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ISGAN
INTERNATIONAL SMART GRID ACTION NETWORK

Power Transmission & Distribution Systems

Flexibility acquisition mechanism designs

Joint ISGAN WG9 - BRIDGE RWG Discussion paper

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ISGAN WG9

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About ISGAN Discussion Papers

ISGAN discussion papers are meant as input documents to the global discussion about smart grids. Each is a statement by the author(s) regarding a topic of international interest. They reflect works in progress in the development of smart grids in the different regions of the world. Their aim is not to communicate a final outcome or to advise decision-makers, but rather to lay the groundwork for further research and analysis.

Disclaimer

Preface

This report has been developed within the framework of international collaboration between ISGAN, BRIDGE, and the European Commission's BeFlexible project. It reflects the joint efforts of project partners to analyse how different acquisition mechanisms, such as network tariffs, flexible connection agreements, and local flexibility markets, can support DSOs in addressing network needs. The results presented here combine theoretical insights with practical evidence gathered from surveys considering the characteristics of demonstration projects, aiming to provide a structured overview of design dimensions and options, highlight emerging practices, and draw recommendations for coordinated implementation of several acquisition mechanism designs.

Acknowledgments

This work results from a joint work between ISGAN and the European Commission BRIDGE initiative (Regulation Working Group) chaired by José Pablo Chaves Ávila (Comillas Pontifical University, Madrid, Spain).

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Nomenclature or List of Acronyms

DSO	Distribution System Operator
LFM	Local Flexibility Market
RES	Renewable Energy Sources
SO	System Operator
TSO	Transmission System Operator

Abstract

The transition of power systems, driven by renewable source integration, electrification, and consumer participation, is creating planning and operational challenges for DSOs. While traditional grid reinforcements remain costly and time-consuming, given the substantial investment required, along with long administrative lead times, flexibility from DERs is emerging as a complementary alternative for solving network problems. This report analyses three acquisition mechanisms—network tariffs, flexible connection agreements, and local flexibility markets—that enable DSOs to access such flexibility. The purpose is to characterise the design dimensions and options of these mechanisms, evaluate current European practices, and examine coordination requirements when multiple acquisition mechanisms coexist. The analysis builds on a structured design-dimension framework, complemented by surveys of partners across the ISGAN, BRIDGE, and BeFlexible initiatives, providing insights from different countries and demonstration projects on how the design of these mechanisms can interplay. The findings underscore that, despite their potential for providing flexibility, these acquisition mechanisms are often developed in isolation, creating risks of overlapping signals and potential distortions. This reinforces the need for coordinated design principles and integrated regulatory frameworks to ensure complementarities and avoid inefficiencies.

Executive Summary

The ongoing transformation of power systems, driven by the integration of RES, end-use electrification, and active consumer participation, is creating new operational challenges for DSOs. These include localised network issues such as overloads and voltage violations, traditionally addressed through grid reinforcements. As a more efficient alternative, DSOs are increasingly exploring flexibility from DERs to solve these system needs.

To acquire flexibility, DSOs can deploy several mechanisms. This report focuses on three: network tariffs, flexible connection agreements, and local flexibility markets. These acquisition mechanisms vary significantly in design and implementation characteristics, and their effectiveness depends on the technical, economic and regulatory contexts in which they operate. The report, developed through the collaboration between ISGAN, BRIDGE, and the BeFlexible project, presents a structured framework of design dimensions and implementation options to characterise these mechanisms, based on surveys and partner inputs from multiple countries and projects.

Network tariffs remain primarily focused on cost recovery, often lacking sufficient temporal or locational granularity to reflect real network conditions. However, their design can be enhanced through technology differentiation and smarter metering to provide stronger price signals for flexibility. Flexible connection agreements are emerging as complementary solutions to accelerate grid access for new customers under non-firm conditions. While not yet widespread, they offer significant potential to defer or avoid costly reinforcements if supported by robust curtailment rules, reassessment procedures, and integration with other mechanisms. Local flexibility markets are being assessed rapidly, with several pilot projects showcasing their potential to procure targeted flexibility services.

A key finding is that, although these mechanisms are promising individually, they are frequently developed and operated in isolation, leading to inefficiencies such as potential overlapping signals, double remuneration or charging, and missed opportunities for synergy. The report emphasises the need for coordinated design and implementation of acquisition mechanisms. This includes ensuring compatibility of signals, avoiding contradictory incentives, and aligning operational procedures across mechanisms. Additionally, policy and regulatory frameworks should support standardisation where possible.

Conclusions and recommendations call for guidance on cost-reflective, transparent, and flexible acquisition mechanism designs, with regulatory clarity for implementation. Ultimately, coordination and integration of acquisition mechanisms are essential to unlock the full value of flexibility and support efficient, fair, and effective power systems.

Table of Content

1. Introduction and background

The ongoing transition of power systems is marked by the rapid integration of RES, the electrification of end uses, and the increasing participation of consumers. These developments, while essential to achieving decarbonisation goals, introduce new challenges for system operators due to higher variability, uncertainty, and bi-directional power flows [1]. As a result, DSOs face increasing challenges to address localised network problems, such as congestions (overloads in lines and transformers) and voltage violations (overvoltages and undervoltages on buses). As shown in Figure 1 [2], traditionally, these network problems have been handled through costly and time-consuming grid reinforcements, but such measures are becoming less attractive due to their high costs, long implementation times, and regulatory or environmental constraints [3], [4].

