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Sustainable plus energy neighbourhoods

The Netherlands

FACTSHEET

Policy recommendations for sustainable plus energy neighbourhoods and buildings

April 2023

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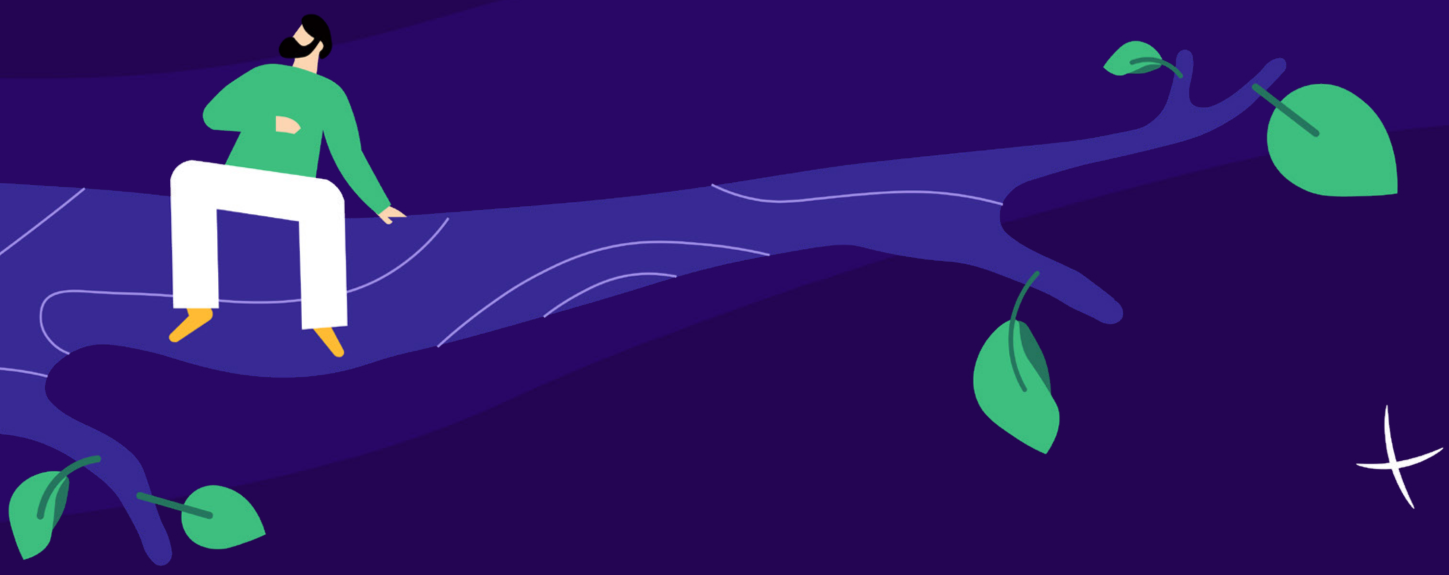
BPIE

Glossary of Terms

CEC	Citizen energy community
CSC	Collective self-consumption
DH	District heating
DSF	Demand-side flexibility
EED	Energy Efficiency Directive
EMD	Electricity Market Design
EPBD	Energy Performance of Buildings Directive
REC	Renewable energy community
NZEB	Nearly zero-energy building
P2P	Peer-to-peer
PPA	Power purchase agreement
REDII	Renewable Energy Directive
SPEN	Sustainable plus energy neighbourhood
SRI	Smart readiness indicator



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Sustainable plus energy neighbourhoods

Sustainable plus energy neighbourhoods (SPENs) can contribute to decarbonising the building stock, while providing additional benefits for residents both at the building and neighbourhood level, enhancing wellbeing and a sense of community. SPENs can provide a range of shared spaces, services and facilities, such as shared heat pumps, PV panels, EV charging, EVs, bicycles, and common spaces with greenery, water and biodiversity. A neighbourhood approach provides additional benefits to demand-side flexibility (DSF) compared to single apartments or buildings. The optimisation of electricity and heat production and sharing renewable energy from various sources is managed by a system of twin modelling and automation.

Shared assets, services and collective energy production installations interact differently with the urban infrastructure thus they often require new legislative frameworks. The Clean Energy Package of 2019 has important provisions to fill in these gaps and allow collective forms of producing, sharing and selling of energy, as well as to encourage prosumers to enter the market. This factsheet maps Spain's progress in implementing provisions of the 2018 Energy Performance of Buildings Directive (EPBD)[1], the Energy Efficiency Directive (EED)[2], the Renewable Energy Directive (REDII)[3], and Electricity Market Design (EMD)[4]. It reviews the latest developments in national, regional and municipal policies regarding the following aspects relevant to SPENs: i) energy performance, ii) renewable energy and energy communities, and iii) digital technologies and demand-side flexibility[5]. The factsheet provides an overview of existing gaps and barriers in the development and market uptake of SPENs, and provides policy recommendations.

