

DOMINOES – DELIVERABLE

D6.11 Standardization proposals – Year 3

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Authors:

Salla Annala, Samuli Honkapuro, LUT
Sirpa Repo, Jan Segerstam, Enerim
Susete Albuquerque, Guido Pires, E-REDES
Fernando Lezama, Zita Vale, Pedro Faria, ISEP
Huiyu Zhou, Jacob Bretherick, UoL
Carlos García, USE
Jorge Landeck, VPS
Eduardo Rodrigues, CNET

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Executive Summary

DOMINOES project (2017–2021) has strived to design and develop a local market concept that is compatible with the European energy policies. The Clean energy for all Europeans package was published before the start of the project, and has thus been taken into consideration in the design of the DOMINOES local market concept. However, since many of the relevant aspects are addressed in directives, transposition into national legislation is necessary before establishment of local markets. Furthermore, due to the novelty of the concept, additional piloting and information exchange between different stakeholders is needed.

Thus, to enable uptake of local markets and utilization of services provided by them, the following recommendations should be fulfilled:

- Requirements of the Clean Energy package should be transposed in Member States without delays
- Remuneration mechanisms for DSOs should take into account the use of flexibility for congestion management and for reliability and quality purposes
- When possible, Member States should strive for harmonized approaches to facilitate wide uptake and scaling up of the new services
- Piloting of novel solutions in cooperation with regulators should be promoted to identify best solutions and remaining gaps in regulation and standardization.

Throughout the project, DOMINOES partners have actively taken part in the development of the standardization and regulatory framework enabling local markets. These activities have included participation in standardization organizations' work, and both formal and informal cooperation with legislative and regulatory bodies. The partners are following and taking part in the development of an enabling framework for local markets via different working groups and industrial associations, enabling sharing of best practices and giving policy recommendations with a larger impact.

List of Acronyms

BRP	Balance responsible party
CEC	Citizen energy community
DSO	Distribution system operator
FCR-D	Frequency Containment Reserve for Disturbances
FCR-N	Frequency Containment Reserve for Normal operation
FFR	Fast frequency reserve
HV	High voltage
LV	Low voltage
mFRR	Manual Frequency Restoration Reserve
MV	Medium voltage
P2P	Peer to peer
REC	Renewable energy community
SD	Standard deviation
TSO	Transmission system operator
VHV	Very high voltage

1 Introduction

1.1 DOMINOES local market concept

DOMINOES project (2017–2021) has strived to design and develop a local market concept that

- empowers prosumers to decide on the distribution of value of their energy resources,
- enables easy demand response service provision,
- creates relevant and liquid flexibility for innovative distribution management,
- enables easy wholesale market uptake of distributed resources,
- enables local sharing and optimisation of renewable resources in MV and LV grids,
- supports liberalized energy markets,
- is compatible with the ongoing policy development.

In addition, the project has developed ICT components enabling the local market concept, and balancing and demand response services supporting local markets. Local market enabled business models have been designed and solutions for secure data handling related to local market enabled transactions have been analysed and developed.

These developments have been described in several deliverables. In particular, DOMINOES local market architecture is presented in D2.3, DOMINOES use cases in D1.3, and local market enabled business models in D5.1. The key themes in the use cases and business models and thus in the DOMINOES local market concept include:

- Utilization of demand response and flexibility for the benefit of DSOs and other stakeholders in the power system
- Peer to peer (P2P) trading and sharing of energy
- Aggregation services for prosumers/end-users, and offering of aggregated flexibility for other stakeholders' needs

1.2 Purpose and scope of the deliverable

This deliverable, D6.11, is a part of the WP6 Dissemination, standardization, regulation and exploitation and the Task 6.2 Standardization and regulatory issues (T6.2). The aim of T6.2 is to produce recommendations for changes in existing local market related standards and regulatory rules. Furthermore, the deliverables of T6.2 list standardization activities of all project partners with updates every 13 months. This is the third and final deliverable of T6.2.

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Section 2 of this deliverable reviews the standardization and regulatory framework related to local markets, including gaps in regulation and development during the project. Based on them, recommendations to better enable local markets are discussed.

Partner activities related to standardization and regulation throughout the project are discussed in section 3. Section 4 concludes the deliverable.

Review and analysis of standards related to key technological issues (cyber security, energy storage systems, inverter driven technologies) related to the local market can be found in the previous deliverables of this task (D6.9 and D6.10). For example, D6.9 recommended cyber security standards for implementation in this project.

2 Standardization and regulatory framework

Compatibility with existing market structures and the ongoing policy development were among the key design goals of the DOMINOES local market concept. As discussed in the previous deliverables of this task (D6.9, D6.10), the European legislative framework regarding these issues is largely covered in the ‘Clean energy for all Europeans’ package (European Commission, 2020). Although the package does not address local markets as such, it provides a framework for several services related to local markets (e.g. aggregation of demand response, energy sharing within communities).