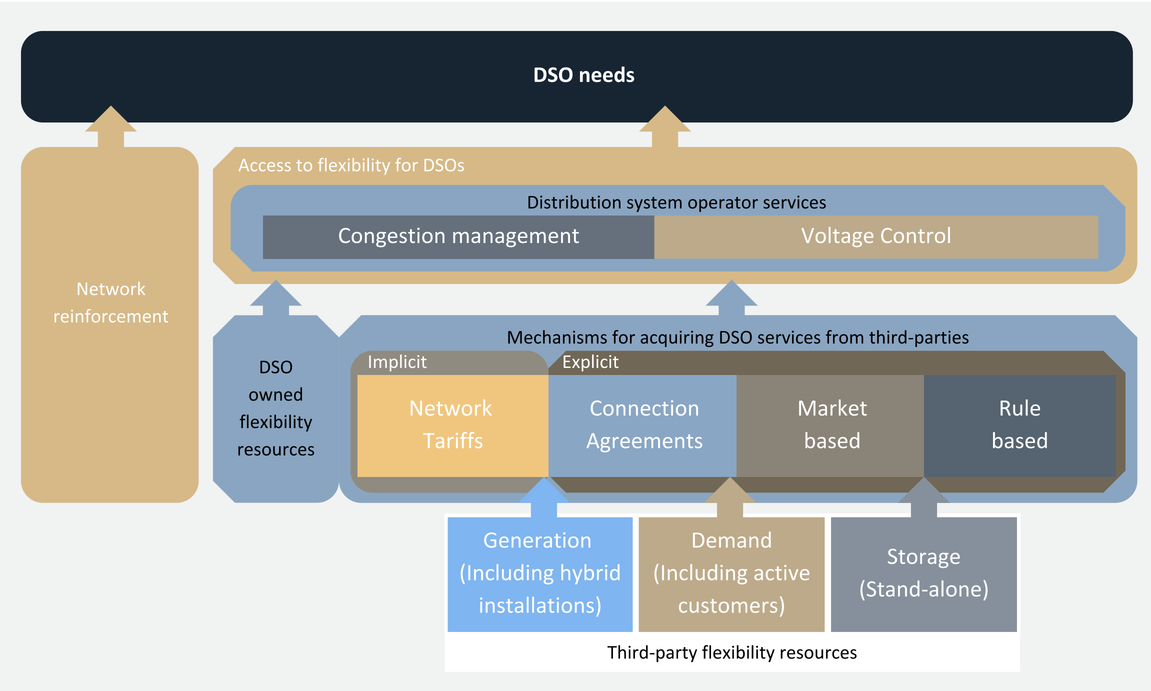

Figure 1. Mechanisms for DSOs to address network needs. Source: [2]

An alternative lies in leveraging flexibility from available resources to provide system services to solve network problems [4]. Flexibility can be defined as the capability of modifying generation or consumption patterns in response to external signals (price or activation), thereby supporting efficient grid operation [5], [6]. Additionally, in this context, European regulatory initiatives [5], [7] and demonstration projects [8], [9], [10] are increasingly fostering the adoption of flexibility as a central tool for efficient and reliable grid management. At the distribution levels, these DSO services mainly comprise congestion management (which focuses on mitigating congestion) and voltage control (addressing voltage violations) [11]. DSOs can access this flexibility through two main approaches: by using their own resources (e.g., network reconfiguration, capacitor banks, or power electronics) or by acquiring services from third-party resources (such as distributed generation, demand-side response, or storage systems) [6].

To enable the flexibility provision from third-party resources, which can adapt their usage according to grid requirements, different acquisition mechanisms can be considered [12]. These can be classified into implicit mechanisms, such as network tariffs, where economic signals are embedded to incentivise efficient grid usage without explicit commitments; and explicit mechanisms, such as local flexibility markets, flexible connection agreements, or rule-based approaches, where service providers actively commit to deliver predefined services under contractual or market-based arrangements.

Each mechanism presents specific advantages and limitations, and its effectiveness strongly depends on its design characteristics and alignment with the technical and operational conditions of the system [2], [13].

This report presents the results of the analyses conducted on network tariffs, flexible connection agreements, and local flexibility markets. Rule-based mechanisms were not considered, as they are highly specific to each country's conditions. The analysis builds on the collaboration between the international initiative ISGAN WG9 and BRIDGE RWGA3 and is based on the assessments carried out within the BeFlexible [14] European Commission's project described in [15]. The study defines the main design dimensions and options of these acquisition mechanisms and integrates feedback from partners across the three initiatives. The design dimensions can be understood as variables that collectively describe the functionalities of each acquisition mechanism, and the options refer to the potential implementation values for a particular dimension. Although not all dimensions or options apply simultaneously, together they capture the specific characteristics of each acquisition mechanism within a given jurisdiction and underscore their potential to enhance economic efficiency (when multiple acquisition mechanisms are jointly implemented). Additionally, the simultaneous deployment of the different acquisition mechanisms calls for effective coordination to minimise conflicts and overlaps while fully exploiting potential synergies.

2. Key activities of task 3 in ISGAN WG9

2.1. Description of the methodology adopted in WG9

ISGAN WG9 aims to identify best practices and barriers in the design and implementation of flexibility mechanisms, as well as to explore how local flexibility markets can be more effectively integrated and coordinated with existing markets. The analysis covers both EU countries participating in ISGAN & BRIDGE and non-EU countries engaged in ISGAN, drawing on inputs from working group contributors and public deliverables. The objective is to develop recommendations that promote the coordination and integration of energy and flexibility markets. Through the evaluation of these projects, this work aims to uncover synergies, address inefficiencies, and propose strategies to improve the design and coordination of flexibility acquisition mechanisms. The methodology adopted is illustrated in Figure 2.

