

Innovation Management, Exploitation, Market Uptake and Business Models

D6.5 AN OVERVIEW OF FINANCING OPPORTUNITIES AND STRATEGIES TO LINK THEM TO SYN.IKIA INNOVATIONS AND INVESTORS

Andrea Kerstens (MSc), Bartje de Wijnse (MSc), Angelin Greco
(PhD)

December 2023 M48



This project has received funding from
the European Union's Horizon 2020
Research and Innovation programme
under Grant Agreement N 869918.



1. Revision Log:

	V0	Andrea Kerstens	Task 6.4 leader	31/08/22
review	V0.1	Caroline Cheng	WP6 leader	02/09/22
	V1	Andrea Kerstens	Task 6.4 leader	30/09/22
review	V1.1	Niki Gaitani	Project leader	13/10/22
	V2	Andrea Kerstens	Task 6.4 leader	17/08/23
review	V2.1	Victoria Taranu Caroline Cheng Bakul Kandpal	WP5 and WP6 members	24/11/23
	V3	Andrea Kerstens	Task 6.4 leader	30/11/23
review	V3.1	Abel Magyari	QA D6.5	12/12/23
	V4	Andrea Kerstens	Task 6.4 leader	18/12/23

PROJECT ACRONYM syn.ikia

PROJECT NUMBER 869918

PROJECT TITLE Sustainable Plus Energy Neighbourhoods

WEBSITE www.synikia.eu

2. Technical References

Deliverable (number)	D6.5
Deliverable Name	An overview of financing opportunities and a strategy to link them to syn.ikia innovations and investors
Work Package (number)	WP6
Task number and Title	Task 6.4 Financing
Dissemination Level	PU = Public, fully open
Date of Delivery	December 2023
Lead Beneficiary	Andrea Kerstens – TNO Bartje Alewijnse – TNO Angela Greco – TNO
Contributors	Ole-Evin Utaker – Arca Nova Ingeborg Strassl – SIR Oskar Mair am Tinkhof – SIR Joan Estrada i Aliberas – INCASÒL Joana Aina Ortiz Ferrà – IREC Jaume Salon – IREC Ann Kristin Kvellheim – SINTEF Thijs van den Oord – AREA

Reviewers	Abel Magyari - ABUD Victoria Taranu - BPIE Caroline Cheng – SINTEF Niki Gaitani - NTNU Bakul Kandpal - NTNU			
Status	Final deliverable			
Document history	V0	Name	Role	Date
	V0.1	Caroline Cheng	WP6 leader	02/09/22
	V1	Andrea Kerstens	Task 6.4 leader	30/09/22
	V1.1	Niki Gaitani	Project leader	13/10/22
	V2	Andrea Kerstens	Task 6.4 leader	17/08/23
	V2.1	Victoria Taranu Caroline Cheng Bakul Kandpal	WP5 and WP6 members	24/11/23
	V3	Andrea Kerstens	Task 6.4 leader	30/11/23
	V3.1	Abel Magyari	QA D6.5	12/12/23
	V4	Andrea Kerstens	Task 6.4 leader	18/12/23

3. Executive Summary

Acknowledging the fundamental role of financing opportunities, this report (D.6.5) has multiple goals. First, D6.5 is aimed at providing an overview of the financial mechanisms, schemes, and resources that could play a role in accelerating the implementation of sustainable plus energy neighbourhoods (SPENs) across the four different countries in which the demo sites are situated. Second, it strives to propose a strategy to attract investors to realize the innovation(s) needed in a SPEN. And third, it consists of policy recommendations regarding the barriers and opportunities of the available financial schemes. These elements are particularly important for the realization of SPENs, since it is widely acknowledged that many investors, both public and private, are looking for new green and sustainable investment opportunities but these are often challenging to pursue due to the stakeholder diversity and complexity of innovations involved in the realization of a SPEN.

3.1 Review of financial opportunities

In this deliverable we present the main financial mechanisms and schemes. We illustrate them by country and by target group. In addition, the research conducted surfaced the following main findings:

- Most small-scale European and federal financial schemes are designed at the building level rather than at the neighbourhood level.
- The demo-countries lack a responsible jurisdiction or entity for the energy management involving a diverse group of stakeholders.
- Current energy business models, make it challenging to prioritize collective approaches over individual benefits (e.g. bureaucratic, contractual issues).
- Knowledge and use of financial schemes are rather fragmented and scarce, and syn.ikia innovations are in clear need for new business models.
- With the current financial landscape and market, the survival of many syn.ikia innovations is limited to the duration of the project.

