articles 44, 47 and 50; and (d) provisions in accordance with Articles 51, 52 and 53.

Therefore, it is ENTSO-E's understanding that the aggregation of power generating modules or demand facilities providing redispatching services to DSOs is under the scope of SOGL requirements as to be established by the relevant national authority.

From ENTSO-E's perspective, it is of interest to highlight that:

- The aggregation of small units may be of the same size than SGUs or larger, therefore their redispatch would have a similar impact to that of SGUs in the control area security.

- In a scenario of a significant volume of aggregation participating in redispatch for distribution network purposes, a coordinated solution with the TSO to ensure the operational security of its control area is absolutely necessary.
- Having structural data (mainly location) of aggregated DS-connected assets is also crucial for ensuring the operational security of the distribution system.

Furthermore, the implementation of SOGL data exchange requirements and KORRR methodology at the national level, developed pursuant to Article 40(6) of SOGL, together with the implementation on CNCs, ensures both operators can obtain the data required for performing the grid assessment.

Below are highlighted certain data exchange requirements for grid assessment integrated in KORRR, which are relevant as they were drafted with the spirit of introducing EU requirements to SGUs data exchange for both TSOs and DSOs:

Notably, with regards to scheduled data, **Article 12(2)** states: *Each DSO shall have access to the scheduled data of SGUs connected to its network. DSOs shall comply with the requirements defined by the relevant TSO to exchange scheduled data.*

And **Article 16(2)** states: *SGUs shall comply with the requirements defined by the relevant TSO, and/or by the DSO when the SGU is required to provide data through the DSO according to Article 3(3) of KORRR, to exchange scheduled data. The frequency of delivery of scheduled data shall be defined at a national level.*

Prioritisation

TSO view: ENTSO-E's view is that the best solution to fill the possible gaps in EU legislation is to review existing legislation. This would allow a system approach, ensuring minimum harmonised requirements to guarantee operational security at the control area level.

ENTSO-E will continue to discuss potential gaps and necessary further specifications when applying the above-mentioned requirements, to assess potential SOGL or KORRR evolution and ensure a consistent and sound EU data exchange framework.

The discussion on the specific need for data exchange by non-SGUs, because they are below the national clarified thresholds and do not provide system services, shall be had with national authorities.

10.1 Data exchange for grid assessment – DSO view

Description

Grid assessment for the DSO is particularly important when there is insufficient capacity in the grid to accommodate all transport requests (the congested areas) or when there are voltage problems. The capacity shortage to accommodate all transport requests can occur in different time frames. It can occur in the planning phase (years ahead), the forecasting phase (months ahead to day-ahead) and in the monitoring phase (real-time). For a DSO, it is not always necessary to monitor all parts of the grid all the time. The real-time monitoring of the grid is especially important in congested areas or at locations where voltage problems occur. The current EU network codes assume the necessity to

monitor all parts of the network all the time. This is, of course, necessary for transmission grids but not always necessary for distribution grids. For a good grid assessment, it is important for the DSO to consider the plans and actual behavior of the grid users. The current EU network codes define the concept of an SGU. An SGU is an existing and new power generating facility and demand facility deemed by the TSO as significant because of their impact on the transmission system in terms of the security of supply, including the provision of ancillary services. SGUs are categorised according to their size. All SGUs have the obligation to provide information about their planning in the long term (years ahead) and short term (day(s) ahead). Usually, larger SGUs also have the obligation to provide real-time usage or production information. For DSOs, it is only important to have granular information of large users or aggregated groups of connection in congested areas. For large DSO users in congested areas, it is important to have day-ahead information, and for very large DSO users in congested areas, it is important to receive real time information.

The concept of SGUs in the current EU network codes is not suitable for DSOs. For instance, in a congestion area, it is deemed necessary by the DSO to be informed about transport prognoses on a day-ahead basis of larger DSO connected users. However, a large user for the DSO is not always the same as an SGU for the TSO. The obligations of an SGU cannot be applied only to users in a specific (congested) area. If the threshold for SGUs is lowered, all new users in all parts of the grid have additional administrative obligations, which put a significant administrative burden on all the new users, although it is only useful for the smaller users in the congested areas. Therefore, DSOs are in favour of being able to oblige larger DSO connected users in congested areas to provide structural data, scheduling and forecast data, and, in some circumstances, real-time data, even for users who are not considered to be an SGU by the TSO.

To solve voltage problems, it is necessary for DSOs to be able to use the smart meters readings to their full extent. Today, it is not always clear to DSOs when they are allowed to use real-time usage data and more granular measurement data from the smart meters for system operation purposes without the consent of all concerned users. Therefore, to be able to solve, among others, voltage problems, it is important for the DSO to be allowed to use smart meter readings to their full extent even without the approval of all concerned users for system operational purposes.

In the monitoring and activation phase, it is important to have visibility of assets which are significant (also for the DSO). At distribution level, the number of connected resources are usually a ten to a hundred-fold compared to the number of assets connected to the transmission grids. This requires a much larger extent of IT standardisation to achieve the visibility and controllability of larger assets which have a significant effect on the security of the grid.

Justification

1. DSOs should be enabled to oblige users in congested areas to provide structural data, scheduling and forecast data and, in some circumstances, real-time data. The DSO should be enabled to set the thresholds for these obligations per congested area.
2. For the purpose of system operation, the DSO should be allowed to use the smart meter readings to their full extent (even without the approval of the concerned users).

Geographical relevance

For DSOs, congested areas can be very local. Therefore, DSOs should be enabled to oblige users in a specific congestion area to provide structural data, scheduling and forecast data, and, in some circumstances, real-time data.

The thresholds to categorise the right users for these obligations can differ per congestion area. Therefore, the DSO should be enabled to set the thresholds for these obligations per congested area.

Regulatory assessment

The current EU network codes are not sufficient to cope with congestion management on a local distribution grid level. Therefore, new legislation is required. Amending the current EU network codes would require new concepts of the categorisation of local congestion users, which is rather fundamental, or would put an excessively high administrative burden on SGUs which are not located in congested areas and is, therefore, not rational.

DSOs should be allowed to use the smart meter readings for the purpose of system operation to their full extent (even without the approval of the concerned users).

Furthermore, the development of IT standards for remotely controlling assets and the obligation for certain users to implement these new standards are necessary.

Prioritisation

DSO view: **High**

10.2 Coordination for security

Description

As a principle, system operators are responsible for ensuring the secure operation of their grids. However, as the electricity system is very much connected and interlinked, coordination between system operators is vital for the safe operation of the whole electricity system. This is also recognised in the ASM report as one of the fundamental principles: TSO–DSO coordination and information exchange is essential. TSOs and DSOs adopted this principle to avoid mutual harmful interference when invoking balancing and/or congestion management actions. Each network operator is responsible for forecasting restrictions, including voltage problems, in the network and for, at least, initiating a coordinated – as applicable – solution.

To ensure the secure operation of their grids, system operators perform a grid assessment. Once the grid assessment is performed and a potential violation of the limits of electrical parameters is detected by the relevant system operator, a coordination of the solution takes place (if required). For the coordination for security, the ASM report distinguishes three relevant phases: the plan and forecast phase, the market phase and the monitoring and activation phase. In the planning and forecasting phase, the forecasts are made in the different time frames, long term, medium term and short term. In all timeframes, coordination between system operators is required.

To control electrical parameters (frequency, flows, voltages), DSOs and TSOs coordinate several actions: topological actions or other actions such as increasing or decreasing the production or consumption of electricity (redispatching), preferably through a market-driven coordinated solution. The frequency shall be controlled in real time by TSOs. The flows are not always controlled in real time. Especially at the lower voltage levels of the grid, real time monitoring is not always available and a prediction of the flows must be done beforehand. Usually, on the lower voltage levels, a prediction is made daily for the next coming day. Voltage and reactive power can be controlled by establishing a minimum operational framework with binding conditions and limits to ensure voltages are kept within operational security limits. Voltage and reactive control in real time can be achieved by automatic actions of grid components and by addressing specific requirements or set points to units. A voltage control process based on the provision of a specific service by providers is only feasible if voltage is measured in real time, which is then a requirement for those providers participating in such a service.

Another basic principle is that DSOs and TSOs should have access to the necessary information to operate the network. This concerns all timeframes (years ahead, months ahead, day ahead and close to real time) together with the necessary granularity of the information. This information must be provided by SGUs and other DSO relevant grid users but also by market parties. This aspect is further analysed in Topics 15.1 and 17.

Articles 40(6) and 31 of the Electricity Directive requires both TSOs and DSOs to exchange all necessary information to ensure the optimal utilisation of resources, the secure and efficient operation of the system and to facilitate market development. This concept is also further developed in Topic 18.

According to Article 32 of the Electricity Directive (common rules for the internal market for electricity), DSOs are incentivised to procure flexibility services to solve congestions. When the DSO procures flexibility services, these flexibility services shall be procured in accordance with transparent,

non-discriminatory, and market-based procedures. A market-based coordinated solution can take several options: from a centralised market solution to a combination of centralised and local coordinated and interoperable solutions.

For example, when a system operator has noticed the need to activate a service, there is a need for coordination in the market phase. When entering the market phase, any affected, in particular neighbouring, system operators need to be informed as applicable pursuant to the market process applied at the national level and shall be capable of applying short-term grid prequalification, described in Topic 16.

When coming to a coordinated solution driven by market processes, it is important to note that bids from flexibility service providers should be selected using an economic merit order and a "technical merit order" (e.g. effectiveness to solve congestion without inducing other issues in the grids), which normally requires coordination.

Coordinating secure decisions is relevant in the market phase. The ASM report notes that when, according to the agreement and applicable framework between the different system operators on pre-qualification, the evaluation of the bids from providers connected in another system operator grid shall include the connecting operator's right to limit those bids if its grid cannot manage the delivery of the service that the units connected to its network want to deliver. This is described in topic 16: (short-term) Grid prequalification.

In addition, during the monitoring phase a new evaluation of the activation of planed and accepted bids is possible but, to also address any uncertainties or sudden events that may arise, a technical evaluation of new bids might be necessary. Usually, this is done based on real-time or close to real-time measurements (when available).

Finally, to ensure load-frequency control, coordination between TSOs and DSOs should be applied as applicable for the option for counterbalancing (see Topic 19); furthermore, to ensure that the adjustment of imbalances is feasible, data exchange between TSOs and DSOs could be required (see Topic 20).

DSO view

In the monitoring and activation phase, it is important to ensure the visibility of assets which are significant (also for the DSO). At distribution level, the number of connected resources are usually a ten to a hundred-fold compared to the number of assets connected to the transmission grids. This requires a much larger need for IT standardisation to achieve visibility and controllability of larger assets which have a significant effect on the security of the grid. With the aid of the flexibility register, assets could be identified which are equipped with the ability to be monitored and controlled remotely. When controlling assets in another system operator's grid, the IT standard should guarantee that the appropriate measures for proper coordination between the different system operators are in place.

Justification

The cooperation of TSOs and DSOs is necessary to ensure both operators can fulfil their roles with regards to network security (DSOs) and the operational security of the control area (TSOs). The integration of demand in the congestion management processes, mandated by the CEP, and the

expected growing relevance of distributed flexibilities as a resource to solve grid congestions in both distribution and transmission networks, preferably by a market-based approach, strengthens the need for cooperation in the future.

Geographical relevance

TSO view

There are different frameworks in Europe and the roles of TSOs and DSOs can significantly vary: in some cases, DSOs send a request to the TSO for redispatching (e.g. Portugal or Spain), whereas in others (e.g. Hungary) there is legislation under development that allows redispatch actions to be carried out directly by DSOs. It therefore seems purposeful to keep national choices on the roles and ultimately a redispatching model to be defined at the national level, while exploring those coordination functions that could be common under national developed solutions.

TSOs highlight that the Directive incentivises DSOs to procure system services. The Directive does not integrate a requirement or role for the DSOs to manage or be responsible for redispatching markets. The procurement of redispatching services can be performed by DSOs, e.g. in coordinated centralised markets.