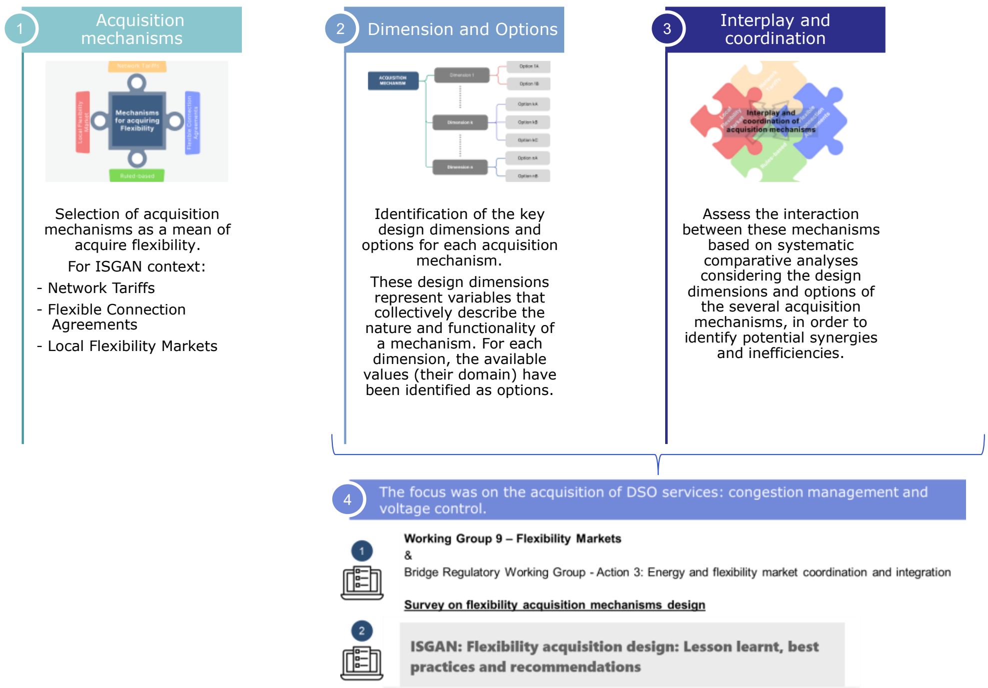

Figure 2. Steps of the methodology adopted in WG9

This methodology follows the next steps.

- **Step 1:** Three acquisition mechanisms, network tariffs, flexible connection agreements, and local flexibility markets, were selected given their current relevance for flexibility procurement.
- **Step 2 and Step 3:** Key design dimensions and options were identified to characterise each acquisition mechanism and assess how they can interact and be coordinated, with the aim of reducing inefficiencies and fostering combined implementation, maximising social welfare.
- **Step 4:** Questionnaires were sent to partners to gather information on acquisition mechanisms already implemented, under design, or tested in project pilots or countries, with a focus on DSO services for congestion management and voltage control.

The results are consolidated in this report and in the "*BRIDGE Regulation Working Group Annual Activity Report 2024–2025"* [16].

2.2. Countries and projects involved in ISGAN WG9 and BRIDGE RWGA3

Figure 3 shows the geographical distribution and number of survey responses by country. Responses were collected from both ISGAN and BRIDGE partners. From ISGAN, Canada contributed two responses. Joint ISGAN–BRIDGE participation accounted responses from Spain, Sweden, Italy, and Austria. The remaining responses correspond to projects under the BRIDGE Initiative, which covers several European countries, including Portugal, France, Slovenia, Finland, Greece, Cyprus, and Ireland.

The project involves 16 projects: BEFLEXIBLE, SENERGY NETS, DATA CELLAR, ODEON, REEFLEX, EV4EU, SHIFT2DC, SENDER, ENFLATE, STREAM, PARMENIDES, DIGITISE, OPENTUNITY, and EU-Dream.

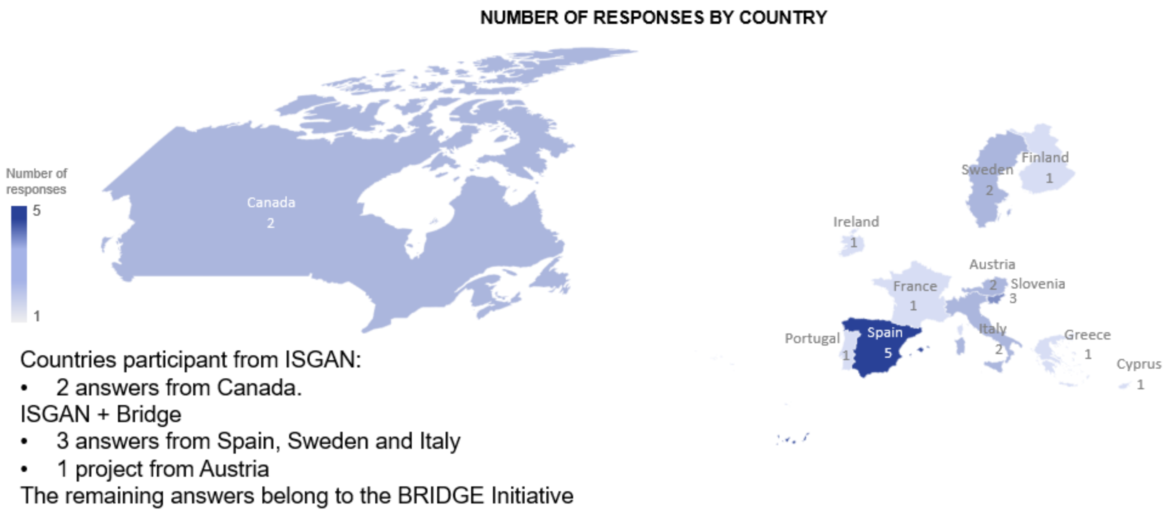

Figure 3. Number of responses by countries

3. Acquisition mechanisms for flexibility in power systems

3.1. Network tariffs

Network tariffs are pricing schemes that recover grid costs (investment, operation, and maintenance) while charging customers for their network usage. Beyond cost recovery, they can also provide economic signals that encourage efficient consumption behaviours for mitigating grid congestion and its associated costs [17], [18].

