

REGULATORY LEARNINGS FROM EU FUNDED FLEXIBILITY PROJECTS. THE I-DE CASE: PREPARING THE FUTURE DSO.

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ABSTRACT

Three European projects *CoordiNet*, *OneNet* and *BeFlexible* are playing a key role in developing key solutions to enable the use of flexibility in the electricity network, but also in particular *i-DE*'s (leading Spanish DSO company at Iberdrola Group) roadmap to adapt to new DSO (Distribution System Operator) roles. This paper addresses the most relevant elements considered in these projects and the implementations options made by *i-DE*. The *CoordiNet* project made it possible to address some of the key challenges for coordination between DSOs and TSOs (Transmission System Operators) and experiment with the full spectrum of services and needs. The *OneNet* project has helped to develop and test a robust local market platform. And the *BeFlexible* project aims to improve liquidity in the flexibility markets to make them more efficient for all players.

The need to properly define the new roles, adequately design the new markets and create the incentives for all agents are issues that are present in the conclusions of these projects and must be taken into account for future development of the electricity markets and the related regulations.

INTRODUCTION

The use of flexibility for electricity networks is currently of utmost relevance in the European energy agenda. High-level European Commission policies like the European Green Deal, Fitfor55 and the most recent REPowerEU stress the need to develop efficient mechanisms to deploy a more flexible use of energy across Europe, and particularly in electricity networks. One of the difficulties in the way forward is the lack of a proper regulatory framework that enables DSOs, as regulated companies, to procure flexibility from new participants like service providers, aggregators, energy communities, active customers or the more traditional generators offering flexibility services. Multiple publications and deliverables present solutions to the technical problems, but only some offer a practical view of the regulatory needs to establish the appropriate framework for enabling DSOs to procure flexibility. More precisely, the experience of *i-DE* with flexibility projects has provided interesting key conclusions to prepare for the scalability

and replicability of the flexibility mechanisms in distribution networks.

This paper aims to present how the participation of *i-DE* in flexibility EU-funded projects, namely *CoordiNet* [1], *OneNet* [2] and *BeFlexible* [3], can shed light on the main barriers from the regulatory point of view that have to be solved before establishing the new flexibility markets. On the one hand, the uncertainty of how DSOs can acquire flexibility without a proper framework prevents them from doing that, but on the other hand, the acquired experience in trying to propose solutions under the umbrella of the pilots could serve as guidance for the existing regulatory barriers (Figure 1). Based on the learning from pilot projects, the participating DSOs are now in a better position to understand what the real needs are, and thus, some relevant learnings aim to help setting up the new flexibility framework through regulatory proposals.

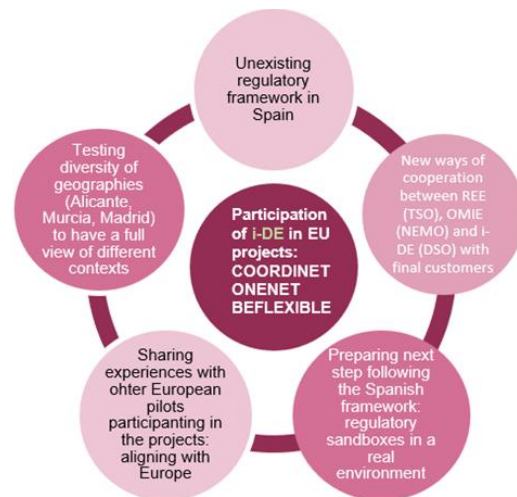


Figure 1. Participation environment of *i-DE* in EU flexibility projects.

The document also concludes that regulatory sandboxes, recently introduced in Spain, are the next natural step to speed up the process of advancing regulatory proposals to enable the use of flexibility services. Regulatory sandboxes represent a new opportunity for DSOs, TSOs, flexibility providers and other agents to delimit the limits of each actor's roles and responsibilities, changes in the regulatory framework and create incentives to enable the