Of special relevance are Electricity Regulation (2019/943), Electricity Directive (2019/944), and Renewable Energy Directive (2018/2001). Their relevance for the DOMINOES local market concept was reviewed in D6.9. Because many of the key issues are addressed in the directives, they need to be transposed into national legislation. Thus, subsection 2.1 briefly discusses the situation related to the identified key themes of the DOMINOES concept in the project piloting countries Portugal and Finland.

Then, section 2.2 discusses remaining issues in the regulatory framework based on a survey to all DOMINOES partners and a workshop regarding local markets. Section 2.3 focuses on recommendations to better enable local markets.

2.1 Current situation and recent developments

2.1.1 DSO regulation

The regulatory framework for DSOs determines their opportunities to utilise flexibility services provided by local markets. Establishing a regulatory framework to allow and provide incentives to DSOs to procure flexibility services is required in Article 32 of the Recast Electricity Directive 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. In particular, the regulatory framework shall ensure that distribution system operators are able to procure such services from providers of distributed generation, demand response or energy storage and shall promote the uptake of energy efficiency measures, where such services cost-effectively alleviate the need to upgrade or replace electricity capacity and support the efficient and secure operation of the distribution system.“*

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The Directive thus sets the common goal for the regulatory frameworks in Member States but methodologies to reach the goal are not defined. Thus, design of the appropriate incentive mechanisms is left for the national regulators and legislators.

Portugal

In May 2020, the framework for the regulatory period 2018–2020 was extended to cover also 2021 as setting new regulatory goals and methodologies for a three year period was considered unfeasible due to the uncertainties caused by the COVID-19 pandemic (Regulamento n.º 496/2020).

The current regulatory framework for DSOs does not include any direct incentive related to the use of flexibility. There is a smart grid investment incentive, which rewards innovative projects with a higher rate of return. Among the features that the regulator considers to be “innovative” there is the feature “promotes demand-side response” and “promotes a flexible network management”. However, this incentive can be applied to several types of projects, not just “flexibility-related” projects.

Finland

In Finland, the current DSO regulatory framework (Energy Authority, 2015) will be applied until the end of year 2023. The framework was fixed for years 2016–2023 in 2015 (i.e. before the publication of the Clean energy for all Europeans package) and does not include specific incentives for the use of flexibility services.

As discussed in Lassila et al. (2019) and D5.4, in Nordic countries LV networks' distribution capacity is relatively high but the expected increase in electric vehicles could significantly increase demand peaks. Furthermore, in addition to the potential congestion management needs, flexibility could be valuable for DSOs trying to fulfil the tightening requirements for security of supply. The Finnish Electricity Market Act 588/2013 states that by the end of the year 2028, outages caused by storm or snow may not last longer than six hours within town plan zones and no longer than 36 hours in rural areas². While this requirement has led to increased use of underground cables, in sparsely populated rural networks such investments require careful consideration due to the regressive population (Lassila et al., 2020). Instead, ensuring the security of supply via the purchase of services from external service providers or agreeing on a lower security level with the customer could be a more efficient option (Lassila et al., 2020). However, the current regulatory framework does not support such approach.

² Finnish government has proposed extending the transitional period until the end of 2036 for DSOs meeting specific conditions.

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2.1.2 Demand response and aggregation in ancillary service markets

At the moment, the participation of different types of resources in ancillary service markets varies widely even within Europe (see e.g. ENTSO-E, 2020). However, transposition of the requirements of the Recast Electricity Directive 2019/944 into national frameworks should facilitate market access of aggregated demand response and other novel resources. For example, Article 17(2) of the Recast Electricity Directive states:

„Member States shall ensure that transmission system operators and distribution system operators, when procuring ancillary services, treat market participants engaged in the aggregation of demand response in a non-discriminatory manner alongside producers on the basis of their technical capabilities.“

Portugal

In Portugal, new developments that increase the usage of local and distributed flexibility services to support DSOs' needs are being tested within H2020 projects.

Currently, interruptible contracts are the main form of demand response participation in the ancillary service provision. However, the Portuguese regulator has established a Regulation Reserve Market (Tertiary Reserve) pilot, where loads connected to the VHV, HV and MV networks could offer to increase / decrease consumption, in similar conditions of generators. This activity is managed by the Global System Manager, which is also the TSO.

Finland

In Finland, all markets operated by the TSO Fingrid are open for demand response and aggregators. Independent or third-party aggregators can access FCR-D, FCR-N and FFR markets. In the mFRR markets, only BRPs can offer aggregated loads. However, the participation of independent aggregators is being piloted in 2020–2021 (Fingrid 2020).