3.1.1. Design dimensions and options for network tariffs

The design dimensions identified for network tariffs are shown in Figure 4, and a brief description is provided in **Table 1**.

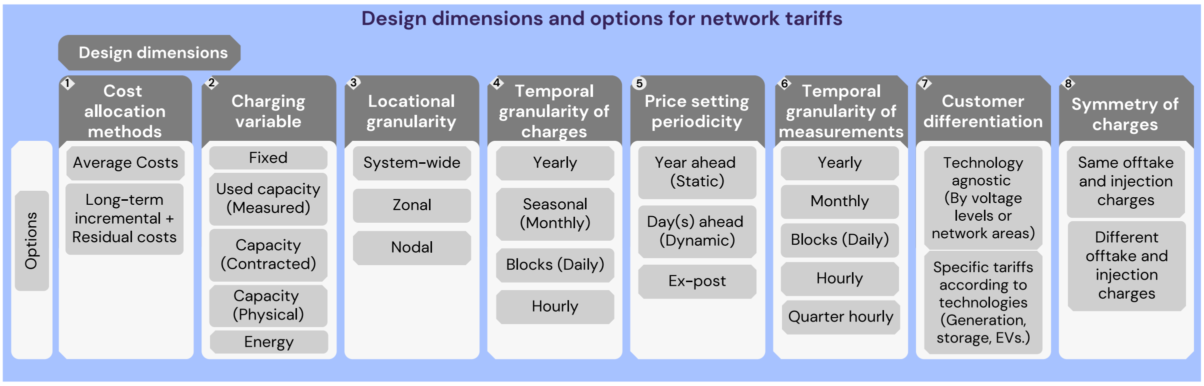

Figure 4. Design dimensions and options for network tariffs

Table 1: Description of the design dimensions and options for network tariffs

Cost Allocation methods: It represents how recognised costs must be recovered and assigned to customers. Network tariffs can be designed considering the current network costs divided by the total consumption *(Average Costs).* Alternatively, considering the current network costs and the network investments forecast to encourage customers to reduce their network usage and avoid expected future costs, plus the residual costs necessary to recover remaining costs *(Long-term Incremental + Residual Costs).*
Charging variable: It defines how costs are allocated to customers. It can be a fixed value assigned per customer *(Fixed),* established as a power-based (kW) charge *(Capacity charge),* or set based on energy (kWh) consumption *(Energy charge).* For the Capacity charge, there are three possibilities: based on the maximum peak demand *(Used Capacity (measured))* and is determined ex-post; or according to a predetermined value in the connection contract *(Capacity (contracted))*; or dependent on the physical availability of the installation *(Capacity (physical)).* Fixed charges can be associated with customer size, wealth, or other variables, but not with energy or capacity.
Locational granularity: It can be understood as how a location is partitioned to allocate network charges. It can be applied uniformly across an entire country *(System-wide)* or can be distinguished by differentiated areas *(Zonal)* or based on connection points *(Nodal).*
Temporal granularity of charges: It can be understood as how time is partitioned for allocating network charges, resulting from generation and demand profile changes and their impact on the network conditions. It can be uniform throughout the year *(Yearly);* vary between seasons in the year, considering specific months *(Seasonal (monthly));* or it can be divided into time blocks (Blocks (daily)), such as hours within a day or across seasons, etc.; or it can be ranged by hours (Hourly).
Price setting periodicity: It measures how often network charges are recalculated. This periodicity can be set once a year *(Year ahead (static));* or based on the forecast network usage for the next day *(Day(s) ahead (dynamic));* or after network usage has occurred *(Ex-post).*

Temporal granularity of measurements: It refers to the subdivision of time for data collection using appropriate equipment, such as smart meters. Lower granularity provides highly detailed data. It can be based on one measure in the year *(Yearly),* every month *(Monthly),* by blocks *(blocks (daily)),* every hour *(hourly),* or every 15 minutes *(Quarter hourly).*

Customer differentiation: It refers to the possibility of tailoring network tariffs based on specific technologies or equipment *(specific tariffs according to technologies (Generation, Storage, EVs, etc.)).* Alternatively, customer differentiation could be based on voltage levels or specific grid areas *(By Voltage levels or network areas*).

Symmetry of charges (Energy or capacity components): It states if network charges can be symmetric for energy withdrawals and injections, i.e., the same charge but with the opposite sign *(Same network and injection charges),* or if energy withdrawals and injections have different network charges *(Different network and injection charges).*

3.1.2. Results of the survey for network tariffs

Figure 5 shows the survey results for network tariffs, based on information from 22 responses across different countries and ongoing projects. The analysis, structured around design dimensions and options, highlights significant heterogeneity in network tariff designs, though some common features emerge. In several countries, tariffs are system-wide, cost-based, and combine capacity (mainly contracted) and energy charges, recalculated annually and supported by 15-minute metering. Moreover, based on the observations provided by project partners, several relevant insights can be highlighted. Network tariff designs vary considerably across the countries analysed, yet none of the initiatives explored new tariff structures explicitly aimed at fostering flexibility or their interaction with complementary acquisition mechanisms such as flexible connections or LFMs. More granular time-based charges could incentivise consumers to shift their usage to off-peak hours, thereby supporting the integration of variable renewable generation. Advances in digitalisation and smart metering further enable precise consumption tracking and stronger demand response to price signals. While most existing network tariffs remain technology-agnostic, dedicated schemes in early stages could encourage investment from flexible customers and emerging business models (e.g. energy communities or aggregators). Finally, clearer communication of network tariff design processes to the public is essential to enhance transparency and acceptance.

