reschool
Creation, growing and management of energy communities

National Reports on Evolving Regulatory Frameworks for the Market and System Integration of Energy Communities

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Executive Summary

D5.3 reports on the evolution of national frameworks in the 4 EU countries where the RESCHOOL pilots are located, in Amsterdam, Athens, Hämmärby Sjöstäd (in Stockholm) and 4 municipalities around Girona in Catalonia[1]. The report covers areas and initiatives of regulatory and legal reform that are meant to foster the integration of energy communities into European energy markets and systems. With many regulatory changes that are not designed to exclusively improve energy community frameworks, D5.3 takes a look beyond and analyses areas that include the evolution of market designs, self-consumption and energy sharing, taxation and network tariff structures, (virtual) net-metering and (virtual) net-billing, solutions for increasing grid congestion (mostly at distribution level), financial support mechanisms and the interaction with system operators and other new and established energy market and system actors (such as aggregators).

In this context and building on the previous Deliverable of this work stream of RESCHOOL (D5.2, the public version of the report on economic sustainability of the RESCHOOL pilots), this present report first provides 4 national reports: 1) on the Netherlands, where new major energy legislation is entering into force, expected to modernize and adapt regulatory frameworks to new realities and reflect increased decarbonisation and decentralization efforts; 2) in Sweden, where key stakeholder are recommending to, at last effectively transpose EU requirements on energy community frameworks; 3) in Spain, where several reform initiatives are being debated among decision-makers and energy stakeholder, incl. on extending and simplifying self-consumption, the facilitation of aggregation and the legal establishment of renewable as well as citizen energy communities; 4) in Greece, where the government, after transposing EU provisions on energy community, has issued a ministerial decree to establish a regulatory framework on virtual net metering. D5.3 aims to improve the understanding on business and operational environments of energy communities in these 4 countries, which is prerequisite to issuing policy advice, which will be done in the next deliverable (D5.4) under this RESCHOOL work package.

[1] See detailed information on the RESCHOOL pilots at Pilots - Reschool project (reschool-project.eu)

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Introduction

The increasing frequency and growing impact of world-wide climate disasters, resulting in great harm that is suffered by people, the environment and wildlife, demonstrates our planet's emergency – and the need to consequently reduce greenhouse gas emissions and decarbonise the ways the produce and use energy. The rise in global temperatures is happening at more extreme levels and sooner than even many scientists had predicted until only a few years ago. 2023 is confirmed to be the hottest year since data are available (and for probably around 100,000 years), while certain models indicate that the 1.5°C objective from the Paris Agreement may have been exceeded in the course of 2024. Despite heftier climate change denial that becomes increasingly reflected in political representation and uncertainty about developments in today's severe geopolitical conflicts, many decision-makers in governments, industry and civil society recognise that continuing the transition to net-zero is the only way to mitigate further climate change, and at the same time strengthen Europe's economic performance and its domestic industries – which are key in delivering clean energy technologies that effectively decarbonise our energy, mobility, buildings and industry sectors.

While EU leaders have addressed the tremendous opportunities that lie in the transformation of Europe's systems and markets, by adopting ambitious policy and legal reform under the Green Deal and the previous Clean Energy Package (adopted in 2018-19) that formulate higher climate and energy targets in the 2030 and 2050 timeframe, the transposition into legal frameworks and the implementation through concrete measures at Member State level is, in many places, lacking behind. With only 5 years left until 2030, when the EU should reach a 45% share in renewable energies (and 25 until we should be climate-neutral), the focus is on national authorities to transpose EU provisions that, amongst other, foster decarbonized, decentralised and smart energy infrastructures that can integrate higher shares of renewable energy sources (RES), and improve market architectures so actors such as self-consumers, energy communities, aggregators and other innovative service providers can benefit from undertaking activities that include energy sharing, demand response, the provision of flexibility, or selling surplus electricity.

In the context of energy communities, many expert stakeholders as well as previous RESCHOOL publications[2] stress out that much stronger political and regulatory support is required, if Europe is to unlock the substantial economic, environmental and social benefits they offer. Many of Europe's emerging energy communities – such as the RESCHOOL pilots in Amsterdam, Athens, Stockholm and the surroundings of Girona – are facing regulatory barriers and uncertainty that challenge their economic sustainability and growth. With public support through grants, subsidies, and other mechanisms remaining crucial to their viability, national authorities are tasked to establish definitions and enabling frameworks for renewable as well as citizen energy communities, and in parallel improve market designs that unlock flexibility potentials at local level and enhance generating new revenue streams.

Experts estimate that by 2050, half of all EU households (or: 113 million) could be producing renewable energy, while 64 million households could be doing so as members of energy communities[3]. Policy-makers and other involved stakeholders who are deciding on reform and support measures that can

[2] See the report on economic sustainability of the RESCHOOL pilot communities, August 2024
[3] REScoop.eu

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advance community energy development should be reminded about such potentials and the convincing value proposition: through citizen and community involvement in decarbonisation processes and higher social acceptance of renewable energy projects, reduced public and private expenditure on energy (that can alleviate risks of social unrest and energy poverty), increased resilience through shorter supply and local value chains, improved domestic labour markets and social cohesion. Moreover, energy communities augment autonomy and energy security, while smart energy management - in combination with storage, demand response, aggregation, self-consumption and/or energy sharing - can reduce infrastructure costs and help avoid investments in conventional grid extension.

Objectives of the 4 Reports

EU-funded initiatives such as RESCHOOL implement EU decarbonisation strategies and policies through concrete actions that are designed to improve the life of citizens in Athens, Amsterdam, Stockholm and around Girona, in form the many benefits the active community involvement in the transition to net-zero delivers. The RESCHOOL project applies social and technology innovation that improves energy behaviour and increase engagement among energy consumers, incl. of younger generations (mostly through gamification and intergenerational learning), while in the long-term foresees to be providing local, renewable, affordable and secure energy to households and businesses. Yet many renewable and citizen energy communities (as per RED II and IEMD[4]) that are being developed today in Europe are - and just like the RESCHOOL pilots - challenged by legal and regulatory barriers that prevent operating and expanding in economically more sustainable ways.

Therefore, the 4 national reports of this Deliverable aim to shed light on evolving regulatory frameworks, providing overviews and background information on recent and ongoing policy and legal reform developments, happening in the Netherlands, Sweden, Spain and Greece. In the Netherlands, where new flagship legislation (the Energy Act) has been just adopted and is expected to establish energy communities as market actors and offer solutions to increasing grid congestion, mainly at distribution level; in Sweden, where government and other stakeholder are debating how to improve (or remove the lack of) framework conditions for energy communities; in Spain, where regulation is further evolving on self-consumption and renewable as well as citizen energy communities, while decisions on transposing EU provisions on aggregation, flexibility and capacity markets are in the making; in Greece, where a recent law is introducing energy communities into national legislation (while the country has been a frontrunner on this since 2018). The 4 reports are issued to improve the regulatory understanding on drivers and barriers that allow and disallow further development of community energy, in a period of time when momentum for such initiatives is gaining across EU countries. With many regulatory changes that are not designed to exclusively improve energy community frameworks, D5.3 takes a look beyond and analyses areas that include the evolution of market designs, self-consumption and energy sharing, taxation and network tariff structures, the development of system flexibility and local energy markets, solutions for increasing grid congestion (mostly at distribution level), financial support mechanisms and the interaction with system operators and other new and established energy market and system actors (such as aggregators).

[4] Recast Renewable Energy Directive (2018/2001/EU) (RED II), Integrated Electricity Market Directive (2019/944/EU) (IEMD)

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Also, the national reports will build the basis for issuing the RESCHOOL policy recommendations (under the following Deliverable of this WP, D5.4).

Contributions of Partners[5]

This report is based on the input received from among the RESCHOOL pilots, which are as follows:

- Girona Pilot: KMo Energy, Diputació de Girona, Bamboo Energy
- Amsterdam Pilot: Resourcefully, Gemeente Amsterdam, Open Remote
- Stockholm Pilot: ElectriCity, Local Life
- Athens Pilot: Collective Energy, Centre for Research and Technology Hellas (CERTH)

Additional involved partners are the Universities of Utrecht and of Girona as well as RISE, who, together with the RESCHOOL pilots, have contributed with expertise and background information on recent and ongoing regulatory and legal reform efforts, with regard to definitions and enabling frameworks for energy communities, the evolution of market designs, self-consumption and energy sharing, taxation and network tariff structures, the development of system flexibility and local energy markets, solutions for increasing grid congestion (mostly at distribution level), and the interaction with system operators and other new and established energy market and system actors (such as aggregators). Further input has been provided on the respective national decision-making process itself, in terms of political landscapes and incumbent industries which are driving or preventing the evolution of regulatory frameworks for energy communities, as well as on information on stakeholder consultations, draft legislative documents, relevant studies etc.

LINK TO OTHER WORK PACKAGES AND TASKS

The 4 national reports build on and analyse in more detail the regulatory evolutions that were discussed and summarised in the previous publication of this RESCHOOL Work Package, which is the report on economic sustainability of the RESCHOOL pilot communities (D5.2). In parallel, these 4 reports will build the basis for issuing the RESCHOOL policy recommendations, as foreseen under the following Deliverable of this WP, D5.4. As such, the regulatory analysis is an important pillar of RESCHOOL's exploitation strategy (developed under T5.1), giving fellow energy communities and replicators access to improve understanding of factors that determine the framework environments of community energy projects, which can be exploited in the development of new initiatives and activities, and in the dialogue with energy and climate stakeholders, incl. at municipal, local and national levels. In parallel, these 4 reports provide advice on changes in regulation that help enable the market uptake and integration of activities conducted within the pilots, thereby feeding project experience made under WP4 (on pilot deployment, adaptation, validation) and also under WP3 (on energy management technologies for communities) into WP5. Also, the results achieved under T5.3 will be used in the replicability assessment and stakeholder engagement through lighthouse replicants, to be conducted under T5.4, incl. in form of dedicated stakeholder roundtables. Regarding WP6 (on dissemination, communication & networking), this report will be relevant especially for the activities carried out under T6.4, which extends to collaboration and exchange with related Horizon

[5] Please see the full list and further information on RESCHOOL partners at www.reschool-project.eu/about-us/#partners

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and other EU initiatives (incl. through BRIDGE), and the high-level policy workshop that will be held towards the end of RESCHOOL in Brussels.

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1. National Report on the Netherlands

Reporting on evolving framework conditions for energy communities in the Netherlands needs to take several aspects into account: first, the Dutch government's ambitious climate and energy targets, seeking to reduce greenhouse gas emissions by 49% until 2030 (compared to 1990 levels), and by 95% reduction until 2050. These objectives were adopted in the 2019 Climate Act, while the overall decarbonisation framework further includes the Climate Plan, the National Energy and Climate Plan (NECP, as required by the EU Governance Regulation) and the National Climate Agreement, which lays out policies and measures to achieve these climate goals. This includes the decision to phase out the use of natural gas in the built environment, with heating to become carbon-free by 2050 and the intermediate target to have 1.5 million of the Netherland's almost 8 million dwellings heated with natural gas – which is a significant driver of increasing electricity production from renewable sources, that amounted to 32.3 billion kWh in the first half of 2024. As a result, and for the first time, more electricity was produced from renewable than from fossil sources, namely 53% (of the total electricity production). In this context, also the significant growth potential and positive outlook in generation capacity for self-consumption for the upcoming years has been acknowledged, with the Dutch Climate Agreement setting out a non-binding policy objective of 50% local ownership of renewable energies on land until 2030.

Second, the country looks back to a long-standing tradition of energy cooperatives, which today display a strong presence of 714 entities in the Netherlands (in 2023), involving 89% of the municipalities and 131.000 participants[6]. Activities of larger cooperatives include joint investment in renewable energy projects, self-consumption of locally generated electricity from PV that was organised according to postal code affiliation (where energy consumers receive an energy tax deduction for energy produced within a collective renewable project situated in their postal code area), as well as the optimization of consumption and production, energy services, the provision of flexibility to the grid and aggregation of available capacity to energy markets (min. 1 MW for participation required). With regard to energy communities, Dutch regulatory authorities have been facing the question if and to what extent the many existing energy cooperatives can be treated as renewable or citizens energy communities, thereby determining the level of ambition when introducing enabling frameworks and amend other relevant provisions - as done now through the new Energy Act the 2025 Tax Plan that foresees the phase-out of net metering (see chapters 1.1 to and 1.3) in 2027.