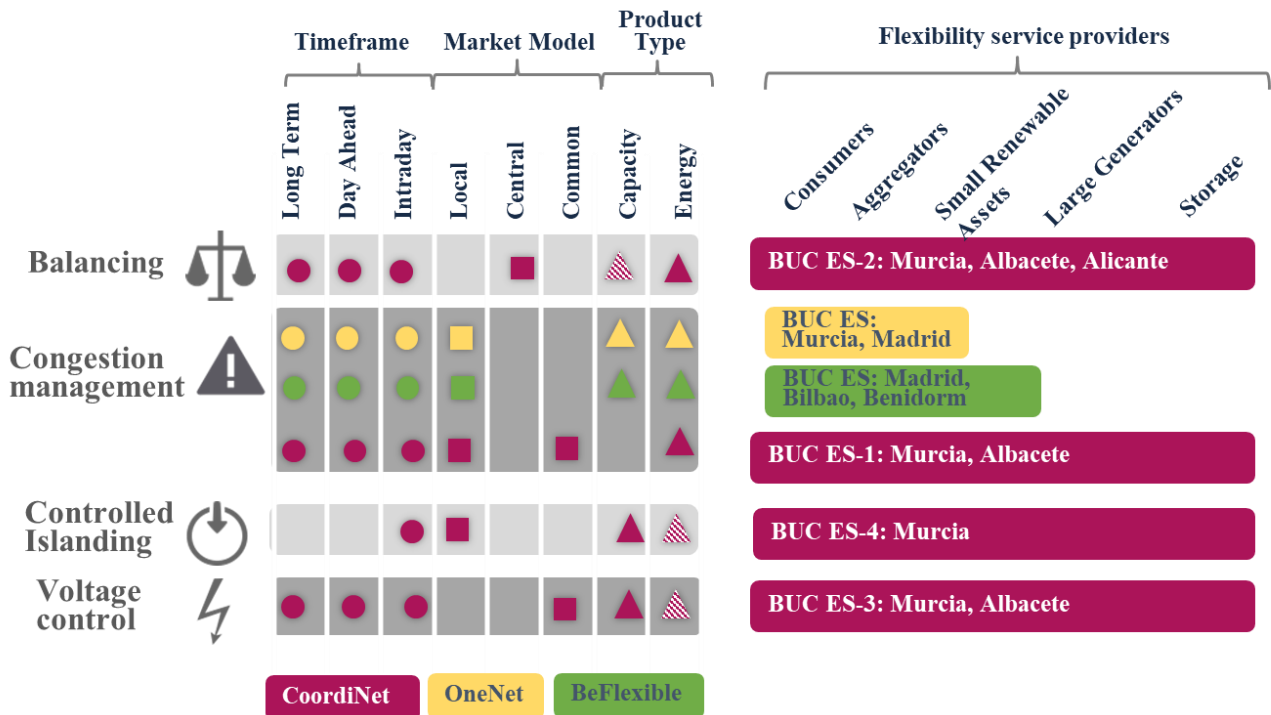


Figure 2. Scope of i-DE participation in CoordiNet, OneNet and BeFlexible

system's flexibility as requested in REPowerEU.

I-DE EXPERIENCE IN FLEXIBILITY PROJECTS

The experience of i-DE in recent flexibility projects is presented in **¡Error! No se encuentra el origen de la referencia.2**. In these projects, resources connected in I-DE networks have provided up to four flexibility products: balancing, congestion management, voltage control and controlled islanding. The contracting horizon varies from the long-term to day-ahead and intraday. The market models tested depend, among other considerations, on the services [4]. For balancing, a central market model managed by the TSO was tested. The challenge was to open the market to demand-side resources connected at the distribution level and accounting for possible congestion in the distribution level. For congestion management, two market models have been tested: a common TSO-DSO market and a local DSO market. For control islanding, a local procurement was considered and finally, for voltage control, a common market model was also tested, as the needs occur at the TSO-DSO interface [5].

Depending on the service, both capacity (i.e. reservation) and energy (i.e. delivery) products have been tested in the real field or energy only. The resources that have participated in the demonstrators cover almost all types, ranging from small consumers to aggregators managing multiple types of resources, industrial demand, renewable assets and storage units. The locations where i-DE networks implemented their tests vary from Madrid and

Albacete (continental climate zone), Murcia and Alicante (Mediterranean zone) and Bilbao (Atlantic zone).

While in the CoordiNet project, i-DE has explored a wide range of possibilities for coordination schemes, services, technologies and even voltage levels, in the OneNet and BeFlexible projects the focus for i-DE has been the local congestion management service, understood as the active power management service for the local needs of the distribution network, both for the long term and short term. Congestion management has been selected, not only because of the conclusions about the usefulness of this service to the needs of the network but also because of the significant number of challenges and barriers that arise in implementing it.

Roles and responsibilities

Flexibility trading involves different actors, from the buyer side (DSO, TSO) or the flexibility service providers (FSPs), either aggregated or direct participation of the resource in the provision of the services. New activities are required to make it possible to the assessment of the needs: 1) technical and financial prequalification of resources, selection of the bids, 2) monitoring, 3) activation, 4) measuring and 5) settlement of the selected resources. To perform these activities, new roles and responsibilities of existing actors, such as DSOs, need to be defined to perform new tasks. Similarly, the roles and responsibilities of new actors, such as local flexibility market operators or FSPs, need to be defined to ensure that flexibility is provided and settled properly.

OneNet Project made updated recommendations for the Harmonised Electricity Role Model [6]. However, the

definition of roles and responsibilities for different actors can be context-dependent on the national regulations, existing business models, among other factors.