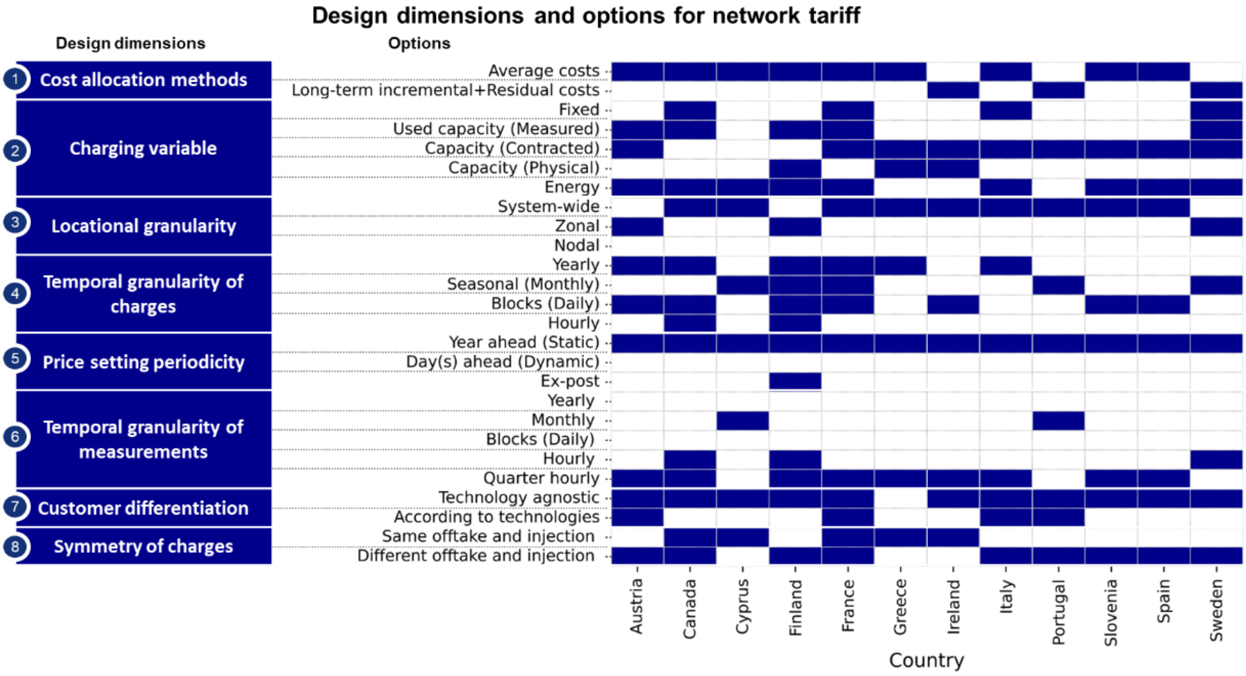

Figure 5. Results from the survey for network tariff

3.2. Flexible connection agreements

Growing congestion risks and costs are challenging the traditional guarantee of firm grid access. In response, some EU countries are adopting flexible (non-firm) connection agreements that enable new customers to connect ahead of reinforcements, with possible limits on capacity or timing [19], [20]. While full access cannot always be guaranteed, these agreements provide a cost-effective way to manage congestion through curtailments.

3.2.1. Design dimensions and options for flexible connection agreements

The design dimensions identified for flexible connection agreements are shown in Figure 6, and a brief description is provided in **Error! Reference source not found.**.

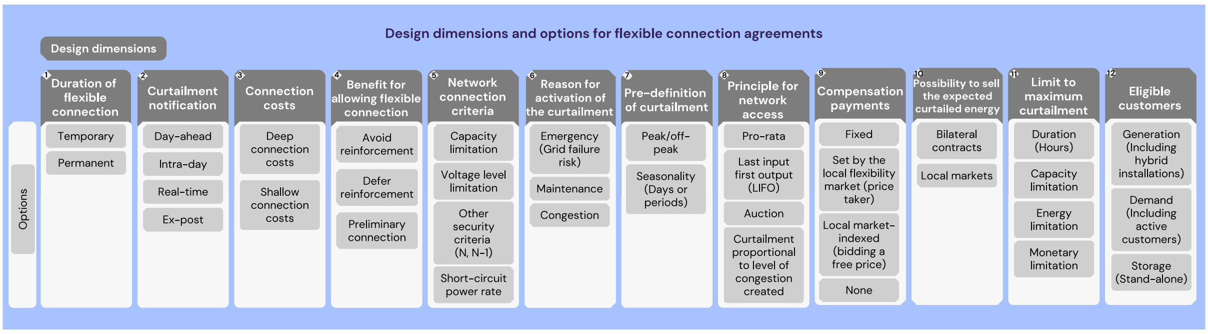

Figure 6. Design dimensions and options for flexible connection agreements

Table 2: Description of the design dimensions and options for flexible connection agreements

Duration of flexible connection: It can be temporary *(Temporary),* for example, waiting until network reinforcement becomes the most efficient solution. Or it can be permanent *(Permanent)* flexible connection agreements when network expansion is not possible at all, or it is extremely costly.
Curtailment notification: It indicates how much in advance customers receive the notification for the curtailment. It can be one day before *(Day-ahead),* hours before on the same day *(intra-day),* or in time intervals less than a fraction of an hour *(real-time).* In some cases, notifications may also be made after the activation due to an immediate response to unforeseen events *(ex-post).*
Connection costs: It can be defined as the amount of cost that should be recovered, and it is assigned to new customers or those who want to increase their current capacity. It can be established if network reinforcement is required for accommodating the demand increment *(Deep connection costs)* or if new customers can connect without added charges *(Shallow connection costs).*
Benefit for allowing flexible connection: flexible connections allow DSOs to avoid network expansion when it is not possible or unfeasible *(Avoid reinforcement).* Alternatively, network upgrades can be deferred *(Defer reinforcement)* when this solution has a lower cost compared to network expansion. Also, flexible connections can serve as a means for connection-seekers to connect to the grid while reinforcement is being carried out due to the long-time frames required for committed grid expansions *(Preliminary connection).*
Network connection criteria: It encompasses the grid requirements that determine access to non-firm connections. The capacity grid might be restricted during a specific timeframe *(Capacity limitation)*. Alternatively, network access can be limited according to tension levels *(Voltage level limitation)*. Also, according to specific measures, such as N or N-1 criteria *(Security criteria),* or short-circuit power rating *(Short-circuit power rate).*