It is relevant to explore different applied solutions (sharing of national practices) to abstract further common coordination principles described in the topic and in the topics referred herewith are in order to ensure operational security in all contexts of the use of flexibility.

DSO view

The DSO view is that the DSO should be responsible for congestion management, capacity management and any other redispatching actions in his own grid, in compliance with Article 32 of The Electricity Directive. This is because the DSO is best placed to oversee the consequences of the actions taken as they have the best knowledge of the actual topology and characteristics of their own grid. This principle should be further developed in EU legislation.

Regulatory assessment

- Electricity Directive
    - **Articles 32(2) and 40(6)** integrate clear mandates, mirroring TSOs and DSOs obligations for cooperation: *TSOs/DSOs shall exchange all necessary information and shall coordinate with DSOs/TSOs in order to ensure the optimal utilisation of resources, to ensure the secure and efficient operation of the system and to facilitate market development*.

It should be recognised that each system operator is responsible for congestion management, capacity management and any other redispatch actions in their own grid. However, market organisation can be Member-State specific.

When entering into the market phase affected in a particular neighbouring system, operators need to be informed as applicable pursuant to the market process applied at the national level and shall be capable of applying short-term grid prequalification described in Topic 16.

During the market phase, it is necessary that, for all flexibility services, when the activation of an asset is planned, an evaluation is possible by the system operator to whose grid the asset is connected to.

In addition, during the monitoring and activation phase, for all flexibility services, it is necessary that, prior to the activation of an asset, an evaluation is possible by the system operator to whose grid the asset is connected to. These principles are further detailed in Topic 16.

A European IT standard should be developed to monitor and control significant (DSO) production and demand facilities. This should be built upon existing EU standards. For (DSO) significant production and demand facilities, this European IT standard should be made compulsory.

Prioritisation

- DSO view: **High**
- TSOs view: **Medium**

Topic 11: (short-term) Grid prequalification

Description

"The pre-qualification for the grid, in [ASM report (2019): p. 27], is defined as checking whether the grid can manage the delivery of the product that the unit wants to sell/deliver (…), according to the agreement and applicable framework between the different system operators on pre-qualification."

Therefore, this topic is concerned with describing the rights, duties and responsibilities, and technical requirements for DSOs and TSOs connecting the assets providing services and intermediate DSOs to impose temporary limits to the use of DF, with the goal of ensuring operational security. Grid pre-qualification comprises the process of verifying the ability of the grid to receive the flexibility service to be delivered. Such processes occur before activation and may consist of, for example, conditional grid pre-qualification (whereby it is dependent on certain conditions being met) or dynamic grid pre-qualification (whereby it can change over time, adapting to grid margin and capabilities).

Justification

"The reason for this is that only this specific system operator knows what the grid can manage and at which moments in time it is possible and when it is not, due to specific constraints." (ASM report [2016]: p. 27) Therefore, clear rights, responsibilities and technical requirements are necessary to allow the efficient use of flex potential in the DSO and TSO grids while respecting technical limits and avoiding network issues caused by the use of DF. At the same time, the participation of distributed assets should not be overly restricted. Restrictions shall not exceed the level which is necessary to ensure the DSOs' and TSOs' needs.

Geographical relevance

Principles could be defined at the EU level, but implementation is to be done at the national level, and rules at the national level should minimise the impact on existing and established processes as far as is compatible with the Guideline objectives.

Regulatory assessment

Does the EU framework provide a standardised framework for TSO–DSO cooperation on grid prequalification to ensure the delivery of these services and enable synergies between prequalification processes for different type of flexibility services?

Some rules for pre-qualification are described in SOGL (Articles 23(3)(4), 182 (5)) and EB GL (Article 15(1)) which establish the following for balancing;

1. There are requirements for pre-qualification processes for providers of reserve services,
2. The DSO, in cooperation with the TSO, has the ability to identify risks to their system and prohibit or limit (e.g. static as well as dynamic [SOGL Articles 182 (4 & 5)]) the participation of distributed connected assets in reserve service provision through the pre-qualification process, and

3. The DSO, in cooperation with the TSO, has the ability to temporarily limit the activation of reserve services from pre-qualified units.

Grid operators have established processes for observing and calculating their grid capacity, and some already may have the ability of an FSP to resolve a current congestion – while submitting information which allows the DSO/TSO to assess the effect on other parts of his grid. Such processes are specific to the physical layout of the grid, which in turn have been built according to national legislation and existing contractual agreements (e.g. grid connection agreements) between the grid operator and the customer. **Forecasting processes by system operators of all voltage levels participating in coordination processes require sufficient flexibility (f.e. DA or up to [near] real time) to cope with the physical and legal specifics of existing system operators.**

Meanwhile, to-be-established processes shall allow FSPs to pursue a comparable business model across different grids. Nonetheless, besides the exchange of structural, scheduled and real-time data between TSO and DSO in relation to distribution-connected demand facilities and power generating modules (commission regulation (EU) 2017/1485 Articles 40, 51 and 53) there is no specific guidance or legislation regarding a framework for the grid prequalification of congestion service providers. This includes requirements on data exchange between TSOs and DSOs for that purpose (according to what is connected in relation to service providers). To avoid excessive and permanent restrictions, a TSO–DSO coordination model could be implemented which allows TSOs and DSOs to **exchange (dynamic) restrictions**. Accordingly, some Member States are trialling, developing and implementing such cross-voltage-level coordination processes already (links with topic 1) that reflect the respective characteristics on the operational level, and the legislation and national structures of DSOs and TSOs. Therefore, principles shall facilitate the interaction between these and other market processes (e.g. links with Topic 8) ahead of the balancing timeframe, e.g. allowing for a communication process from flex provider to TSOs and DSOs, including data validation. These shall be compatible with existing working coordination processes at the national level.

Prioritisation

JTF recommendation: **Medium**

EU regulation provides provisions on balancing prequalification and a generic basis for the national implementation of data exchange between TSO and DSO on structural, scheduled and real-time data. Thus, detailed requirements on specific processes for DA or real-time grid-prequalification of DSF are subject to national implementation where processes may exist already.

Topic 12: Flexible services from aggregates: availability of disaggregated data

Description

If flexibility services are provided through the aggregation of several flexibility resources, TSOs and DSOs shall be able to request from service providers and have access to all necessary data from single resources within the aggregate to safely perform their grid-prequalification as well as grid-assessment. Data should include accurate information concerning how much and where in the grid the service is available and will be provided.

Independently of how the flexibility market is organised, the detailed information of the units participating in aggregation could require additional data requirements that should be defined at the national level based on the needs of involved TSOs and DSOs. This could be done following a bottom-up approach (from the single units or ensemble of them, upwards through the voltage levels) or by having the possibility for both T&D system operators to ask for the necessary disaggregation of the data. This would guarantee that all necessary data for grid assessment and grid pre-qualification from each resource (or groups of resources as applicable) within the aggregate are available to the involved system operators. Where high granularity of data is not necessary, the related system operator is, therefore, able to remove the additional information which creates an aggregate data or, simply, the disaggregation of data would not be required in the first place. When providing services for specific areas, e.g. congestion management, the aggregation of the service provider could be mapped to the relevant area or, in the event that providers are bidding in larger portfolios, a solution shall be to identify the units or ensemble of units that provide the localised service or that are involved in a congestion.

A Flexibility Register could be a useful and effective tool to gather data from FSPs and share these with all stakeholders including TSOs and DSOs. Thanks to this Flexibility Register, high granularity data (i.e. data of each resource) could be aggregated as necessary by means of a “key code of the aggregate” (i.e. a key code uniquely associated to the aggregate, including the related resource).

Justification

Aggregates, so far, have been defined based on the needs of the one contracting the services. Due to the electrical system architecture, the increase of distributed generation and the increase of demand result from the ongoing energy transition, a significant amount of flexibility services will be provided by DERs.

If an aggregate includes resources connected to several DSOs, and data concerning the whole aggregate such as “scheduled data” and “aggregate bid” do not provide the necessary granularity that could be required by DSOs to perform grid-prequalification and grid-assessment, the FSP should de-compose the aggregated data at the level of the granularity required by DSOs.

Moreover, due to an eventual lack of information concerning how each resource within the aggregate contributes to the delivery of the service (i.e. when and how much), TSOs and DSOs might use wide conservative margins during grid-prequalification and grid-assessment that could result in the imposition of unjustified limitations or the inhibition of the bid or service delivery, limiting market access.

Geographical relevance

The principle would guarantee a better use of the resources and availability of the necessary data for system operation purposes without imposing on Member States common constraints that would not fit properly with specific national features.

At national level, each NRA, together with TSOs, DSOs and market participants (such as FSPs), should further define minimum data requirements (such as granularity [time, location] and quality [accuracy and reliability)] as well as which data can be aggregated, considering local features and needs.

National experiences could be useful to outline a set of European reference solutions.

Regulatory assessment

At EU level, there are no full indications of how data from aggregates should be provided and made available to TSO and DSO.

Indeed, concerning data availability and data exchange, Article 40(6) of Regulation (EU) 2017/1485 outlines the "*organisation, roles, responsibilities and quality of data exchange*" for system operators and SGUs. Article 2(1) of the Regulation also defines SGUs as the aggregates:

> *[…]*
>
> *(e) providers of redispatching of power generating modules or demand facilities by means of aggregation and providers of active power reserve in accordance with Title 8 of Part IV of this Regulation […]*

KORRR establishes additional high-level requirements concerning data and data exchange among stakeholders, also applicable to aggregated resources participating in demand response and connected at the distribution level.

Data exchange requirements should enable T&D system operators to perform grid-prequalification and grid–assessment. It is necessary to note that whereas Articles 48 to 51 from SOGL refer just to "*distribution-connected power generating modules*", Article 53 from SOGL refers to "*distribution-connected demand facilities or third parties participating in demand response other than through a third party*"; therefore, it is the one applicable to "*demand aggregates*".

The rules in Article 53(2) of SOGL or Article 3(3) of KORRR could be a basis for clarifying the requirements concerning data from each aggregated resource connected at distribution level, in order to improve EU provision concerning the more significant data required of the DSO to perform grid-assessment and grid pre-qualification, i.e. resource scheduling data.

EU regulation should ensure the availability of data from aggregates with adequate granularity. Each Member State, based on the needs of involved T&D system operators, should define which data shall be provided for each resource within the aggregate and which data can be provided as aggregated.

Prioritisation

JTF recommendation: **High**

Topic 13: Coordination between market processes for market accessibility and efficiency

Description

As stated in [ASM report (2019): p 28], DF resources should be used where they provide the most value to the whole electricity system[…]. Coordination between market processes and functions before activation is essential for market efficiency. It can increase market access and facilitate participation.[12]

Justification

Coordination amongst markets could lead to improved efficiency by increasing liquidity and taking advantage of synergies. An integrated system approach involving the different (diverse) market processes is necessary. At a minimum, an interoperability approach involving the different (diverse) market processes is required.

Geographical relevance

Reducing fragmentation allows market participants to offer their services in any market fostering competition and new services in the European electricity market.

Regulatory assessment

- The Electricity Directive provides a regulatory basis for TSO and DSO coordination.
    - **Articles 32(2) and 40(6)** oblige DSO and TSO to "*exchange all necessary information and shall coordinate with transmission/distribution system operators in order to ensure the optimal utilisation of resources, to ensure the secure and efficient operation of the system and to facilitate market development".*
    - Furthermore, **Article 31(9)** states that ***"****Distribution system operators shall cooperate with transmission system operators for the effective participation of market participants connected to their grid in retail, wholesale and balancing markets (…)"*
    - **Article 31.6** lays out that **"***(…) Where a distribution system operator is responsible for the procurement of products and services necessary for the efficient, reliable and secure operation of the distribution system, rules adopted by the distribution system operator for that purpose shall be objective, transparent and non-discriminatory, and shall be developed in coordination with transmission system operators and other relevant market participants".*

[12] Please note: Topics 15–17 address the necessary coordination to ensure the secure operation of the grid. Building on this coordination, Topic 18 addresses the coordination of market processes necessary to ensure and improve market efficiency.