Third, the Dutch electricity grid is exposed to congestion issues, due to increasing renewable energy installations and electrification initiatives (mainly in the mobility and heating sector) – which is contrasted by limited grid expansion. Securing grid connections has become challenging while grid fees have seen significant hikes, and real-time congestion is surging. Since most decarbonisation technologies rely on electricity, reduced access and high grid costs are threatening the Dutch transition to net-zero. In response, the Dutch Government launched in January 2024 the National Action Program for Low Voltage Grid Congestion (see chapter 1.2), outlining measures to solve congestion at distribution level.

[6] Source: Lokale Energie Monitor 2023

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1.1. The Energy Act – Game Changer for Dutch Energy Communities?

The new Energy Act is meant to build the legal foundation and accelerate the Dutch transition to net-zero, and make national legislation and regulation comply with EU law[7]. Adopted by the Senate in December 2024[8], the new Act replaces and updates the currently applying Electricity Act and Gas Act from 1998 (but not the Heat Act), aiming to modernize Dutch energy systems and markets, and promote increased local renewable energy production, storage and flexibility. The Act issues measures to empower residential as well as industrial consumers, who are encouraged to play a more active role in the energy transition. This is done, amongst others, through provisions that legally recognise energy communities and active customers, and facilitate activities such as energy sharing, peer-to-peer trading and demand response, as well as easier supplier-switching, improved access to data and the protection of vulnerable groups. Regarding energy systems, there are now more options for a flexible use of the electricity grid, with a revised framework for transmission and distribution system operators, incl. the broader application of congestion management and the expansion of 'cable pooling[9]' options.

1.1.1. Provisions for legally recognizing new market actors: energy communities & active customers

Relevant in the context of RESCHOOL and this report is the legal recognition of new market actors, such as energy communities, but also active consumers. This gives both a distinct position and partly overlapping role in the energy market, alongside suppliers, producers and grid operators. By recognising energy communities as legal entities, it enables them to make bilateral agreements with suppliers and DSO's/TSO's.

As such, the Energy Act defines market participants as natural or legal persons who buy or sell electricity (or gas) without the intervention of another market participant, or who produce, aggregate, supply, facilitate peer-to-peer trading, or who provide demand response services or energy storage service for electricity (yet actors sharing electricity are not considered as market participants). At the same time, market participants are prohibited to prevent final or active customers from participating in energy communities, as well as from producing electricity for self-consumption, storage, supply to third parties, or from providing flexibility services. This definition considerably widens the range of activities that can now be conducted on Dutch electricity markets and intends to create a level-playing field for all actors involved, reflecting developments towards a decentralised, decarbonised and digitalised system architecture that are designed for the integration of higher RES shares. In this context, energy community are, for the first time in Dutch regulation, legally recognized as entities that carry out activities on the energy market, with the main objective to provide environmental, economic or social benefits to its members, partners or shareholders, or to the local areas in which it operates. This transposition approach is largely built on replicating

[7] such as the revised Renewable Energy Directive, the reformed Energy Market Design, and the Decarbonised Gas Package
[8] Approved by the Senate on 10 December 2024, the entry into force will take place in phases. While some provisions apply immediately after publication in the Government's official journal, others follow later. This gives companies and organizations sufficient time to prepare and adapt.
[9] Cable pooling offer a solution to insufficient connection capacity, by 'pooling' multiple generation capacity on one single grid connection. For instance, this is feasible in situations where a solar park is installed close to an existing wind park that has a grid connection. Cable pooling can also be applied on an industrial location with an existing connection capacity, which can accommodate a wind/solar park.

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respective EU definitions[10], incl. the provision that energy communities are not meant to generate financial gains as its primary purpose. Likewise, the Energy Act closely follows the Clean Energy Package on defining what active customers are entitled to do – who are final customers, or a group of final customers acting jointly - and who consume or store self-generated or shared electricity within their own or joint installation, who sell or share self-generated electricity, who consume or store shared electricity, or who use flexibility or energy efficiency services, provided that such activities do not constitute their principal commercial activity.

With regard to membership and participation, governance and control of energy communities, the Energy Act lays down the following: 1) participation is open and voluntary, granting members the right to leave an energy community; 2) the actual control over the energy community lies with members, partners or shareholders who are natural persons, SMEs, municipalities, provinces or joint arrangements (with equal voting rights). Also, energy communities developing renewable energy projects may assign the actual control over to those members who are established in the vicinity of such projects.

An enabling framework element, in addition to the provisions on energy sharing, peer-to-peer trading, aggregation and demand response (see chapter 1.1.2), is the exemption granted to energy communities which produce electricity (or gas) to supply without a permit - with the restrictions that 1) the electricity (or gas) is supplied to members or shareholders of the energy community; 2) not more electricity or gas is supplied than is fed into the system, on a yearly basis; 3) the energy community does not have more members or individual shareholders than a number that is yet to be determined by ministerial regulation.

1.1.2. Energy community empowerment through energy sharing, peer-to-peer trading, demand response, and dynamic pricing

Through the Energy Act, members within an energy community, as well as active customers, get the right to share energy, if: 1) the energy community (or active customer) concludes an energy sharing agreement with a supplier that offers such a service (and with whom there is a supply agreement); 2) if adequate metering devices are installed; and if 3) the electricity is shared per imbalance settlement period – which is 15 minutes in the Netherlands.

Furthermore, the Energy Act establishes definitions for activities and agreements that extend to peer-to-peer trading, demand response, the feeding-in of electricity and other aggregation. In legal terms, a feed-in agreement is required when a market participant purchases electricity from an active customer, while peer-to-peer trading is the supply of renewable electricity produced by an active customer (which can be an energy community) to a final customer, under pre-determined conditions regarding the automatic execution and settlement of that supply. This is facilitated by a supplier for the benefit of an end user and on the basis of a supply agreement for peer-to-peer trading. In this case the active customer selling his renewable electricity (via a market participant who facilitates peer-to-peer trading) is exempted from having a supply permit.

[10] See the relevant provisions on Renewable as well as Citizen Energy Communities in the recast Renewable Energy Directive (2018/2001/EU) (RED II) and Integrated Electricity Market Directive (2019/944/EU) (IEMD), both adopted as part of the Clean Energy Package in 2018-19

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Demand response is defined as change in the consumption of electricity compared to their normal consumption patterns, in response to market signals or system needs, with the aim of selling the demand reduction or increase on an energy trading market. Demand response agreements are setting the conditions under which a market participant can apply demand response for the benefit of an end user. In terms of balancing responsibility and settlement, market participants who are different from the supplier need to conclude an agreement with the balancing responsible party (BRP), unless the services are provided to TSOs and DSOs. Also, they are bound to request the BRP to make a "reasonable" financial compensation offer for adjusting the electricity consumption or feed-in as a result of the demand response, with regard to imbalance costs that might occur, and for the exchange of relevant data. When calculating the financial compensation, a method shall be applied that is still to be determined by the Consumer and Markets Authority (the Dutch regulator, or ACM), considering both the electricity purchased but not sold through demand response, as well as the electricity not purchased but sold in addition (through demand response). In general, the Energy Act transposes Article 5 of EU Regulation 2019/943[11], requesting producers or active customers who do not sell electricity via a market participant (or a final customer who does not purchase electricity via a market participant), to be responsible for ensuring that a balancing responsible party for electricity is active at the connection point in question.

Additional reform measures that can benefit also energy communities stem from EU requirements that suppliers[12] with more than 200,000 customers, are obliged to offer dynamic price contracts to customers who submit such a request and are equipped with smart meters that fulfill necessary communication functionalities. Such dynamic supply agreement needs to reflect the price variation on the spot markets and where the intervals are equal to or greater than the market settlement period of those markets. In this context, the supplier must provide information about the potential benefits, costs and risks of such arrangements, prior to concluding dynamic supply agreements.

1.1.3. Further consumer protection and empowerment, flexible use of the electricity grid and exchange of information between grid operators, energy suppliers and consumers

The agreements on feed-in, peer-to-peer trading, demand response and dynamic price contracts underlie certain requirements regarding transparency, clear contractual information and language, price comparison, fees and timeframes for supplier switching and termination, final settlement, and the treatment of complaints. Customer protection and empowerment that can be also relevant to energy communities is further enhanced through provisions that require suppliers who facilitate peer-to-peer trading on behalf of an end user – or members of an energy community – to trade at transparent costs and reasonable conditions, while ensuring that the amount of electricity that is supplied to end users over a period of one year does not exceed the amount of electricity that is returned under feed-in agreements concluded for peer-to-peer trading in that same year. Other provisions in this respect include the issuing of invoices that are free of charge, inform on energy sources used (substantiated by means of guarantees of origin) and provide transparent and comprehensive data on supplied amounts.

[11] the Internal Electricity Market Regulation and part of the Clean Energy Package
[12] other than those facilitating peer-to-peer trading

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Activating demand response, peer-to-peer trading and energy sharing require a more flexible use of the grid (while at the same time reducing grid usage), and the entry of new market participants, such as aggregators. In consequence, the Energy Act requires DSOs who purchase a demand response service, in form of changes to the load, to adjust the regime of the BRP and unlock the flexibility in the system. Also, the aggregator must settle the adjusted amount of electricity between the demand response provider and the corresponding BRP in accordance with a calculation method to be determined by ACM, the Dutch regulator. For the implementation, the system operator shall use no more than quarter-hourly metering data for electricity and aggregate the metering data of the connected parties at the earliest opportunity. In this context, the DSO facilitates and interacts with the TSO on the administrative handling and data exchange of the balancing. As such, TSOs and DSOs must cooperate and provide each other with the data necessary for the performance of their legal tasks and obligations, and for ensuring and stimulating the effective involvement of market participants in energy markets.

The Energy Act further regulates the exchange of data among different market and system actors, incl. through provisions on metering responsibilities and obligations, the installation and management of smart meters, as well as the collection and validation of data (for connections below or equal to 3x80A: the DSO). This is e.g. relevant to energy communities and active consumers who have multiple market participants on one connection and conclude agreements on supply, feed-in or peer-to-peer trading. In general, TSOs and DSOs are instructed to provide suppliers, market participants (incl. active customers, energy communities), balancing responsible parties, and metering responsible parties with the data (yet to be determined by ministerial regulation) that are used for processes that namely secure the functioning of the energy system and include purchasing, supplying, feeding-in, facilitating peer-to-peer trading, sharing, aggregating, switching, generating, storing, trading, balancing, measuring, connecting, transporting and managing and maintaining systems. To that purpose and at institutional level, Dutch TSOs and DSOs shall jointly establish a legal entity to perform the data exchange tasks that foster functioning energy markets and systems.

1.1.4. Mitigating grid congestion through cable pooling & revised framework for TSOs and DSOs

Already ahead of the Energy Act's adoption and entry into force, in November 2024, ACM had issued measures to improve the utilization of electricity network connections and the network itself. By giving market participants (e.g. electricity producers, battery systems, businesses) the right to share a single connection - also known as cable pooling – the authorities expect to alleviate congestion problems and avoid peak production. While cable pooling was previously available to solar and wind parks, it is now allowed, by means of the Energy Act, for all types of buyers. However, it is only of interest to energy communities who operate both, wind and solar. There is a minimum capacity threshold is in place (starting from2 MVA), as well as a maximum number of market participants who can share a single connection (up to 4 properties according to the Dutch Valuation of Immovable Property Act). In practice, cable pooling is currently often implemented under MLOEA scheme - which stands for "meerdere leveranciers op één aansluiting, or multiple suppliers on a single connection - when market participants make arrangements among themselves about the use of the shared connection and access to the grid.