Reason for activation of the energy curtailment due to flexible connection: It may occur during outages (*Emergency*), planned grid works requiring temporary reductions (*Maintenance*), or when electrical flow variations restrict access capacity (*Congestion*).
Pre-definition of curtailment: It identifies the potential hours of curtailment. If congestion occurs due to electrical flow variations, flexible hosting capacity might be assigned as peak/off-peak capacity *(peak/off-peak).* Alternatively, it may follow the resource's seasonal availability, over specific days or periods (*Seasonality*).
Principle for network access: It considers the methodology to assign curtailment to non-firm customers. All customers connected can be curtailed equally *(Pro-rata),* with the same percentage of available energy or the same amount of capacity. Also, the last customer to connect is the first to be curtailed *(Last-in-first-out (LIFO)).* Otherwise, curtailment is assigned according to an auction scheme *(Auction).* Also, when the customer with the highest participation in the congestion is curtailed first *(Level of congestion created).*
Compensation payments for energy curtailment: The magnitude of compensation payment can be arranged as a flat price in the connection agreement *(Fixed).* Furthermore, if curtailable connections participate in an LFM as a price taker, the compensation payment is determined from the LFM price *(Set by the Local Flexibility Market (LFM)).* Also, both SO and customers can prefer a variable payment to consider future changes in SPOT and flexibility prices *(Local Market-indexed).* In certain regions, access to flexible connections may be granted with the requirement of curtailment, if necessary, without an assigned payment *(None).*
Possibility to sell the expected curtailed energy: For upstream congestions, customers could sell their electricity to others in the same feeder. This could be enabled via the introduction of LFM *(Local Markets).* Another approach is allowing participation in the negotiation process *(Bilateral Contracts).*
Limit to maximum curtailment: It offers customers certainty through various options: setting a maximum duration *(Duration (hours))* for curtailment in hours per year: imposing a maximum capacity curtailed *(Capacity Limitation),* either full disconnection or partial with a minimum agreed capacity, ensuring firm grid capacity; limiting maximum energy curtailed *(energy limitation)* annually, in MWh or % of available energy; introducing a maximum economic *(Monetary limitation)* value of curtailed energy, in € or % of potential earnings.
Eligible customers: It means that, depending on the state of network congestion, flexible connections might be offered to customers of different technologies. It can cover generation, including hybrid facilities *(Generation),* and consumption *(demand),* including active customers. In addition, storage systems *(Storage)* that operate as stand-alone systems are also included.

3.2.2. Results of the survey for flexible connection agreements

Figure 7 summarises partner inputs on flexible connection agreements from 12 responses. Results show wide variation in design across EU countries, with temporary agreements often used to optimise short-term grid utilisation. Real-time and intra-day curtailment notifications are common, while options to sell curtailed energy remain rare, limited to bilateral contracts or market participation in only a few cases. Furthermore, insights gathered from project partners highlight several relevant aspects. Flexible connection agreements are still uncommon across most EU countries, though they are well established in some cases (France and Austria). They can help address long waiting lists for new customers but should be periodically reassessed to reflect the actual hosting capacity of the network and, where possible, allow flexible connections to be upgraded to firm access. As with other acquisition mechanisms, flexible connections involve costs, which need to be considered alongside other solutions such as grid reinforcement, expansion, or LFM to ensure that the lowest-cost solution is prioritised.