- Furthermore, **Article 24(1)** states that (…) *Member States shall facilitate the full interoperability of energy services within the Union.*

These provisions set out a basis for coordination between TSO, DSO and market participants as well as market interoperability to be further developed by Member States and EU legislation. While fully respecting the principles set in CEP, to support efficient market functioning of markets established on national or sub-national levels it may be required to create further provisions to ensure interoperability of flexibility markets. TSO and DSO have already agreed to several principles to ensure that rules for collection, selecting and validating bids are clearly defined and made transparent towards market parties [ASM report (2019) p: 30].

These principles include: *selecting bids respecting an economic merit order and technical merit order*; *a selection of bids which appropriately takes into account (short-term and long-term) grid prequalification*; *making the market process and market results transparent to market parties* (see Electricity Directive above) and i*nteroperability between platforms to ensure liquidity and coordination* should be enabled (see Electricity Directive Article 24(1)). Furthermore, the principles state

- *Price formation (…) should be defined clearly and separately for each market process*,
- *consistency between rules of different market processes (gate opening/closing time, coordination, etc) should be sought*;
- *the risk of gaming and exercising market power considered, and*
- *incentives to stimulate market parties to improve load/generation forecast should be in place*

Building on these, flexibility service markets should follow the following principles:

- FSPs should be allowed to participate in different markets with the same flexibility resources through the same or different services if these services are compatible with each other (from a technical perspective, e.g. Capacity Mechanism [CM] and voltage regulation, CM and Balancing). The volume and type of service offered and provided to each party shall be clearly defined and measurable/evaluable. Market procedures should be designed to enable value stacking while avoiding double payments for the same service activation (see also Topic 28).
- The flexibility procurement mechanisms should be designed so that the FSP has the possibility to reoffer services of pre-contracted capacity to other parties if the DSF was not selected in prior market processes.
- Fragmentation caused by possible locally organised markets of e.g. CM can be avoided by coordinated use of a Common Asset Database (Flexibility Resources Register) and by including locational information in flexibility requests: in this manner, TSO and DSO can assess their flexibility needs.
- When redispatching services for distribution network purposes are organised, a coordination among markets shall be ensured, at least at national level, to avoid market fragmentation. For this purpose, coordination among markets should be fulfilled by improving and adapting procedures within the existing market and sharing flexible resource data, including location data, by a Common Asset Database (flex registry, further developed under cluster …). Moreover, the services requested by TSOs or DSOs and/or offered by FSPs should include locational data at a detail level adequate to the type of services and to enable involved TSOs and DSOs to perform a grid pre-qualification assessment minimising the imposition of restrictions on resources.

- It important to consider how the activation of flexibility services impacts the schedule of BRPs and thus their primary responsibility to keep the balance, including financial settlement.

Keeping in mind that national market models can exhibit a wide variance, it is recommended to further develop a shared view on a reference framework for coordinating markets. Such a high-level framework for coordinating markets to improve efficiency could be formulated at the EU level through regulation or at least as a technical paper, after a series of workshops involving multiple experts from different countries exchanging existing national solutions and sharing best practices, and ensuring that existing national solutions are considered.

Prioritisation

- DSO view: **High**
- TSO view: **Medium**

Topic 14: Process for counterbalancing in the event of activations of flexibility resources

Description

Activation of flexibility resources for purposes other than balancing, including redispatching, to control electrical parameters (flows, voltages), can cause imbalances that might need to be resolved (the solution to such imbalances is called "counterbalancing" in this paper).

Justification

Activations of flexibility can create imbalances that might need to be counteracted. Market processes should have sufficient coordination functions between them for operational security, as well as economic efficiency. TSOs and DSOs, in coordination with all market actors, should strive for efficient coordination, especially in buying and settling flexibility products. The ASM report foresees three different options in terms of who is responsible for performing these counteractions:

- The FSP: the flexibility product sold to the system operator could include the correction of the imbalance. The cost or benefit is considered when preparing the bid.
- The system operator contracting the flexibility is responsible for counterbalancing. This entails having a portfolio of different (shared) resources to be used for this purpose by the T&D system operators). This could have the advantage that a correction that directly contravenes the original product can be prevented, for example by being activated in the same area that is affected by the congestion.
- The TSO is responsible for counterbalancing. This could have the advantage that the TSO can access a large portfolio of counterbalancing actions. As such, this would enable the additional netting of effects (e.g. counteractions that would need to be taken for multiple activations could have opposing directions).

To avoid the counterbalancing action contravening the purpose of the original activation, or to avoid creating other network constraints, grid prequalification is required (see Topic 16 and Topic 17 in this regard). However, this does not always prevent a counterbalancing action from being counterproductive from a system balancing perspective.

The most suitable option will depend on the specific situations and size of markets, but also on the coordination model and data exchange between TSOs and DSOs (Topics 15, 16, 17, 18 and 20, respectively).

Geographical relevance

The EU framework should recognise that Member States ensure that the responsibility for counterbalancing as applicable in the event of activation of flexibility resources has always been assigned. Different options exist for counterbalancing, of which the most suitable option(s) depend on the specific situations of the market. The EU framework could describe a non-exhaustive list of options for counterbalancing. It is up to national legislation to clarify the option(s) to take concerning the counterbalancing of redispatching actions.

Regulatory assessment

The EU framework does not provide guidance on how to use counteractions for imbalances caused by the activation of flexibility resources.

There are certain high-level requirements in EBGL **Article 15** (Cooperation with DSOs):

- *1. DSOs, TSOs, balancing service providers and balance responsible parties shall cooperate in order to ensure efficient and effective balancing.*
- *2. Each DSO shall provide, in due time, all necessary information in order to perform the imbalance settlement to the connecting TSO in accordance with the terms and conditions related to balancing pursuant to Article 18.*

DSO position

A recommendation for an EU framework to further highlight the importance of counteractions and clarify its applicability, always allowing Member States' choice for the preferred option, or combination of options, or even stating the options as non-exhaustive. Nevertheless, in the spirit of not limiting the Member States' options, but rather clarifying and triggering the development of the markets, the DSOs' opinion is to formalise high level legislation which provides guidance at the EU level.

TSO position

TSOs prefer to state a more flexible recommendation, based on proactive research and the assessment on national practices, that the EU DSO Entity and ENTSOE can discuss from a technical perspective, to ultimately identify potential barriers to overcome or aspects of added value that can be facilitated by new EU rules.

Prioritisation

JTF recommendation: **Medium**

Topic 15: Adjustments of imbalances of balance responsible parties in the event of redispatching activations

Description

The activation of a redispatch service has an impact on the allocations, and hence on the imbalance, of a BSP. In this regard, adjustments of the imbalance can be considered in the event of the activation of redispatching bids. This topic addresses the responsibilities, rules and data exchange requirements with respect to adjustments done by imbalances of BRPs in the event of redispatching activations (by DSOs and TSOs). Adjustments of imbalances of BRPs in the event of redispatching activations might not be relevant for all market design. For instance, as described in Topic 19, when the flexibility product sold to the system operator includes the correction of the imbalance, an adjustment of the imbalance might not be required.

Justification

Clarity on responsibilities and rules for adjustments of the imbalance contribute to the objective of fostering non-discrimination and transparency, as stated in Article 3(1)(a) of the EB GL. In addition, this could also contribute to the objective of enhancing the efficiency of balancing and redispatching markets.

Geographical relevance

n/a

Regulatory assessment:

Gaps to be addressed: Clarifications could be provided regarding the possibilities for adjustments of the imbalance of a BRP related to the activation of other services than balancing energy bids.

- EB GL
    - **Article 18(1)** specifies that the TSOs shall develop a proposal regarding the terms and conditions for BRPs.
    - **Article 18(6)(k)** further specifies that the terms and conditions for BRPs shall contain, among others, the rules for the settlement of BRPs (pursuant to Articles 52–55)
    - **Article 54** sets the requirements for the calculation of the imbalance. In accordance with **Article 54(4)**, each TSO shall set up rules, including the rules for the determination of the imbalance adjustment pursuant to **Article 49.**
    - However, given that **Article 2(14)** defines imbalance adjustment as an energy volume representing the balancing energy from a BSP, the imbalance adjustments do not address the possible adjustments of the final imbalance of a BRP in the event of activation of other flexibility products than balancing energy bids (such as redispatching bids to resolve intra-zonal congestions).

As such, in contrast to the adjustments of the imbalance in the event of the activations of balancing energy bids, the EU framework does not provide guidance on if and how such adjustments should be

performed in the event of the activations of other services, such as redispatching services to resolve intra-zonal congestions. However, the calculation of the imbalances, for which the TSO is obliged to specify the rules in the terms and conditions for BRPs, can also contain rules related to such an adjustment of imbalances. The T&Cs for BRPs are subject to approval by the NRA. This is appropriate as these rules would depend on the market design implemented at the national level.

There is a need for data exchanges between TSOs and DSOs to enable the TSO calculate the imbalance adjustment following a redispatching action requested by a DSO. EB GL **Article 15(2)** specifies that each DSO shall provide the necessary information for the TSO to perform the imbalance settlement.

Clarifications could be provided regarding the possibilities for adjustments of the imbalance of a BRP related to the activation of redispatching activations. Sufficient liberty needs to be foreseen given that the need and approach to perform an imbalance adjustment of a BRP in the event of an activation of redispatching depends on the market design for redispatching, which is not harmonised at the EU level.

Prioritisation

- TSO view: **N/A** as no regulatory gap was found
- DSO view: **Medium**

Topic 16: Framework for flexibility service providers

Description

The Electricity Directive provides mandate to Member States to allow all customer to participate in electricity markets. Customers should be allowed to aggregate their flexibilities and market participants engaged in aggregation are likely to play an important role as intermediaries between customer and the markets. Consumers should be able to consume, store and sell self-generated electricity to the market, to each other and to participate in all electricity markets by providing flexibility to the system, for instance through energy storage. Member States should be able to have different provisions in their national law with respect to e.g. incentives, taxes and levies for individual and jointly-acting active customers.

Customers connected to the grid can help TSOs and DSOs to keep the values of the frequency, flows or the voltage level within the safety limits by adjusting their production or consumption, preferably by market processes.

Participation in system services can be performed directly by customers or by market parties who act on behalf of a group of customers (notably by an independent aggregator, as described in the Electricity Directive.

TSO view:

EG3 and the commonly agreed ASM report strive to clarify a market-based approach in which FSPs can participate on an equal footing in all markets. The general principles to organise the involvement of FSP in the different markets and specifically in congestion management in distribution networks are described in the Electricity Directive. The Directive also gives Member States the capability to decide on the different governance options and the design of customer participation individually or in aggregation into system services markets, as the market structure and governance, as well as the physical and operational needs, can differ substantially between Member States.

With regards to the subject of grid assessment and coordination for security between system operators, which act as facilitators of markets for system services, SOGL, KORRR and EBGL integrate a wide set of requirements for data exchange with SGUs and between T&D operators as well as some requirements for coordinated processes/functions between T&D operators with the purpose of ensuring operation security, which could be further detailed or clarified. The present report integrates an assessment and concrete proposals for improvements in existing legislation, to eliminate barriers and facilitate the integration of FSPs in the system services (meaning frequency and non-frequency ancillary services as well as redispatching to solve congestions). EG3 and the commonly agreed ASM report strive to clarify a market-based approach in which DSF are actors capable of participating on an equal footing. The general principles that should apply to Member States when organising the involvement of DSF in the different markets and specifically in congestion management in distribution networks are described in the Electricity Directive. The Directive also gives Member States the capability to decide on the different governance options and design of congestion market as the physical and operational needs, as well as the organisational aspects of intra-zonal congestion management, can differ substantially between Member States.

With regards to the subject of grid assessment and coordination for security, SOGL, KORRR and EBGL integrate a wide set of requirements for data exchange with SGUs and between T&D operators as well as some requirements for coordinated processes/functions between T&D operators with the purpose of ensuring operation security, which could be further detailed, always keeping the one system approach in mind. The present report integrates an assessment and concrete proposals for improvements in existing legislation, to eliminate barriers and facilitate the integration of FSPs in the system services (meaning frequency and non-frequency ancillary services as well as redispatching to solve congestions).