2.1.3 Energy communities and P2P trading

Local energy and flexibility markets are not directly included in the European legislation. However, energy communities and P2P trading are addressed in the Electricity Directive 2019/944 and Renewable Energy Directive 2018/2001.

P2P trading is addressed in the Renewable Energy Directive which defines peer-to-peer trading of renewable energy as

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“the sale of renewable energy between market participants by means of a contract with pre-determined conditions governing the automated execution and settlement of the transaction, either directly between market participants or indirectly through a certified third-party market participant, such as an aggregator.” Furthermore, *“the right to conduct peer-to-peer trading shall be without prejudice to the rights and obligations of the parties involved as final customers, producers, suppliers or aggregators.”*

Apart from the definition, P2P trading is addressed only in Article 21 concerning renewables self-consumers³. According to this article, renewables self-consumers must be entitled to sell their excess production through P2P trading arrangements without being subject to discriminatory or disproportionate procedures and charges.

The Clean energy for all Europeans package defined two types of energy communities: citizen energy community (CEC, in Electricity Directive) and renewable energy community (REC, in Renewable Energy Directive). The framework concerning CECs had to be transposed into national legislation by 31 December 2020 whereas the framework concerning RECs has to be transposed by 30 June 2021.

Definitions of CECs and RECs and requirements concerning their rights and regulatory framework concerning them is presented in Table 1.

³Renewables self-consumer is defined as „a final customer operating within its premises located within confined boundaries or, where permitted by a Member State, within other premises, who generates renewable electricity for its own consumption, and who may store or sell self-generated renewable electricity, provided that, for a non-household renewables self-consumer, those activities do not constitute its primary commercial or professional activity. “

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Table 1 Communities defined in EU legislation (Directives 2019/944 and 2018/2001)

	Citizen energy community	Renewable energy community
Defini- tion	<p>a legal entity that:</p> <p>(a) is based on voluntary and open participation and is effectively controlled by members or shareholders that are natural persons, local authorities, including municipalities, or small enterprises;</p> <p>(b) has for its primary purpose to provide environmental, economic or social community benefits to its members or shareholders or to the local areas where it operates rather than to generate financial profits; and</p> <p>(c) may engage in generation, including from renewable sources, distribution, supply, consumption, aggregation, energy storage, energy efficiency services or charging services for electric vehicles or provide other energy services to its members or shareholders;</p>	<p>a legal entity:</p> <p>(a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is effectively controlled by shareholders or members that are located in the proximity of the renewable energy projects that are owned and developed by that legal entity;</p> <p>(b) the shareholders or members of which are natural persons, SMEs or local authorities, including municipalities;</p> <p>(c) the primary purpose of which is to provide environmental, economic or social community benefits for its shareholders or members or for the local areas where it operates, rather than financial profits;</p>
Rights	<p>(a) are able to access all electricity markets, either directly or through aggregation, in a non-discriminatory manner;</p> <p>(b) are treated in a non-discriminatory and proportionate manner with regard to their activities, rights and obligations as final customers, producers, suppliers, DSOs or market participants engaged in aggregation;</p> <p>(c) are financially responsible for the imbalances they cause in the electricity system; to that extent they shall be balance responsible parties or shall delegate their balancing responsibility in accordance with Article 5 of Regulation (EU) 2019/943;</p> <p>(d) with regard to consumption of self-generated electricity, CECs are treated like active customers in accordance with point (e) of Article 15(2);</p> <p>(e) are entitled to arrange within the CEC the sharing of electricity that is produced by the production units owned by the community,</p>	<p>are entitled to:</p> <p>(a) produce, consume, store and sell renewable energy, including through renewables power purchase agreements;</p> <p>(b) share, within the REC, renewable energy that is produced by the production units owned by that REC, subject to the other requirements laid down in this Article and to maintaining the rights and obligations of the REC members as customers;</p> <p>(c) access all suitable energy markets both directly or through aggregation in a non-discriminatory manner.</p>