The factsheet also lists the drivers, potential business models and policy support measures that enable investments and wider uptake of SPENs. The policy mapping and recommendations are based on desk research, ten interviews and two workshops with experts from the private and public sectors, including developers and local authorities involved in projects of SPEN and energy communities.

[1] Directive (EU) 2018/844
[2] Directive (EU) 2018/2002
[3] Directive (EU) 2018/2001
[4] Directive (EU) 2019/944
[5] A complete policy mapping is available in Boll et al. (2021)

1.
Energy performance

The positive energy balance of a SPEN can be achieved with three subsequent steps:

- Sufficiency measures at neighbourhood level
- Reducing energy demand with energy efficiency measures at the building level
- Collective production and sharing of renewable energy

Energy sufficiency aims to reduce total energy consumption by analysing the need of services, spaces and the technology use in the design phase, by providing an adequate level of utility or services from energy. Sufficiency measures within SPENs, such as shared heating systems, EV charging stations, EVs, bicycles and common spaces, can reduce both operational and embodied emissions. The second type of measures that aim at reducing energy demand at the building level depend on building regulations for new constructions and renovations. Finally, after reducing the energy demand, the low amount of energy required should be covered by renewable energy produced and shared within SPENs.

The 2010 EPBD[6] mandated nearly-zero energy (NZEB) for new constructions by 2020 and minimum energy requirements for major renovations. This section will describe in detail the implementation of minimum energy performance requirements in Spain, considering that more ambitious requirements at the building level will also have an impact on the energy balance of SPENs. All the syn.ikia demo projects have implemented ambitious targets at the building level going beyond the statutory minimum requirements. Given the scope and ambition of SPENs to achieve energy-positive performance levels, a broader set of policy provisions and support measures are being reviewed, including policies that aim to reduce lifecycle climate impacts.

[6] Directive 2010/31/EU

Minimum energy performance requirements

Energy performance requirements in the Netherlands have been in place since 1995 and are updated regularly to move towards NZEB targets. As of 1 January 2021, the energy performance requirements are threefold:

1. Maximum energy need (kWh/m² per year)
2. Maximum primary energy use (kWh/m² per year)
3. Minimum share of renewable energy (%)

The energy performance requirements often referred to as the NZEB-requirements (BENG-italics) are applicable for new buildings (both residential and non-residential) and will be calculated with the newly developed energy performance calculation method NTA 8800 (Nederlandse Technische Afspraak) which is based on the CEN Standards (CA EPBD, 2021).

Table 1: Requirements for NZEB. Source: CA EPBD (2021)

	EC benchmarks for oceanic climate (Western European areas)		Energy performance and renewable energy requirements	
Building type	**Primary energy use* (kWh/m² per year)**	**Renewable as % of total primary energy**	**Primary energy use (kWh/m² per year)**	**Share of renewable energy (%)**
Single family house	50-65	61%	30	50
Apartment building	-	-	50	40
Office	85-100	49%	40	30
School	-	-	70	40

*The requirement for primary energy use (BENG-1) depends on the ratio between the surface of the building envelope (A_{ls}) and the heated floor surface (A_g), except for the health care use function (hospitals etc.). This creates a differentiation based on the 'compactness' of a building. A higher limit value for the energy requirement applies to a building that is less compact[7].

The Dutch government supports a programme from intermediate organisations including NEPROM (project developers' organisation) and Bouwend Nederland (builders' organisation) targeted at preparing market players for increased demands to reach the NZEB level for new buildings[8].

Major renovations are required to meet minimum requirements for building components. When more than 25% of the building envelope is renovated, the renovation is considered to be major. The energy performance calculation is also mandatory for major renovations of residential buildings and offices.

Minimum requirements for the R-value of walls, roof and floor, and the U-value of windows and doors, are set for minor renovations. For these cases, no energy performance calculation or building permit is required. The requirements for the individual building components are listed below.

[7] https://www.nieman.nl/specialismen/energie-en-duurzaamheid/beng-eis-vanaf-01-01-2021/
[8] https://epbd-ca.eu/ca-outcomes/outcomes-2015-2018/book-2018/countries/netherlands

Table 2: Minimum requirements for the thermal quality of the building envelope by 1 January 2015 for new buildings and major renovations. Source: CA EPBD (2021)

Roofs	R-value ≥ 6.3 m^2.K/W
Floors	R-value ≥ 3.7 m^2.K/W
Façades	R-value ≥ 4.7 m^2.K/W
On average for all transparent elements in a façade section	U-value < 1.65 W/m^2.K
Individual transparent elements (window, door)	U-value < 2.2 W/m^2.K

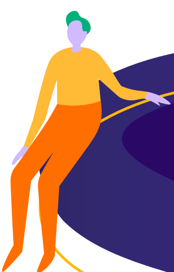
Table 3: Minimum requirements for building components for minor renovations. Source: CA EPBD (2021)

Roofs	R-value ≥ 2.1 m^2.K/W
Floors	R-value ≥ 2.6 m^2.K/W
Façades	R-value ≥ 1.4 m^2.K/W
Individual transparent elements (window, door)	U-value < 2.2 W/m^2.K

Minimum requirements for renewable energy are obligatory and are shown through a **calculation tool** in case of a major renovation installation, (partial) renewal, change or expansion of an installation for space heating or space cooling[9].