Market mechanisms designs

To meet flexibility needs, flexibility services are traded through different market mechanisms. As the needs are diverse, depending on the network and resources characteristics, the CoordiNet project concludes that regarding the market models there is no size fits all [7].

CoordiNet project [7] emphasizes that coordination among system operators is needed when flexibility services can be offered for solving problems for both DSO and TSO, and when the procurement of a certain flexibility by one system operator affects the operation of the grid of another operator (e.g., the procurement services from distribution-connected resources by the TSO would require coordination with the DSO to ensure that operational issues in the distribution grid are avoided).

OneNet project further analyses the key elements which constitute the flexibility mechanisms: actors involved, system services, procurement method, coordination schemes, and grid constraints inclusion. OneNet developed a market framework and applies it to the demonstrators [8] to identify aspects useful for describing the adopted market model framework and the interaction among the actors involved.

In the OneNet project, the Spanish demonstrator develops a local market along with the Iberian market operator (OMIE) in an adapted platform to procure services for congestion management tested in i-DE networks.

Information exchange

To procure flexibility services, it is essential to guarantee interoperable information exchange among actors: TSO, DSO, NEMO (Nominated Electricity Market Operator) and FSPs. This exchange requires technical integration based on interoperable communication links, data models and communication protocols which, as stated by the CoordiNet project, have a strong impact on economic models because there are no one-size-fits-all solutions for communications solutions either [9]. The use case methodology by SGAM (Smart Grid Architecture Model) and the security- by-design approach by IEC 62559-2 were developed and applied in CoordiNet to map the information and communication solutions.

DSO Incentives

A key challenge which highlighted in both CoordiNet and OneNet projects but not addressed in detail is how to set economic incentives for all agents to engage in the exchange of flexibility services. This is especially relevant for DSOs which have new roles for procuring flexibility

services and have to evaluate this alternative in comparison with traditional solutions as grid investments. BeFlexible project is addressing the key elements that such remuneration scheme should have to, on one hand, create incentives for the DSOs, but on the other hand, incentivise cost reduction in the long-run for grid users.

Customer engagement

Another key challenge faced by i-DE in CoordiNet and OneNet is how to engage customers to participate in the provision of flexibility services. These challenges relate to four main areas: economic benefits, environmental awareness, motivations and technical knowledge. In CoordiNet, i-DE tried to involve a wide range of customers where some of them didn't join due to a lack of economic incentives and lack of knowledge of the flexibility potential, among other barriers. The ones involved were either agents that already participate in TSO markets or local authorities and universities which support innovation initiatives. Although both CoordiNet and OneNet had cascading funds provided by the European Union to remunerate part of the costs for customers to participate in the projects, other significant barriers were found that BeFlexible is considering, and which aims to address through developing value propositions, business models and pricing alternatives attractive to customers and pricing alternatives that complement business models. BeFlexible project looks at the motivations and needs of customers to encourage participation in flexibility solutions.

REGULATORY PROPOSALS

i-DE, as a leading DSO in the European scene, is committed to transforming the electricity network into a more decarbonized and flexible energy system encompassing the full range of emerging smart energy technologies that are now available under the principle of flexibility, providing active customers more control and choice over how they use their electricity and putting forward new competitive opportunities for them to participate in the energy market, as set out in the Clean Energy Package and particularly in Directive (EU) 2019/944.

In this context, experiences from the three aforementioned projects in which i-DE is participating can be distilled in the form of five regulatory proposals to be further detailed by the Spanish National Regulatory Authority, CNMC (Comisión Nacional de los Mercados y la Competencia), and the European institutions for the regulatory development.

1. It is essential to correctly **define roles and responsibilities of all the involved agents** to facilitate well-functioning flexibility mechanisms. A framework where DSOs, TSOs, customers, market operators and the rest of participants trading flexibility services should facilitate and provide convergence and standardisation,

taking into consideration the different realities across Europe. It is recommended that all the participants, and specially TSOs and DSOs, agree on the usage of the proposed framework and on market model options. By doing so, they can ease market interaction on flexibility services and ensure an efficient allocation between the different uses of flexibility [9].

2. The rules to be developed should be technology neutral and consider all clean available technologies to achieve a significant participation in the flexibility markets. Market neutrality is a fundamental principle to procure flexibility services in a way that creates a level playing field for all energy technologies and services. Moreover, another lesson learned from Coordinet and OneNet is that the lack of market liquidity could present a problem to obtain enough bids to solve a need. Allowing all available technologies can increase the number of bids. Transparent rules of market processes should be made clear towards all participants in flexibility market and market operators who manage them. System operators should ensure equal opportunities for bids gathering and selection of providers. Nevertheless, technical aspects such as the geographical location and the reliability considerations should also be considered in bids selection, so as to ensure the security of the grid and the overall system.

