The Network Code Demand Response: Implications for the Procurement of System Operator Services in Austria

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Abstract: The EU Network Codes are legally binding implementing regulations that govern grid connection, grid operation and electricity markets. The "Network Code Demand Response" (NC DR), targeting market integration of demand response and other flexibility resources, is currently in preparation. The NC DR follows up on existing EU regulations prescribing market-based procurement for system operator (SO) services (congestion management, voltage control and balancing). With existing EU regulations not yet fully implemented into national law in Austria, major changes to the national electricity market rules are pending. This paper analyses the provisions of the present draft of the NC DR in view of the current legislative and regulatory framework in Austria, focussing on SO services and regulations aiming at facilitating market access for demand response.

Services for congestion management and voltage control are currently not procured in a market-based manner in Austria. The congestion management regime at transmission level prescribes cost-based remuneration and does not provide incentives for demand response participation. On distribution level, congestion management is limited to feed-in curtailment and based on bilateral contracts. Reactive power requirements for voltage control are regulated in grid connection rules and SOs' terms and conditions. An implementation of existing EU regulations and the (prospective) NC DR will require distribution system operators to consider flexibility services and market-based reactive power procurement from grid users in grid operation and planning. In the field of balancing, market-based procurement by the transmission system operator is fully implemented, and markets are open to any flexibility resources, including demand response. Regulations of the NC DR draft affecting market rules for balancing include those applicable to any SO services, i.e. on aggregation models (specifying the treatment of imbalances caused by independent aggregators, financial compensation, rules for verification), market access (e.g., qualification of service providers, prequalification of assets), as well as on coordination and data exchange.

The NC DR draft does not introduce fundamentally new rules for the procurement of SO services. It builds upon the concepts of existing EU legislation, defines processes for establishing national and EU-wide harmonized terms and conditions and specifies the matters for national decision. Notable regulations aiming at facilitating prequalification and market access include the concepts of "Tables of Equivalences" (to avoid redundant prequalification processes) and "Flexibility Registers" (national information systems providing information on controllable units and service providers) as well as simplified procedures for "standardised devices" and "small controllable units".

Keywords: Network code, flexibility, demand side response, digitalisation, ancillary service, system operator service, voltage control, congestion management, redispatch, balancing

1 Background and motivation

1.1 The EU Network Codes

The EU Network Codes are legally binding implementing regulations that govern grid connection, grid operation and electricity markets in the European Union (see [1]). The core aims of the EU Network Codes include European market integration, non-discrimination, effective competition, and the efficient functioning of the market (cf. Art. 59 of Directive (EU) 2019/944 [2]). The existing Network Codes define rules for: grid connection ("Demand Connection Code" [3], "Requirements for Generators" [4], "High Voltage Direct Current Connections Code" [5]), grid operation ("Emergency and Restoration Code" [6], "System Operations Guideline" [7]), markets ("Capacity Allocation and Congestion Management Guideline" [8], "Electricity Balancing Guideline" [9], "Forward Capacity Allocation" [10]) and cybersecurity (Network Code on Cybersecurity; see [11]; adoption by the European Commission planned for first quarter of 2024 [12]).

1.2 The "Network Code Demand Response"

With the "Network Code Demand Response" (NC DR), the European Commission aims at establishing an EU-wide harmonized framework for the integration of demand response and other (distributed) flexibility resources in transmission and distribution-related services and electricity markets. Based on a Framework Guideline prepared by the Agency for the Cooperation of Energy Regulators (ACER) [13], the associations of European electricity system operators (SO) ENTSO-E and EU DSO Entity have been tasked by the European Commission to prepare a draft proposal for the NC DR. At the time of writing this paper, a preliminary draft by the system operators ("SO draft") has been published and been subject to public consultation [13], and the final SO draft is scheduled to be submitted to ACER in May 2024. Subsequently, ACER will, in cooperation with the national regulatory authorities (NRAs), review and revise the draft and submit its proposal to the European Commission before end of 2024.