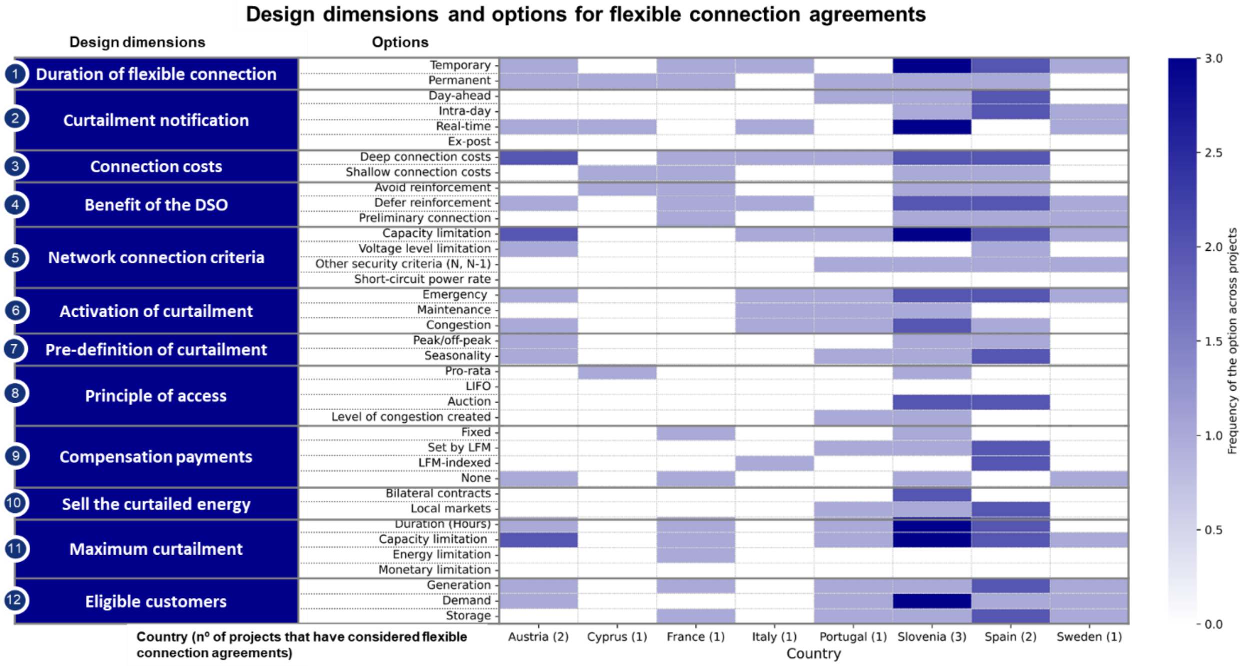

Figure 7. Results from the survey for flexible connection agreements

3.3. Local Flexibility Markets (LFMs)

LFM is an acquisition mechanism where flexibility from distributed energy resources is traded to support the operation of electrical networks for managing local network problems. Through structured processes of prequalification, activation, and settlement, LFMs create a transparent and market-based framework in which service providers can offer flexibility and system operators, or neutral third parties, can procure it when and where it is needed [6], [21].

3.3.1. Design dimensions and options for local flexibility markets

The design dimensions identified for local flexibility markets are shown in Figure 8, and a brief description is provided in **Error! Reference source not found.**.

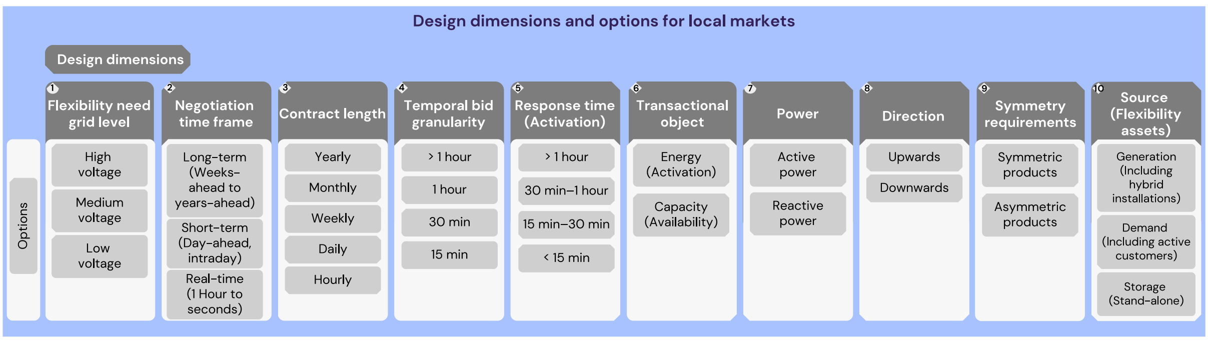

Figure 8. Design dimensions and options for local flexibility markets

Table 3. Description of the design dimensions and options for local flexibility markets

Flexibility need - grid level: It refers to the specific voltage level on the electricity grid where local flexibility services are required to solve network problems: *High Voltage, Medium Voltage,* or *Low Voltage*.

Negotiation time frame (Gate Opening and Closure for participation): Refers to the window in which participants submit flexibility offers. At gate opening, DSOs publish requirements, and at gate closure, the clearing process matches offers with needs under technical constraints. This can be Long-term *(weeks to years ahead),* Short-term *(day-ahead, intraday),* or Real-time *(1 hour to seconds).*
Contract length: It defines the duration for which a service contract is established with a commitment from the flexible resources to remain available. This period can be one year *(Yearly),* occur monthly *(Monthly),* seven-day periods *(Weekly),* cover a single day *(Daily),* or even real-time availability with short-term notice *(Hourly).*
Temporal bid granularity: It corresponds to the temporal resolution, or the smallest time interval, at which flexibility needs change, and service providers must be capable of responding uninterruptedly. It can vary from greater than an hour *(>1 hour),* providing bids in hourly or longer time-blocks, one-hour intervals *(1 hour),* 30-minute intervals *(30 min),* or 15-minute intervals *(15 min).*
Response Time (Activation): Time needed for a resource to adjust after an activation command, either ramp-up or ramp-down. Resources are classified as slow *(> 1 hour),* moderate *(30 min – 1 hour),* fast *(15–30 min),* or near-instantaneous *(<15 min).*
Transactional Object: Refers to the commodity traded for providing system services. It can be *Capacity (Availability),* i.e., a commitment to remain on standby for potential deployment, or *Energy (Activation),* i.e., the real-time injection or absorption of energy.
Power: Refers to the type of power needed to solve network problems. *Active Power* is typically used for line or transformer congestion, while *Reactive Power* addresses voltage violations (overvoltage/undervoltage) at buses.
Direction: Indicates how flexibility is required. *Upwards* means increasing generation or reducing consumption, while *Downwards* means decreasing generation or increasing consumption.
Symmetry Requirements (Upwards/Downwards): Define if products must provide balanced flexibility in both directions *(Symmetric products)* or can be tailored to different needs for each direction *(Asymmetric products).*
Source (Flexibility assets): Refers to the assets providing flexibility. These include *Generation (including hybrid plants), Demand (including active customers),* and *Storage (stand-alone),* such as batteries.

3.3.2. Results of the survey for local flexibility markets

Figure 9 summarises partner inputs on LFMs from 19 responses. Based on the insights gathered from project partners, several key aspects of LFMs can be highlighted. While some countries, such as France, already operate LFMs, others are piloting tailored designs for specific objectives, including long- and short-term markets. The current trend favours long-term markets for availability (capacity) and short-term markets (day-ahead and intraday) for activation (energy), rather than real-time trading. LFMs mainly trade active power products (upward or downward) from diverse resources and often rely on aggregators to pool small-scale assets (for lowering entry barriers and meeting minimum bid volumes). To ensure transparency and competitiveness, it is important to clearly define the roles and responsibilities of aggregators, DSOs, and market operators, thereby reducing the risk of market distortions.