3.2 Strategies to attract investors

In order to attract investors, different strategies can be followed. These are:

- The business models (Deliverable 6.6) can be enhanced with certain financial schemes that focus on specific elements of these business models. This deliverable includes the link between these business models and schemes.
- Compliance with the EU Taxonomy could potentially encourage investments in SPENs. Investors will, in the future, be held accountable for how 'green' their investments are. The EU Taxonomy will help identify this. This means it will be beneficial for SPENs to comply with these standards. This can be

demonstrated by finding alignment between the syn.ikia SPEN KPI framework and the EU Taxonomy framework (included in Deliverable 5.2).

- A template to comprehensively summarize information for potential investors was designed.

3.3 Policy recommendations

In our comprehensive study on financial support for SPENs, we offer refined policy recommendations for regional and national policymakers to enhance project effectiveness:

- Prioritize collective action and inclusivity through policy frameworks.
- Expand incentives for shared energy production and collective self-consumption among interconnected structures.
- Streamline implementation of Renewable Energy Directive to empower prosumer engagement in energy market.
- Explore alternative financing solutions to ensure accessibility across income levels to tackle fuel poverty and access to housing.
- Embrace diverse target groups and address split-incentive challenges for holistic neighbourhood sustainability.

1. REVISION LOG:	1
2. TECHNICAL REFERENCES	1
3. EXECUTIVE SUMMARY	3
3.1 Review of financial opportunities	3
3.2 Strategies to attract investors.....	3
3.3 Policy recommendations	4
4. ROLES AND RESPONSIBILITIES	7
5. INTRODUCTION	8
6. OBJECTIVES OR PROBLEM STATEMENT	8
7. FINANCIAL SCHEMES, MECHANISMS AND SOURCES	9
7.1. Working definitions	9
7.2. Mechanisms.....	9
7.2.1. Public funding	9
7.2.2. Private funding.....	11
7.2.3. Public-private partnerships.....	12
7.2.4. Bond and stock market	12
7.3. Financial Schemes.....	13
7.3.1. Austria.....	15
7.3.2. The Netherlands	17
7.3.3. Norway.....	20
7.3.4. Spain	21
7.4. Strategies to attract investors.....	23

7.4.1. Business models.....	23
7.4.2. Using the EU taxonomy for sustainable activities.....	25
7.4.3. Essential components for attracting funding.....	26
7.5. Policy recommendations	29
7.5.1. Catalysing collective action and inclusivity	29
7.5.2. Balancing energy efficiency and production support	29
7.5.3. Empowering prosumerism through regulatory reforms.....	29
7.5.4. Facilitating financial accessibility for all income groups	29
7.5.5. Diversification of target groups and addressing split-incentive issue.....	30
8. CONCLUSION	30
9. REFERENCES:	32
10. ACKNOWLEDGING EU FUNDING	35

4. Roles and Responsibilities

Name	Role	Responsibility
TNO	Task 6.4 leader, coordinator of D6.5, deliverable content, contributor	Research design; desk-research; interviewer; research analysis; writer; research coordination.
Arca Nova	Interviewee	Knowledge and experience sharing on relevant financial schemes and mechanism for Norway
INCASÒL	Interviewee	Knowledge and experience sharing on relevant financial schemes and mechanism for Spain
IREC	Interviewee	Knowledge and experience sharing on relevant financial schemes and mechanism for Spain
SIR	Interviewee	Knowledge and experience sharing on relevant financial schemes and mechanism for Austria
AREA	Interviewee	Knowledge and experience sharing on relevant financial schemes and mechanism for the Netherlands
SINTEF	Interviewee	Knowledge and experience sharing on relevant financial schemes and mechanism for Norway
	Reviewer	Work package leader and Review of the deliverable
ABUD	Reviewer	Review of the deliverable
NTNU	Reviewer	Review of the deliverable
BPIE	Reviewer	Review of the deliverable

5. Introduction

Financing opportunities have been proven effective to kick-start energy transition initiatives in the built environment. In fact, in the last decade there have been many tangible improvements resulting from the numerous funding programmes announced by the European Commission since the early 2000s (Panteli et al., 2020). The realization of Sustainable Plus Energy Neighbourhoods (SPENs) is challenging as it requires multi-stakeholder network of innovators, investors, and users who have diverging interests.