1.3 Objective

With the "Clean Energy Package" (see [16]) not yet fully implemented in Austria, major changes to the national electricity market rules are pending. The provisions of the NC DR will set the framework and rules for demand response and distributed flexibility, and therefore deserve high attention.

This paper aims at giving an overview of the scope of the NC DR and highlighting implications for the Austrian legal and regulatory framework. With a focus on system operator services (SO services; see explanation in section 3.1), regulations set forth in the NC DR to promote the efficient procurement and utilization of SO services and to facilitate market access for demand

response and other flexibility resources are analysed, providing insight into market design options and necessary amendments to current market rules.

2 Methodology

The methodological approach comprises an analysis of current practice of SO service procurement and the regulatory framework in Austria, the relevant EU legislative acts and provisions of the SO draft. For each SO service addressed in the NC DR, namely congestion management (CM) and voltage control on distribution and transmission level as well as balancing, the current practice in Austria is discussed in the light of existing and prospective EU regulations. Action points for enabling and promoting the participation of demand response in SO services are identified and suggestions for legal and regulatory changes are derived. The paper concludes with reflections on further selected topics addressed in the NC DR and their implications for the Austrian legal and regulatory framework as well as the role of the E-Control.

3 Results

This chapter is comprised of two parts: Section 3.1 describes existing EU provisions on the procurement of SO services, the additional rules set forth in the SO draft as well as the current regulatory framework in Austria. Section 3.2 summarizes regulations of the SO draft aiming at facilitating the participation of DR and other flexibility resources in the markets for SO services.

3.1 System operator services: EU provisions and current situation in Austria

The term “SO services” is here used to summarize the services addressed in the NC DR that shall be procured from grid users by system operators. This includes services to solve congestion issues[1] and voltage issues[2] (“congestion management” and “voltage control”, summarized as “local services”) and balancing services for power-frequency control.[3]

The NC DR builds upon EU regulations prescribing market-based procurement for all SO services and requiring member states to ensure non-discriminatory market access for demand response (Art. 17, 31, 32 and 40 of Directive (EU) 2019/944 [2]). These regulations are yet to be implemented into national legislation (with the forthcoming Electricity Market Law “ElWG”; a draft version is currently under consultation, see [15]). Derogations from market-based procurement are possible; prerequisites for derogations differ between SO services and leave some room for interpretation.

3.1.1 Congestion management

Regarding congestion management, Art. 13 of Regulation (EU) 2019/943 [17] stipulates that the resources for redispatching shall be “selected from among generating facilities, energy

[1] Defined as situations where the electric current flow through an asset exceeds operational limits.

[2] Defined as situations where the voltage is above or below operational limits.

[3] The term „SO services“ is not used in the SO draft but in the Framework Guideline Demand Response [13].

storage or demand response using market-based mechanisms". Contrarily, the present redispatch regime in Austria prescribes cost-based remuneration (section 23, para. 2, item 5 of the ElWOG 2010), which eliminates the risk of strategic bidding inherent to markets with low competition. On the downside, the current regime is not suitable for incentivizing the participation of demand response in congestion management. The SO draft describes principles for procurement and pricing for market-based CM, for procuring by tender procedures and coordination and interoperability with other markets. Market-based procurement is a necessary precondition. Legislative changes to the Austrian redispatch regime are thus indicated. A hybrid (cost- and market-based) redispatch model (see [18]) could prove as a reasonable compromise between maintaining the benefits of the established cost-based approach for generators (especially safeguarding against strategic bidding behaviour) and incentivizing the participation of demand response.

While on transmission level, the legislative framework for CM needs to be reconsidered, it is yet inexistent on distribution level. According to Art. 32 of Directive (EU) 2019/944 [2], the framework shall "allow and provide incentives to distribution system operators (DSOs) to procure flexibility services, including CM in their areas, in order to improve efficiencies in the operation and development of the distribution system", and requires DSOs to coordinate with the TSO. The rules for redispatch according to Art. 13 of Regulation (EU) 2019/943 [17] also apply to distribution grid operation. Regulations on CM on distribution level thus need to be introduced into the national legal framework, with due consideration of Art. 13 and the provisions of the NC DR. The SO draft elaborates on the alternatives for DSOs in managing grid congestion, which include "grid investments, non-firm connection agreements, grid-technical measures, including non-costly remedial actions, and market-based procurement".