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	<p>subject to other requirements laid down in this Article and subject to the community members retaining their rights and obligations as final customers.</p>	
<p>Regulatory framework</p>	<p>(a) participation in a CEC is open and voluntary;</p> <p>(b) members or shareholders of a CEC are entitled to leave the community, in which case Article 12 applies;</p> <p>(c) members or shareholders of a CEC do not lose their rights and obligations as household customers or active customers;</p> <p>(d) subject to fair compensation as assessed by the regulatory authority, relevant DSOs cooperate with CECs to facilitate electricity transfers within CECs;</p> <p>(e) CECs are subject to non-discriminatory, fair, proportionate and transparent procedures and charges, including with respect to registration and licensing, and to transparent, non-discriminatory and cost-reflective network charges in accordance with Article 18 of Regulation (EU) 2019/943, ensuring that they contribute in an adequate and balanced way to the overall cost sharing of the system.</p>	<p>(a) unjustified regulatory and administrative barriers to RECs are removed;</p> <p>(b) RECs that supply energy or provide aggregation or other commercial energy services are subject to the provisions relevant for such activities;</p> <p>(c) the relevant DSOs with RECs to facilitate energy transfers within RECs;</p> <p>(d) RECs are subject to fair, proportionate and transparent procedures, including registration and licensing procedures, and cost-reflective network charges, as well as relevant charges, levies and taxes, ensuring that they contribute, in an adequate, fair and balanced way, to the overall cost sharing of the system in line with a transparent cost-benefit analysis of distributed energy sources developed by the national competent authorities;</p> <p>(e) RECs are not subject to discriminatory treatment with regard to their activities, rights and obligations as final customers, producers, suppliers, DSOs, or as other market participants;</p> <p>(f) the participation in the RECs is accessible to all consumers, including those in low-income or vulnerable households;</p> <p>(g) tools to facilitate access to finance and information are available;</p> <p>(h) regulatory and capacity-building support is provided to public authorities in enabling and setting up RECs, and in helping authorities to participate directly;</p> <p>(i) rules to secure the equal and non-discriminatory treatment of consumers that participate in the REC are in place.</p>

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The definitions and rights of CECs and RECs have many similarities. The main differences relate to the applicable form of energy (only renewable energy for RECs and only electricity for CECs), locational restrictions (for RECs: proximity to renewable energy projects that are owned and developed by the community), and membership (RECs: for private undertakings, participation may not constitute their primary commercial or professional activity) (Directive 2018/2001; Directive 2019/944; CEER 2019).

Portugal

In Portugal, Decree-Law 162/2019 established the legal framework for RECs. This decree-law defines renewable energy communities similarly as they are defined in the Renewable Energy Directive. According to the REC definition in the Renewable Energy Directive, shareholders or members must be located in the proximity of the renewable energy projects but no further details are given. In Decree-Law 162/2019, Directorate General for Energy and Geology (DGEG) is assigned with the responsibility of assessing the geographic proximity on a case by case basis assuming the physical and geographic continuity of the project and the respective prosumers and REC participants. The assessment may take into account the transformation station to which the project is linked, the different voltage levels of the project, and any other technical or regulatory elements.

According to Decree-Law 162/2019, RECs must register on and interact with an electronic platform (portal) of the Directorate-General of Energy and Geology (DGEG) which is used for registration, licensing and other procedures for the management and control of self-consumption activity and RECs.

In June 2020, Order (Despacho) n.º 6453/2020 exempted RECs and collective self-consumption projects from paying costs of general economic interest (CIEG) which are included in the network tariff. Individual self-consumption projects were given a 50 % reduction. The exemption is effective for a period of seven years for projects that have registered by the end of 2021.

Finland

Update of Decree 66/2009 of the Council of the State concerning balance settlement and measurement that entered into force in the beginning of 2021 was the first Finnish legislation to address energy communities. The decree defines a 'local energy community' that can be considered a subcategory of the CECs defined in the Electricity Directive as the definition of a local energy community is mainly consistent with the CEC definition. However, enterprise members of local energy communities may include SMEs whereas CEC definition mentions only small enterprises. In addition, the right to distribute energy is mentioned in the CEC definition but not in the rights of local energy communities.

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Instead, local energy communities have an additional locational restriction. According to Decree 66/2009, local energy communities' members' or shareholders' electricity consumption points must be located within the same property or a group of properties, and they must be connected to the DSO network through the single connection point. DSO is responsible for metering of the local energy community members or shareholders.

In practice, the update of Decree 66/2009 enables formation of energy communities e.g. in apartment buildings, and the energy sharing service utilising smart meters proposed in D3.4. The update tackles the legislative barrier for energy sharing services described in D6.10.

In addition to defining local energy communities, the decree update states that end-users may form a group of active customers for the settlement of electricity deliveries if they together generate or store electricity or participate in flexibility or energy efficiency schemes. The aforementioned activities must not constitute end-users' primary commercial or professional activity. Similar locational restrictions as for the local energy communities are applied.

A local energy community or a group of active customers must register with the DSO responsible for its electricity measurements. It must inform the DSO about the consumption points that belong to the community, guidelines for allocating electricity that was generated or withdrawn from storage, guidelines for dividing electricity injected to the grid, or any changes in this information.