The Energy Act further revises roles and responsibilities for TSOs and DSOs. In addition to general obligations to manage, maintain and develop the electricity system and guarantee safety, reliability and efficiency, TSOs and DSOs must be taking aspects regarding the environment, digitalisation,

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energy efficiency, the transition to a sustainable energy system and the functioning of the European internal market into account. Also, the purchase of congestion management or system management services shall be considered, if it can prevent the system from being overloaded, whereas system operators shall procure congestion management or system operation services (other than re-dispatching) according to transparent, non-discriminatory and market-based procedures that facilitate the participation of all eligible market participants - unless the procurement is not economically efficient or would lead to serious market disruptions or increased congestion. Equal criteria and procedures apply to the procurement of non-frequency ancillary services.

1.2. National Action Program for Low Voltage Grid Congestion

Prior to the regulator's decision to allow cable-pooling with the intent to mitigate grid congestion (see chapter 1.1.4), the Ministry for Climate and Energy launched in January 2024 the National Action Program for Low Voltage Grid Congestion[13], setting out a series of measures to prevent and mitigate (the consequences of) congestion of low-voltage grids. Acknowledging the very risks and social consequences if no measures were taken, the Program estimates that one and a half million consumers could be affected by issues related to grid congestion by 2030, incl. in form of disconnections, dysfunction of electrical equipment, and the non-integration of additional renewable sources that are required for the Netherland's transition to net-zero. In parallel, the lack of grid capacity for small connection (below or equal to 3x80A) is a serious barrier. Drawn up in stakeholder cooperation among system operators, the industry, knowledge partners and the Ministry, the Program addresses existing and new connections of end users such as residential homes, local businesses, social institutions (including schools, health care centers etc.), smaller industry, farms, as well as small-scale renewable generators (mostly rooftop solar).

The Action Program therefore identifies 3 major focus areas: 1) accelerating the reinforcement and expansion of the low-voltage networks; 2) better comprehension about the (future) load on the low-voltage networks; and 3) preventing peak loads through the efficient use of the grids.

The need to reinforce and expand the electricity grid is drawn on calculations done by the Dutch sector representation of electricity and gas network operators (=Netbeheer Nederland), according to which between 37.000 (+39%) and 54.000 (+57%) additional electricity substations must be built by 2030/2035, and 80.000 and 105.000 km of cable that must rolled out. The grid reinforcement stems, amongst others, from growing electrification that is mostly due to heat pumps and e-vehicles, requiring between 260 and 330 km2 of additional underground space for low- and medium-voltage cables – which makes this not only a technical but also a spatial and logistical task. This scale of reinforcement cannot be implemented without concerted action and stronger cooperation among grid operators and municipalities (and the involvement of citizens), incl. regarding the lack of required technology components and human resources. Concrete measures are designed to accelerate the spatial integration of low voltage networks incl. standardised permit applications and agreements regarding land ownership and land use, and to facilitate the implementation of a proactive neighborhood and district-oriented approach, through efficient grid investment planning, long-term contracting, shorter lead times with municipalities - also with a view to dimensioning the grid towards fossil free system scenarios. Other measures aim to increase the implementation capacity among

[13] In Dutch: Actieagenda Netcongestie Laagsspanningsnetten

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third parties, e.g. through broadened tender criteria and the outsourcing of certain grid reinforcement tasks to other providers.

A better comprehension about the (future) load on the low-voltage networks is required for accurately determining where and how much the network needs to be reinforced, and where this need is most present. Through monitoring in the low-voltage network and the ability to use smart metering data, grid operators improve comprehension on network loads and enable a more efficient grid use. The Program therefore proposes measures that allows grid operators to adjust ICT systems and organise such processes in a way that smart meter data from consumers on small connections are being used. Also, grid operators will benefit from a better understanding on expected bottlenecks through information on energy, heating and mobility plans that are drawn up by municipalities, allowing for joint and efficient planning of grid reinforcement. Concrete measures include the development of use cases of grid operators using smart metering data for the purpose of detecting congestion, while making small consumers, who are not yet equipped with such devices, install smart meters that can measure consumption and feed-in separately. Also, the mandatory registration of newly installed grid-intensive devices, such as e-vehicle charging stations, heat pumps, solar panels, cooling systems, is proposed.

Nevertheless, faster grid reinforcement and the improved comprehension about loads would not be sufficient to prevent low-voltage grid congestion. At the same time, it would not be cost-effective to reinforce grids for short periods of peak usage that can occur only a few times per year. Therefore, the Program extends the focus on making a smarter use of the grid, incl. by better matching supply and demand. This prevents peak loads and ensures that energy is used where it is generated, which requires unlocking the flexibility potentials and adjust the demand, or supply, of devices and systems that are adjustable, in response to a price signal. Therefore, the Program proposes to conduct research on the effect dynamic supply pricing and changes to network tariff structures would have on low-voltage grid congestion, and the potential to stimulate demand response behaviour among small consumers. Also, the contribution smart controllable devices can make to using the grid more efficiently should be further investigated, as well as the role of home and neighborhood batteries. Further measures proposed are to set requirements for interconnectivity and interoperability, to develop plans for bi-directional charging and to analyse the feasibility of a dynamic power limitation based on voltage (active limitation), as well as the potential of using flexibility to prevent low-voltage grid failure in the event of physical congestion. In addition to congestion management, the Program suggests grid operators to organise flexibility tenders, through which flexible capacity services can be purchased in a technology-neutral way and used to prevent the grid to overload. These grid congestion measures can, in theory, support the energy community development in the Netherlands, by introducing price signals which can contribute to new business models that apply demand response and energy sharing in the neighbourhood.

1.3. The 2025 Tax Plan and the Phase-out of Net Metering

The current net metering scheme prescribes that every kWh that residential producers and small businesses feed into the grid is worth as much as they pay for a kWh consumed from the grid, with the annual electricity bill amounting for the resulting balance. Yet the compensation is reduced when prosumers start producing more electricity than they consume, hence limiting the economic incentives e.g. for energy communities to invest and install more renewable generation capacity than is needed for meeting their own demand. Now, with increasing numbers of producers (such as energy communities) revenues for incumbent energy suppliers (as well as tax revenues for the state) are

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decreasing, and the low voltage grid is becoming under stress at certain times of the day and in certain places. While the current scheme is still in place, there is little economic incentives to go beyond self-consumption and undertake new activities, such as peer-to-peer trading and the instalment of battery storage systems.

In its 2025 Tax Plan[14], the Netherlands' government has announced to phase out net metering by 2027. Instead of offsetting electricity that is fed back into the grid (against the purchased electricity), users will, under a new scheme, receive "reasonable" compensation from the energy supplier for the electricity they feed in. While the amount and calculation method are yet to be determined, users will remain exempted from paying energy tax on electricity they generate and consume directly. This means that payback periods for solar panel owners, such as energy communities, might become longer after 2027, depending on price levels for electricity and solar panels as well as on how much of the generated electricity is being self-consumed. With the intent to increase self-consumption, the government also seeks to reduce grid congestion.

[14] More information available here.

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2. National Report on Sweden

Overall, Swedish energy and climate policy is designed to enhance and combine environmental sustainability, competitiveness and security of supply, and to create the short, medium and long-term conditions for efficient and sustainable energy use and a cost-effective supply system with low negative impacts on health, environment and climate. The transition to net-zero should be implemented by 2045, with emissions from enterprises on Swedish territory to decrease by at least 85% (compared to 1990) until then. The national climate policy framework was adopted in 2017 and consists of national climate targets, a Climate Law and a Climate Policy Council[15], building the key component of Sweden's efforts to comply with the Paris Agreement. The objectives for energy include a 2040 electricity generation target that is 100% fossil-free and a 2030 energy efficiency target of 50% on final consumption (compared to 2005)[16]. The political guidelines for the 2022-2026 term of the current Swedish government[17] include 6 major cooperation projects on political reforms, among which the climate and energy project focuses on increasing the amount of fossil-free electricity generation in the energy system, incl. by improving the framework conditions for building new nuclear power, and on accelerating the roll-out of charging infrastructure for e-vehicles.

In terms of renewable energy generation, the installed capacity in wind and in recent years also from solar PV parks has significantly increased since the early 2000s. In total, the traditionally high penetration of the country's RES share, with most of its electricity generation stemming from hydropower[18], has risen from 57.25 % in 2000 to 69.16% in 2023. In combination with Sweden's 6 operable nuclear reactors (around 7000 MWe), electricity generation is almost emission-free. In terms of PV self-consumption, the installation rate of PV continues to increase rapidly in Sweden, particularly on rooftop and in the residential sector. In 2022, a total of 796.6 MW of grid-connected solar capacity was added, accounting for a 59 % market growth compared to the 499.7 MW that were installed in 2021. The 796.6 MW are split into approximately 37.2 MW of centralised ground-mounted PV parks and 759.4 MW of PV systems for self-consumption, which has expanded by 70% compared to 2021. Small scale wind and small-scale hydro are also being used for self-consumption.

Experts consider a series of factors that could lead to greater community energy development and involvement of citizens in local renewable energy projects: 1) although electricity prices in Sweden which have been historically low but spiked during until before COVID-19 and when Russia's invasion of Ukraine began, are almost back down to previous levels, price volatility as well as price differences between the North and South of the country are still well-above previous levels – which is purring private investments in the residential sector into energy efficiency measures, solar installations, batteries and the purchase of EVs. Both the pandemic and the war have increased awareness for resilience and availability, and probably also added on the willingness to contribute on an individual and community basis; 2) increased electrification and investments in the production of renewable steel, fossil-free concrete and the battery industry are feared to cause a shortage of electricity, with Sweden's capacity needs to increase from 140 TWh to approx. 380 TWh by 2045[19] (which might be in

[15] Composed of members with high scientific competence in the fields of climate, climate policy, economics, social sciences and behavioural sciences, tasked to assess how the government's overall policy is compatible with the climate objectives
[16] See Sweden's Updated National Climate and Energy Plan
[17] Governing in a coalition of Christian Democrats, Liberals and Sweden Democrats
[18] 41% of the total generation in 2022
[19] KTH Royal Institute of Technology

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contrast to achieving the national energy efficiency target, see above). In parallel, the infrastructure development needs to address that larger transmission capacity is required, for transporting electricity to the more populated South of the country, while most of the renewable generation is located in the Northern parts. Electricity companies have therefore been encouraging decision-makers and energy consumers to locally produce renewable electricity, to meet the increasing demand; 3) due to EU requirements to introduce power capacity network tariffs, Swedish DSOs have begun implementing such tariffs (with the biggest DSO in Sweden, Ellevio, having started as of 1 Jan 2025). In the future, these price incentives might be driving load optimization and shifting peak loads to hours of less demand (and avoid costly tariff hours). Experts expect that local self-consumption and demand flexibility through automated load management (via integrated energy management systems) will become much more available and impactful; 4) the debate on policy and legal reform for establishing definitions and enabling frameworks for energy communities – and lastly advance in the transposition of EU rules – has gained momentum, with climate and energy stakeholder groups advocating for stronger policy support. Also, innovative pioneer communities, such as in Hammarby Sjösta (the RESCHOOL pilot in Stockholm) and Tamarinden in Örebro[20], and the estimated growth potential for community energy and distributed electricity generation are taking this development forward.

2.1. The Recommendations Issues by the Swedish Energy Agency on Improving Framework Conditions for Energy Communities

Against this background, the Swedish Energy Agency (in Swedish: Energimyndigheten, hereafter: the Agency) was mandated to analyse necessary measures and issue recommendations to transpose EU rules for energy communities and energy sharing. This included assessing framework conditions for the establishment and operation for renewable as well as citizen energy communities and, if necessary, proposing further efforts to promote such communities. The process was initiated by the government who tasked the Agency to conduct an official investigation, who then, in September 2024, published its findings in the report "Energy communities - prerequisites and proposals for support measures"[21]. The government will decide whether to initiate a legal reform process and submit draft legislation to public consultation. Afterwards, the government takes the legislative procedure forward (or not), incorporating the input received to the consultation and submitting the revised legal proposal to the Parliament for further debate and adoption. It is important to note that the government's mandate did not extend to financial and taxation frameworks, which are essential to the economic conditions under which energy communities operate but fall under the competence of the Swedish Tax Agency.