Regarding market-based procurement, the SO draft prescribes that SOs shall commonly propose national terms and conditions, suggesting that there should be a common market for DSO and TSO procurement. Since separate markets for each service entail the risks of insufficient liquidity and low efficiency, it seems crucial that market designs are harmonized and grid users offering flexibility for congestion management can be activated by both DSOs and TSOs. The national terms and conditions shall also define the processes and responsibilities to ensure system balance if congestion management services (or voltage services using active power) are activated. System balance shall be ensured in a timely and cost-efficient manner, possibly using bids from balancing energy markets, but avoid imbalances necessitating the activation of balancing energy.

3.1.2 Voltage control

For voltage control, there are currently no legal provisions in Austrian legislation requiring SOs to apply a market-based approach. Reactive power management is regulated in grid connection rules and system operators' terms and conditions. Bilateral contracts between TSO and generators stipulate cost-based remuneration for reactive power provision. The SO draft prescribes that the procurement of active power for voltage control shall follow the same rules as CM.

For reactive power procurement, the provisions of Art. 31 (7) and Art. 40 (5) of Directive (EU) 2019/944 [2] imply market-based procurement as the standard approach – unless the NRA has granted a derogation. The SO draft specifies that when mandatory requirements for grid users do not provide sufficient reactive power needed for voltage control,

the DSO shall assess the additional needs, identify possible solutions (e.g., grid investments, procurement of reactive power from grid users), define an action plan and coordinate with the NRA. The SO draft defines market-based procurement as the preferred solution but allows for rules-based procurement if certain conditions are met (e.g., lack of competition due to small number of potential providers; market-based solution not economically efficient).

3.1.3 Balancing

In the field of balancing, market-based procurement by the TSO, as prescribed in Art. 6 of Regulation (EU) 2019/943 [17], is fully implemented in Austria. Balancing markets are open to any flexibility resources, including demand response, rules for participation via independent aggregation are in place and the according processes are operational.

Regulations of the SO draft that necessitate amendments to national legislation and market rules include provisions on market access, such as qualification of service providers, prequalification and verification, coordination between the procuring SO (i.e., the TSO), the connecting SO and other involved SOs, as well as on aggregation models and rules for compensation of market actors affected by the activities of independent aggregators. These regulations are not limited to balancing markets but relevant for any participation of DR and distributed flexibilities in markets for SO services. Selected aspects are described in the next section.

A summary of the current regulatory framework and practice related to SO service procurement, existing EU regulations and provisions of the SO draft is provided in Table 1.

Table 1. Summary of the existing national framework and EU regulations on the procurement of SO services (based on SO draft of the Network Code Demand Response; as of 01/2024)