In balance settlement, the electricity generated or withdrawn from storage must be allocated between the community or group members according to the guidelines given by the community or group. Each community or group member's consumption and proportion of the community generation /storage withdrawal is summed within each imbalance settlement period. If member's proportion of the generation /storage withdrawal exceeds its consumption, the community or group decides whether the excess is allocated between each member or entirely to the consumption place where the generation or storage unit is located.

2.2 Issues identified in partner survey and workshop

During the final year, DOMINOES project has conducted two internal surveys to map the remaining barriers to local energy markets. These surveys were sent to all project participants in June 2020 and February 2021. The Clean Energy package was seen as the most important enabler energy transition, increase of distributed generation, utilization on demand response, and thus also local markets. Nevertheless, the main barrier mentioned in many responses was that many countries are now only starting to implement the requirements of the package. While the development of the community legislation at

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national level has already enabled provision of new services, the role of DSOs in the transitioning system remains somewhat unclear and further clarifications are needed regarding their opportunities to utilize new flexibility services such as demand response and storages. DSOs need to have access to a toolbox of flexibility solutions (from market-based to own solutions) and opportunity to buy flexibility from any public, open market place. Clear, open and transparent rules are also mandatory to ensure the engagement of all parties and to respect the right balance between market and system operation. Furthermore, while flexibility is an important element for DSOs, it is not the single solution to address all the needs.

Further work is needed to ensure that the national implementations of requirements is compatible with existing mechanisms in national markets. Yet, national differences make scaling up of services difficult. Thus, when possible, harmonized approaches should be pursued.

During the project, the Portuguese legislation has changed now allowing prosumers to store and sell electricity and also allowing the constitution of energy communities, promoted by the law decree DL 162/2019. However, the context provided by the law obligates the prosumers to comply with general market access and participation requirements, not establishing a special context to address the needs that characterise other approaches, such as local markets. Furthermore, the updated Finnish legislation covers only communities connected to the DSO network through the single connection point (e.g. community formed within an apartment house) but arrangements concerning more distributed communities are less clear.

Local market is a new concept and not directly addressed in the regulatory and legislative framework. Thus, depending on the intended services within and from the local market to external markets, different aspects in the current regulatory framework need to be considered. There is also uncertainty regarding the best technological approaches (e.g. blockchain). Thus, stakeholders need to follow carefully the development and regulators should create the necessary conditions for testing and piloting new solutions and evolving roles.

Furthermore, DOMINOES project hosted on 25 November 2020 a webinar “How to design, develop and validate a transparent and scalable local energy market solution” with presentations from both DOMINOES partners and external speakers. During the webinar, participants were encouraged to enter their views on barriers/challenges to local energy markets via an online workshopping tool. After gathering the views, participants were asked to rate the barriers/challenges by their impact (1 = no impact, 5 = major impact) on establishing local energy markets. The identified barriers/challenges and their mean rating is presented in Table 2.

Table 2 Barriers/challenges for establishing local energy markets.

Item	↓ Mean	SD
Engaging participants	4.25	0.23
Money. Is constructing & maintaining the flexibility worth it?	4.17	0.22
Customer engagement and required technology platform in place	4.09	0.29
Are local markets reliable enough source of flexibility for DSOs	3.55	0.31
Privacy and data security challenges	3.50	0.28
Complicated balancing responsibility concepts	3.42	0.31
Even if loads and aggregators can participate in ancillary service markets, minimum bid sizes may hinder participation	2.82	0.28

The highest rated barriers were related to engaging participants, whether constructing and maintaining flexibility is worth it and having required technology platform in place. The only listed barriers directly related to the regulatory framework or market rules were complicated balance responsibility concepts and minimum bid size requirements in ancillary service markets. Of these, the balancing responsibility concept was seen as a larger concern.

According to the Recast Electricity Directive, citizen energy communities, active customers, and participants engaged in aggregation have to be financially responsible for the imbalances they cause in the electricity system; to that extent they shall be balance responsible parties or shall delegate their balancing responsibility.

Balance responsibility has been considered in the development of the DOMINOES local market model. DOMINOES D2.3 discussed novel solutions for balance responsibility and imbalance settlement taking into account the impacts of local trading. Two approaches were proposed: 1) light local balance responsibility in which an additional local balance is established, and 2) full local balance responsibility in which the balance responsibility is applied even to individual end-customers. While the DOMINOES solutions are compatible with the balancing responsibility defined in the Electricity Directive, it is important to keep in mind that e.g. TSOs as purchasers of flexibility may define specific approaches for third party aggregators.

2.3 Recommendations

To summarize the previous sections, the Clean Energy for all Europeans package should pave the way for local energy markets. **Thus, to enable local markets and services provided by them, the package should be transposed into national frameworks without delays.** From the viewpoint of DOMINOES local market concept, the most crucial points are that flexibility incentives for DSOs are established, market access of demand response and aggregators is guaranteed, and frameworks for energy sharing and energy communities are created.