In the introduction, the reports highlights that in 2023, private households invested SEK 20 billion (or EUR 1.74 billion) in solar power production and stationary batteries, and another SEK 47 billion (or EUR 4.1 billion) in electric cars, which is in order of the magnitude of the annual investment of SEK 30 billion (or EUR 2.6 billion) that electricity network companies plan to make from 2024 to 2027. Also, increasing capacity shortages of Sweden's electricity grids are outlined as drivers for collective action

[20] See System change with locally shared energy | RISE

[21] In Swedish: Energigemenskaper - Förutsättningar och förslag på främjandeinsats, available here.

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in local renewable production and consumption and smarter energy use, to reduce grid loads (incl. further up the system, at high voltage / transmission level).

Given the circumstances, and the existence of and rising interest in renewable energy cooperatives and new community projects, the report acknowledges the need to develop framework conditions further and enable energy communities to reach their full potential. In a nutshell, this should be done by removing regulatory barriers and efforts to improve economic incentives, and by applying resources to capacity and knowledge building among citizens and other relevant stakeholders. It is important to highlight that the Stockholm RESCHOOL pilot, Hammarby Sjöstad, has been actively contributing with input to the report, and is explicitly featured as an example for a more recent and innovative energy community in the Executive Summary. ElectriCITY, in cooperation with Ellevio (the DSO), Hammarby Sjöstad and KTH (Royal Institute of Technology) outlined an approach to virtual sharing in Sweden, which was to the Energy Agency's investigation

2.1.1. Legal clarity through the introduction of a definition

The lack of definitions for energy communities in Swedish legislation has been mentioned by many stakeholders in the report's consultation process, resulting in a lack of clarity around what activities can be carried out, and by whom. Therefore, the Agency recommends the introduction of a definition, which would also help formulating further regulatory support and concrete legal proposals (see following chapters). To this purpose, legal amendments should be introduced according to what the Energy Market Inspectorate (or Energimarknadsinspektionen, the Swedish Regulator) had proposed in 2020[22], incl. for transposing relevant EU Directives[23] and requirements for establishing energy community definitions and frameworks. The definition issued by the Agency defines citizen energy communities (while there's no definition proposed for renewable energy communities) as legal entities that are based on voluntary and open participation and controlled by members or co-owners, who are natural persons, local authorities incl. municipalities, or small businesses. Closely following the EU definitions from the Internal Energy Market Directive, such entities have as main objective to provide its members or partners or the neighborhood where it is active environmental, economic or social benefits, rather than generating financials profits, and may participate in production, including from renewable energy sources, distribution and supply, consumption, aggregation, energy storage, energy efficiency services or, charging services for electric vehicles or providing other energy services to their members or shareholders.

2.1.2. Financial incentives through reduced network tariffs in the case of virtual energy sharing

To enable virtual energy sharing, regulation is required on how electricity network companies account for billing the actors involved. This is also relevant in transposing recent EU provisions on energy sharing that were adopted under the market design reform[24], with the Energy Markets Inspectorate tasked to table legislative proposals in January of 2025 (see chapter 2.2.1). Clear rules regarding obligations and rights of network operators towards actors who seek to establish energy communities should formulated as part of this transposition into Swedish law.

[22] Energimarknadsinspektionen 2020, *Ren energi inom EU- Ett genomförande av fem rättsakter*

[23] Directives (EU) 2019/944 and (EU) 2018/2001, as part of the Clean Energy Package

[24] See Article 15a of Directive (EU) 2024/1711

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As such, electricity grid tariffs are regulated in the Electricity Act and in regulation EIFS 2022:1, that entered into force in 2022 and must be applied by no later than 1 January 2027. Accordingly, tariffs must be cost-reflective of customer categories, which is why the Agency suggests categorizing energy communities as a customer type of its own, based on the recommendation to introduce a clear definition (see chapter 2.1.1). Network tariffs are made of different components, with the objective to be cost-reflective (of using the network) and to cover the costs occurred for operation, maintenance and reinforcement. In this context, the report introduces the proposal to cover long-term costs through an impact fee, which could be lower for active customers and energy communities who self-consume, store, or undertake energy sharing or peer-to-peer trading - and thereby reduce local network constraints. Also, offering flexibility to support grid needs could be rewarded through reduced network tariff components.

To substantiate its recommendation, the Agency features best practice cases where EU countries have adopted lower grid charges for energy communities that share energy virtually: in Austria, where energy communities benefit from 57 % lower grid tariffs for energy that is shared in a local community, and from a 28 % reduction if energy is shared at regional level. In Italy, energy communities can claim a refund of grid tariffs while in Belgium (Brussels Capital Region) tariffs for energy communities are calculated on the level at which the sharing takes place - within a building, under a low-voltage substation, under a substation, or under several substations. This is based on the assumption that grid reinforcements can be avoided or postponed when at least 20 % of the consumed energy is shared (and the gird is used more efficiently).

2.1.3. Case studies for the development of an energy sharing framework

Individual self-consumers and energy communities are treated equally, from a regulatory perspective, with regards to financial incentives – mostly through exempting self-produced electricity from energy tax and network charges. This drives energy communities to reduce the number of connection points, which stands in contrast to the general legal principle that grants energy customers the right to choose their own supplier. At the same time, the EU Renewable Energy Directive allows renewable self-consumers (Art. 15, 1) to act jointly, whether this is within the same building or across several buildings (e.g. in an energy community). Therefore, the report stipulates all self-consumers should benefit from the same incentives, while being entitled to contract their supplier of choice.

In case the limitation to the same building is to be maintained, the Agency suggests further examination of other instruments (incl. virtual settlement points), from regulatory and technical perspectives. In a first step, the formulation of use cases could provide support to energy communities, which can then be further developed and offer scalable process support regarding permitting, the specification of technical requirements, model agreements and regulatory compliance guidelines (incl. on data management). To this purpose, the Energy Agency has been in consultation with the Energy Market Inspectorate, and now recommends pursuing this work stream under a separate mandate the government should issue.

2.1.4. Targeted financial support through existing research & innovation programmes

The Energy Agency intends to include targeted financial support for energy communities within the framework of its existing research and innovation programmes. A call has been launched (deadline for applications is September 2025), with the objective to explore the potential of energy communities and energy sharing in Sweden, offering grants to conduct feasibility studies and other relevant research activities. The Agency estimates that such support is required for the initial phase

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of approx. 1-1.5 years, incl. for analysing implementation options and the development of 10-20 feasibility studies for new energy communities. Projects that receive financing under this programme should involve a wide range of stakeholders with focus on citizen-led initiatives and sustainable business models or energy sharing arrangements, where local grid operators play an important role. The proposed budget from the Energy Agency is SEK 30 million (around EUR 2.6 million) while funded projects will also have to contribute to the national support and information campaigns (see chapter 2.1.5), and by producing qualitative and quantitative input for the benefits of other energy communities.

2.1.5. Coordinated support and information efforts to raise awareness on energy community benefits

Coordinated support and information efforts should accompany the financial support to be delivered through research and innovation programmes (see chapter 2.1.4), with the Agency recommending allocating additional external resources to this purpose (with an amount of approx. SEK 2 million, or EUR 175.000). These efforts could be implemented in form or contact points or local or regional competence centres that are qualified and can respond to stakeholder inquiries related to energy communities. Foreseen activities include: facilitating the collaboration between existing and new energy communities; producing information material for different target audiences; providing legal support and identifying regulatory barriers and connecting to related areas and actors regarding flexibility, smart energy system management, safety, energy efficiency and the energy performance of buildings.

This recommendation derives from EU requirements[25] that Member States must develop suitable information, awareness raising, guidance or training programs to inform citizens exercising their rights as active customers, and on practical details around technical and economic aspects, incl. in the context of renewable energy communities. Also, Article 22.4 g) states that tools to facilitate access to funding and information must be included as part of enabling frameworks to promote the development of such communities. In parallel, provisions from the revised EU Energy Performance of Buildings Directive name energy communities and citizen-led initiatives as "indispensable" to implement the EU renovation wave and contribute to Europe's energy efficiency targets. For instance, energy communities should be considered when building administrative, financial and organizational capacity, while Member States must develop and implement information and awareness campaigns and necessary measures to inform property owners, tenants and relevant market participants (incl. energy communities) on methods for improved energy performance and with targeted information to reach vulnerable households. Furthermore, the EU Energy Efficiency Directive (EED) mentions that energy saving initiatives by renewable as well as citizen energy communities can play an important role in educating and increasing citizens' awareness on reduced energy consumption and lower network tariffs, and in mitigating energy poverty. Article 22 of the EED requests market actors, such as active consumers and energy communities, to be informed in a transparent and accessible way on available energy efficiency measures and financial and legal frameworks, and be given the opportunity to participate in multi-stakeholder dialogue about available incentives and changes in regulations that remove barriers to energy efficiency.

[25] See Art. 18.6 of the revised Renewable Energy Directive 2018/2001

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2.2. Further Reform Initiatives from Transposing EU Directive and Regulations

2.2.1. Transposing EU energy sharing provisions into Swedish law

In February 2024, the Energy Market Inspectorate was commissioned by the government to assess which measures are required for transposing EU provisions[26] to improve market designs through energy sharing (which must be transposed into Swedish law by 2026). In January 2025, the Energy Market Inspectorate presented its report[27] with proposals on how the sharing of renewable energy should be implemented in Sweden and which legal changes are required to ensure that households, SMEs and public bodies can share energy through the public grid. In general, the report concludes that already today, there are no regulatory barriers for electricity suppliers and consumers to bilaterally agree on access to electricity – yet for complying with EU rules, Swedish law must ensure the right to energy sharing. Therefore, the Swedish Electricity Act[28] needs to be amended so that e.g. consumers with rooftop solar panels are entitled to sell or share the electricity produced to another consumer, within the same bidding zone (of which Sweden has 4[29]).

The proposals issued in the report focus on sharing renewable energy through the public electricity grid. The Energy Market Inspectorate underlines in this context that today in Sweden, it is possible to share energy between properties as long as the sharing takes place in so-called non-licensed networks (or micro-grids, and under one connection point). This is also being done by energy communities who own and operate microgrids, without having to obtain permission from the system operator. This allows for physical sharing connecting nearby buildings via new lines, which often run in parallel to the public electricity network, or for reorganising the network and connection arrangements for an apartment building with rooftop solar so it qualifies as self-consumers and can benefit from energy tax exemptions that apply to prosumers in Sweden. On the other hand, also virtual sharing through the public network is, from a regulatory perspective, feasible – yet there are, unlike for self-consumers, no incentives or exemptions for virtual sharing models, making it unprofitable in most cases. Also, the distribution system operators are free to decide whether to accept the sharing to take place over the network they operate. In this regard, the Ei proposal does not introduce any significant changes that could incentives sharing through the public network, other than introducing new rights into Swedish law.

The Energy Market Inspectorate further proposes that electricity supplier must deduct the electricity shared, as well as fed into the grid, from the total consumption that is billed to the person participating in energy sharing. However, the deduction shall not affect taxes and network fees, which constitute a large share of the total amount customer are paying. Consumers entering energy sharing agreements are obliged to notify their electricity supplier, while market actors are prohibited from subjecting anyone who participates in energy sharing to discriminatory treatment. Furthermore, rules

[26] From Regulation (EU) 2019/943 and Directive (EU) 2019/944 on common rules for the internal market for electricity, as well as from the revised electricity market design rules, consisting of Directive (EU) 2024/1711 and Regulation (EU) 2024/1747.
[27] See the report "Energidelning och andra nyheter till följd av ändringar i EU:s elmarknadslagstiftning" (in Swedish)
[28] The Elecricity Act (1997:857) is the Swedish main legislative framework with regard to electrical generation, transmission, distribution, consumption and safety installations.
[29] Luleå (SE1): Northern parts of Sweden, including Luleå and Norrbotten. Sundsvall (SE2): Central parts of Sweden, including Sundsvall, Gävle, and Dalarna. Stockholm (SE3): The Stockholm metropolitan area and surrounding regions, including Stockholm, Uppsala, and Gotland. Malmö (SE4): Southern parts of Sweden, including Malmö, Skåne, and Blekinge.

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are proposed that would apply when consumers appoint a third party to conduct the energy sharing on their behalf. The third party is then obliged to apply certain regulations that already apply to electricity suppliers, in terms of customer protection, contractual agreements and billing.