DSO view

The current EU legislation, including CEP, SOGL, KORRR and EBGL, already provides some principles for grid assessment and coordination between TSOs and DSOs. Member States are in the implementation phase of this. The commonly agreed EG3 and ASM report calls for more to be done, especially for the congestion management processes that both TSO and DSO must implement in a coordinated manner. The EG3 report calls for an efficient coordination model when buying flexibility and the settling of flexibility products. The ASM report provides a high-level description of a congestion management process.

As the principles of congestion management on a distribution level are not yet specified in EU legislation, the implementation in the national Member States can differ substantially. A certain level of harmonisation can benefit market participants. Harmonisation to a certain degree could also lower entry barriers for market parties. In this manner, market parties can enter new markets more

efficiently. The ASM report already provides some general principles for TSO–DSO coordination which can be detailed further in EU legislation, always keeping the one system approach in mind.

It is necessary to work on a HRM for the use of flexibility by DSO (and TSO on equal footing). Part of the Implementing Act for Data Access and Interoperability (Article 24 of the Electricity Directive) provides interoperability requirements and non-discriminatory and transparent procedures for access to data for demand response services. Part of this Implementing Act is to develop a Reference Model. This Reference Model should be developed in close cooperation with the developments for the establishment of NCs according to the rules of Article 59(1)(e) of the Electricity Regulation in relation to demand response, including rules on aggregation, energy storage and demand curtailment.

Justification
TSO view:

To respect Member State options and avoid impairing solutions under discussion and implementation in the different Member States and to integrate FSPs in all the markets (e.g. independent aggregator model, customer incentives to active participation, etc.), the more secure and fit-for-purpose approach in the view of TSOs is to propose a practice exchange at EU level, where TSOs and DSOs can share the challenges faced in their national implementation, if they have found legal barriers for valid options, and explore potential aligned recommendations.

DSO view:

An EU framework for FSPs, also called an HRM, is necessary based on the following:

- The EG3 report recommends developing a framework for data access and data sharing as new secondary legislation based on the CEP.
- The ASM report recommendation: "*A conceptual framework is a useful tool for structuring the discussion around market interaction on congestion management: a clear definition of roles and responsibilities, market model options, coordination options and platform options. It is recommended that TSOs and DSOs agree on the usage of this conceptual framework on the EU level, without impairing national specificities and allowing the selection of options on a national level.*"
- The draft Implementing Act for data access and interoperability (Article 24 of the Electricity Directive) proposed by DSOs and TSOs requires a reference model for demand response services.
- The establishment of NCs according to Article 59(1)(e) of The Electricity Regulation could benefit substantially from having a clear harmonised role-model for flexibility.

This HRM for flexibility services should be developed by the EU DSO Entity, preferably in cooperation with ENTSO-E if possible.

Regulatory assessment
The role and the responsibilities of an independent aggregator is not further specified in EU legislation. It is also not specified how to link an independent aggregator to a BRP. This is in line with the Electricity Directive, **recital 39**: “Member States should be free to choose the appropriate implementation model and approach to governance for independent aggregation while respecting the general principles set

out in this Directive. Such a model or approach could include choosing market-based or regulatory principles which provide solutions to comply with this Directive, such as models where imbalances are settled or where perimeter corrections are introduced. The chosen model should contain transparent and fair rules to allow independent aggregators to fulfil their roles as intermediaries and to ensure that the final customer adequately benefits from their activities."

TSO view:
The cooperation between EUDSO Entity and ENTSOE in further discussing and developing an *HRM* is a good way forward to further research and clarify DSF participation.

DSO view:
An HRM for flexibility services should be developed by the EU DSO Entity, preferably in cooperation with ENTSO-E if possible. This should be mandated by EU legislation.

Prioritisation

- DSO view: **High**
- TSOs view: **Low**

Topic 17: Use of a Flexibility Resources Register for T&D coordination purposes

Description

As mentioned in Topic 3 ("Does the EU framework address the concept of a FRR and related functionalities?") the concept of a flexibility register represents an important tool in the hands of both TSOs and DSOs for the effective management of all the (flexibility) resources in the availability of the T&D system operators.

The main purpose of the flexibility register for TSO & DSO coordination is to:

1. Ensure joint knowledge of all resources participating in flexibility markets. It could also be very helpful if the use of these resources could be shared between system operators (e.g. for congestion management).
2. Support system operators in identifying the qualified providers that could cause or solve constraints (data required for grid security assessment and grid pre-qualification – see also Topics 11 and 16).
3. The register can support the real-time status information of the asset (e.g. representing the resources availability or other asset performance-related information). This information is very important for the coordination between TSOs and DSOs for security reasons.
4. The register could provide useful information for the allocation of volumes.

Justification

ASM report recommendation: "Information on flexibility resources that are pre-qualified

or are seeking participation in congestion management and balancing should be shared and available (typically nationally) for both TSOs and DSOs, through a flexibility resources register. TSOs and DSOs jointly recommend that the concept of flexibility resources register should be acknowledged at the European level and the implementation should be decided on a national level."

Geographical relevance

The flexibility register is a concept not an IT implementation. Therefore, the concept could be applied in all Member States, leaving it to national implementation to solve aspects such as governance or relationship with coordination functions/platforms.

Regulatory assessment

The concept and principles of the flexibility register could be further developed in EU legislation. Considering the current EU legislation such as the network codes, the Implementing Acts on data access and interoperability and respecting the privacy rules in the GDPR.

Prioritisation

- DSO view: **High**
- TSO view: **Medium**

Topic 18: Costs for coordination and data exchanges

Description

Regulatory acknowledgement of costs borne by system operators stemming from obligations laid down in EU-regulation for additional required processes f.e. on T&D coordination.

Justification

Ensuring the secure and efficient operation and application of additional non-profit, operation processes that ensure neutral DSF integration into markets by DSOs and TSOs requires recovery of additional costs.

Geographical relevance

It is regulated f.e. in principle on EU level (s. Article 9 SO GL) and implemented by national authorities respecting national characteristics.

Regulatory assessment

There are already existing provisions for cost recovery (e.g. **Article 9** SOGL). These need to sufficiently reflect additional processes that are required to ensure neutral DSF integration into T&D coordination and market processes when new processes will be established.

Prioritisation

JTF recommendation: **Low**

As there are already provisions on the European level, a proper acknowledgement should be provided even on lower voltage levels to ensure fast and efficient implementation.

6. Measurement, Validation and Settlement

The verification of actually activated flexibilities and settlement based on this verified information assume accurate measurement. Therefore, large part of the topics are dedicated to data management in this section. Although access to measurement data is essential for validation and settlement processes, it is also most useful in other flexibility market phases such as in prequalification and real-time monitoring. Topic 19 addresses the requirements for main meter based data exchanges benefiting interactions between concerned stakeholders to manage distributed flexibilities. Topic 20 highlights the principle of the free flow of sub-meter data and defines the technical requirements for multilateral data exchange. Topic 21 also addresses sub-meter data but specifically for settlement and observability processes. Topic 22 proposes harmonised principles for baselining. Topic 23 concerns harmonised rules for coordinated settlement to account for the effects of value stacking and grid constraints.

Topic 19: Main meter data exchanges for distributed flexibility

Description

Requirements for smart/main meter based data exchanges benefiting TSO–DSO interactions but also other stakeholders to manage DFs:

- Exchange of data for verification of activated flexibilities (actual vs. requested activations)
- Exchange of data for settlement purposes (metered data, baseline calculation, …)
- Exchange of data required for correcting the balance perimeter of impacted BRPs or required to manage the transfer of energy (dependent on the national aggregator implementation model)
- Exchange of data required for grid and product prequalification
- Exchange of data for (near) real-time monitoring and observability
- Submeter data is addressed in Topic 20

Background information:

- Link with ASM report
  - 2.4. Prequalification: For product prequalification, historical data is required. The exchange of data for prequalification processes should not be forgotten!
  - 2.5 Recommendation on marketplace: system operators should always exchange all the relevant information from their grid and the relevant connected assets
  - 6. Prequalification: data needed before activation for (dynamic) prequalification purposes.
- Link with EG3 report
  - 4.3.4: Foster new flexibility markets, specific data required for settlement, prequalification...
- Standardisation
  - Standardisation plays a key role in ensuring interoperability. In 2011, the European Commission gave a mandate to CEN, CENELEC and ETSI to develop an interoperable framework for smart grid standardisation in Smart Grids – Mandate M/490[13]. The aim was to develop a reference architecture to enable interoperability for power processes, incl. DER management and home automation. European standardisation organisations CEN, CENELEC and ETSI responded by proposing a Smart Grid Architecture Model (SGAM)[14], Smart Grid Set of Standards[15] and an Interoperability Tool[16].
  - In addition, the European Commission has established a Smart Grids Task Force, its Expert Group 1 working on data interoperability. The group has issued several reports addressing standardised access to near-real-time data from smart meters[17], access to meter data ("My Energy Data")[18] and recommendations for metering data-based interoperability[19].
  - In parallel, BRIDGE Initiative as the cooperation platform for Horizon2020 finance Smart Grid projects has proposed an European energy data exchange reference architecture based on SGAM.

Justification

[13] https://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search.detail&id=475#

[14] https://ec.europa.eu/energy/sites/ener/files/documents/xpert_group1_reference_architecture.pdf

[15] ftp://ftp.cencenelec.eu/EN/EuropeanStandardisation/Fields/EnergySustainability/SmartGrid/CGSEG_Sec_0042.pdf

[16] ftp://ftp.cencenelec.eu/EN/EuropeanStandardisation/HotTopics/SmartGrids/SGCG_Interoperability_Report.pdf

[17] https://ec.europa.eu/energy/sites/ener/files/documents/20160829_EG1_Final%20Report%20V1.1.pdf

[18] https://ec.europa.eu/energy/sites/ener/files/documents/report_final_eg1_my_energy_data_15_november_2016.pdf

[19] https://ec.europa.eu/energy/sites/ener/files/documents/eg1_main_report_interop_data_access.pdf

For availability control, product and grid prequalification, activation control and settlement purposes, TSOs and DSOs require the necessary(*) data.

(*) "necessary data" can be more than the data used for settlement, in some cases, additional data may be required to allow validation.

Geographical relevance

The harmonisation of some data exchange principles can help to avoid discussions between DSO and TSO in some Member States.

National solutions may be quicker to implement but may increase the risk of market fragmentation (different rules, standards, organisational setups, etc.).

Regulatory assessment

Regarding historical validated consumption/generation measurements from smart/main meters, the existing legislation is quite extensive. More details for access and sharing of these data will be provided in implementing acts on data access and interoperability, which are currently being drafted (based on the mandate in **Article 24(2) of the Electricity Directive**). These principles and requirements remain to be implemented.

There are less legal requirements and practices in the field of data closer to real-time (i.e. with granularity of less than the imbalance settlement period).

- Electricity Directive
    - **Article 20(a)** requires "*Non-validated near real-time consumption data shall also be made easily and securely available to final customers at no additional cost, through a standardised interface or through remote access, in order to support automated energy efficiency programmes, demand response and other services.*"

Currently, data interoperability implementing act (according to Article 24(2) of the Directive) is being drafted to address use cases for near-real-time data.

- SO GL/KORRR: Real-time data is being referred to for observability purposes.
    - According to KORRR **Article 10(1)**, "*Each TSO, in agreement with the DSOs in its control area, shall specify and publish the list of detailed content for real time data exchange and the format for real-time data exchange between them related to the distribution network observability area within its control area.*"
    - According to **Article 10(3),** "*Each TSO shall specify the technical requirements, including time stamping, for real time data exchange related to the distribution network observability area and to the SGUs within its control area. The technical requirements should where possible, be in accordance with an international standard recommended by all TSOs and with current technologies to guarantee security, confidentiality and redundancy of the communications.*"

Clarification is required regarding whether measurements from smart/main meters can be used for such observability, both in terms of access to data and the quality of that data.