Policies to encourage positive energy buildings

There is a growing awareness of SPENs among policymakers and researchers.



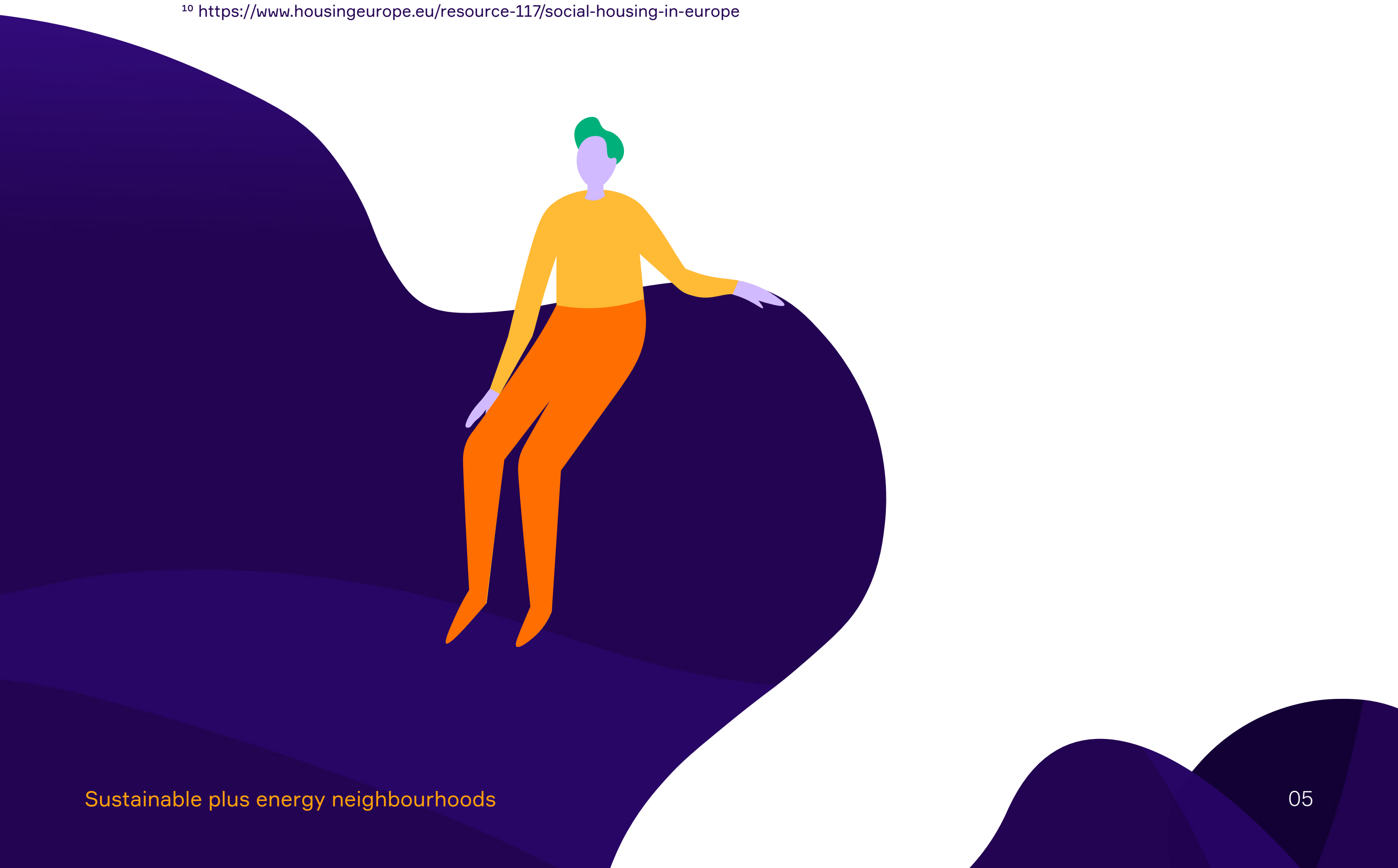
While the government aims to renovate the Dutch building stock through a district approach and natural-gas-free districts programme as part of the national Climate Agreement framework, the main goal is to disconnect existing buildings from the gas network, rather than explicitly develop positive energy buildings and districts.