In a chapter dedicated on energy communities and energy sharing[30], the Energy Market Inspectorate acknowledges, despite the absence of legal recognition through definitions and other enabling framework elements (see chapter 2.1.1), the benefits energy sharing can deliver to energy communities, in terms of responding to collective needs (such as improved access to affordable and sustainable electricity), creating incentives to providing grid services and flexibility solutions, or unlocking socially efficient investments in renewable energies. Against this background, the report informs that the Swedish government is open to consider introducing changes to relevant regulation that would be justified by the benefits described. While Ei points out that energy sharing can be carried out by all electricity consumers (and also by energy communities), energy sharing that is done without effective control, or that has not been designed to contribute to local system efficiency and reduced grid costs, is not beneficial to electricity grids (in terms of reduced congestion, less network reinforcement etc.).

In result, the Energy Market Inspectorate report makes concrete legislative text proposals, which the government can (or not) submit to public stakeholder consultation and table as legal amendment to the Electricity Act to the Swedish Parliament. The articles proposed yet do not refer to energy communities as such.

2.2.2. Government investigation on reforming Sweden's electricity market design

In January 2024, the Government commissioned an investigation to analyse the Swedish electricity market and develop proposals to amend regulatory frameworks. Expected to submit the final results by April 2025, the investigation's objective is to clarify roles and responsibilities of system and market actors, increase security of supply, create long-term planning conditions and provide carbon-free energy sources with market-based compensation for the benefits they contribute to Sweden's energy sector. This research need is justified by increasing electrification[31] of society and industry, by the phase-out of fossil fuels (the policy target is to have 100% fossil-free electricity production by 2040), and by resulting infrastructure needs.

Against this background, the investigation shall i.e. propose how financial markets for electricity, long-term power purchase agreements, capacity mechanisms and ancillary services markets could be developed. Moreover, the role of contracts for difference in a future electricity market based on the conditions set out in the EU regulation need to be analysed and clarified, as well as the evolving roles of TSOs and DSOs in the transition to decentralised, decarbonised and smart systems. Also, regulatory review is required on balancing service provision and the phase out of assigning default electricity contracts to consumers to retail customers (in case they fail to conclude an electricity or gas contract with an energy supplier).

For energy communities in Sweden, the investigation is expected to result in greater clarity, which many stakeholders involved have been requesting. More clarity on roles and responsibilities, and the

[30] See chapter 3.3 on „Energigemenskaper och energidelning"
[31] The Swedish Energy Agency projects electricity demand to double or even triple until 2045.

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benefits energy communities can offer will be reflected in the design and unlocking of incentives, in order to stimulate the further development of community energy initiatives. In the Stockholm RESCHOOL pilot, who is already collaborating with the DSO and energy companies on strategies for virtual energy sharing, this investigation could provide the necessary tools to practically test sharing among the members of the energy community.

2.2.3. Government investigation on increasing electricity system flexibility

In June 2024, the government mandated the Swedish Energy Authority to conduct an investigation on how to increase electricity system flexibility. This assignment includes mapping the flexibility potential among Sweden's industry and power producers, review flexibility processes and requirements for a reliable cooperation between all involved actors and in all system operating conditions, and develop open, secure and standardized communication protocol for technologies that can enable flexible electricity consumption as well as production, incl. through storage and aggregation. Information about flexibility must be adapted and disseminated to target groups, incl. to household consumers, industry, businesses and small-scale electricity producers. A partial report (on mapping flexibility potentials and the dissemination of information to target audiences) is expected to be available in April 2025, while the full assignment to be finalised by November 2025.

The investigation must include flexibility from small-scale electricity generation, such as solar farms, district heating, small-scale hydropower and wind farms, and others forms of production that the Energy Agency considers can contribute to increased electricity system flexibility. In the process, the Agency must cooperate and consult with the Energy Market Inspectorate (the regulator), the TSO (Svenska Kraftnät), Sweden's national accreditation body (Swedac), and the Swedish Consumer Agency (Konsumentverket). Also, the work stream must take existing EU legislation into account, especially regarding connection and operation requirements for electricity systems, as well ongoing negotiations on new national legislation, such as on metering and demand flexibility.

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3. National Report on Spain

Issued in 2019, Spain's strategic energy and climate framework consists of a climate law, the National Energy and Climate Plan[32] (NECP) and a just transition strategy. After declaring a climate and environmental emergency in early 2020, the Climate Change and Energy Transition Law[33] was adopted in May 2021, setting the target to make Spain climate-neutral before 2050, together with energy and climate targets for 2030 that will be reviewed on a regular basis. Amongst other, the Law prohibits issuing new permits for extracting oil and gas on Spanish territory and establishes the NECP as the main climate planning and governance instrument. The updated final NECP[34] draws up ambitious 2030 targets on emissions reduction (minus 55% compared to 2005 levels); on renewable energy deployment (48% in final energy use and 81% in electricity generation); energy efficiency (43% improvement in energy efficiency over final energy use[35]); self-consumption (19 GW) and storage (22.5 GW), and the further development of demand management and flexibility and implementation of energy communities to promote citizen engagement.

Severely struck by climate disasters in form of droughts, heat waves, devastating floods and wildfires, the government's strong policy support and high awareness among citizens[36] has made Spain achieve considerable progress, e.g. in terms of reducing emissions in energy industries (-69 %) and per capita emissions, which dropped by 41 % between 2005 and 2023. Also, Spain achieved its 2020 targets for GHG emissions, renewable energy and energy efficiency under the EU framework[37], whereas renewable installed capacity grew by 40% between 2019 and 2023. Most of all, solar PV has seen the fastest growth, with additional 193% in his period – which does not even account for all self-consumption (largely integrated on the demand side and behind the meter). Also, between 2019 and 2023, wind power increased by 20 %, from 25.678 MW in 2019 to 30.810 MW in 2023, making Spain Europe's first larger economy to have more than 50% of the total electricity generation coming from renewable sources. In 2022 at global and EU level, Spain was ranked 2nd in wind capacity (in the EU) and 5th in the world, and 8th in the world's renewable installed capacity. At the same time, the country is still heavily dependent on imports, which accounted for 77.8 % of its total energy supply in 2022 (and the fifth highest share among EU Member States). To reduce import dependency to 50% by 2030, Spain intends to fully exploit its renewable energy potential and increase economic savings in fossil fuel imports that are estimated at €87 billion over the decade to 2040[38].

In Spain's decarbonisation efforts, self-consumption plays a major role. The NECPs underlines that since 2015, when the first regulatory framework for self-consumption was introduced, hundreds of thousands of households and industry sites have been benefitting from affordable and green electricity, through innovative solutions and business models. At the same time, there is greater involvement of society as a whole, with many citizens and SMEs actively participating in Spain's transition to net-zero. After the regulation for self-consumption, which allows for using the electricity distribution network at neighborhood level without being charged for network tariffs[39], was upgraded

[32] As introduced by the Regulation on the governance of the energy union and climate action (EU)2018/1999
[33] In Spanish: Ley 7/2021, de 20 de mayo, de cambio climático y transición energética, available here.
[34] Published in June 2024 and available here.
[35] compared to a projected baseline scenario where no measures are taken.
[36] In a 2023 Eurobarometer survey, 48 % of Spaniards consider climate change to be among the most serious problems the world is facing.
[37] The so called 20-20-20 targets (20% RES, 20% improved energy efficiency, 20% emission reduction)
[38] See the European Parliament briefing "Spain's climate action strategy", available here.
[39] Yet taxes and other charges apply.

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in 2019[40] (it still builds today's reference framework), self-consumption, individual and collective, has grown to over 8.5 GW, which is equivalent 3,7% of Spain's total electricity demand. The supportive self-consumption framework allows for surplus compensation at low-voltage level (up to 100 kW), where customers who feed into the gird are directly remunerated by retailers. Above 100 kW, the injected surplus electricity does not generate benefits from the compensation scheme, but from being sold directly to the electricity market and distributed according to the energy price at any given time. To do so, producers need to get certified.

While these favorable conditions have also helped developing energy community projects, no enabling frameworks have been established, neither for renewable nor citizen energy communities. Likewise, there are no local energy markets that would allow for generating new revenue streams for energy communities. While Royal Decree 23/2020 formally introduced a definition for renewable energy communities, (merely a copy-paste from the EU Directives), it did not further specify any governance principles, rights, duties, and possible market activities. As a result, most existing energy communities rely on the above-mentioned framework for collective self-consumption (excluding key technologies, such as wind or small-hydro), as well as grants provided through funding programs such as CE-Implementa[41].

At the same time, rising community and citizen interest in developing collective energy initiatives are exposed to considerable regulatory uncertainty. As of today in Spain, regulation does not provide incentives nor benefits to energy communities, as foreseen by the framework adopted by the EU in 2018-19 as part of the Clean Energy Package. Yet regulatory evolution is on its way, with several legal and policy reform initiatives that were recently adopted, or are currently being under consultation – incl. the expansion of the limitations that apply to self-consumption (see Royal Decree 18/2022, chapter 3.1). At the same time, adoption is pending on establishing renewable as well as citizen energy communities into Spain's legal framework (see draft Royal Decree 18/2022, chapter 3.2), while further legislation has been proposed for the creation of independent aggregators (see chapter 3.3) and the increase of flexibility through changes on grid access requests and connections agreements (see chapter 3.4). Also, in 2023, legal reform was launched on closed electricity distribution networks, which could be relevant to (more advanced) energy cooperatives and communities (see chapter 3.5).

3.1. Expanding the Limitations to Self-Consumption through Royal Decree 18/2022

In comparison to many EU countries, Spain is a frontrunner in regulatory support to self-consumption, both at individual and collective level. The first reference framework for self-consumption that builds the economic foundation of most of today's energy communities was designed to increase self-consumption at building/neighborhood level while using the electricity distribution network without being charged for network tariffs (while taxes and other charges apply).

The initial 2019[42] regulation allows for surplus compensation at low-voltage level (up to 100 kW), where customers who feed surplus electricity that is not consumed can be fed into the distribution grid - and get remunerated directly by their retailer, in form of a discount on their bill. The level of

[40] Royal Decree 244/2019
[41] Funding program to support energy communities, issued under Spain's Recovery and Resilience Plan
[42] Royal Decree 244/2019

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compensation is offered by the retailer over the period of one year and follows the wholesale market price. Below 100 kW, the level of savings depends on the kWh fed into the grid, and the compensation price applied. The so-called compensation limit prevents prosumers to be financially compensated for more kWh than they withdraw from the grid. This is done so consumers do not have to declare capital gains for the energy sold to the grid and presents a fiscal measure to simplify the tax regimes for households and small companies. Above 100 kW, the injected surplus electricity does generate benefits from the compensation scheme but can be sold directly to the electricity market, for the energy price at any given time. Doing so can be financially more beneficial (incl. for energy communities), as no limit to the level of remuneration is applied. Yet for selling directly on the market, producers need to get certified, which is a process that requires registering PV installation in the self-consumption registry ("registro de autoconsumo") and the RIPRE (registry of electricity generating installations, or "registro de instalaciones productoras de energia electrica") in the respective autonomous communities (such as Catalonia). The installations above 100kW require more documentation to be submitted than the registration of installations below 100kW.

The regulation limits self-consumption to having the production and consumption done within the same substation. The 2019 regulation was revised in 2022[43], expanding the participation radius from 500 to 2000 meters, which has been highly anticipated by involved actors, since the 500-meter limitation prevented many collective self-consumption initiatives from becoming larger and involving more citizen and neighbouring businesses. However, this expansion applies only to projects using PV technology that is located on buildings, industrial sites and built environments that have a different purpose of use, such as parking lots. It is important to keep in mind that Spain's self-consumption scheme is applicable within energy communities. Yet, it can be done individually and collectively (coordinated by a "self-consumption manager", or "gestor de autoconsumo"), without any specific entity which is legally established and entitled to undertake other activities. Also, the benefits stemming from collective self-consumption are split among individual households (through a redistribution coefficient) but are not meant to create revenues or discounts for energy communities as an entity.