Regulatory assessment: partial.

Proposal to address the gaps in legislation:

- Ensure that validated historical measurements from main meters are available to different stakeholders on an equal basis **while fully respecting relevant privacy and data protection regulations.** This could be addressed in data interoperability implementing act.
- Availability of near-real-time non-validated measurements (< imbalance settlement period) from main meters for settlement and observability processes. This data is increasingly available but rules are needed for how to use it in these processes, at least in terms of:
    - customer consent
    - validation of data
    - access to data
    - sharing of data

Prioritisation

JTF recommendation: **High**

Topic 20: Free flow of sub-meter data

Description

Facilitate the free flow of sub-meter data (based on customer consent) and define the technical requirements for multilateral data exchange, incl. for cross-border data exchange.

Background information:

- Link with ASM report
    - 4. Information exchange: Implicit link: If there is only one meter at the connection point, a baseline must be determined.
- Link with EG3 report
    - 5.3.5 assets delivering flexibility products should be connected to a smart (sub) meter to collect data at the right time interval, depending on product
        - Recommendation 5-5
    - 7.2.2 barriers: place of measurement: the connection point is not necessarily the optimal place to register explicit DSF activations
        - Recommendation 7-3: best practices on sub-metering
- Standardisation
    - The European Commission supports Smart Appliances Reference (SAREF) ontology for modelling data exchange with prosumers' flexibility assets. SAREF was first elaborated

by TNO in 2015[20] and then standardised in ETSI TS 103 264 in 2020[21]. In the PwC and Tractebel study for the European Commission, the recommendation is made to promote the European wide adoption of "SAREF family of standards" by no later than 2023 to enable interoperability in the smart appliances' domain[22]. Even though the basic aim of SAREF is to ensure interoperability between flexibility assets (i.e. sub-meters) and home (building) energy management systems, this standardised framework could be leveraged to data exchange with further stakeholders such as system operators and market operators.

Justification

The availability of data to aggregators (e.g. to facilitate aggregator switching) and other ESCOs. DSOs and TSOs can clearly benefit from sub-meter data – e.g. for settlement, baselining, real-time monitoring, forecasting, planning, prequalification processes. Having to adapt to different data exchange rules and standards for each country and for each product/need is an additional cost for flexibility service providers (e.g. measurement device, telemetry, aggregation software, integration). Lock-in to a certain provider should be avoided.

Geographical relevance

National solutions may be quicker to implement but may increase the risk of market fragmentation (different rules, standards, organisational setups, etc.).

Regulatory assessment

Regarding energy legislation, there is no explicit reference to sub-meter data management.

- An indirect reference can be found in the Electricity Directive
    - **Article 23(1)**: authorities "*(…) shall specify the rules on the access to data of the final customer by eligible parties in accordance with applicable Union legal framework. Data shall be understood to include metering and consumption data as well as data required for customer switching, demand response and other services*."

Based on this, it should be assumed and promoted that sub-meter data can be used for demand response and other services, where more granular and available in close to real time is required.

    - According to **Article 24(2),** the Commission shall adopt, by means of implementing acts, interoperability requirements and non-discriminatory and transparent procedures for access to data. This could include sub-meter data for future releases of implementing acts.

[20] https://docs.google.com/file/d/0B2nnxMhTMGh4WTVsSVRsb01ha3c/edit
[21] https://www.etsi.org/deliver/etsi_ts/103200_103299/103264/03.01.01_60/ts_103264v030101p.pdf
[22] https://ec.europa.eu/energy/studies/assessment-and-Roadmap-digital-transformation-energy-sector-towards-innovative-internal_et

It should be noted that there are generic, sector-agnostic requirements in other legislation such as GDPR, eIDAS, NIS, Data Governance Act, etc., which should equally apply to electricity sub-meter data.

Regulatory assessment: partial.

Proposal to address the gaps in legislation:

- The free flow of sub-meter data and interoperability at different SGAM layers should be required as part of the data interoperability implementing acts:
    - Define clearly that data owners should be in control over their sub-meter data, similar to main meters' data
    - Availability of sub-meter data to any stakeholder on an equal basis (based on data owner's consent or legal obligation or contractual relationships)
    - Tools for data owner to share his/her sub-meter data and manage his/her consent towards a service partner (GDPR)
    - Use cases for handling the sub-meter data
    - Recommended information and role models
    - Define data semantics – active and reactive, power and energy, metadata

Prioritisation

JTF recommendation: **High**

Topic 21: Settlement and observability based on sub-meter data

Description

As the main meter is the only meter at the connection point to the grid, this is also the only one used to assess the security issues on the grid.

However, the measurement of the activation of flexibility can be based on submeters to obtain more precise volumes, although it is recommended to consider a link to the measurements of the main meter for validation purposes.

- Framework for verifying the activation and the volumes of DFs based on sub-meter data. Main meters with a near real-time output can be helpful for the right granularity.
- Scope must also include private sub-meters.
- Role of sub-meter as additional observability (or even settlement for some products).

Nevertheless, it could be allowed and is already the de facto practice (see automatic Frequency Restoration Reserve [aFRR] procurement in Austria and Belgium, and Estonia for mFRR) that settlement is based on sub-meter data only.

Background information

- Link with ASM report
  - 3. 1. 4. Close to real-time/real time monitoring: sub-meters can play a role in more accurate observability, but this is not mentioned here.
  - 3.1.5. Measurement: The difference between the baseline and the measurements is allocated to the FSP. The amount determined by the baseline is allocated to the BRP of the supplier. The baseline might be different for different types of assets.
  - 4.1 The information in the Flexibility Resources Register could be used to verify if and how much energy is delivered when comparing the measurements of the meter to the baseline of the unit; this could also be performed for aggregated bids.
- Link with EG3 report
    - 7.3.2 – It is recommended to develop best practices for sub-metering: allowing aggregators to limit their balancing responsibility to the flex device,
    - specify requirements for meter specs, validation, etc. that allow embedded metering equipment, private sub-meters
    - recommendation 7-3
- References to projects
  - H2020 project Platone (https://platone-h2020.eu). This solution is based on local controllers
  - Smartbirds model in Luxemburg: A local dongle sends real-time information from the smart meter to a central platform, where it is available for service partners upon customer consent.
  - Internet of Energy project (IO.E) in Belgium
  - Equigy project

Justification

Use of sub-meter data for easier participation of demand-response units. As private sub-meters appear with different sample rates, the technical specifications of the meters must be aligned.

TSO and DSO have the same objectives:

- Maximise the use of distributed flexibility but keep the system security under control
- Pursue overall energy system efficiency, reducing the costs of technical complexities
- Foster new markets through standardisation and cutting barriers

There may be several reasons where relying (only) on main meter data for a settlement may be disadvantageous:

- For very short (activated for few seconds, few minutes) products, the effect cannot be seen from the main meter data (unless real-time data reading from main meter is enabled and accepted).
- To understand whether a procured flexibility was actually delivered, it is not sufficient to examine net effect on main meter level. The anticipated change in total consumption may have occurred because of different reasons than flexibility delivery.
- Baselines may be easier to calculate on sub-meter level (i.e. for individual devices).

Geographical relevance

National solutions to use submeter data for settlement and monitoring may be quicker to implement but may increase the risk of market fragmentation (different rules, standards, organisational setups, etc.). Could be addressed as part of a new implementing act on data interoperability.

Regulatory assessment

The reliance on “sub-meter” data for settlement (verification of flexibility activation as well as financial settlement) and observability processes is not foreseen in current regulation. The regulation does not address the usage of device-level measurements for these processes.

However, the current legislation seems to be more clear regarding observability.

- SO GL
  - **Article 19(2)**: each TSO should be able to monitor certain transmission system parameters in real-time in its control area, based on real-time telemetry measurements or on calculated values from its observability area, considering the structural and real-time data in accordance with Article 42. Therefore, it should be possible to obtain such “real-time telemetry measurements” from sub-meters.
  - **Article 44** states that “Unless otherwise provided by the TSO, each DSO shall provide its TSO, in real-time, the information related to the observability area of the TSO …". As such, it is clear that real-time data is also required from distributed resources.

Potentially, in addition to near-real-time data interfaces of smart meters, sub-meters could play that role.

It should be noted that clauses in SOGL and KORRR concern both TSO and DSO observability.

- KORRR
  - **Recital (1)** addresses the need of all system operators: "... it is necessary that each party of the electric system has the necessary observability of the network elements and services that impact their activities." This need is related to balancing ("Especially relevant is the global demand-generation balance through the procurement of balancing services and activation of balancing energy bids…"), but should be considered equally relevant for congestions management and other system challenges, incl. by DSOs.
  - **Article 17** enables DSOs to have access to the real-time data of the SGUs connected to their network.

Regulatory assessment: partial.

Proposals to address the gaps in legislation:

- System operators and aggregator should have the right to use the sub-meter data (incl. private sub-meters) for settlement/billing reasons but should consider the validation of the data (e.g. by considering the information from the main meter). In addition, main meter data might be required to check/assess the impact on the grid.
- It should be specified in SOGL/KORRR that sub-meter data can be used for observability, provided that it meets certain quality requirements.
- It should be specified in relevant legislation that sub-meter data can be used for DSO observability as for TSO observability, although it is clear that only the main meter can measure the impact on the grid.
- There should be requirements for the sub-meter data validation process to check and ensure the quality of the sub-meter data, for example in terms of (to be evaluated further):
  - standardised meter specification (manufacturing, installation)
  - certification of meters and manufacturers
  - responsibilities of manufacturers, metering data responsibilities, FSPs and other concerned actors to ensure data validity
  - available data parameters
  - standard data formats
  - standardised communication protocols
  - privacy and security requirements
  - Using main meter data and sub-meter data in parallel, to verify each other's accuracy and keep the system security under control.
- Define whether different levels of sub-meter data quality are allowed (e.g. can the quality be "looser" for "smaller" flexibilities).

NC are to be adapted or provided for these questions.

Prioritisation

JTF recommendation: **Medium**

Topic 22: Harmonised principles for baselining

Description

To calculate the delivered flexibility, the difference between the injection/take-off must be compared with a baseline.

Some baselines can be simple, such as the quarter hour just before the activation of flex. However, more complex baselines can be necessary to avoid gaming and/or to consider special days such as weekend, warm-up,…

Ex-ante (schedules based) and ex-post baselines are possible.

Background information:

- For example: Baltic TSOs analysed four [23] methods

Method	Short description
EnerNOC	Baseline is equal to the average consumption of 5 corresponding hours with highest consumption within 10 last non-event days. Baseline is adjusted upwards by the average difference between last two hours' actual consumption and their baseline. Formula: $b_t = \frac{c_1 + c_2 + c_3 + c_4 + c_5}{5} + \max[\frac{c_{t-1} - b_{t-1} + c_{t-2} - b_{t-2}}{2}; 0]$
UK model	Baseline is equal to the average consumption of 5 corresponding hours within 5 days with highest daily consumption (out of 10 last non-event days). Baseline is adjusted upwards and downwards by the difference between last two hours' actual consumption and their baseline. Formula: $b_t = \frac{C_1 + C_2 + C_3 + C_4 + C_5}{5} + \frac{c_{t-1} - b_{t-1} + c_{t-2} - b_{t-2}}{2}$
Average	Baseline is equal to the average of consumption one hour before and one hour after the DR event. Formula: $b_t = \frac{c_{t-1} + c_{t+1}}{2}$
Daily profile	Baseline is equal to the consumption within preceding hour multiplied by the fraction of increase/decrease of consumption in the corresponding hours a day before the event. Formula: $b_t = \frac{c_{d,\,t-1} * c_{d-1,\,t}}{c_{d-1,t-1}}$

b_t –baseline at hour t; c_1 –highest corresponding hourly consumption within 10 last non-event days; C_1 –highest corresponding hourly consumption in a day with highest daily consumption within 10 last non-event days.

- Link with ASM report
  - 3. 1. 5.