When designing regulatory frameworks and market rules for the competitive sectors, harmonized approaches within member states would facilitate scaling up of operation and internationalization for companies offering new services (e.g. aggregation, energy sharing within communities) and thus provide more options for European consumers and prosumers that could serve as an example also outside Europe.

Arrangements related to energy sharing within communities and participation of flexibility (including participation of third-party aggregators) in ancillary service markets have been piloted in several projects. Pilots have revealed both technical and regulatory aspects that need further consideration. **Thus, piloting of novel solutions in cooperation with regulators should be promoted to identify best solutions and to tackle possible gaps in regulation and standardization.**

Trading with local resources (e.g. energy trading between prosumers, third-party aggregation of flexibility) contradicts with the traditional chain of balance responsibility. DOMINOES project has in D2.3 proposed **two novel solutions for balance responsibility and balance settlement arrangements.** Whatever solution is applied, if correction mechanisms are included in balance settlement, they should be as light and simple as possible to enable market access of new, potentially small service providers. Some flexibility services (e.g. frequency regulation) do not have significant impacts on energy, and do not necessarily require consideration in the balance settlement.

When designing incentives for DSOs to utilize flexibility services, different needs of DSOs should be considered, including congestion management and security and quality of supply. However, it should also be taken into account that even if flexibility would be a feasible option, it is not always the best option (e.g. if there are uncertainties related to the availability of flexibility). Thus, use of flexibility should not be favoured if other options are more efficient. Because of pre-existing differences in national regulatory frameworks, different mechanisms may be applied. For monopoly sector, such differences are not critical, as long as same goals are achieved.

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Finally, the **minimum bid size requirements** in ancillary service markets should be reviewed and, in some cases, lowered. While differences between different product types may be justified, there is currently large variation in the minimum bid sizes of similar products in Europe (see ENTSO-E, 2020 for details).

3 Partner activities

Partners' activities related to standardization, regulation and legislation have been mapped throughout the project via web-based surveys sent at regular intervals to all project partners. The last survey was conducted in February 2021. This section summarizes the activities throughout the project duration.

Standardization organizations

Enerim and LUT have been active in SESKO's (Finnish National Electrotechnical Standardization Organization) committee SK8 Systems aspects for electrical energy supply and are involved in discussions on flexibility management technology implementation. SK8 participates in activities of the committees IEC TC 8 Systems aspects for electrical energy supply, IEC SC 8A Grid Integration of Renewable Energy Generation, IEC SC 8B Decentralized Electrical Energy Systems, IEC TC 123 Management of network assets in power systems, IEC SyC Smart Energy, and SyC LVDC Low Voltage Direct Current and Low Voltage Direct Current for Electricity Access. Furthermore, SK8 participates in CENELEC committee CLC/TC 8X System aspects of electrical energy supply. During DOMINOES project, Enerim has participated in ten SK 8 meetings and LUT in three. The topics addressed in these meetings include, for example, connecting of distributed resources, energy storages, microgrids, and measurement systems and load control. In addition, LUT representative has directly participated in three SyC LVDC meetings.

LUT has also been active in SESKO's committee SK69 Electrical road vehicles and industrial trucks. The national committee participates standardization work of the committees IEC/TC 69 (Electric road vehicles and electric industrial trucks) and CENELEC/TC 69X (Electrical systems for electric road vehicles) and also observes committees IEC/TC 21 (Secondary cells and batteries), IEC/SC 23H (Plugs, Socket-outlets and Couplers for industrial and similar applications, and for Electric Vehicles), IEC/SC 121B (Low-voltage switchgear and control gear assemblies) and ISO/TC22/SC21 (Electric Road Vehicles). The national committee SK69 prepares national standardization in the field of EV charging for Finland and provides national guidelines to follow. During DOMINOES project, LUT has participated in 14 SK69 meetings. The issues addressed in these meetings include, for example, fire and electrical safety issues related to EV charging. The committee contributes to the national EV charging recommendations published by SESKO. Updated recommendations will be published in 2021 (previous version published in 2019).

E-REDES is active in several European initiatives like the BRIDGE initiative which facilitates information sharing between Horizon 2020 projects related to Smart Grid, Energy Storage, Islands, and Digitalization to identify possible obstacles to innovation based on experiences from demonstration projects.