Such financial opportunities, however, need to provide value for other stakeholders for these innovations to be endorsed in the long run. To address this challenge, this report (D6.5) begins with an overview of financial mechanisms and schemes currently supporting energy-driven interventions in the built environment in the four countries (Norway, Spain, Austria and the Netherlands) in which the syn.ikia demo-sites are situated. Our methodology consisted of a thorough review of the existing literature and a desk research on financial schemes, next to semi-structured interviews with experts from the four demo countries.

Secondly, we propose strategies to attract investors by linking the financial schemes to the designed business models (see D6.6). Lastly, we discuss policy recommendations regarding the recognized barriers and opportunities related to using the financial schemes for SPENs.

6. Objectives or Problem Statement

Financing opportunities are often challenging to pursue due to the stakeholder diversity and complexity of innovations involved in the realization of a SPEN. Therefore, in D6.5, we draw upon existing financing mechanisms and schemes (new or old) and evaluate their suitability for the SPEN context, such as the smart finance for smart buildings initiative. To do so, we cooperated closely with WP5 as well as with Tasks 6.3 and 6.6 in order to:

- Identify possible financing opportunities for SPENs: sources, mechanisms and schemes.
- Propose a strategy to match SPEN measures for selected financing opportunities and define how SPEN stakeholders can attract possible investors by linking the financial schemes to the designed business models (D6.6).
- Propose policy recommendations on how to match financial schemes with SPENs.

7. Financial schemes, mechanisms and sources

7.1. Working definitions

The term financial schemes, mechanisms, and sources are often used interchangeably both in the policy and academic discourses. However, in this report we differentiate among the three. We refer to **financial scheme** as any financial plan or investments allocated or made available by a certain recognized institution or organization. Example of financial schemes are regional funding for home renovation or EU incentives. These are often available under certain conditions to be met by the beneficiaries and there might or might not be high degree of competition among the potential beneficiaries.

We refer to **mechanisms** as the dynamics or process by which a financial opportunity is set up or pursued.

Sources refers to the origin of the funding. In other words, we use it to describe ‘where it comes from’, e.g. whether the funding is of public or private nature.

7.2. Mechanisms

7.2.1. Public funding

Funding available from a federal, state, or another publicly funded agency. In Table 1 an overview of available public funds on EU-level related to energy efficiency is given. There are different kinds of public funds. Grants and subsidies contain financial support dedicated to given projects, and do not have to be repaid. On the other hand there are (low interest) credits and loans, which enable certain activities but have to be repaid. Lastly, governments might also offer guarantees, to cover risks. For all funds except for the Innovation Fund, you have to apply via relevant regional or national authorities in the member state where you are registered. The Innovation Fund allows parties to apply directly by developing a proposal that includes the following items: GHG emissions avoidance calculation; Relevant cost calculation; Technical feasibility study; Project implementation plan; Knowledge sharing plan. The funds target projects that correspond with the goal of the fund. This indicates that they would target SPEN projects as a whole, and not individual home owners.

Table 1: EU public funds for energy efficiency

Name	Goal	Description	Target groups
Cohesion Fund (CF) (<i>Cohesion Fund, 2023</i>)	Reduce economic and social disparity between EU countries and promote sustainable development.	One can use short-term growth triggering investments, e.g. in building retrofits that are needed for the clean energy transition.	Clean energy transition projects.

European Regional Development Fund (ERDF) <i>(European Regional Development Fund, 2023)</i>	Reduce economic and social disparity between the EU's regions.	One of the ERDF's four priority areas for 2014-2020 is 'the low carbon economy'. A minimum percentage of ERDF funding must be channeled towards low carbon projects in regions: 20% for more developed regions, 15% for transition regions and 12% for less developed regions.	Low carbon projects.
European Social Fund Plus (ESF+) <i>(European Social Fund Plus, n.d.)</i>	Offer support to deliver on sustainable energy-related policies to reach the EU green deal objectives.	The LIFE Clean Energy Transition sub-program has a budget of nearly EUR 1 billion over the period of 2021-2027 and aims at facilitating the transition towards an energy-efficient, renewable energy-based, climate-neutral and -resilient economy by funding coordination and support actions (Other Action Grants) across Europe.	Projects to involve and empower citizens in the clean energy transition.
Recovery and Resilience Facility (RRF) <i>(Recovery and Resilience Facility, 2021)</i>	It allows the Commission to raise funds to help Member States implement reforms and investments that are in line with the EU's priorities and that address the challenges identified in country-specific recommendations under the European Semester framework of economic and social policy coordination.	The Facility is a temporary recovery instrument to emerge stronger from the pandemic. It makes available €723.8 billion (in current prices) in loans (€385.8 billion) and grants (€338 billion) for that purpose. 37% climate earmarking.	Green transition projects. Might focus more on market ready technologies. It encourages prosumers.
Innovation Fund <i>(Innovation Fund, 2023)</i>	The Innovation Fund is one of the world's largest funding programs for the demonstration of innovative low-carbon technologies.	The Innovation Fund will provide around EUR 38 billion of support from 2020 to 2030 (at EUR 75 / tCO₂), depending on the carbon price, for the commercial demonstration of innovative low-carbon technologies, aiming to bring to the market industrial solutions to decarbonize Europe and support its transition to climate neutrality.	The Innovation Fund focuses on highly innovative technologies and big flagship projects within Europe that can bring on significant emission reductions. It is about sharing the risk with project promoters to help with the demonstration of first-of-a-kind highly innovative projects.