Further changes that were introduced in the 2022 revision eliminating strict membership requirements (e.g. as part of the same company or business group) when using direct lines connected to distributed renewable generation, making it easier to have higher numbers of industrial consumers and businesses benefit from locally available green electricity. Royal Decree 18/2022 further increases the threshold for exempting small-scale renewable installations from permitting and notification requirements, lifting it from the initial 100 kW to 500 kW. Both measures are relevant mostly to energy communities established by industrial players with higher consumptions needs that can be satisfied through larger PV installations and dispose of more available rooftop space and bigger buildings.

In October 2024, the Spanish Ministry for Ecological Transition and Demographic Challenge held a public consultation on another revision of Royal Decree 244/2019 as well as other regulatory changes to improve administrative, technical and economic procedures and promote a more efficient implementation of collective self-consumption and energy community projects. Proposed measures include extending the limit for being eligible for surplus compensation from 100 to 450 kW and

[43] In Spanish: Real Decreto-ley 18/2022, de 18 de octubre, medidas de refuerzo de la protección de los consumidores de energía y de contribución a la reducción del consumo de gas natural, available here.

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increasing the radius between production and consumption from 2000 to 5000 meters. This would incentivize replicating energy communities in the industrial sector, similar to the substantive growth rates that have been observed among residential consumers.

Growth rates in individual and collective self-consumption have skyrocketed from 0.38 GW in 2017 to over 8.5 GW[44] at the end of 2024 – which is an increase by 22 times and has largely surpassed the country's 7 operable nuclear power plants (7.1 GW). In 2023 alone, solar self-consumption increased by 59% compared to the previous year, and by 23% from January to October 2024 (compared to 2023), positioning Spain as Europe's leader in this development. Experts estimate that by 2040, 40% of Spanish households could be self-consuming solar electricity, with Spain's updated National Energy and Climate Plan forecasting to reach 19 GW until 2030.

3.2. Royal Decree 5/2023 and the Establishment of Renewable as well as Citizen Energy Communities into Spain's Legal Framework

In June 2023, the Ministry for Ecological Transition and Demographic Challenges tabled draft legislation[45] that, amongst other, was meant to transpose EU provisions on renewable as well as citizen energy communities into the national legal framework. Yet the adoption of the Royal Decree is still pending, whereas basic definitions, roles, rights and obligations for Renewable and Citizen Energy Communities are already included in Spanish Law 24/2013 (= "la ley del sector electrico").

3.2.1. Renewable Energy Communities (RECs) – consumer rights and obligations, energy community activities, reduction of administrative, regulatory and technical barriers, energy market access rights

The draft legislation establishes the right for end-consumers, including households, to participate in RECs while maintaining all rights or obligations as final consumers, and without being subject to unjustified or discriminatory conditions, or to procedures that prevent participation in RECs, provided that, in the capacity of private enterprises, this participation does not constitute their main commercial activity. If the legislation adopted, RECs would be entitled to produce, consume, store and sell renewable energies, in particular through renewable electricity purchase contracts, and allowed to conduct energy sharing within the RECs in question (while respecting relevant consumer rights). Also, RECs would get access to all organised energy markets, both directly and through aggregation. To promote and facilitate the development of RECs, public administrations must guarantee that unjustified regulatory and administrative barriers are removed and that RECs who supply, aggregate or commercially provide other energy services are subject to the regulations that apply to carrying out such activities.

In compliance with matching EU provisions, the Royal Decree further introduces the obligation for DSOs to cooperate on facilitating energy sharing within RECs, and prescribes that RECs would benefit from fair, proportionate and transparent procedures, with regard to registration and permitting, market participation, and to cost-reflective network rates that ensure adequate contribution to the overall cost of the system. In addition, instruments should be made available to facilitate access to

[44] Source: APPA Renovables, see here.
[45] In Spanish: Real Decreto-ley 5/2023, de 28 de junio, available here.

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financing and information, while regulatory and capacity-building support is provided to public authorities who should promote and create RECs (alongside helping authorities to participate directly). Also, RECs must be taken into consideration when designing support schemes, with the objective to ensure a level-playing field with other market players.

3.2.2. Citizen Energy Communities (CECs) – entitlement of consumers and CECs, activities, exemptions to permitting up to 3000 KW

The draft Royal Decree establishes a legal definition that is almost identical to the EU definition, according to which CECs are legal entities based on voluntary and open participation, and whose effective control is exercised by members who are natural persons, local authorities, or small businesses, and whose main objective is to offer environmental, economic or social benefits to its members, rather than generating financial profits. Similar to the REC provisions (see chapter 3.1.2), the rules for voluntary and open participation apply to CECs, granting the right to maintain all rights and obligations as end-consumers and in the termination of membership. CECs are equally allowed to access all organized energy markets, both directly or through aggregation, and without being discriminated by other market participants. CECs would be subject to procedures and fees, incl. for proportional and transparent permitting, network tariffs and non-discriminatory network access policies. Provided that consumers grant the corresponding power of attorney to CECs, they can act as representatives of these consumers and undertake collective self-consumption and other activities on their behalf. Regarding simplified rules for permitting, competent public authorities can exempt installations up to 3000 kW from related granting procedures, incl. for generation, distribution, direct lines and e-vehicle charging points.

While the legislation, if adopted, legally recognises RECs and CECs and clarifies certain aspects, in terms of governance, membership, participation in energy markets and activities they can conduct, it does not specify enabling framework elements that go beyond the corresponding EU provisions (with the exception of the permitting exemptions for CECs). Nevertheless, adopting the provisions would help evolve Spain's national framework for energy communities, in terms of energy market integration and the exploitation of their full potential. clearly defined roles, rights and obligations of the energy communities as established actors of the electricity system will allowing designing and undertaking activities that are in compliance with regulatory frameworks and help reduce uncertainty.

3.3. Legislative Proposal for the Creation and Regulation of Independent Aggregators

The legal reform initiative for the establishment of independent aggregators can have indirect impacts on energy community development, and in general make the national framework advance - by unlocking and monetising flexibility on the demand-side. In the high-level climate and energy policy context (see introduction to chapter 3), the regulatory review by the Spanish decision-makers[46], who conducted a public consultation from July to September 2024, is justified by the need to

[46] Information on the proposal and the legal draft (in Spanish: Proyecto de Real Decreto por el que aprueba el Reglamento General de Suministro y Contratación y se establecen las condiciones para la comercialización, agregación y la protección del consumidor de energía eléctrica) issued by the Ministry for Ecological Transition and Demographic Challenges are available here.

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strengthen the role and protection of consumers who should benefit from market-based price formation and fair competition among suppliers and other energy service providers. In this framework, improving the framework for independent aggregators play a fundamental role, incl. through rights and obligations that are prerequisite to fostering demand response and management, and to providing new sources of flexibility to the electricity system that allows integrating higher RES shares. This contributes, among others, to more efficient renewable generation and consumptions, to a better functioning of competitive energy markets and in result, to creating economic benefits to final customers – which can also increase revenue streams for participating energy communities. In this regard, the draft Royal Decree introduces a missing link between suppliers, distributors and final customers.

As such, the consumer is no longer considered as a mostly passive actor. On the one hand, protective and enabling measures include the prohibition of direct marketing and advertising outreach to end customers via phone (a common practice in Spain), streamlined and accelerated procedures for supplier-switching (max. period of 2 weeks, and 24hrs from 2026 on), the introduction of ombudsmen and conflict resolution mechanisms, and the obligation to return deposits that have been submitted as guarantees for registering new grid connections within 4 months. Also, customer would have the option to contract more than one supplier. These provisions would also apply to groups of active customers (such as energy communities) and strengthen their market integration.

In parallel, the proposed Royal Degree fosters the market entry of aggregators, allowing to cluster multiple consumers and facilitate joint participation in electricity markets. This is done by allowing aggregators to adapt the consumption among groups of customers and respond to fluctuating wholesale prices, in exchange for financial remuneration. Aggregators are defined as energy managers who are allowed to act on behalf final consumers (but disallowed to represent third parties or advertise the selling of electricity) and efficiently manage aggregated consumption, while guaranteeing safe and continuous supply. The compensation the aggregated final consumers receive will be settled between the aggregator and the energy supplier(s). Energy communities, potentially representing large numbers of consumers, are destinated to contract services offered by independent aggregation providers, who are planned to be up and running by September 2025.

Furthermore, new provisions would promote the use of smart technologies, clarifying the regulatory treatment of storage in the process of network access and connection requests. Changes also would apply to the measurement and access to data, which should be managed in a centralized model by Spain's TSO, Red Eléctrica.

3.4. Increased Flexibility through Changes on Grid Access and Connection Agreements

The Spanish regulator, the Comisión Nacional de los Mercados y la Competencia, has issued legislation (in Spanish: circular[47]) on establishing methodologies and conditions for the access and connection to transmission and distribution networks. Entered into force in January 2025, the circular is based on the principle of granting third-party access and prevent discrimination between connected users, while enhancing coordination among network operators and consumers. Its purpose is to

[47] Circular 1/2024, in Spanish: la metodología y condiciones del acceso y de la conexión a las redes de transporte y distribución de las instalaciones de demanda de energía eléctrica, available here.

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maximise and optimise the use of existing networks and connection points, thereby facilitating cost-efficient network development and minimizing negative economic and environmental impacts. For instance, the process of requesting network access and connection is accelerated and made more transparent, through streamlined and simplified information requirements that applicants must meet. To this end, network operators must have detailed and updated information on available capacities on their website.

The new regulation changes basic electricity system principles, by allowing certain demand facilities[48] to opt for flexible access, which would result in system benefits in form of greater flexibility in supply and optimised network use. Up to now, supply to consumers must have been guaranteed at all times. Now, with the introduction of flexible access capacity, which is assessed through specific technical criteria in a capacity analysis, continuous and uninterrupted supply does not have to be longer maintained (on a voluntary basis and upon explicit request by the consumer / demand facility). Yet this cannot affect the security of supply to any other conventional customers.

Moreover, the circular seeks to enable the market and system integration of new actors (such as energy communities) who are required to support the deployment of more renewable energies and for the implementation, among others, of active demand-side management. This includes provisions that apply to storage facilities and closed electricity distribution networks, with regard to procedures and requirements for permit granting and administrative management.

3.5. Royal Decree 314/2023 and the Ownership of Closed Electricity Distribution Networks

In April 2023, the Spanish Ministry for Ecological Transition and Demographic Challenge issued Royal Decree 314/2023, on procedures and requirements for permit granting for closed electricity distribution networks[49]. The regulation establishes basic principles that the development of closed distribution networks must respect, in terms of economic and financial energy system sustainability, energy efficiency and just transition. At EU level, closed distribution networks were first introduced in 2009[50], defined as "systems which distribute electricity within a geographically confined industrial, commercial or shared services site and does not supply household customers, without prejudice to incidental use by a small number of households located within the area served by the system and with employment or similar associations with the owner of the system". In reality, this was often implemented at industrial sites across several EU countries, for responding to industry needs to connect facilities in geographical vicinity.

In accordance, the Royal Decree defines that closed network distributes electricity to industrial consumers in an industrial area that does not exceed 8 km2, provided that this is done by means of its own private networks. In addition, the production processes of these industrial consumers must be interrelated, while the network must distribute primarily to the owner or operator of the network or to its related companies (at least 50 % of the consumption must go to the network owner or operator).

[48] EU Regulation 2016/1388, Art. 2 (1): 'demand facility' means a facility which consumes electrical energy and is connected at one or more connection points to the transmission or distribution system. A distribution system and/or auxiliary supplies of a power generating module do no constitute a demand facility

[49] In Spanish : Real Decreto 314/2023, de 25 de abril, por el que se desarrolla el procedimiento y los requisitos para el otorgamiento de la autorización administrativa de las redes de distribución de energía eléctrica cerradas, available here.

[50] See Article 28 of Directive 2009/72/EC

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Furthermore, the closed network may distribute to a maximum of 100 non-industrial consumers, provided that certain conditions are met: there must be economic or commercial ties with the owners or operators of the network, while the non-industrial consumers represent at least 2% of the total consumption, and are located on adjacent areas.