	System operator services				
	TSO congestion management	**DSO congestion management**	**Voltage control by TSO**	**Voltage control by DSO**	**Balancing**
Summary of current regulatory framework and practice in Austria	*§ 23 (5) ElWOG 2010*: • Redispatch contracts between TSO and grid users. • Procurement of "network reserves" to ensure sufficient redispatch resources. • Cost-based remuneration of redispatch measures. *§ 23 (9) ElWOG 2010* • If further resources are required to relieve congestion, all generators have to honour requests by the TSO and in return receive cost-based remuneration.	• No legal provisions. • Bilateral contractual agreements between DSOs and generators if firm connection is not possible.	• No legal provisions on procurement procedure for reactive power or active power for voltage control. • Terms and conditions stipulate agreements on reactive power provision between TSO and generators. • Bilateral contracts between TSO and generators on cost-based remuneration of reactive power provision.	• No legal provisions on procurement of reactive power or active power for voltage control. • Terms and conditions and the Technical and Organi-sational Rules [19] confer DSOs the right to define reactive power settings for generators.	• Provisions on procurement of balancing services (§ 67 and § 69 ElWOG 2010) are in line with EU requirements. • TSO only procures standard products according to Art. 2 of Regulation (EU) 2017/2195 and is an operational member at the European platforms for the exchange of balancing energy PICASSO and MARI. • Participation of demand response in balancing markets, also via independent aggregation (current aggregation model is best described as a "contractual model" according to the USEF classification [20]).
Provisions of existing EU regulations	• Redispatch shall be market-based; derogations are possible for various reasons (Art. 13 of Regulation (EU) 2019/943) • No discrimination of generators, demand response and storage in selection of resources for redispatching	• Regulatory framework shall ensure that DSOs use flexibility and congestion mgmt. to increase efficiency. • Regulations on redispatching according to Art. 13 also apply to distribution grids.	• Voltage control is defined as non-frequency ancillary service (Art. 2 (49) Directive (EU) 2019/944) • Default procurement procedure for non-frequency ancillary services shall be market-based, unless the regulatory authority has granted a derogation on grounds of economic inefficiency (Art. 31 (7) and Art. 40 (5) of Directive (EU) 2019/944)		• Balancing services shall be procured in a transparent and market-based manner (Art. 6 of Regulation (EU) 2019/943). • Non-discriminatory access to balancing markets for generators, demand response and storage.
Provisions of Network Code Demand Response (excerpts from SO draft)	• Systems operators shall choose most efficient option or combination of options (grid investments, non-firm connection agreements, grid-technical measures, remedial actions, market-based procurement of flexibility services) • National terms and conditions for congestion management markets shall be developed. • Interaction with other markets, options for forwarding bids etc. shall be considered. • Interoperability between markets shall ensure cost efficiency (for grid users and system operators).		• Procurement of active power for voltage control shall follow the same rules as congestion management (see previous columns). • When mandatory requirements for grid users provide insufficient reactive power, optimal solutions (grid investments, market-based procurement, …) shall be identified and applied by DSO in coordination with the NRA. • For the procurement of reactive power, market-based procedures (based on principles of transparency, non-discrimination and technology-neutrality) are preferred. • Derogations from market-based reactive power procurement are possible in case of economic inefficiency, insufficient of competition etc.		• Provisions on the design of aggregation models, balancing responsibilities etc. • Rules on financial compensation of suppliers and other actors affected by activities of independent aggregators. • Provisions on market access requirements and processes (prequalification, verification, …) (These provisions basically apply to all SO services, but so far, only balancing services are procured in market-based manner in Austria)

3.2 Regulations to facilitate market access for demand response and other flexibility resources

The NC DR shall provide rules on market design and market processes ensuring efficiency and non-discrimination. It shall define principles for market access, coordination between SOs, and on topics concerning market interaction, non-market-based mechanisms to relieve congestion and voltage issues, and on procedures towards EU-wide harmonization in areas

where this is considered necessary. The following sections summarize some of the main regulations set forth in the SO draft.

3.2.1 Definitions, new market actors and organisational concepts

The SO draft includes several notable definitions and new market actors related to market rules and new organisational concepts. Particularly relevant definitions include:[4]

"**Local services**" include congestion management and voltage control services procured in markets ("**local markets**").

"**Service provider**" refers to a market participant supplying local or balancing services (or intending to do so). It can be considered as an extension of the "balancing service provider" introduced in the Electricity Balancing Guideline [9].

Regarding the technical assets providing in SO services, the SO draft differentiates between "technical resources", "controllable units", "service providing units" and "service providing groups" (see Figure 1). "**Technical resources**" are individual demand, storage or power generating units. A number of technical resources at a common connection point represent a "**controllable unit**" if there is a common controller like an energy management system. For the purpose of SO service provision, service providers define "**service providing units**" (SPU); these may be composed of a single or many technical resources or controllable units, as long as these resources/units share a common connection point. Resources/units at different connection points are combined to "**service providing groups**" (SPG). These differentiations are particularly relevant for prequalification, registration and data exchange.