			The Fund is also open to small-scale projects with total capital costs under €7.5 million.
--	--	--	--

7.2.1.1. Tax incentives

Measures that provide a more favourable tax treatment, such as tax deduction, for certain activities or sectors. This can serve as an incentive to invest in e.g. sustainable energy projects. One example is the property tax incentive in Flanders. Here, if the energy performance after building or renovation is higher than required, a property tax reduction can be granted (Vlaamse Overheid , 2023).

7.2.2. Private funding

Funding in the form of loans, grants and gifts, provided by a private agency (e.g. banks, NGOs, ESCOs). Two examples of mechanisms through which private funding is enabled are shown in Table 2 below.

Table 2: examples of private funding mechanisms

Name	Goal	Description	Target groups	Use
Triodos Investment Management – Energy and Climate (<i>Energy and Climate</i> , n.d.)	Loans to finance companies and projects that accelerate the energy transition.	Investment management company.	Projects that are renewable energy producing energy assets, such as: off-shore and on-shore wind, PV solar, and rooftop solar, small hydro and energy efficiency projects.	Contact the Energy and Climate team for more information about funding options.
JPI funding (<i>Get Involved in JPI Urban Europe JPI Urban Europe</i> , n.d.)	JPI Urban Europe’s task is to connect public authorities, civil society, scientists, innovators, business, funding agencies and industry to provide an effectful environment for research and innovation to contribute to urban transformation processes.	It functions as a gateway and a hub for urban research, facilitating and financing research on a scale which simply could not be carried out by any one nation alone. A co-creative process was applied, involving representatives from all stakeholder groups and regions – scientists, (private) funding agencies, cities, business, industry, and civil society.	They connect public authorities, civil society, scientists, innovators, business, and industry to provide a new environment for research and innovation.	Join the network (online channels, calls) to get in contact with funders. Become a member. This requires an application from a governmental body responsible for urban research and innovation.

7.2.2.1 Crowdfunding

Crowdfunding engages a large number of possible funders who are willing to invest in the implementation of a project or idea through the internet. The users have the option to choose among different investment options, therefore covering different financial status. The online process of collecting the finances increases the speed of transaction processing and the rate of raising funds, which can unlock new business models.

It can also allow investors to become shareholders and share investments on energy projects. There are different types of investment opportunities, such as (mini-)bonds, equity, P2P lending, debts and rewards. These investment opportunities are available for everybody, ranging from owners or residents of SPENs to external people or organisations, mostly on online platforms.

Currently, most of the crowdfunding platforms focus on renewable energy. More specifically, on solar and wind energy, e.g. [OnePlanetCrowd](#). The degree to which this alternative financing mechanism could be exploited still remains far from its full potential, as other elements of SPENs could be included as well.

7.2.3. Public-private partnerships

A collaboration between the public and private sector with the purpose to implement public projects using resources and expertise of the private sector. The collaboration with the private sector can bring new solutions and finance, while the risks and responsibilities are being shared. Examples are the financing of renewable energy generation, power purchase agreements, carbon capture and storage, transportation, fuel supply and social housing. In the Netherlands for instance the [Porthos](#) project has been developed. Here, the public and private sector collaborate to enable carbon capture in the Port of Rotterdam. Currently this project only focuses on carbon capture for industries, but similar projects could be applied to SPENs as well.

7.2.4. Bond and stock market

A place where investors can trade equity (shares) or bonds issued by corporations or governments. The market for green bonds is growing. For example, in Hungary the Central Bank of Hungary (MNB) has reduced capital requirements for green bonds in order to encourage the banking sector to increase the level of green loans (Schonherr, 2023).