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UoL has followed the ISO 27000 series relating to logging and monitoring of network traffic and GDPR related to data handling, data storage and data collection. Furthermore, in October 2020, UoL attended a kick off meeting of a series of Roundtables: “ICT Verticals and Horizontals for Blockchain Standardisation.” This meeting was organized by DG Connect and it aimed to allow H2020 projects to present the work done and explore more active involvement into activities of blockchain standardization bodies. The meeting included speaks about the value and importance of blockchain, for example, from the IEEE standardization sector chair.

The development of the standardization related to local markets has taken place via cooperation between several industrial and scientific partners and not solely within DOMINOES project. Nevertheless, the different committees and meetings attended have been highly relevant for DOMINOES project as they have covered topics such as design and management of decentralized electricity supply systems, cybersecurity in power systems, and virtual power plants. EV charging on the other hand represents a potential controllable load i.e. demand response resource. Thus, participation in the committees and meetings has helped to increase the awareness of technological standard capability in facilitating local market functions.

Regulators/legislators

Enerim has been active in the IEEE Power and Energy Society through collaboration with research partners and DG CONNECT discussions on facilitation of flexibility information exchange (e.g. implementation of datahubs). DG CONNECT facilitated an interactive session between development projects where DOMINOES was showcased as part of Utility Week in Paris (2019).

In addition, Enerim has had several activities with the national regulator and legislators. Enerim has done background work on flexibility as part of balance settlement and network ancillary service value for the Finnish Energy Authority. Enerim has also discussed with the national regulator and legislator in conjunction with development of future network codes to ensure legislation on relevant information / processes at networks to utilize flexibility in line with requirements coming from the Clean Energy package package. This is important for the DOMINOES project because it relates to the enablement of local market functionality to provide flexibility for network needs.

To facilitate solar PV production in housing companies, **LUT** was involved in writing a policy brief (Auvinen and Honkapuro, 2018), published in August 2018, that promotes allowing the use of virtual metering services for dividing building’s PV generation between the residents. This service was enabled by a change of change of Finnish legislation in the end of 2020, as discussed in section 2.1.3.

PUBLIC

LUT has participated in a study on electricity self-production and energy communities for the Finnish prime minister office. Final report (Gaia Consulting and LUT University, 2019) was published in December 2019, and it includes proposals for promoting energy communities and self-production in Finland, including proposals for regulatory changes.

LUT has analyzed the development needs in the Finnish regulatory framework for DSOs (Partanen et al., 2020). Suggestions for developing the regulation methodology for the next regulatory period starting in 2024 were given, including the inclusion of flexibility incentives.

CNET has been participating in European projects promoting the aggregation of flexibility or use of storage and has promoted recommendations for changes in EU regulations and policies. In addition, CNET has participated in a flexibility pilot test (led by the Portuguese Regulator), for load flexibility participating in the ancillary services provision.

E-REDES is in contact with both European and national regulators/legislators to share knowledge and identify needs and steps forward. E-REDES has regular interactions with the Portuguese Regulator, ERSE. Furthermore, their regulation department has participated in some consultations promoted by the Council of European Regulators. E-REDES is involved in several European projects regarding the development of new local flexibility services to support DSO needs.

E-REDES is also active in European Distribution System Operators (E.DSO) which promotes the development and testing of smart grid technologies in real-life situations, new market designs and regulation. E-REDES exchanges information of best practices and opportunities with E.DSO and EPRI.

VPS maintains informal contacts with the Portuguese energy services regulatory authority to better understand the medium to long term legislator viewpoint and position. For example, the need of having a legal framework that allows a more active role of the energy consumer/prosumer in the energy systems of the future, namely, having the possibility of implementing the Local Energy Markets being developed in DOMINOES project has been discussed with the director of pricing and tariffs of ERSE. VPS has also had a meeting with DGEG (Directorate-General for Energy and Geology) a public administration body working on the design, promotion and evaluation of public policies related to energy resources, focusing on the discussion and clarification about the future legal framework to implement renewable energy communities. VPS has discussed with a market manager of the Portuguese TSO regarding a pilot project for demand-side participation in the regulatory reserve market. In addition, VPS has also participated in some workshops and in the public consultation phase of some regulatory documents by offering comments or asking for clarifications.

PUBLIC

VPS has become a member of Smarten, a European business association integrating the consumer-driven solutions of the clean energy transition, which holds weekly meetings with its members to update on EU policy developments and gather members' feedback. Through Smarten VPS has voiced its comments to public consultations on legislative acts, such as the EU Renewables Directive and Energy Efficiency Directive. VPS believes that the success of Local Energy Markets is closely linked with the EU Renewable Directive efforts to promote Renewable Energy Communities.