[9] https://www.rvo.nl/onderwerpen/wetten-en-regels-gebouwen/energieprestatie-eisen-verbouw-renovatie/hernieuwbare-energie

Table 4: Main policy updates (for a complete list of policies relevant for SPENs and energy efficiency, see Boll et al. (2021))

Policy	Implementation level	Main provisions
Phase-out of fossil fuel boilers	National	Ban on new gas boilers and gradual replacement of old gas boilers with heat pumps or hybrid boilers starting from January 2022.
GPR rating	National	Building rating used by municipalities in public procurement.
Performance guarantee	National	After investments in energy efficiency upgrades, developers can implement increases in rental prices.
Renovation strategy of the Social Housing Agency	National	The social housing sector makes up an important share of the building stock in the Netherlands, accounting for 32% of the total housing stock and 75% of the rental stock[10]. The Social Housing Agency has renovation targets, using the strategy of renovating multiple building elements at once with an industrial renovation approach, leading to economies of scale.

[10] https://www.housingeurope.eu/resource-117/social-housing-in-europe



2.
Renewable energy and energy communities

REDII (Directive (EU) 2018/2001) and EMD (Directive (EU) 2019/944) contain important provisions and definitions for a legal framework enabling the production, storage, sharing and selling of energy. The implementation of these Directives can enable smaller players such as SPENs to play an increasing role in the energy market – and thus the energy transition. However, Member States have opted for different strategies and are at different stages in implementing the definitions of collective self-consumption (CSC), renewable energy community (REC) and citizen energy community (CEC). The transposition of these frameworks into national legislation is a key enabler for SPENs.

Overview of existing policies: existing drivers and barriers

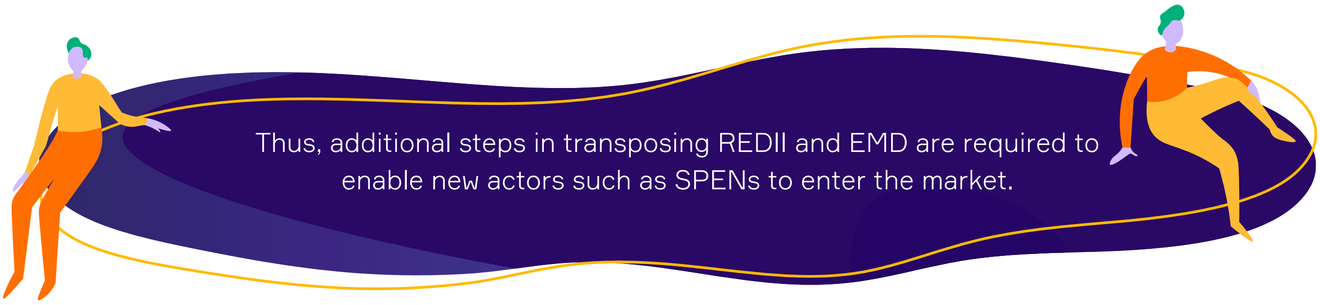
The Netherlands has not transposed CSC, REC and CEC according to the REDII and EMD definitions (Table 5). Instead of CSC the ‘Postcode approach’[11] has been used since 2013, which grants tax reliefs for electricity generation by a cooperative or by an association of homeowners, applicable to members living in the same or adjacent postcode areas to the generation plant (Frieden et al., 2020).

[11] Postcode regulations 2023

Table 5: Transposition of collective self-consumption and energy communities in national legislation in the Netherlands. Adapted based on Frieden et al. (2020), Tual et al. (2022) and Murley & Mazzaferro (2021)

Collective self-consumption	Renewable energy communities	Citizen energy community
Allowed in a regulatory sandbox[12] Postcode approach	Transposed as ‘energy community’ in Energy Law 2022	Transposed as ‘energy community’ in Energy Law 2022

The current energy community framework under the **Energy Law 2022** does not distinguish between REC and CEC. However, REC under REDII allows all types of renewable energy, including renewable heating, while CEC (included in the EMD) regards only electricity. SPENs require a framework similar to CSC or RECs, that would allow sharing of all types of renewable energy.

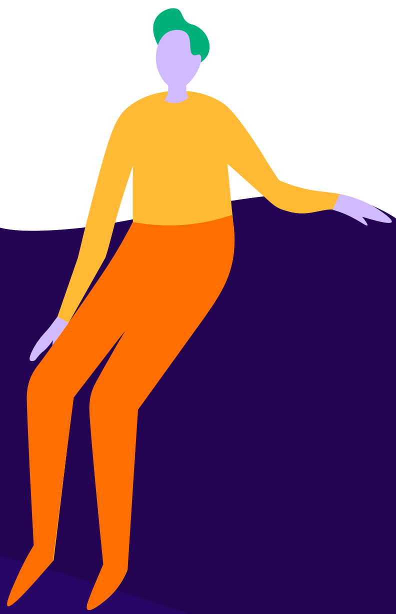


Grid capacity is a key concern in the case of electricity production. The production and sharing of electricity must be encouraged within the low-voltage and medium-voltage distribution system by means of lower tax rates or boundaries in the definition of CSC. The postcode approach is a good step forward; however, a clearer framework in line with REDII would further encourage demand-side flexibility (DSF) and enable SPENs. The argument of grid capacity limit may be used by grid operators to discourage new smaller actors from entering the market, which is a major barrier for SPENs that are new developments. New business models are required to remove the administrative and financial barriers to investments in additional grid infrastructure, and to provide incentives for grid operators to collaborate with SPEN developers. There is a need to assign a supervising authority for the energy communities to prevent potential corporate abuses.