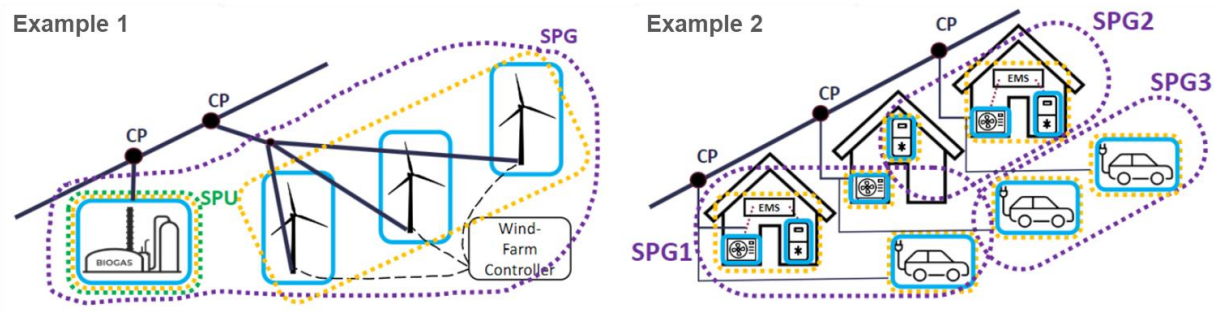

Figure 1. Exemplary situations illustrating the terms "service providing group" (SPG; purple dashed frames), "service providing unit" (SPU; green dashed frames), controllable unit (yellow dashed frames) and technical resource (blue frames); CP: connection point. Source: [21]

The term "**flexibility register**" refers to an information system supporting the registration of service providers, prequalification of SPU and SPG and related processes. It includes a "**CU module**" and a "**SP module**" that contain, manage and make available data about controllable units and service providers, SPU and SPG. According to the SO draft, the flexibility register shall be accessible via a single access point ("common front-door"). It is a central element of market access processes (see 3.2.4).

[4] Authors' own explanations and not the original wording of the SO draft

"**Product prequalifying responsible**" refers to the party which is, according to the national implementation, responsible for qualifying a SPU or SPG for the delivery of a SO service. This may be a TSO, a DSO, a third party delegated by the responsible SO or assigned by the NRA.

3.2.2 National terms and conditions

Similar to other Network Codes, the NC DR aims at defining principles rather than directly applicable rules. Technical and implementational details are to be regulated in EU-wide and national terms and conditions. The terms and conditions shall be established in a transparent, participative and cooperative manner, ensuring stakeholder involvement through public consultations, and establish clear and non-discriminative rules as well as rights and obligations for market actors.

On national level, proposals for terms and conditions shall be prepared by "all system operators" and submitted to the NRA for review and approval. Specifically, national terms and conditions for the following actors/topics are envisaged:

- Service providers (e.g., qualification, activation tests, switching of service provider, penalties)
- Product prequalification and product verification processes,
- Market designs for local services (including, for example, rules for procurement and pricing, for active and reactive power procurement, and coordination and interoperability between markets) and defining market processes (e.g., imbalance settlement) and standard products, and
- Data exchange and coordination between SOs (TSO-DSO and DSO-DSO).

3.2.3 EU-wide harmonization and European terms and conditions

The NC DR aims at EU-wide harmonization of terms and conditions in areas where this is considered to improve the overall efficiency of European regulatory frameworks. For this purpose, the NC DR foresees a monitoring process at the EU level and the publication of a monitoring report every three years, analysing national implementation and providing recommendations for harmonization. The recommendations shall at least cover the following areas:

- Aggregation models
- Product prequalification and product verification processes
- Baseline methodologies
- Options for market-based congestion management, including product definitions
- Measures to prevent market abuse
- Treatment of catch-up effects[5]

ENTSO-E and EU DSO Entity will be responsible for preparing the monitoring report, proposals for EU-wide harmonized terms and conditions as well as amendments, if requested by ACER,

[5] Since the term "catch-up effect" is not defined in the SO draft, the meaning is not entirely clear. It is assumed that it refers to the "rebound effect", i.e. an alteration of withdrawal or injection after or before the activation of a service, performed as a reaction to the activation.

and to perform public consultations. ACER is responsible for revising or approving the proposed EU-wide terms and conditions.