3. The information exchange model between DSO and flexibility resources is key to providing an effective provision of flexibility. Some levels of information are identified as very relevant for a well-functioning framework, comprising the main identification of the flexibility provider, prequalification information such as the requirements for becoming a service provider in the respective product and contractual information for relevant parties. Also, interoperable information exchange platforms are crucial to remove any technological barriers. From an operational perspective, the delivery of the service requires static data and dynamic status of the asset (e.g. representing the resources availability and other asset performance-related information), as well as settlement-related information to accurately reflect contractual conditions.

4. Right incentives in their compensation schemes for DSOs to acquire flexibility. The regulatory framework should allow and properly incentivise DSOs to use flexibility when this is the most efficient solution for the grid, taking into account the long-run cost efficiency of the whole system.

According to article 32 of the Directive (EU) 2019/944 Member States shall provide the necessary regulatory framework to allow and provide incentives to distribution system operators to procure flexibility services, including congestion management in their areas, in order to improve efficiencies in the operation and development of the distribution system. Unfortunately, not all countries have

transposed the Directive and DSOs have not yet the possibility to conduct a decision-making criteria which supports the dispatch of services. Projects like Coordinet or OneNet have proved the benefits of using flexibility from an experimental perspective under certain conditions that cannot be sustained beyond the duration of the projects.

In this sense, the Council of European Energy Regulators (CEER) highlights that a different regulatory treatment of OPEX and CAPEX leads to the lack of a level-playing-field in terms of the DSOs' choices of how to dimension their networks [10]. A regulatory treatment of equal technical solutions could enable DSOs to find the most efficient solution for each specific situation.

5. Traditional customers and generators generally show little appetite for flexibility provision in the early stages: knowing more about customer capabilities, limitations and needs and setting efficient prices is needed to stimulate their participation. As suggested before, in several Member States electricity markets have not yet the possibility for using flexible services.

Coordinet project showed that active customers, aggregators and flexibility providers in general are not familiar with the mechanisms to provide flexibility to DSOs, particularly for congestion management and voltage control, therefore it is recommended to prepare a set of actions such as an initial dissemination of the rules of the flexibility markets and initiatives to educate the interested parties of the benefits of providing flexibility to the distribution grid.

6. Incentives for flexibility providers

The participation of small customers and demand-side resources requires matching the activity, process or needs with the flexibility demands of the electricity system. The delivery of a flexible service should minimise associated costs of flexibility provision in order to make it cost-competitive. Incentives should be technological neutral to allow all type of resources to compete for providing the services in a level-playing field. Similarly, to maintain reliability of electricity supply, it is also necessary to consider penalties to maintain the guaranteed delivery.

THE ROLE OF SANDBOXES

Developing sandboxes which can test DSOs services in a real framework including contractual relations can set the economic responsibilities to engage in the provision of flexibility services. In Spain, Sandbox regulation is already in place, the Royal Decree-Law 23/2020 introduced the authorization for the government to establish regulatory Sandboxes that contribute facilitating research and innovation in the electricity sector which was finally established in the Royal Decree 568/2022, of 11 July. This regulation aims to stimulate innovation and the regulatory learning to facilitate the review of existing regulations to new needs.

One of the key topics that can be potentially beneficial to facilitate innovation and unlock the flexibility value of flexibility resources is the remuneration of flexibility to DSOs to incentivize use flexibility services on the same footing as investment in traditional network assets. Although the regulation of such elements is complex and should be adapted to the overall national regulations some elements can be considered:

1. Enhance remuneration avoiding biased CAPEX-oriented incentives, considering for instance, the experience in UK based on total expenditures (TOTEX) and mitigating any negative accounting impact.
2. Create incentives to reduce network costs in the long-run and provide incentives for the DSO to use flexibility

Through regulatory sandboxes different models can be tested in real environment.

NEXT STEPS

i-DE is currently leading BeFlexible, a European project in the field of flexibility for DSOs, which will build on the previous experiences of CoordiNet and OneNet. One of the main objective of BeFlexible project is to increase the participation of active customers to increase the flexibility of the electricity system. BeFlexible focusses in four areas: Markets and Regulation, Services Ecosystem, Platforms & Architecture and Customer engagement and social co-creation. BeFlexible started in mid-2022 and will continue over the next four years, trying to gain more experience on how to increase flexibility primarily through analysis and validation of alternative designs that foster consumer engagement and acceptance of proposed technologies. To this purpose, the project plans to develop local market-based flexibility platforms, to also develop a data-platform for the exchange of information of new actors with the DSO, and to generate a set of consumer-centric and grid-centric services trying to propose a system architecture framework that will enable the creation of new business models providing additional value to meet consumers' needs in compliance with a stable regulatory framework.

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