23 https://elering.ee/sites/default/files/public/Elektriturg/Demand%20Response%20through%20Aggregation%20%20a%20Harmonized%20Approach%20in%20the%20Baltic....pdf

  - Measurement & control of activation and settlement: The amount of flexibility delivered is determined by evaluating the meter reading (the measurements) at the connection point and compared with a baseline or a schedule
  - Difference between the baseline and the measurements is allocated to the FSP. The amount determined by the baseline is allocated to the BRP of the supplier. The baseline might be different for different types of assets.
- Link with EG3 report
  - 4.2.2: a lack of baselining methodology is a barrier for market access
  - 4.2.3 and 4.3.3: integration of implicit and explicit DR.
  - 7. M,V & S of Flex products
    - 7.2.4. Baseline methodology: accurate, simple, transparent, unbiased, without gaming options.
    - 7.3.4: recommendations: baseline methodology
    - Recommendation 7-4A
- smartEN viewpoint[24]
  - Ex-post calculated baselines should be more preferred than ex-ante schedules provided by FSPs and the NC should not provide a single baseline methodology but rather provide a guideline as to what needs to be considered in choosing baseline methodologies. This could include, among others, the baseline calculation, transposition methods between different baselines, standards for exchanging baselines and a certification process. The process to adopt the baseline methodology can be included in the NC, with mechanisms for market participants to propose additional methodologies and to participate in a testing process. Although the baseline methodology can be different from country to country or even different in each region, and should possibly vary according to the type of flexibility involved and the kind of services provided, a common standard for the data should be used, so as to facilitate the interoperability of solutions from one baseline methodology to the other. The verification mechanism needs to be defined together with the baseline methodology. This verification process can be different in each member state, but a certain degree of standardisation is required to avoid having a fragmented market with each DSO and TSO having their own procedure.
- USEF: Universal Smart Energy Framework (https://www.usef.energy/flexibility/)
  - The USEF has been established to drive the fastest, most cost-effective route to an integrated smart energy future. It delivers one common standard upon which to build all smart energy products and services. It unlocks the value of flexible energy use by making it a tradeable commodity and by delivering the market structure and associated rules and tools required to make it work effectively. USEF fits on top of most energy market models, extending existing processes, to offer the integration of both new and existing energy markets. It is designed to offer fair market access and benefits to all stakeholders. As well as delivering a common standard, USEF intends to set guidelines for the harmonisation and development of distributed flexibility mechanisms.

[24] https://smarten.eu/wp-content/uploads/2020/05/200506-Consultation-response-Network-Code-final-1.pdf

Justification

Benefits include:

- To enable the correct settlement or transfer of energy, delivered flexibility must be measurable.
- To enable regular activation control/availability control (also in case the flex is valorised with the Supplier/BRP of the access point)
- Correct measurement values together with activation information will enable correct calculation.
- FSPs do not want to learn new and different baseline methodologies in each country/market. FSPs want to have sufficiently accurate, and not too complex, baseline methodologies. Flexibility providers will require some stability and some uniformity between Member States to facilitate easy market access.
- Baselines may help to detect gaming.

Geographical relevance

Sharing best practices of existing types of baselines can be helpful to illustrate and guide national authorities.

Regulatory assessment

Recital 15 of the Electricity Regulation states that "all market participants should be financially responsible for the imbalances they cause in the system, representing the difference between the allocated volume and the final position in the market. For demand response aggregators, the allocated volume consists of the volume of energy physically activated by the participating customers' load, based on a defined measurement and baseline methodology."

That being the only reference to the baselines in the present regulation, the mandate to use baselines in the settlement process has been established, but no further details neither related to principles to establish nor to co-ordinate and maintain the baseline methods or details related to implementation methodologies have been provided.

Regulatory assessment: partial.

Proposals to address the gaps in legislation:

- Definition of baseline principles which must be accepted in any Member States – e.g. agreement on terms and definitions. Any methods allowed if agreed so between FSP and system operator (e.g. accuracy vs. simplicity/transparency of a baseline method).
- Advice to EU DSO entity and ENTSO-E to collect a list of best practices of baseline methodologies. As such, it means that it might be sufficient if only general requirement for such cooperation is established in NC but not the details. The list of best practices could include baseline methods, associated algorithms and examples.

Prioritisation

JTF recommendation: **Medium**

Topic 23: Harmonised rules for coordinated settlement

Description

When value stacking (i.e. resources active in different products, at the same time) is allowed/possible or when more expensive bids need to be selected, or when counter balancing actions are required, the flexibility quantification and costs in settlement need to be coordinated.

Background information:

- Link with ASM report
  - 3.1.5. Measurement:
    - The amount of flexibility delivered is determined by evaluating the meter reading (the measurements) at the connection point and compared with a baseline or a schedule
- Link with EG3 report
  - 5.3.5: In any case, for settlement purposes, the reference meter should remain the one installed on the main connection point.
  - 7. Measurement, validation and settlement of flexibility products
    - 7.3: M,V & S procedures needs to be designed and implemented at national level, but with a strong need to harmonise at the EU level.

Justification

Benefits include:

- Facilitating value stacking
- Avoiding double counting
- Agreement on how to split the bill if a more expensive bid needs to be activated in order to avoid further congestions.
- Agreement on practices to compensate when actions are combined e.g. when congestion flex helps or counteracts balancing

Geographical relevance

European principles for settlement in the case of value stacking

Regulatory assessment

The EB GL provide a general requirement for TSOs to develop a procedure for the calculation of balancing energy based on requested or metered activation, but no further details on which elements should be considered.

- **EB GL Article 45(1)(a)** Each TSO establishes a procedure for the calculation of the balancing energy based on requested or metered activation:
    a. In the event of shared connection points, there is the possibility to split the settlement in energy supply and balancing product
    b. Monitoring processes may be necessary

Therefore, it only concerns the settlement of balancing energy for, at least, the frequency restoration process and the reserve replacement process. The settlement of other flexibility services is not addressed in the existing legislation.

Regulatory assessment: partial.

Proposals to address the gaps in legislation:

- Rules for avoiding double counting and splitting the bill between system operators in the event of value-stacking (same flexibility used by > 1 system operator).
- Rules for splitting the bill if a more expensive bid needs to be activated in order to avoid causing further congestion.
- For value stacking, it is also important to consider a cost–benefit analysis. A joint settlement might be very complex and not proportional if there are no indications of assets willing to participate in different services.

Prioritisation

JTF recommendation: **High**

7. Recommendations

Based on previous reports, national experiences and findings of EU-funded projects (e.g. Interface, Coordinet), the JTF DF identified 23 potential topics for regulatory intervention which are distributed across four main chapters in the Roadmap:

- Market access and rules for aggregation
- (Flexibility) Product design & procurement
- Market processes and TSO–DSO coordination
- Measurement, validation and settlement of flexibility services

For each topic, the JTF DF provided a description of the barrier and/or the solution as well as a review of the relevant regulatory provisions at European level. From this assessment, it identified (or not) regulatory gaps and provided recommendations on how to address these gaps. It also provided a level of priority associated with the recommendations. These findings are summarised in the table below. Note that for some topics, the table indicates split TSO and DSO positions, which are briefly explained in the remarks.

Topic	Recommendation	Priority	Remark
1	Establish requirements as applicable for data exchanges necessary to enable, for example, market-based congestion management	**High***	The report includes an indicative list of relevant requirements to facilitate multilateral data exchanges, with split TSO and DSO positions for some. *The development of new roles associated with these data exchanges is considered a low priority.
2	Review the EU framework for standardised functional requirements related to market-based congestion management, taking into account the presence of DSOs in operations	**High**	The report specifies conditions under which the exchange of this information is not deemed desirable or necessary, e.g. mitigate gaming.
3	Introduce the concept of flexibility resource register as important tool for TSOs and DSOs for the effective management of flexibility resources	**High**	
4	Provide high-level principles for enabling FSPs to access multiple revenue streams and stack value across different markets	**High**	
5	Do not develop the role of flexibility market operator in EU regulation	**Low**	The report recommends avoiding EU regulation on this topic to enable the development of innovative solutions at national level.
6			

	Develop a common non-exhaustive list of attributes for new flexibility services (grid capacity management, congestion management, voltage control)	**High** **TSO: Low***	*TSOs agree that the development of such attributes for congestion management is high priority, however, they deem it a low priority for grid capacity management and voltage control products.
7	Develop principles for product prequalification of new flexibility services (grid capacity management, congestion management, voltage control)	**High** **TSO: Low ***	*TSOs agree that the development of such prequalification principles for congestion management is high priority; however, they deem it a low priority for grid capacity management and voltage control products.
8	Develop principles for static grid prequalification of congestion management	**High***	*DSOs deem that principles for static grid prequalification should also be developed for grid capacity management.
9	Introduce telemetry requirements for measurement, validation and settlement purposes for flexibility services	**DSO: High** **TSO: Low**	The report introduces split TSO and DSO positions because of diverging interpretation regarding the applicability of existing SO GL / KORRR regarding provision of real-time information.
10.1	Introduce data exchange requirements for grid assessment	**DSO: High** **TSO: Low**	The report introduces split TSO and DSO positions because of diverging interpretation regarding the applicability of existing SO GL / KORRR.
10.2	Develop principles for TSO–DSO coordination for security	**DSO: High** **TSO: Medium**	The report introduces split TSO and DSO positions because of diverging perspectives on the need for additional regulatory provisions in this area.
11	Develop principles for facilitating the dynamic grid prequalification of FSPs	**Medium**	
12	Introduce requirements for the availability of data from aggregated portfolios with adequate granularity	**High**	
13	Develop a high-level framework for coordination across market processes	**High**	
14	Develop rules for counterbalancing in case of the activation of flexibility resources	**Medium**	
15	Develop rules for the adjustments of imbalances of BRPs in the event of redispatching activations	**DSO: Medium** **TSO: No gap**	The report introduces split TSO and DSO positions because of diverging perspectives on the need for additional regulatory provisions in this area.

16	Develop an HRM for flexibility services	**DSO: High** **TSO: Low**	The report introduces split TSO and DSO positions whereby DSOs recommend that EU regulation includes an HRM, whereas TSOs deem that this is a topic for further discussion between ENTSO-E and the EU DSO Entity.
17	Develop rules for the use of a Flexibility Resources Register for the TSO–DSO coordination process	**Low**	
18	Ensure the recovery of costs for data exchanges and coordination platforms	**Low**	
19	Ensure the availability of historical and near real-time data from main meters for settlement and observability purposes	**High**	
20	Ensure the free flow of sub-meter data and interoperability at different SGAM layers	**High**	
21	Develop a framework for enabling the use of sub-meter data for settlement and observability processes	**Medium**	
22	Define baseline principles which must be accepted in any Member States and collect a list of the best practices of baseline methodologies	**Medium**	
23	Develop harmonised rules for avoiding double counting and splitting the bill between system operators in case of value-stacking or if more expensive bid needs to be activated.	**High**	

These recommendations aim to support the development of concrete regulatory proposals. ENTSO-E and the EU DSO associations, however, share different perspectives regarding the housing of these new rules.

DSOs view

DSO view: For most of the recommendations above to address gaps in European legislation, a dedicated new Network Code Distributed Flexibility (NCDF) is the most appropriate document to house the new rules. There are various reasons for this choice:

1. Most importantly, the analysis has convincingly demonstrated that where similar rules exist, they were designed in view of large-scale flexibility for balancing or congestion management by TSOs. However, the challenges for an effective additional use of small- and medium-scale distributed

flexibility for congestion management by DSO are fundamentally different. For most recommendations, it will be much easier to draft new rules for this purpose than to adapt existing legislation designed for fundamentally different problems.

2. All relevant system operators and stakeholders should be included in the process to draft the new rules. The enhanced procedure in Article 59 of The Electricity Regulation for the establishment of NCs provides an appropriate procedure with enhanced possibilities for participation of all relevant actors. In contrast, the procedure for the amendment of NCs in Article 60 of The Electricity Regulation provides much more limited possibilities to contribute to the drafting and decision processes.