3.2.4 Market access

The NC DR aims at simplifying market access requirements such as registration and prequalification procedures. The establishment of a central **flexibility register** plays a central part in this, as it prevents fragmentation of information that shall be accessible for all entitled parties. All service providers, controllable units participating in SO markets and their assignment to SPU and SPG shall be registered in the flexibility register. It shall be the single point of contact for parties seeking access to SO markets: for qualification as service provider, product prequalification and other processes.

Another concept aiming at facilitating access to SO markets and eliminating duplicate processes is the "**Table of Equivalences**" (ToEq), a single point of reference describing all requirements for SPU/SPG to provide a certain service or product and highlighting equivalent requirements. Initially, the ToEq shall be defined in the national terms and conditions; based on national ToEq, EU-wide harmonized ToEq are envisaged. Both on national and EU-level, the establishment of ToEq shall promote the standardisation of requirements, avoid duplicate prequalification processes and simplify "value stacking"[6].

Another notable concept, intended to simplify market access for mass-produced technical resources like heat pumps or single charging stations, is to implement specific rules for "**standardised resources**". Provided that the conformity of the asset with the respective requirements has been verified by the responsible authority, fast-track market access procedures may be established. Similarly, the SO draft suggests simplified market access for "**small controllable units**" connected to low-voltage grids. SPG consisting entirely of standardised or small controllable units may skip certain prequalification steps or activation tests or be easily reconfigured or expanded by additional units.

Conversely, small controllable units and standardised units may be required to comply with national or European standards for controllability in order to avoid business models by manufacturers that result in customer lock-in and reduced competition.

3.2.5 Aggregation models and responsibilities

According to Art. 17 of Directive (EU) 2019/944 [2], Member States shall allow and foster market participation of demand response through aggregation. The regulatory framework of Member States shall further enable independent aggregators, i.e. market participants engaged in aggregation who are not affiliated to the customer's supplier, to participate in all electricity markets in a non-discriminatory manner and without the consent of the customer's supplier. To enable viable business models for independent aggregators and avoid undue adverse effects on suppliers, clear rules, rights and responsibilities are required.

These arrangements are referred to as "aggregation models" in the NC DR. According to the SO draft, aggregation models shall be characterized based on three features:

- the treatment of imbalances and imbalance calculation,

[6] Provision of multiple services, e.g. DSO congestion management and balancing services, with a single SPU/SPG.

- the way of financial compensation for market actors affected by the activities of independent aggregators (mainly suppliers), and
- the method of verifying activation and quantifying the activated volume (by means of measurement or calculation).

The contribution to this conference by Perger et al. [22] provides a review and discussion of aggregation models already used in practice.

A noteworthy aspect, however, of the SO draft is the assignment of roles and responsibilities related to aggregation models. System operators shall be responsible for calculating baselines, collection and processing of meter data (which must be sent by "metered data administrators"; see below), validation of activations, settlement of delivered services with the service provider and cooperation with each other. TSO are responsible for the calculation and settlement of imbalances.

The metered data administrator is a role defined in the Implementing Regulation (EU) 2023/1162 [23], who is responsible "for storing validated historical metering and consumption data and distributing these data to final customers and/or eligible parties". Regarding the tasks of the metered data administrator, the SO draft refers to Art. 5 of the Implementing Regulation. The SO draft does not clearly assign the responsibility for meter data "correction", necessary in the aggregation model referred to as "corrected model" in Ref. [20].

The service provider is responsible for respecting all grid limitations, including temporary limits communicated by system operators (see section 3.2.6), for settlement of financial compensation (if applicable according to national terms and conditions), and for paying penalties in case of non-delivery of a service.

The SO draft states that the parties responsible for providing baselines shall be established in the national terms and conditions; the responsible parties may be system operators, market parties or third parties appointed by the NRA.

3.2.6 Coordination and data exchange

Data exchange requirements shall generally be defined in the national terms and conditions, building upon the regulations set in the System Operation Guideline [7] and NC DR. The coordination and data exchange requirements mentioned explicitly in the SO draft are summarized in the following sub-sections.