While this framework is not explicitly designed to promote energy communities or cooperatives to own or operate closed distribution networks, entities with strong industry involvement could benefit from implementing such models. The Royal Decree requires owners of closed distribution networks to be enterprises or cooperatives with the sole purpose to distribute electricity in closed networks. While closed distribution is not deemed a regulated activity, it needs to comply with a regime of legal, financial and technical requirements (similar to a regulated distribution system operator), in terms of safety, security of supply, quality standards etc. On the other hand, exemptions are foreseen for the need to operate online platforms for managing network access and connection requests, as well as for the collection of data (and smart metering). Yet overall, the regulatory regime operators of closed networks underlie might make mostly technically and financially advanced energy communities decide to own and run their own networks[51].

[51] Such as the Spanish "Cooperativa Eléctrica Benéfica San Francisco de Asís de Crevillent", which is part of the Enercoop group

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4. National Report on Greece

In January 2025, the Greek Ministry of Environment and Energy published its revised final National Energy and Climate Plan (NECP)[52], which includes more ambitious 2030 targets for emission reduction and renewables, to make the country become climate-neutral by 2050- which is enshrined in domestic climate legislation. In the Plan, Greece aims to raise the RES share in electricity production to 81% by 2030 (up from 50,2% in 2024, mostly generated by solar, wind and hydropower) and sets intermediate objectives of 55% emission reduction by 2030 and 80% by 2040, compared to 1990 levels. Net GHG emissions are expected to fall from nearly 75 MtCO2eq in 2022 to zero in 2050, following a sharp reduction in emissions from power generation and transports, increased LULUCF[53] removals and the use of carbon capture.

Today, fossil fuels account for around 48% of electricity generation, with natural gas as dominant source (around 41%), and coal representing 6% of the mix. To change this, the substantial rise in renewables should be continued, with solar PV capacity to surge from 7 GW in 2023 to 13.5 GW in 2030 (plus 37%) and to over 35 GW in 2050 (plus 49%). In parallel, onshore wind capacity should rise from 5.2 GW in 2023 to 8.9 GW in 2030 (plus 24%) and 13 GW in 2050 (plus 18%), while 1.9 GW of offshore wind should be installed by 2030 (plus 5%) and 11.8 GW by 2050 (plus 16%). Coal-fired capacity, which today stands at 1.3 GW, should be phased out before 2030 and fossil capacity (mainly from gas) should only account for 9% of the installed capacity in 2050 (6.5 GW). In the building sector, renewables should cover 67% of energy consumption by 2030 (95% by 2050) and the share of heat pumps in residential and tertiary buildings should double between 2022 and 2030. Renewables should also reach 14% in transports in 2030 (91% in 2050).

While sector experts[54] expect the 2030 PV targets might be reached 3 to 4 years earlier, the wind targets, both offshore and onshore are much more challenging to implement, due to lengthy permitting and a lack of social acceptance. In some areas, there is risks of oversupply and increasing curtailment of renewable electricity generation – which are exacerbated by saturation of the electricity networks. Currently, the capacity of RES projects in operation and those with binding grid connection offers are around 35 GW nationwide, whereas average peak electricity demand is between 6-7 GW – which means the totally committed renewable capacity exceeds the average peak demand by 4-5 times (!). Thus, significant amounts of excess electricity will need to be stored[55] or exported – or in the worst case, to avoid black-outs, curtailed. In the medium and long-term, Greece will have to accelerate electrification and improve the balance between local supply and demand (incl. through energy communities).

Network saturation is also one of the major barriers to energy community development, with 48% of pending projects having received a notification by the Hellenic Distribution Network Operator (HEDNO) about unavailable grid capacity. At the same time, requests for self-production initiatives are increasing substantially, with the submission of 377 new such projects during 2023, while 4 were submitted for commercial projects. In addition, there is a limit put on all PV plants, at 70% of their

[52] The NECP is available here.
[53] LULUCF stands for Land-Use, Land-Use Change and Forestry
[54] Such as GAREP, the Greek Association of Renewable Energy Producers
[55] The revised NECP foresees the addition of 5.4 GW of new storage capacity (over and above the existing 0.7 GW one). 4.3 GW are batteries, and 1.1 GW represent pump storage

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capacity, reducing the overall feasibility and economic sustainability of small-scale projects for energy communities. This also impacts the RESCHOOL pilot in Athens: while finding a location with sufficient grid capacity and in compliance with proximity requirements was done without facing any major barriers, the 70% limitation restricts the pilot's PV production (using inverters), reducing the energy yield and the energy community's overall profitability. Nevertheless, Greece has seen significant energy community development throughout recent years, with 1742 energy communities (1318 MW) that have been established until July 2024. PV generation carried out by energy communities as well as individual households, farmers, businesses and municipalities amounts to 665 MW, which is approx. 8% of the country's installed PV capacity. The existing and pending overall capacity self-production projects is 1788 MW, approaching the 2 GW grid capacity that is therefore foreseen as provided by Law 5037/2023. Yet network saturation is slowing down progress, with 35% of the requested capacity (779 MW) having received a notification of inability (to connect to the grid), whereas 9% have been ultimately cancelled (194 MW). Mitigation measures include reserving an absorption margin of 10 MW per substation for self-production projects, while up to 3.8 MW are specifically foreseen for CECs and RECs (together with other categories of self-producers). In addition, the available share for self-production per substation or per high-voltage/medium-voltage transformer was raised from 20% to 60%, beyond the 10 MW capacity. On the other hand, the share of commercial projects for RES producers has been restricted to 40% (from 80%).

4.1. Law 5037/2023 and the Introduction of Renewable Energy Communities (RECs) and Citizen Energy Communities (CECs) into Greek Legislation

Although Greece, in comparison to many other EU countries, made early progress in implementing EU rules on renewable and citizens energy communities, incl. through a law that was adopted in 2018[56] (even before the Clean Energy Package and its EU Directives had been approved) and had opened the door for corporates to take advantage and benefit from provisions that were meant to foster collective energy actions by stakeholders that include municipalities, citizens and other local actors. In the meantime, measures were taken to reduce such "high-jacking" by businesses and large industrial consumers who had been initiating e.g. virtual net metering projects and self-consuming the electricity produced, taking over grid capacities that are scarce in the first place.

4.1.1. Legal clarity and complexity through parallel definitions

The recent Law 5037/2023[57] transposed EU provisions for RECs and CECs, establishing elements of an enabling framework and introducing 2 new definitions, thereby increasing legal complexity and questioning the status of already existing communities (Greece has now 3 definitions in parallel). Yet, existing energy communities established under the 2018 law are supposed not to be affected by their transition to the new legal forms, incl. for the RESCHOOL pilot[58] in Athens, where existing contracts and agreements are to be continued, such as the contract with the DSO on virtual net-metering, which is running over 20 years in total. Overall, the parallel existence of 3 definitions causes a lot of

[56] Law 4513/2018

[57] Adopted in March 2023, Law 5037/2023 is available here (in Greek).

[58] While certain administrative procedures have been undertaken without facing any obstacles, ministerial decisions for further clarification are pending

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confusion to citizens and other stakeholders who seek to set up energy communities, as the legal framework they need to navigate is complex and the differences between the 3 definitions are not easy to distinguish. The existing framework from 2018 (4513/2018) is only available to already established energy communities, allowing them to continue their operations without having the options to develop new projects.

The criteria and requirements that apply for RECs and CECs are in line with EU provisions, in terms of open and voluntary participation, and membership. REC members can be natural persons, local authorities and associated enterprises and associations, SMEs, cooperatives and public and private non-profit entities (as long as they are SMEs). CEC members can be natural persons, local authorities and associated enterprises and unions, legal entities of public and private law, and agricultural as well as urban cooperatives (not restricted to SMEs). According to the EU definition, the CEC participation of private companies cannot represent their main commercial or professional activity. In theory, RECs and CECs can be established without any citizen participation – yet there are minimum requirements on membership size: in general, RECs and CECs should count at least 30 members, unless 1) they are located in municipalities or islands whose population is lesser than 3.1000, reducing the minimum number to 20; 2) 15 SMEs take part, reducing the minimum number to 15 (in the case of CECs: legal entities of public or private law); 3) at least 1 local authority and 2 affiliated enterprises (in 100% ownership of the authority) participate, reducing the number to 3. Experts have criticized that such minimum membership requirements might open the door to cooperate abuse.

According to Law 5037/2018, RECs require vicinity, which for natural persons means permanent residency or full or partial ownership of real estate that is located within the area where the REC is operating. Legal entities must have their seat registered in the REC area. Also, more than 50% of the members should be based in proximity of the REC (there are no vicinity requirements for CECs) and be those in effective control. The ownership of each member can extend, in addition to the mandatory share, to one or more optional shares, up to a max. share in the cooperative capital of 20%. Local authorities and affiliated enterprises (= in full ownership by such authorities) can each participate in the cooperative capital with up to 40%. Regardless of the number of shares held, each member gets 1 vote in the decision-making process (such as in a general assembly). This is in compliance with the legal entities established for RECs and CECs (enacted in 2018 through the initial energy community legislation), in the form of "civil cooperatives"[59]. While the vicinity requirements only apply to CECs, the governance – one member, one vote – and the ownership principles apply to both RECs and CECs. Unlike several other EU countries, Greece has elaborated in detail on legal terms and content requirements, inc. on statutes, registration, the submission of supporting documents, and the use and redistribution of surpluses and internal reserves.

4.1.2. Roles and rights

The Law 5037/2023 specifies the activities RECs are entitled to carry out – which include production, consumption, storage and the supply of RES. This includes operating water desalination units that run on RES, as well as producing energy from biomass and biogas, incl. the collection, transport and processing of raw material therefore required. RECs can share self-generated renewable energy among the community and make use of virtual net metering to serve the RECs' members' energy

[59] regulated by the Law 1667/1986

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needs, incl. vulnerable groups who are affected by energy poverty (even if they are not members of the REC in question). RECs can further engage in research and the provision of technical support and training and awareness-raising, incl. through the participation in national and EU funding programs. Further activities comprise the provision of energy services, aggregation and demand response, and the development of alternative fuel infrastructure and the operation of sustainable transport solutions (mostly e-mobility), as well as other public utility undertakings related to raw materials, energy, renewable fuels and water.

While RECs carry out the above-mentioned activities in one region, CECs can do so across one or several regions. CECs must engage at least in one of the following activities: production, self-consumption or supply of RES electricity (not energy), storage, distribution, aggregation, provision of flexibility and balancing, energy efficiency services, e-vehicle charging and the provision of energy services to their members. Thus in comparison to RECs, the legal framework widens the scope of CECs, both in terms of activities (e.g. distribution) and geographical range. Like RECs, CECs can get involved in research, training, awareness-raising, funding programs, and offering support to vulnerable customers.

4.1.3. Enabling framework elements for energy community development

One enabling framework element is the legal provision to guarantee that RECs and CECs are subject to fair, proportionate and transparent procedures, including for their registration, licensing and permit granting procedures[60]. Priority should be given to REC applications to obtain producer certificates for RES and cogeneration units, as well as to environmental licensing matters and installation and operation permits. Also, RECs are exempted from application fees, or pay reduced fees, for getting certified by the Waste, Energy and Water Regulatory Authority, and regarding administrative procedures, grid connection and installations. Also, as renewable energy producers, RECs do not have to submit certificates that guarantee the origin of the electricity generated.

In their capacity as market and system operators, CECs and RECs must not be discriminated in relation to their roles and rights as end-consumers, producers, suppliers, distributors etc., having access to all organized energy markets, both directly and through aggregation (this is mostly copied from the EU Directive). In this regard, the Greek DSO (HEDNO) is tasked to cooperate with RECs and CECs and facilitate energy sharing and transfers within communities, subject to compensation payments which are set by the Waste, Energy and Water Regulatory Authority.

Another enabling element consists of carrying out annual assessments on barriers and drivers regarding the development of RECs and CECs, which is supposed to be done by the Centre for Renewable Sources and Energy (CRES)[61]. Based on the assessment and if considered adequate, CRES should then recommend to the Ministry of Environment and Energy to take action and initiate policy and legal reform or other support measures. Relevant information on existing and new measures must be communicated on the Ministry's and CRES' websites, to inform involved stakeholders who include citizens and local communities and energy industry actors (e.g. energy system and market operators, as well as manufacturers, installers, equipment suppliers). The Ministry of Environment and Energy should also provide awareness raising and training programs, with the involvement of

[60] Energy communities are obliged to notify the REC and CEC Registry, which is established in the General Commercial Registry
[61] See http://www.cres.gr/

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local authorities and the objective to inform citizens on rights and technical and economic aspects regarding renewable energies and self-consumption, incl. in the context of energy communities.