Yearly net metering[13] in the Netherlands is a successful incentive for investments in PV panels. However, net metering is a costly public incentive, and it favours consumers with PV installations who do not pay VAT for the energy consumed from the grid. Yearly net metering also discourages DSF, and thus requires additional investments in grid capacity. The authorities are considering phasing out net metering starting from 2025, until a complete phase-out towards using only 15-minute imbalance settlement[14] in 2031; however, the measure has not been implemented yet.

[12] **Regulatory sandboxes** are frameworks which, by providing a structured context for experimentation, enable where appropriate in a real-world environment the testing of innovative technologies, products, services or approaches for a limited time and in a limited part of a sector or area under regulatory supervision ensuring that appropriate safeguards are in place.
[13] Net metering an electricity billing mechanism that allows consumers who generate electricity to account for it in the billing as electricity used anytime within a certain time period, instead of when it is actually used.
[14] Imbalance settlement determines the electricity deliveries between the parties operating in the electricity market.

Drivers	• Postcode approach which grants tax reliefs for electricity generation within a postcode area. • Policy to phase out gas boilers. • Yearly net metering is a successful incentive for investments in PV installations. • Distribution system operators publicly share information regarding grid capacity, which is an enabler for projects such as SPENs or energy communities.
Barriers	• Lack of transposition of CSC framework, currently energy sharing being allowed in a regulatory sandbox of postcode approach. • The transposition of energy communities makes no distinction between RECs and CECs. • Limited grid capacity is an important barrier for SPEN to enter the market.



3.

Digital technologies and demand-side flexibility

An adequate policy framework is a prerequisite for a successful implementation of demand-side flexibility (DSF). DSF refers to a mechanism that allows consumers to change their electricity consumption or generation (reduce, increase or shift) for a certain duration based on external signals, such as market price. In this way, they could reduce their exposure to high energy prices, hedge against potential power outages, and monetise their flexible energy use.

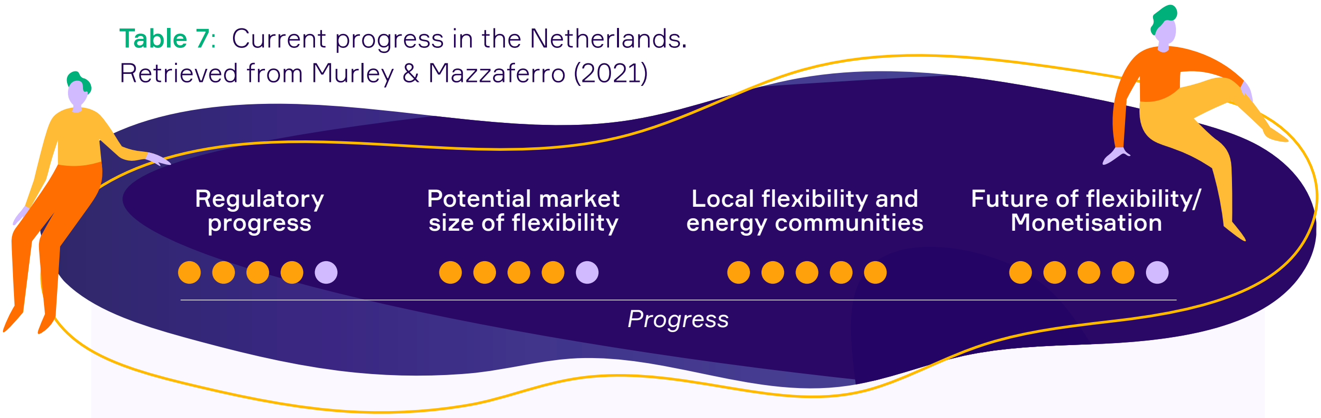
Electricity markets need to improve the accuracy of demand-supply forecasts. Thus, the so-called 'imbalance settlement period' should be set at 15 minutes. This would drive market price balance, and the system would be closer to becoming a real-time electricity market. All smart meters can deliver 15-minute measurements. Previously, yearly net metering was being used as an incentive to encourage investments in renewable energy; however, it does not encourage DSF as the alternative 15-minute imbalance settlement. DSF is important to reduce peak demands and avoid additional investments in grid upgrades.

Overview of existing policies: existing drivers and barriers

The success of the DSF development will largely depend on i) having demand-side regulation in place, ii) potential market size, iii) the presence of local flexibility mechanisms, and iv) monetisation and the possibility of having markets in the future.

The progress of the existing regulatory framework, as well as future regulatory targets and flexibility market maturity, is presented in Table 7.