Coordination and data exchange among system operators

The procurement and use of SO services by system operators as outlines in the Framework Guideline and the SO draft necessitates enhanced communication and coordination among system operators. The SO draft stipulates that system operators shall develop a common proposal for national terms and conditions for TSO-DSO and DSO-DSO coordination. The terms and conditions shall ensure that system operators share all necessary information about the procurement and activation of local and balancing services with any system operator involved in the grid issue or the remedial action. Specifically, the SO draft differentiates between the "procuring" and the "connecting" system operator as well as "requesting", "affected" and "intermediate" system operators. Within the concept of "**DSO observability**

areas" – these areas shall be identified and described within Network Development Plans (see section 3.2.7) –, these roles and associated responsibilities are assigned.

The data to be shared among system operators for an observability area are categorized into:

- structural data (substations, lines, transformers, SPU, SPG,…),
- scheduling and forecast data (location and duration of a grid issue, planned outages, temporary limits etc.), and
- real-time data (actual topology, active and reactive power flows, real-time measurements of SPU and SPG etc.).

System operators shall further exchange data on temporary limits for service providers. Connecting as well as intermediate system operator shall be entitled to set temporary limits to the delivery of local and balancing services. The SO draft outlines the procedures and timing for sharing this information; details of "short-term procedures to account for DSO temporary limits" shall be defined in the national terms and conditions.

Data exchange between system operators and system users

Regarding responsibilities for service providers, the SO draft states that the "applicability, scope and granularity of data exchange" shall be specified in the national terms and conditions. The following data categories are defined:

- structural data to be submitted as part of the prequalification process, such as metering point identifier and flexibility capabilities for each controllable unit
- scheduling and forecast data (scheduled power consumption or, alternatively, a calculated baseline[7], expected contribution of SPU/SPG to local service provision, scheduled unavailabilities)
- real-time data (operation status, active and reactive power, voltage at the connection point, unavailability; for storage devices: stored energy; for system users with non-firm connection agreements: available capacity)
- data for prequalification
- data for verification of service provision and activation tests

Data exchange requirements may differ for different sizes and characteristics of SPU and SPG, as well as for different voltage levels and services.

Within the prequalification process, the connecting and intermediate system operators shall verify the compatibility of a controllable unit, an SPU or a SPG with safety and operational limits ("grid prequalification"). The grid prequalification procedure shall be supported by the flexibility register, allowing entitled system operator to define, access and update the grid prequalification status of a controllable unit.

[7] The SO draft stipulates that demand facilities providing SO services through aggregation (significant grid users under Art. 2 para. 1 (e) of the System Operation Guideline [7]) shall, in addition to the data exchange requirements defined in the System Operation Guideline, provide scheduled active power consumption or, alternatively, a calculated baseline on a day-ahead and intraday basis.

Subject to the approval of the NRA, the SO draft stipulates that DSOs shall be entitled to extend the applicability of data exchange requirements to any system user in their observability area if this is necessary for forecasting or maintaining operational security.

3.2.7 Distribution Network Development Plans

An obligation for DSOs to publish network development plans at least every two years has already been stipulated in Art. 32 para. 3 of Directive (EU) 2019/944. The Directive further states that Distribution Network Development Plans (DNDP) shall provide transparency on the planned investments for the next five to ten years, particularly with regard to infrastructure required to connect new generation capacity and new loads. The DSOs' planning within the DNDP shall include the use of demand response, energy efficiency and energy storage as an alternative to grid expansion and describe the DSOs' need for flexibility services. This obligation is not yet implemented into national law in Austria.

The SO draft reiterates the regulations of the Directive and specifies further details, obligatory contents and principles for the DNDP planning methodology. These principles include the identification of DSO observability areas and consistency with the planning methodology and scenario building process of the relevant TSO(s). Descriptions on the general planning methodology and specifically on how DSOs take local services into account to cost-efficiently alleviate or postpone grid expansion and reinforcement needs and secure operation shall be provided. Regarding the cost efficiency assessment for local services, the SO draft suggests cost categories that may be taken into account. These include (avoided) investment, maintenance and operating costs, costs of losses and curtailment (non-injected energy), value of lost load, costs to enable and implement local services, and costs of the actual services.