VPS has also become a member of APESE, which is the Portuguese association of Energy Services Companies. APESE gathers opinions, comments and proposals from its Members to interact with the Portuguese energy regulator (ERSE) and other relevant stakeholders (e.g. government, financial institutions). Recently, VPS has contributed to APESE's reply to the public consultation launched by ERSE regarding the upcoming Self-Consumption Regulation. As mentioned, VPS believes that the success of Local Energy Markets depends closely on the definition of clear and simple regulations regarding the installation of Renewable Energy Communities.

USE has disseminated results and asked for regulator viewpoints on topics such as prosumer legislation, types of self-consumption and their regulatory, legislation about selling your energy to grid.

The formal cooperation and informal discussions with the regulators promote information exchange between the project and the regulator. This has enabled taking the regulatory viewpoints into consideration when the work is in progress and also bringing new viewpoints to developers of regulation and market rules.

CIREN

Several DOMINOES partners have presented papers⁴ related to local energy and flexibility markets in CIREN (international association active in the technical field of Electricity Distribution Systems) conferences and workshops. In addition, E-REDES, CNET and LUT have had representatives in several CIREN working groups with focus on issues such as flexibility in distribution systems and microgrid business models. These activities enable knowledge sharing and enhancement.

The working groups with DOMINOES partners have included:

- Microgrids in interconnected and islanded modes - WG 2018-3 (CNET/E-REDES)
- Microgrids business models and regulatory issues - WG2019-2 (LUT)

⁴ Detailed list of DOMINOES related publications can be found in D6.4, D6.5 and upcoming D6.6.

PUBLIC

- Blockchain, Transactive Energy and P2P Trading - WG 2018-6 (LUT)
- Flexibility in active distribution systems - WG 2019-3 (LUT)

These working groups have focused on issues such as frequency control and voltage regulation (WG 2018-3), challenges presented by transactive energy, role of DSOs in the implementation of such marketplaces, market models and business models of transactive energy and associated opportunities and challenges for DSOs (WG 2018-6) (CIRED 2020), microgrids value, taking into consideration ability to optimize DSO's investments and provision of services to power system (WG2019-2), possible structure of markets relevant to flexibilities provided by distributed generation, storage systems and active demand to DSOs and TSOs (WG 2019-3) (CIRED 2020). These issues are considered also in the DOMINOES project and thus, DOMINOES project has enabled provision of relevant information for the working groups and vice versa.

4 Conclusions

Compatibility with existing market structures and the ongoing policy development were among the key design goals of the DOMINOES local market concept. Thus, existing market rules and the 'Clean energy for all Europeans' package which was published before the project and finalized during the project have been carefully considered in the development of the local market concept. Many of the identified barriers for local markets are expected to be alleviated by the implementation of this package.

However, since the key topics enabling local trading/sharing and services from local stakeholders to the higher-level markets are addressed in Directives, the topics need to be transposed to national legislation first. Some positive developments have already occurred in national legislation, especially the inclusion of energy communities into national laws. This has partly removed the barriers to P2P trading/sharing discussed in earlier deliverables of this task. However, while the Portuguese legislation has adapted the requirements concerning renewable energy communities largely as they are described in the Renewable Energy Directive, in Finland the community legislation is restricted to communities connected to the DSO network through the single connection point. The Finnish decree thus enables communities e.g. in apartment houses and can boost generation investments in them. However, the framework for energy trading/sharing between e.g. detached houses is less clear.

The deadline for transposing the framework for citizen energy communities is only at the end of the project. Thus, additional guidelines and more conducive framework for local markets may emerge soon. Furthermore, creating incentives for DSOs to utilise flexibility (and thus enabling the utilization of local market services by DSOs) takes time as the regulatory framework is typically set for a long period at a time. Both Finland and Portugal are yet to establish the flexibility incentives required by the Recast Electricity Directive. Nevertheless, it is important to take into account that DSOs in different environments have different needs for flexibility.

Thus, to enable uptake of local markets and utilization of services provided by them, the following key recommendations should be fulfilled:

- Requirements of the Clean Energy package should be transposed in Member States without delays
- Remuneration mechanisms for DSOs should take into account the use of flexibility for congestion management and for reliability and quality purposes
- When possible, Member States should strive for harmonized approaches to facilitate wide uptake and scaling up of the new services
- Piloting of novel solutions in cooperation with regulators should be promoted to identify best solutions and gaps in regulation and standardization.

CONCLUSIONS

PUBLIC

Throughout the project, DOMINOES partners have actively taken part in the development of the standardization and regulatory framework enabling local markets. These activities have included participation in standardization organizations' work, and both formal (e.g. project regarding energy communities for the Finnish Prime Minister's office) and informal cooperation (discussions, checking for viewpoints) with legislative and regulatory bodies. The partners are following and taking part in the development of an enabling framework for local markets via different working groups and industrial associations, enabling sharing of best practices and giving policy recommendations with a larger impact.

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