Table 7: Current progress in the Netherlands. Retrieved from Murley & Mazzaferro (2021)



Regulatory progress

To enable DSF, the regulatory framework must allow aggregators or other companies offering DSF or ancillary services[15] to enter the market. An aggregator is an energy service provider which can increase or moderate the electricity consumption of a group of consumers according to total electricity demand on the grid, and can also operate on behalf of a group of consumers producing their own electricity by selling the excess electricity they produce. DSF and potential savings on the bill for residential consumers allow for new types of services on the electricity market, provided by aggregators. Thus, the new electricity market regulations must allow new companies to enter the market, including in the REC context, at the same time protecting consumers who must ultimately benefit from savings from DSF (BEUC, 2018).

In the Netherlands, the regulatory framework is rather favourable for DSF market participation. The Netherlands is a frontrunner in commercial distribution electricity, being the only Member State with commercial instead of trial distribution system operator flexibility, although it still doesn't have a commercial market for residential flexibility.

Smart readiness indicator (SRI)[16] is a policy to encourage smartness and ICT in the building sector at the European level. It was first introduced as a voluntary scheme by the 2018 EPBD recast (Directive (EU) 2018/844). SRI may be a useful certification for buildings that have implemented smart building automation, since developers usually want to attest to the additional investments. However, SRI is at an early stage of implementation in the Netherlands, at the start of its testing phase[17]. It is not widely known on the market and it may not be useful for final consumers.

[15] Ancillary services are additional services provided by the distribution system operator required for a proper operation of the grid such as keeping the frequency, voltage, and power load within certain limits.

[16] Smart readiness indicator measures the capacity of buildings to use information and communication technologies and electronic systems to better suit the needs of occupants and the grid, as well as improve energy efficiency and overall building performance.

[17] https://www.rvo.nl/onderwerpen/wetten-en-regels-gebouwen/epbd-iii/smart-readiness-indicator

Potential market size of flexibility

Electricity markets encompass many ancillary services, which can create revenue opportunities. These ancillary services need to exist in the local market; regulation needs to enable a dynamic and flexible market with no double network charges, and to enable aggregation of resources. The market is testing different options, for example using EVs as one of the ancillary services. For now, however, this has shown very low profitability (Murley & Mazzaferro, 2021).

Local flexibility and energy communities

The regulatory framework should also enable energy production, sharing and selling of excess energy by transposing the CSC, REC and CEC into national legislation. The CSC is allowed with the postcode approach, while REC and CEC have been merged as a single concept of energy community (Table 5).

Future of flexibility

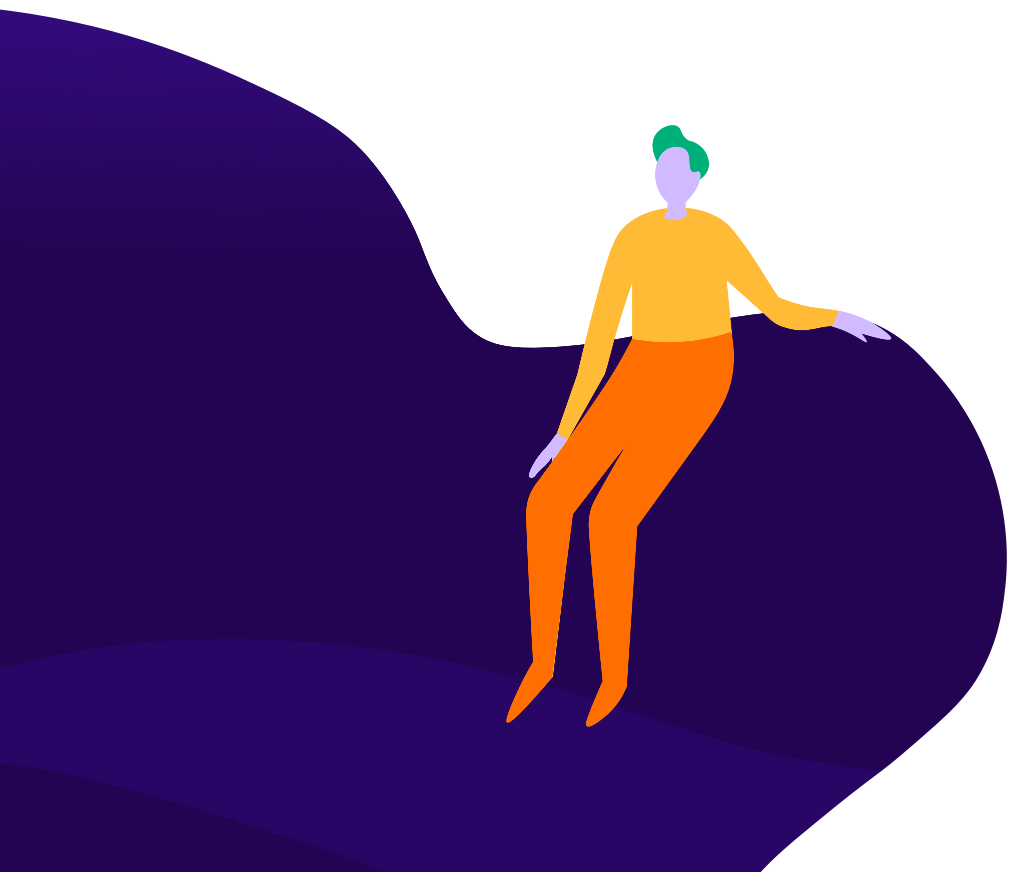
The progress of policies in terms of future targets for renewables or target dates to join the European market coupling is assessed in Table 7, as well as the current monetisation of flexibility. To help the acceleration of DSF, further development of dynamic time-of-use tariffs, removal of net-metering and double taxation of storage[18] are needed. Double taxation is in the process of being removed – the provision has been passed but has not yet been signed into law, while net metering is to be phased out by 2031.