Continuity of consecutive DNDP shall be strengthened by documenting changes in plans, assumptions, methods and scenarios. Scenarios shall be coordinated between SOs and national authorities, in order to be "sufficiently consistent", and SOs shall share all information required to ensure planning consistency.

4 Conclusions

With the "Clean Energy Package" not yet fully implemented into national law, the Austrian legislative framework is currently inconsistent with European regulations on SO services. Market-based procurement is not established in congestion management and voltage control, and a proper framework enabling and incentivizing demand response units to provide these services is missing.

An action plan for a legislative framework should include the following:

- **Establishment of a favourable legal framework that is compatible with European regulations**: The forthcoming amendment to the Electricity Industry and Organization Act (ElWOG), titled "Elektrizitätswirtschaftsgesetz" ("ElWG"), must facilitate a regulatory framework for SO services that is compatible with EU regulations, considers the specifics of demand response, obliges DSO to make use of flexibility in grid planning and operation (in order to promote cost-efficiency and increase hosting capacities and security of supply), and enables value stacking for flexibility service providers (i.e., multi-use of flexibility resources).

In view of the present uncertainty regarding the provisions of the final version of the NC DR, it seems advisable to ensure ample room for setting market rules at the sub-legislative level.

- **Decisions on procurement methods**: Regulatory decisions on how SO services for congestion management shall be procured in various settings need to be taken. Like the current electricity law the ElWOG, the ElWG will presumably include the principles for congestion management at transmission level.

  It is not expected that the ElWG will set any requirements for reactive power procurement for voltage control. Pursuant to the provisions of the cost efficiency of market-based approaches in different application fields (transmission grid, distribution grid, grid levels, etc.) must be assessed by E-Control. This assessment shall enable an educated decision as to what extent the existing rules-based approaches shall be augmented or replaced with market-based procurement.

  Procurement of active power for voltage control shall, according to the NC DR, follow the same rules as CM.

- **Decisions on market design**: The market design for flexibility procurement needs to be decided. Viable options – that are not necessarily mutually exclusive but may be complementary – include tenders for long-term (e.g. half-year or monthly) contracts with flexibility service providers, procurement from dedicated short-term markets for congestion management, their integration with (Day-Ahead/Intraday) power exchanges, combined markets for balancing and congestion management etc.

  It is expected that E-Control will be entitled to enact ordinances on the methods of flexibility procurement and grant derogations from market-based procurement, i.e. the legitimate scope of and preconditions for non-market-based procurement (especially non-firm connection agreements and tariff-based flexibility).

- **Details of market design and market communication**: Further design options include, for example, the definition of operational processes and associated market communication, and details for communication between SOs. In contrast to the fundamental decisions on market design mentioned in the previous bullet point, which are largely in the responsibility of the NRA, proposals for the details of market design and communication should, according to the NC DR, largely be developed by the involved market actors. As stipulated in the SO draft, terms and conditions clarifying these details should be subject to public consultation and to the NRA's approval.

- **Technical and organisational interoperability**: Technical interoperability is a fundamental prerequisite for easy market access for distributed resources and competitive and liquid markets for SO services. To ensure technical interoperability and avoid redundant communication and control systems, clearly defined roles and responsibilities regarding technical infrastructures are needed. This legal and organisational interoperability is considered crucial for establishing efficient processes involving grid users, suppliers, aggregators, service providers, original equipment manufacturers, DSOs, TSOs, and further parties.

- **Establishment of Distribution Network Development Plans**: DNDPs play a central part in enhancing transparency for project developers, grid users, flexibility service providers,

NRAs and other stakeholders. DNDPs should also substantiate that the new approaches to grid planning and operation necessary for reaping the benefits of using SO services as supplement and alternative to grid investments are implemented by DSOs.

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