3. An adaption of existing rules will probably be limited to changing only the necessary minimum, whereas the drafting of a new NCDF will naturally be a process which will be more open to designing the best rules to realise the potential of DF. It can reasonably be expected that a new NCDF would unleash a dynamic development where market participants, together with the system operator, ensure the optimal use of DF, which is essential for an efficient realisation of the decarbonisation objectives.

However there are some exception where rules should be housed not in the new NCDF, but in other documents: [specifics from subgroup leads]

ENTSO-E view

ENTSO-E is convinced that DSF and DF in general will be pivotal for delivering the Green Deal, because the integration of renewables and the decarbonisation of balancing and other non-frequency ancillary services will be greatly facilitated by these new flexibility resources. In fact, balancing services are already provided by small-scale distributed energy resources in many EU Member States.

Although our joint DSO and TSO analysis shows that regulatory gaps in the current EU framework exist, it is also true that in the current EU regulatory framework, some implementation choices are deliberately left to NRAs and Member States to be able to consider existing local contexts. Moreover, we have to acknowledge that DF is an innovative and challenging topic that can still benefit from testing different approaches and from collecting best practises before defining common rules for the sake of harmonisation.

ENTSO-E therefore believes that it would be more efficient to await the effects of the national implementation of the Electricity Directive by all Member States before considering an additional NC. In addition, an amendment of the existing set of NCs and GLs (e.g. SO GL for T&D coordination issues) and the upcoming Implementing Acts on Data Interoperability (e.g. exchange of meter data between relevant parties) would provide a faster way to address some of the identified issues compared to developing a new NC from scratch. It would also avoid the risk of creating inconsistencies vis-a-vis existing codes.

In addition, ENTSO-E supports the vision of One System of Integrated Systems working as one and therefore considers that NCs and GLs should not be developed separately for each voltage level. This would be detrimental to a closer integration of wholesale and retail markets and lead to discrimination between resources connected at transmission level and those connected at distribution level. It also entails the risk of contradictory provisions, which would endanger the security of the electricity system and hamper the aggregation of resources across the grid.

Nevertheless, ENTSO-E and the EU DSO associations intend to keep working together in a spirit of good and equal cooperation, together with the European Commission, the Agency for Cooperation of Energy Regulators and relevant stakeholders, to address these identified gaps.

8. Annex I: Glossary

Non bidding and non-exhaustive list of terms

- "congestion management" means the activation of a remedial action to respect network operational security limits, either in a preventive or a curative manner.
- "DSO grid capacity management" means using flexibility as an alternative to grid reinforcement, including long term network development planning requirement, offered by the FSP on a voluntary basis;
- "flexibility service" by DSOs means a service necessary for DSO to manage local congestion or to improve efficiencies in the operation and development of the distribution system, provided by flexibility resources; this could be considered as: non-frequency ancillary services (inter alia: voltage control), local congestion management services, and grid capacity management services.
- "flexibility service" by TSOs means ancillary services (balancing services, non-frequency ancillary services) and services for infrazonal congestion management (or infrazonal redispatching).
- "local congestion" means a situation when constraints have only consequences on the local state' as defined by SOGL Article 3(2)(46).
- **DSO view:** "local congestion management"; all actions taken by DSOs (grid reconfiguration or flexibility services activation) to avoid local congestion.
- Main meter = the meter measuring at the connection point with the grid
- "physical congestion" means any network situation where forecasted or realised power flows violate the thermal limits of the elements of the grid and voltage stability or the angle stability limits of the power system (according to CACM Article 2(18);
- *"standard product"* means a harmonised balancing product defined by all TSOs for the exchange of balancing services *(according to* EB GL (Article 2(28));
- "flexibility product" means a product defined by TSOs and DSOs in collaboration with market participants for the exchange of flexibility services, at least at national level.
- "sub-meter" = meter that measures only a part of a consumer's load/production behind one connection to the grid (measured by a main meter) or a meter with a different granularity of metering data than the main meter.

List of Abbreviations

aFRR	Automatic Frequency Restoration Reserve
API	Application Programming Interface
ASM	Active System Management
BRP	Balance Responsible Party
CEP	Clean Energy Package
CM	Capacity Mechanism
DA	Day Ahead (market)
DCC	Demand Connection Code
DER(s)	Distributed Energy Resources
DF	Distributed Flexibility
DSF	Demand-Side Flexibility
DSO	Distribution System Operator
EB GL	Electricity Balancing Guidelines
FMO	Flexibility Market Operator
FSP	Flexibility Service Provider
GDPR	General Data Protection Regulation
GL	Guideline
HRM	Harmonised Role Model
ID	Intraday (market)
JTF	Joint Task Force
KORRR	Key Organisational Requirements, Roles and Responsibilities methodology
LV	Low Voltage
mFRR	Manual Frequency Restoration Reserve
MV	Medium Voltage
NC	Network Code
NCDF	Network Code Distributed Flexibility
NEMO	Nominated Electricity Market Operator
NRA	National Regulatory Authority
RfG	Requirements for Generators
SGAM	Smart Grid Architecture Model
SGUs	Significant Grid Users
SO GL	System Operation Guidelines
T&Cs	Terms & Conditions
T&D	Transmission & Distribution
TSO	Transmission System Operator

9. Annex II: Flexibility product attributes

1. Mode of activation:

a) The attribute means: the mode of activation of bids for congestion management, manual or automatic.

b) Is there a definition in the regulations? Yes, according to the EBGL Article 2(34) only for balancing products.

"mode of activation" means the mode of activation of balancing energy bids, manual or automatic, depending on whether balancing energy is triggered manually by an operator or automatically in a closed-loop manner;

In addition, *"mode of activation"* is one voluntary characteristic of a standard product bid for balancing energy and balancing capacity (EB – EBGL Article 25(4)(h)).

"Standard product" means a harmonised balancing product defined by all TSOs for the exchange of balancing services (EB - EBGL Article 2(28)).

a. **If no – should there be?** N/A

b. If yes – is there a need to change it? Yes, two ways to standardise:

Creating a new definition for flexibility products:

"mode of activation for flexibility bids" means the mode of activation of energy or capacity bids for flexibility needs, manual or automatic, depending on whether the bid is triggered manually by an operator or automatically in a closed-loop manner;

or modifying the existing definition in a way that allows its use for all products and consequently all necessary changes existing in regulations; related terms are needed.

"mode of activation" means the mode of activation of balancing energy bids ~~and~~ or any other flexibility bids, manual or automatic, depending on whether the ~~energy~~ bid is triggered manually by an operator or automatically in a closed-loop manner.

Consequently, the definition of *"standard product"* must also be modified.

2. Availability window:

The attribute means: Availability window (per day, per week, per year) is the time period required by the DSO when the resource shall be available to provide a service.

Availability windows defers to the former "validity period" as the latter is the period where the unit is available, and it is provided by itself according to the EBGL Article 2(33).

a. Is there a definition in the regulations? No

b. **If no – should there be?** Yes, as the time period required by the DSO when the resource shall be available to provide a given service.

c. **If yes – is there a need to change it?** N/A

3. Validity period

The attribute means: the period when the balancing energy bid offered by the BSP can be activated, where all the characteristics of the product are respected. The validity period is defined by a start time and an end time;

a. **Is there a definition in the regulations?** Yes, according to the EBGL Article 2(33) it is only for balancing products.

The validity period is part of the voluntary list of variable characteristics of a standard balancing product bid. EU Reg. 2017/2195 EBGL Article 25(4)(h).

b. **If no – should there be?** N/A
c. **If yes – is there a need to change it?** Yes, because the existing definition concerns balancing energy bids only and has been introduced at EU level. 2 options:

New definition*: "Validity period for flexibility bids" means the period when flexibility bids offered by the flexibility service provider can be activated, where all the characteristics of the product are respected. The validity period is defined by a start time and an end time;*

or modify the existing definition in a way that allows its use for all products and consequently all necessary changes existing in regulations, related terms are needed.

Validity period means the period when the balancing energy bid or any other flexibility bids offered by the balancing service provider or by the flexibility service provider can be activated, where all the characteristics of the product are respected. The validity period is defined by a start time and an end time;

Consequently, the definition of *"standard product"* must also be modified.

Frequency: Maximum number of activations

- **The attribute means** how many times the system operator can activate the bid.
  - **d. Is there a definition in the regulations?** No
  - **e. If no – should there be?** Yes, how many times the system operator can activate the bid
  - **f. If yes – is there a need to change it?** N/A

4. Duration of the contract

a. **The attribute means** the duration of a given contract between the system operator and the market participant. The duration may vary from hours to years.
b. Is there a definition in the regulations? No
c. If no – should there be? Not necessarily the definition, but the attribute should be mandatory for each product. There is a major difference with balancing products, which are in fact short-term products. Congestion Management

Products may be long, medium or short term. The needs could be for investment deferral in network planning (long term contract, 1–10 years), for managing planned outages and maintenance operations (medium term contract, monthly or seasonal) or for managing peak times or unplanned event / fault (short-term contract). Based on the UK example for products (dynamic, restore, sustain and secure). In France, Enedis RFO (e.g. cantal zone), products are short term.

d. If yes – is there a need to change it? N/A

5. Locational information

a. The attribute means: Where (electrical localisation, at the metering point) the product is available.

DSOs and TSOs congestion management should be seen as meeting local network needs. Places with periodic local network constraints are well identified at the DSO/TSO network level, hence the solutions offered by sources connected in specific locations. This attribute allows T&D system operators to properly locate flexibility resources/bids in the area affected by congestions.

Any product used for flexibility must necessarily include locational information, which by nature is essential for congestion management, capacity management, voltage control, etc while simultaneously complying with privacy regulation (GDPR). The exact specification of this information should be left to Member State specific rules, which should in any case allow as much portfolio optimisation as possible.

Is there a definition in the regulations? No, however, there are references to the location information in Article 25(5)(c) and Article 18(5)(g) EB GL as part of the list of variable characteristics of a standard balancing product.

b. If no – should there be? Yes

This attribute should be mandatory for each congestion management product. The common general definition is welcome.

How it should be defined must be established at the level of the future, national congestion management platform.

c. If yes – is there a need to change it? N/A

6. Recovery time: Minimum duration between the end of the deactivation period and the following activation

The attribute means the time required for a flexibility resource to be able to recover from one flexibility activation and to be able to perform a new flexibility activation. Examples: the time an electrical energy storage needs to load again after providing the flexibility service or the time an electrical heating device needs to heat the building before it can be turned down again.

Is there a definition in the regulations? Not explicitly defined, but there is a reference in EU Reg. 2017/2195 EBGL Article 25(5)(d) as part of the mandatory list of variable characteristics of a standard balancing product bid: "*Minimum duration between the end of deactivation period and the following activation*"

- **If no – should there be?** Yes, the definition of what is meant by the attribute.
- **If yes – is there a need to change it?** N/A

7. Minimum/Max quantity

   a. **The attribute means** the minimum quantity of a bid traded on the market; it may be capacity or energy based depending on the nature of the product.
   b. **Is there a definition in the regulations?** – no definition, but explicitly used in Article 25(4)(d) EB GL as one of the voluntary characteristics of the standard products. Quantity for aFRR Implementation Framework (IF), mFRR IF, RR IF already set (approved by ACER/NRAs).
   c. **If no – should there be?** – easy to understand – definition not necessary. To be set on national level.
   d. **If yes – is there a need to change it?** No need identified

8. Direction of activation (up/down)

   a. **The attribute means** if the unit is activated in one direction or another (up/down)
   b. **Is there a definition in the regulations?** NO
   c. **If no – should there be?** no
   d. **If yes – is there a need to change it?** N/A

9. Divisibility

   a. **The attribute means** the possibility for a TSO to use only part of the balancing energy bids or balancing capacity bids offered by the BSP, either in terms of power activation or time duration.

b. **Is there a definition in the regulations?** Yes, in EB GL Article 2(35) but only for balancing products. It is also one of the mandatory characteristics for standards product EU Reg. 2017/2195 EB GL Article 25(5)(b)
c. **If no – should there be?** N/A
d. **If yes – is there a need to change it?** Yes only and has been introduced at EU level.