Table 6: Implementation of smartness and DSF in electricity regulation. Adapted from Murley & Mazzaferro (2021)

Residential dynamic tariffs	15-minute imbalance settlement period	Storage in ancillary service	Distribution system operator flexibility – commercial/trial
Available	No	Yes	Commercial

[18] Double taxation refers to taxes on the part of energy stored to be fed back to the system.

Drivers	• SPENs have additional opportunities for DSF compared to single apartments because of shared assets such as shared heat pumps, PV panels, EV charging, EVs and bicycles, etc. • New opportunities for business models based on DSF such as aggregators or other companies that manage all types of heat and electricity exchange within a SPEN.
Barriers	• Yearly net metering does not encourage DSF. The authorities are considering phasing out net metering by 9% per year starting from 2025, until a complete phase-out in favour of 15-minute imbalance settlement in 2031. However, the measure has not yet been implemented. • No financial incentives for DSF through price signalling because the price for selling the surplus energy produced within a SPEN and buying from the grid are currently the same. • The optimisation of electricity and heat production requires complex modelling and automation, as well as an energy manager for SPEN.



4. Financing, business models and enabling conditions

Low energy demand and the surplus energy of a SPEN offer new business model opportunities for energy sharing within SPENs, as well as selling excess energy to a third party within a REC. Potential business models must be aligned with the existing regulatory framework in the Netherlands. The business models (Table 8) were analysed in a workshop with experts and developers, to assess their applicability to existing SPENs and their alignment with the existing regulatory framework (Table 9).

SPENs benefit from a range of shared assets such as heat pumps, thermal energy storage, PV panels, EV charging etc. An automation of the heating system at a SPEN level instead of an apartment level can contribute significantly to DSF. Improved prediction of buildings' demands within a SPEN (e.g in response to users' needs, weather forecasts etc.) contributes to a more adaptive, efficient and responsive building performance. The predictive digital twin contributes to shaving peak demand, avoiding grid congestions, responding to energy prices, and climate and weather adaptation. With outputs from energy monitoring, the individual contracts of the final consumers can be adjusted to maximise the local consumption of energy and allow consumers to reap the maximum benefits from billing.

Table 8: Overview of potential business models relevant for SPENs

Business model	Description	Relevance for SPENs
P2P or local electricity market	Promote collective self-consumption by creating a marketplace among prosumers and consumers.	Energy sharing system among positive energy buildings in a SPEN. It incentivises and rewards plus-energy buildings. It encourages the community as a whole to share electricity and achieve a potential net gain.
Joint shared assets	Shared energy assets and investments such as batteries, PV panels etc.	Assesses the added value of SPEN projects compared to business as usual. Determines the optimal investments and the source of revenues to pay these (individual, collective, or both).
SPEN as an energy retailer	The SPEN becomes a retailer that buys power directly from wholesale markets, hence reducing costs by avoiding an intermediary (currently retailers).	Assuming that an advanced energy management system is available in the SPEN, automatises the hourly energy balance and predicts demand commitments in the power market. It brings advantages including more choices of energy suppliers and independence from retailers. This challenges the status quo and has the potential to channel more revenues to consumers, by avoiding the transaction costs of a retailer.
PPA	Power purchase agreements. Green or zero-carbon-emission energy might be of interest for industry or public buildings to certify guarantees of origin.	PPAs offer the possibility of a long-term commitment to sell surplus energy from SPENs to external players interested in acquiring certified renewable energy.
Inter-SPEN	The surplus energy of a SPEN can be traded or offered to an open marketplace, for example within a REC.	Trading surplus energy outside a SPEN may incentivise additional investments in energy efficiency and renewable energy. Surplus energy could be bought by aggregators, other neighbourhoods or SPENs, industry, retailers etc. RECs and CECs may enable small actors such as SPENs to enter the electricity market.
SPEN flexibility services	Business models based on DSF: shifting demand according to energy availability to reduce peak loads and reduce grid congestion. The DSF avoids additional investments in grid upgrades.	The SPEN provides energy flexibility to external actors: distribution system operators, aggregators, local grid, EV smart charging etc. The SPEN, through the energy management system, engages in DSF that has to be monetised and brings financial benefits to the consumers.