4.2. Access to Financing

Under the EU Just Transition Development Program 2021 – 2027, public funding has been allocated, for the first time, to a specific energy community project. The Municipality of Kozani receives €6.7 million for self-production projects of 7 MW total capacity, under the funding program's "Energy Transition - Climate Neutrality" priority. This is the outcome of a call for proposals that was open until March 2024, earmarking a total budget almost €42 million to support allocated to projects that must be operational by 2030 at the latest and use renewable sources to cover electricity needs of municipal buildings such as hospitals, schools etc. - while in parallel supplying vulnerable households[62]. The funds will cover up to 80% of the costs of energy community projects, with a minimum installed capacity of 0.3 MW[63], helping to foster energy community development in five Greek regional prefectures, including Western Macedonia and Crete – but by now, not in the Attica region, where the Greek RESCHOOL pilot is located. The approved project in Kozani will employ virtual net-metering to meet the energy needs of its members, which are the municipality, municipal water supply and sewerage company, the waste management utility of Western Macedonia, the Kozani industrial park, and the municipal company of urban planning.

With regards to national resources, between 2019 and 2023 only €3 million have been budgeted for energy community support, in lignite areas. Specifically, for the energy community of the Region of Western Macedonia and the Region's Local Land Improvement Organizations. According to last year's Law 5140/2024, national funds for the Just Transition of lignite areas were transferred from the "Green Fund" to the Special Service for Just Development Transition, which also administers the EU's Just Transition Fund. This makes one entity oversee allocating funding resources to this purpose, incl. to energy community projects in lignite areas.

In general, most of the funding programs are designed to incentivize municipalities to develop energy communities, while in practice, there are many initiatives which are being implemented without the participation of municipalities. Thus, there is a lack of support schemes directed at citizen-led energy communities, with the available resources not being claimed by many of the projects that are currently being established in Greece. On the other hand, the recently introduced virtual net billing scheme (see chapter 1.4) offers support that many energy communities in Greece can take advantage of. At the same time, Law 5037/2023 states that RECs can be covered by the legal framework for social cooperative enterprises, as a distinct form of cooperative organization, as well as in other Greek or EU programs, in compliance with the state aid rules. Such programs can be issued for the installation of different renewable energy and storage technologies, incl. within energy communities.

[62] The so-called "Apollon" constitutes the largest energy aggregation program in Greece, combining energy and social policies, through the installation of new RES and the implementation of virtual net metering, and under the form of citizen energy communities.
[63] PV Magazine International

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4.3. Legal Reform on Virtual Net Metering and Net Billing

4.3.1. The exclusion of energy communities from (virtual) net-metering

Legal reform[64] undertaken in 2024 has changed who is eligible to apply net-metering and virtual net-metering. Since May last year, (virtual) net-metering is only available to beneficiaries of the "Photovoltaics on the Roof" program, as well as farmers with installations up to 30 kWp, government entities, and households affected by energy poverty. The "Photovoltaics on the Roof" program was introduced by the Ministry of Environment and Energy in April 2023, allocating grants worth €200 million to residential and agricultural small-scale PV installations and storage systems, covering 75% of the costs incurred to households, and 60% in the case of farmers. The recent restrictions on who can benefit from (virtual) net-metering leaves RECs and CECs excluded from the scheme – for many of whom it as, until last year, building the foundation of their business model and economic sustainability.

Virtual net metering is also being carried out by the Greek RESCHOOL pilot COEN (the contract runs for a total of 20 years), who thereby obtains reductions on the electricity bills for its members. COEN members have collectively invested in PV installations, with each member contributing according to their energy consumption profile, and with the investment transferred into cooperative shares. Then, a file with a matrix of the members' meters' IDs, together with the sharing coefficients, are provided to the DSO, who then signs the energy sharing contract. HEDNO (the DSO), based on the coefficients, provides the retailer with the netted energy that is billed. The energy sharing contract with the HEDNO can be updated whenever the energy communities is requesting so. This business model does not involve monetary transactions, since the excess energy is not compensated, yet the reduction in electricity bills can be significant, as the cost of electricity represents around 60% of the total electricity bill (the rest are grid tariffs and taxes). Moreover, members are not affected by changes in the cost of electricity. With the new legislation replacing (virtual) net metering by (virtual) net billing, COEN is exploring to change its legal entity and expand self-consumption through a virtual net billing scheme (as mentioned above: the legal changes are applicable to new energy community projects, but not existing ones). Several new provisions (of the Laws 5106/2024 and 5151/2024) are designed to foster the transition from (virtual) net-metering to (virtual) net-billing. This includes converting permits and licenses of self-generation units so both net- and virtual net-billing becomes operable, the issuance of final connection offers or connection contracts for registered units that exclusively use net- and virtual net-billing, and priority treatment of new requests. In addition, self-generation projects (up to 150 MW) undertaken by already established energy communities which involve local authorities should be examined on a priority basis.

4.3.2. The new framework for (virtual) net billing

In September 2024, a Ministerial Decree[65] was issued to establish the regulatory framework for (virtual) net-billing models in self-consumption. This is done in form of a market-based compensation mechanism, according to which surplus renewable electricity is injected into the grid and compensated at wholesale market prices. Any natural person or legal entity, whether public or private, can participate in net-billing scheme, including RECs and CECs. In-net billing, RES generation

[64] Law 5106/2024 and Law 5151/2024

[65] Government Gazette 5074/B'/05.09.2024

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must be installed either in proximity of the consumption points, or connected through a direct line, if located on a non-adjacent site. In virtual net billing, at least one of the consumption points must not be connected to the RES generation unit – which means the RES project may be installed anywhere in Greece, regardless of where the electricity is consumed. Both in net-billing and virtual net billing, restrictions apply to third parties who under certain conditions do not qualify as self-consumers and are thus disallowed from generating revenues, in order to prevent industry incumbents from taking advantage.

In both net-billing and virtual net-billing, the surplus electricity injected into the grid is compensated based on the day-ahead market clearing price. This process involves the DSO, the electricity supplier and the RES aggregator, with the DSO notifying on the absorbed electricity as well on the injected and generated electricity per settlement period (which in Greece is 15 minutes). In net-billing, the RES aggregator calculates the monetary value of the injected surplus energy injected, and makes monthly payments to the self-consumers, after deducting service charges. In virtual net-billing, the RES aggregator calculates the monetary value of the surplus energy, the injected energy, and the netted energy. The RES aggregator then pays, on a monthly basis, the monetary value of the total netted energy to the supplier, and to the self-consumers the value of the surplus energy, after deducting service charges. In both net billing and virtual net billing, the supplier issues electricity consumption settlement bills to the self-consumer for the netted supply. In terms of further available revenue streams, self-consumers (such as energy communities) can enter into bilateral power purchase agreements (PPAs). Net-billing as well as virtual net-billing agreements are concluded between self-consumers and suppliers for a duration of 20 years.

The net billing schemes have been introduced into the Greek framework to encourage self-consumers to interact with the grid, incentivise decentralized renewable generation and foster grid optimization. Unlike other self-consumption models, net-billing, in particular in comparison to net-metering, offer incentives that reflect market developments and the true value of renewable electricity when fed into the grid, at any given time. Self-consumers – and energy communities - are incentivised to adjust energy consumption patterns and integrate battery storage to maximize revenues from distributed renewable generation, e.g. through the use of dynamic tariffs. In parallel, when self-consumers are encouraged to feed-in at times of high demand (and offtake at times of abundant supply), network saturation is reduced. In result, energy communities benefit by continuing energy sharing schemes as well as behavioural changes towards a more efficient use of energy. At the same time, the new scheme does not seem to be as economically beneficial to individual households as the virtual net metering, due to low levels of self-consumption. More advanced assessments must be carried out to better understand on the economic feasibility of the new net-billing scheme.

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Conclusions and Outlook on RESCHOOL Deliverable 5.4 – The Policy Advisory Paper on Changes Required in Regulation

In conclusion, while framework conditions for the market and system integration of energy communities are evolving to different degrees in In Sweden, the Netherlands, Greece and Spain, much is left to be done - for a consequent implementation of policy and legal reform initiatives that would enhance collective citizen actions to thrive. In the Netherlands, where involved actors are expecting legal clarity and having energy communities being established on a level playing field as market participants, while measures to tackle grid congestion should include making use of flexibility that can be unlocked on the demand side; in Sweden, where the government are cooperating with stakeholders on investigating how energy communities should be treated, from a regulatory perspective; in Spain, where several consultations on draft legislation are underway, with decision-making processes on extended self-consumption, legal definitions, independent aggregators and flexibility measures; in Greece, where net-billing is replacing net-metering while enabling framework elements should be fostering the interest and great number of initiatives that are being established (while also facing grid congestion challenges). Although progress is still slower than many involved stakeholders had hoped after the adoption of EU provisions in 2018-19, national authorities in Greece, Sweden, Spain and the Netherlands are in the progress of consulting and preparing the further development of framework conditions that enhance community energy to thrive, becoming active on functioning markets that reward flexibility and demand response, and reduce dependencies from public support schemes - while at the same time alleviate pressure on electricity networks (relevant in particular in Greece and the Netherlands) and integrate higher RES shares.

Areas of regulation and enabling framework elements where national decision-making is advancing extend to 1) the legal recognition of renewable as well as citizen energy communities as distinct market actors with specified rights and responsibilities; 2) the establishment of local energy markets and the introduction of new actors such as aggregators who are, in many places, still in early stages and done at demonstration or pilot sites; 3) improved energy market design that i.a. grant citizens and businesses the right to share energy and request flexible grid connection agreements; 4) the revision of frameworks to reinforce energy infrastructures that are meant to become decentralised, digitised and flexible, helping to integrate active consumers incl. energy communities. At the same time, renewable energy development in general as well as energy communities depend, in countries like Spain and the Netherlands, on public support, which comes in forms of grants, subsidies, and other schemes and programs. In this context, it is further important to address that, in reality, available financial support is not always accessed or channelled to nascent initiatives which are seeking to foster their economic viability – or else could expand in size and engage in new activities.

It needs to be underlined once more: without improvements in energy market designs and frameworks that are truly enabling citizens and local actors in Sweden, Spain, Greece and the Netherlands will not be reaping the large range of economic, environmental and social benefits that community energy offers. While the RESCHOOL reports on economic sustainability[66] and on evolving national frameworks for the market and system integration of energy communities (D5.3) analyse the

[66] See D5.2, the report on economic sustainability of the RESCHOOL pilot communities.

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progress made as well as remaining barriers, will the next Deliverable (5.4), in continuation of this work stream, issue policy advice on changes that are required in regulation. To this purpose and based on the findings of these 2 reports, RESCHOOL partners will now formulate recommendations on further policy and legal reform measures that decision-makers in Sweden, Spain, Greece and the Netherlands should adopt. Supported by the RESCHOOL dissemination and outreach efforts, the results will thereby support informed decision-making and help overcome implementation challenges.

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Abbreviations

ACM – Autoriteit Consument & Markt (the Netherlands Authority for Consumer and Markets)

BRP - Balancing Responsible Parties

BSP - Balancing Service Providers

CEC – Citizen Energy Communities

CEP – Clean Energy Package

CRES - Centre for Renewable Sources and Energy

DER – Distributed Energy Resources

DSO – Distribution System Operator

EU – European Union

EU-ETS - European Union Emission Trading Scheme

EV – Electric Vehicle

IEMD – Internal Electricity Market Directive

LULUCF – Land Use, Land-Use Change, Forestry

NECP – National Energy and Climate Plan

NRA – National Regulatory Authority

P2P – Peer-to-Peer

PV – Photo-Voltaic

REC – Renewable Energy Communities

RED II/III - Revised / Recast Renewable Energy Directive

RES – Renewable Energy Sources

RIPRE - Registro de Instalaciones Productoras de Energia Electrica (Spain's registry of electricity generating installations

SME – Small and Medium-Sized Enterprise

TSO - Transmission System Operator

WP – Work Package

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