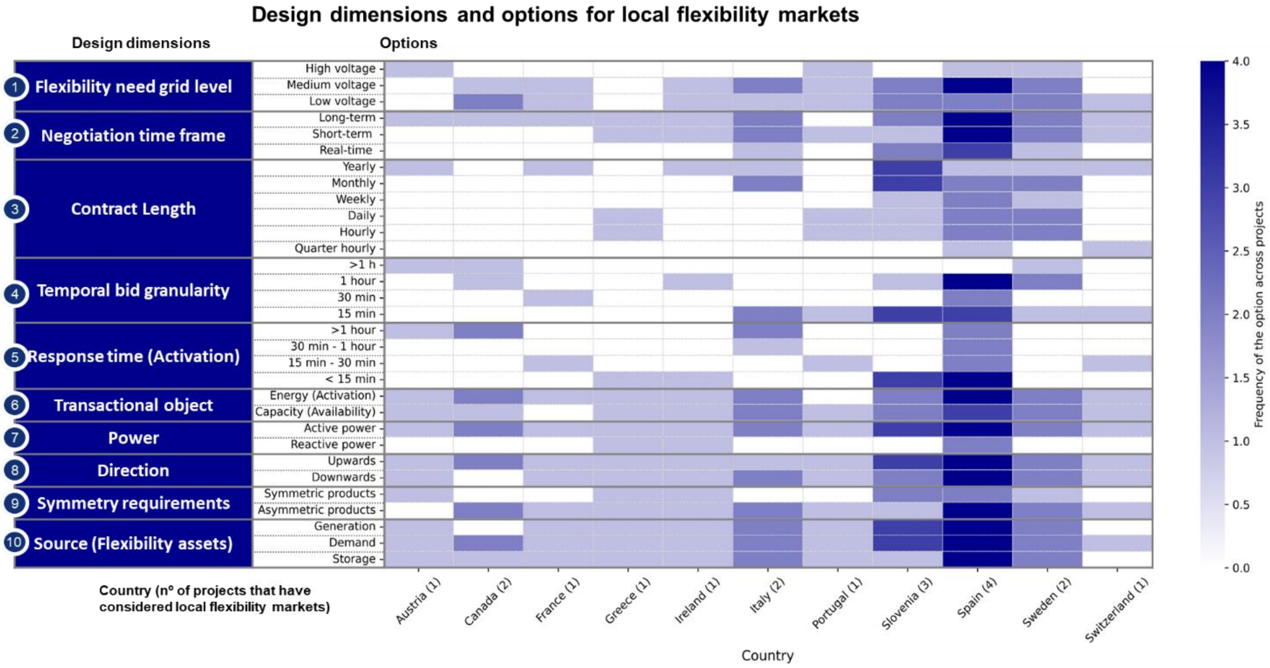

Figure 9. Results from the survey for Local Flexibility Markets

4. Interplay and coordination of acquisition mechanisms

While mechanisms such as network tariffs, flexible connection agreements, and local flexibility markets bring clear benefits, stand-alone designs risk overlooking synergies when applied simultaneously. For instance, network tariff designs lacking locational or temporal granularity may fail to reflect real network costs, but LFMs or flexible connection agreements can complement them by activating local resources during critical periods, mitigating network constraints locally. However, it is important to consider that overlapping or contradictory signals may also lead to conflicts or inefficiencies, such as double rewarding or double charging, which potentially encourages gaming behaviours or creates an uneven playing field. For example, network tariffs with insufficient temporal differentiation might trigger network problems at specific hours, which could then be addressed by activating flexibility through an LFM. Yet, if the same resources that alleviate congestion via the LFM are also those whose consumption patterns contributed to creating the problem in the first place, the system risks fostering gaming risks and inefficiencies rather than improving economic efficiency.

These inefficiencies arise not only from limitations in the design of individual acquisition mechanisms but rather from the lack of proper coordination between them. Therefore, it is essential to develop tools that help identify how these mechanisms interact. The dimensions and options explained in this paper offer a starting point for such an assessment. Previously published work [2] provides a more detailed qualitative exploration in this field; in particular, these analyses rely on pairwise comparisons of acquisition mechanisms at the level of specific design options.

5. Final recommendations and conclusions

Network tariffs, flexible connection agreements, and local flexibility markets each offer valuable pathways to procure flexibility from distributed resources, but their effectiveness depends on careful design and implementation. For tariffs, EU-wide guidelines should establish consistent principles while allowing for national adaptations, ensuring cost-reflective, fair, and efficient pricing that incorporates temporal and locational signals. Public communication is also essential to increase acceptance. Also, flexible connection agreements can ease capacity constraints and shorten waiting times for new customers if procedures are standardised, periodically reassessed, and coordinated with SOs. In turn, LFMs represent a good alternative for solving local network problems, but it is important to have stronger cooperation among DSOs, TSOs, market operators, and aggregators, along with transparent price signals, streamlined registration processes, and clear role definitions to foster participation and avoid distortions.

Despite their coexistence in practice, these mechanisms are often developed in isolation, overlooking synergies and risks of conflict. However, uncoordinated acquisition mechanism designs can create inefficiencies, such as overlapping incentives, reduced market liquidity, or distorted customer responses. To maximise efficiency, acquisition mechanisms should be coordinated so that they complement rather than compete with each other, ensuring that flexibility is mobilised where it is most valuable. Future research should advance methodologies to quantify trade-offs, enabling regulators and DSOs to design integrated frameworks that unlock the full potential of flexibility while safeguarding fairness, transparency, and economic efficiency.

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