2 options:
New definition *"Flexibility products divisibility" means the possibility for TSO and DSO to use only part of the flexibility bids offered by the flexibility service provider, either in terms of power activation or time duration.*

or modifying the existing definition in a way that allows its use for all products and consequently all necessary changes existing in regulations, related terms are needed.

"the possibility for a TSO or DSO to use only part of the balancing energy bids or balancing capacity bids or any other flexibility bid offered by the balancing service provider or by the flexibility service provider, either in terms of power activation or time duration".

Consequently, the definition of *"standard product"* must also be modified.

10. Activation period: time before activation signal and ramp up period (1 h, 15 min, 0 s) = Full Activation time

a) The attribute means *"means the period between the activation request by the connecting TSO in the case of the TSO–TSO model or by the contracting TSO in the case of the TSO–BSP model and the corresponding full delivery of the concerned product;"*

b) Is there a definition in the regulations? There is a lack of definition for flexibility products other than Balancing. For Balancing products EU Reg. 2017/2195 EBGL, Article 2 (30). There is a reference in EU Reg. 2017/2195 EBGL Article 25(4)(c) as part of the list of characteristics of a standard balancing product bid.

c) If no – should be? N/A

d) If yes – is there a need to change it? Yes, there are two ways to standardise them: (1) by modifying the existing definition: *means the period between the activation request by the DSO or by the connecting TSO in the case of the TSO–TSO model or by the contracting TSO in the case of the TSO–BSP model and the corresponding full delivery of the concerned product;* or (2) *means the period between the activation request by the connecting DSO and the corresponding full delivery of the concerned product*

11. Preparation period.
    a. **The attribute means** the time before activation signal and ramp up period (1 h, 15 min, 0 s)

b. **Is there a definition in the regulations?** Yes, according to Article 2(29) of the EU Reg. 2017/2195 EBGL "means the period between the request by the connecting TSO in the case of the TSO–TSO model or by the contracting TSO in the case of the TSO-BSP model and the start of the ramping period products.
c. It is also one of the voluntary characteristics for standards product EU Reg. 2017/2195 EBGL Article 25(4)(a)
d. If no – should there be? N/A
e) If yes – is there a need to change it? Yes, two ways to standardise them: (1) by modifying the existing definition: "*means the period between the request by DSO, the connecting TSO in case of TSO–TSO model or by the contracting TSO in case of the TSO–BSP model and the start of the ramping period products",* or (2) creating a new definition *"means the period between the request by the DSO or the TSO and the start of the ramping period product"*

Consequently, the definition of *"standard product*" must also be modified.

12. Ramping period (15 min, 5 min, …)
    a. **The attribute means**
    b. **Is there a definition in regulation?** Not explicitly, but there is a reference in EU Reg. 2017/2195 EBGL Article 25(4)(b) as one of the voluntary characteristics for a standards product
    c. If no – should there be? Yes
    d. **If yes – is there a need to change it?** N/A.

10. Annex III: Dependencies between topics

List of key policy issues ("topic") addressed in the 4 main chapters of the Roadmap

Chapter 1 – Market access and rules for aggregation	
#1	Multilateral data exchanges including the preservation of privacy
#2	Standardised functional requirements to ensure for market parties access to necessary information from system operator on their needs for the services
#3	Concept of the Flexibility Resources Register and related functionalities
#4	FSPs' access to multiple revenue streams and value stacking across different markets
#5	The role of the flexibility market operator and its interaction with other entities
Chapter 2 – Product design and procurement	
#6	Common list of attributes for flexibility products
#7	Product prequalification for flexibility services
#8	(Static or long term) grid prequalification for congestion management
#9	Telemetry requirements for measurement, validation and settlement purposes for flexibility services

Chapter 3 – Market processes and T&D Coordination	
#10	10.1 Principles for grid assessment 10.2 Principles for coordination 6n security
#11	Short – term pre-qualification
#12	Availability of disaggregated data in case of aggregates
#13	Coordination between market processes for market accessibility and efficiency
#14	Processes for counterbalancing in the event of activations of flexibility resources
#15	Responsibility rules and data exchange requirements with respect to adjustments of imbalances of balance responsible parties in case of re-dispatching activations
#16	Framework for flexibility service providers
#17	Use of flexibility resources register for T&D coordination purposes
#18	Cost for coordination and data exchanges
Chapter 4 – Measurement, validation and settlement	
#19	(Main) meter data exchanges for distributed flexibility
#20	Free/Flow of sub-meter data
#21	Settlement and observability based on sub-meter
#22	Harmonised principles for baselining
#23	Harmonised rules for coordinated settlement

Dependencies between topics

Topic	… is interdependent with…	Comment
#1	/	/
#2	• #1 • #3 • #7	Multilateral data exchange between DSOs, TSOs and market parties. Flexibility resources register information should be considered Product prequalification for flexibility services. Before making the data available, DSO and TSO can seek coordination so that no conflicting information is offered to the market (also relates to balancing).
#3	• #1 • #2 • #12	Data privacy – Coordination should avoid the improper use of sensitive data collected in the Flexibility Resources Register Access to network Data – Market communication should provide for an efficient flow of data between the Flexibility Resources Register and the T&D system operators. T&D Coordination Processes – coordination should make the Flexibility Resources Register suitable for the T&D Coordination Processes... ...as well as for the activities of Measurement, Validation & Settlement.
#4	N/A	Value stacking is dependent on a range of areas such as products, procurement processes, dispatch, validation, settlement, data-exchange and T&D co-ordination.

#5	N/A	Procurement, Market processes & T&D coordination sections
#6	• #10.2	Coordination for security
#7	• #2 • #3	Prequalification process (market access). Flexibility Resource register (market access) Additional link with T&D coordination processes
#8	N/A	Definitions, Flexibility Resource Register (market access), T&D Coordination
#9	N/A	Link with measurement and validation cluster, product prequalification
#10.1	N/A	
#10.2	• #6 • #11 • #14 • #15 • #17	List of attributes (voltage control)
#11	• #7 • #8	Product prequalification for flexibility services ○ shall ensure that units are delivering data as required in the to-be-established grid prequalification processes (either conditional or dynamic). ○ shall ensure that units can receive and react upon coordinated signals sent by the DSO and TSO ○ check with TSO/DSO coordination on what output from the DSO grid prequalification is required by the TSO (e.g. location, aggregated capacity, degree of granularity…). Next, verify if this requires EU-level harmonisation. (static or long term) Grid prequalification for congestion management
#12	• #1 • #3 • #6 • #8 • #9 • #10.1 • #11	Privacy for multilateral data exchange Flexibility Resources Register Common list of attributes for flexibility products (e.g. Locational information) (static or long-term) grid prequalification Telemetry requirements for measurement, validation and settlement purposes for flexibility services Data exchange for grid assessment (short-term) Grid prequalification
#13	• #2 • #3 • #4 • #5 • #11	Standardised requirements to ensure market parties have access to necessary information from system operators on their needs for the services; Concept of Flexibility Resources Register (for DSO & TSO needs) and related functionalities; Access to multiple revenue streams for their assets and stack value across different market; Role of FMO Grid prequalification: Market procedures should avoid natively that services requested/acquired by a T&D system operator (e.g. DSO) are annulled by other services provided to another T&D system operator

	• #15	(e.g. TSO). Priority rules, applicable in a normal state situation (Article 3(1)(5) of SOGL), should be defined in the regulation. Data exchange for BRP perimeter correction: Regarding the coordination of the interoperable flexibility markets with the financial settlements of BRPs, the EB GL should be updated as it does not include this issue (Articles 17, 18 and Chapter 4).
	• #23	Harmonised rules for coordinated settlement
#14	• #13 • #15	
#15	• #14	Management of imbalances caused by activations of flexibility resources for redispatching
#16	N/A	
#17	• #3	Concept of Flexibility Resources Register and related functionalities
#18	N/A	Interlinkages may exist in every process that is new or adapted in a way that requires additional efforts
#19	• #1	Roles required for facilitating and preserving privacy for multilateral data exchange
	• #9	Telemetry requirements for measurement, validation and settlement purposes for flexibility services
#20	• #1	Roles required for facilitating and preserving privacy for multilateral data exchange
	• #9	Telemetry requirements for measurement, validation and settlement purposes for flexibility services
#21	• #9	Telemetry requirements for measurement, validation and settlement purposes for flexibility services
#22	N/A	Flexibility product design: appropriate baseline methods per specific product might be useful
#23	• #4	How can FSPs access multiple revenue streams for their assets and stack value across different markets?
	• #9	Telemetry requirements for measurement, validation and settlement purposes for flexibility services
	• #13	Coordination between market processes for market accessibility and efficiency
	• #14	Process for counterbalancing in the event of activations of flexibility resources

11. Annex IV: Stakeholders' involvement

On 20 May, the JTF DF organised a workshop with the relevant stakeholders to present the preliminary findings of the study.

Here is a non-exhaustive list of the participating organisations: ACER, BEUC (European Consumer Organisation), CAN Europe, Council of European Energy Regulators, DG ENER, Eurelectric, European Heating Industry, Europex, NRA representatives, SmartEn, Solar Power Europe, T&D Europe etc.

Below is the full list of written questions (anonymised). Moreover, the floor was taken by several representatives of the aforementioned organisations. Due to time constraints, it was not possible for the JTF to provide a written answer to all these questions, but they provide a clear indication from stakeholders of the areas which require further clarification or improvements going forward.

Written questions

- What about the aggregator implementation models and aggregator balance responsibility definition in the context of each implementation model?
- Did you consider the need for further guidance (possibly non-binding) to help steer the implementation of independent aggregator models? When it comes to aggregator–supplier compensation, there is a de facto risk from diverging models and a different approach to defining net costs. Some arrangements may, in effect, prevent aggregators selling the flex on the DA market.
- No distinction is made between the requirements for installations connected to distribution grid (with smart meters) and those connected to medium or high voltage grid (AMR industrial meters). Is this relevant?
- Can global balancing services be prioritised over local congestion management services? If YES, how?
- What is meant by the term counterbalancing? Is this not a normal part of the redispatching process?
- How would Competition Law aspects be ensured to be respected if all flexibility resources provided by individual commercial entities were required to be visible in a public registry? Furthermore, why would such a public registry at all be required, e.g. beyond registry of parties are "eligible" to participate in given DSO (local) flexibility mechanisms?
- On Topic 12, it is important to clarify that this need for information granularity goes in parallel (and not against) of aggregated portfolio bidding and settlement.
- On Topic 16, an HRM under the implementing act of interoperability could be beneficial, considering that market parties may operate in several countries and this kind of harmonisation may be useful to avoid market parties having to develop too different solutions for each country where they are active, though there still may be national specificities.
- On Topic 19, it would be relevant to include the fact that near-real-time non-validated data should also be available to different stakeholders.
- To what extent does your definition of flexibility differ from "redispatching" as defined in SOGL (i.e. the possibility to constrain the dispatch of a distributed asset)?
- Who will examine the coordination of congestion management with wholesale markets, adequacy mechanisms, or technology-specific support schemes?
- If data are used for billing/checking services that are remunerated, it seems very risky to rely on the flexibility provider data. Who would check that there is no bias in the data? We would prefer the DSO/TSO to be in charge of this data.
- The type of counterbalancing depends very much on the timing of the redispatching action. Do you discuss this timing in the report?
- The aim of the section on market access and rules for aggregation is not very clear. Does it refer to aggregation independent of congestion management, or does it focus on congestion management, incl. with aggregated bids?
- Is the idea in Topic 1 to introduce a new limitation to aggregation, by specific requirements in congested areas? Is this what is meant by unlocking DF?

- In the case of submeters, would you consider a direct connection of the submeter with the TSO/DSO (to avoid any distortion of the data)?
- It is a challenge to avoid a recircuiting (e.g. reconnecting the load on a non-submetered part of the installation) of the consumer installation behind the submeter? How will you avoid this?

12. Annex V: Contributors

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