Table 9: Overview of possible business models for SPENs in the Netherlands

Business model	P2P or local electricity market	Joint shared assets	SPEN as retailer	PPA	Inter-SPEN	SPEN flexibility services
Suitability for SPENs in the Netherlands	No	Yes (storage)	No	Yes	No	No
Regulatory framework requirements	CEC and CSC	REC and CSC	CEC	REC	CEC and REC	CEC and REC

The syn.ikia SPEN demo in Uden has a strong focus on social cohesion and community building. The project developed the 'social beautiful' concept. Dwellings for people who need care, for example, people with autism, or people with social difficulties, are usually not integrated in regular developments. With the 'social beautiful' concept the syn.ikia demo integrates a mix of 39 regular apartments with 15 apartments for people with special needs. Residents agreed that they would help each other and organise activities in a common space, as in a common living room.

The project has also implemented fewer parking spaces, which were replaced by green spaces. The urban regulations were negotiated with the local authorities in such a way that this 'reserved' green space can be turned into parking lots if necessary in the future.

SPENs will need to assess and track whether they add value in terms of quality of life, sense of community or access to green spaces compared to more traditional real estate developments. Certification schemes can attest to the added values of SPEN developments compared to business as usual, and become a source of verified documentation that can support compliance with sustainable finance claims (taxonomy) or the articulation of the business case for SPENs.

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5. Policy recommendations for the Netherlands

Reducing energy demand at the building level for new constructions and renovations plays an important role in the total energy balance of a SPEN. Implementing the 2018 EPBD increased the ambition for minimum requirements to NZEB levels. The next steps towards achieving zero-emission building stock by 2050 will be set out in the upcoming revised EPBD of 2023.

EU regulations regarding the collective production, sharing and selling of energy have been partially implemented in the concept of energy communities and in a regulatory sandbox of postcode approach. These can be further improved, and the following policy recommendations can enable new actors such as SPENs to enter the energy market.

Energy performance	• After the implementation of NZEB standards, the upcoming implementation of zero-emission building standards of the revised 2023 EPBD should further increase the ambition for new constructions and renovations by lowering the whole life carbon limit values of buildings. • Support schemes are necessary to encourage additional investments in positive energy buildings, beyond minimum requirements.
Renewable energy and energy communities	• The existing postcode approach should be further improved to further encourage DSF. The existing administrative boundaries could be replaced with the approach used in Austria, based on grid delimitations, to further incentivise using energy within low and medium-voltage grid segments. • The existing CSC framework should be extended beyond electricity sharing, to also include renewable heating. • The existing energy community framework should be further improved, making a distinction between RECs, which allow both heating and electricity, and CECs, which only regard the electricity market. • A supervising authority should be assigned for the energy communities.
Digital technologies and demand-side flexibility	• REC and CEC frameworks should be further elaborated for regulating the role of new market players such as aggregators, energy managers or SPENs within energy communities. • Financial incentives should promote DSF, such as the development of dynamic, time-of-use tariffs and the removal of double taxation of storage. • The planned phase-out of yearly net metering in favour of 15-minute imbalance settlement should be implemented. • The limited grid capacity should be addressed with new business models and incentives for DSF.

References

BEUC. (2018). ELECTRICITY AGGREGATORS: STARTING OFF ON THE RIGHT FOOT WITH CONSUMERS The Consumer Voice in Europe. 32(9505781573), 0–11. www.beuc.eu

Boll, J. R., Dorizas, V., Broer, R., & Toth, Z. (2021). Policy mapping and analysis of plus-energy buildings and neighbourhoods.

CA EPBD. (2021). Implementation of the EPBD The Netherlands. Status 2020. (Vol. 49, Issue 11). https://doi.org/10.54648/TAXI2021092

Frieden, D., Tuerk, A., Neumann, C., D'Herbemont, S., & Roberts, J. (2020). Collective self-consumption and energy communities : Trends and challenges in the transposition of the EU framework. Compile, December, 1–50.

Murley, L., & Mazzaferro, C. A. (2021). European Market Monitor for Demand Side Flexibility. In https://smarten.eu/wp-content/uploads/2022/02/EU_Market_Monitor_2021_PUBLIC_ONLINE.pdf.

Tual, R., Theesfeld, V., & Zieher, M. (2022). Energy sharing regulation in the EU (Issue 893240). https://www.rescoopvpp.eu/blog/energy-sharing-regulation-in-the-eu

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Sustainable
plus energy
neighbourhoods

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Norwegian University of Science and Technology

DTU Technical University of Denmark

BPIE

SINTEF

HOUSING EUROPE

IREC Shaping Energy for a Sustainable Future

ARCA NOVA GRUPPEN

area

INCASÒL Institut Català del Sòl

TNO innovation for life

ENFOR

ABUD Advanced Building & Urban Design

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