In addition, there are municipal bonds. These are debt securities issued by governmental entities to finance capital projects related to infrastructure. Projects can purchase bonds and over time repay this amount including interest payments (Painter, 2020). As SPENs include elements of urban regeneration and public infrastructure, applying to municipal bonds could offer a possible funding opportunity.

This market place includes many initiatives in the energy sector, but not SPEN-specific yet. National or local governments can play a role in bridging this gap.

7.3. Financial Schemes

Below we elaborate on the public financial schemes that are currently supporting energy-driven interventions in the built environment in the four countries in which the Syn.ikia demo-sites are situated. All schemes identified up until now address individual buildings and do not yet tackle the neighbourhood level sufficiently. As neighbourhoods are populated by several stakeholder groups and entities, we categorize the schemes according to their target group.

However, it is important to note that there are notable exceptions in Austria and The Netherlands that do address the neighbourhood level. To provide a comprehensive understanding of the schemes examined in this study, in what follows, we present an overview of these schemes, categorized based on their target groups (Figure 1) and the type of support they offer.

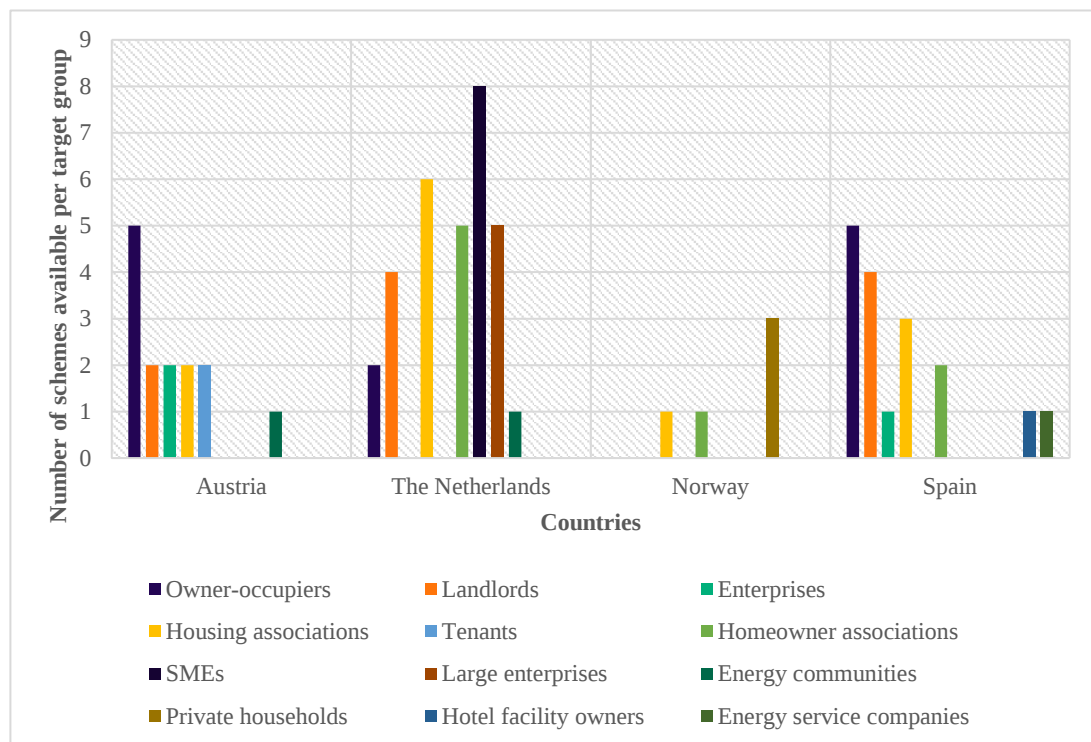


Figure 1 Number of financial schemes per target group

Most schemes primarily focus on addressing isolated building parts, components, or single buildings, and involve stakeholders who are typically found within a neighbourhood. The identified target groups encompass owners-occupiers, landlords, homeowners' associations, (social) housing associations, SMEs or (large) enterprises, energy communities, tenants, and energy service companies (Table 3). Additionally, we provide a detailed description of each scheme's main characteristics and highlight the various implementation mechanisms employed.

Table 3 Target group definitions

Target group	Definition
Owner-occupiers	Owner-occupiers are individuals who own and reside in their homes, assuming both the role of homeowner and occupant.
Landlords	Landlords are individuals or entities that own residential properties and rent them out to tenants in exchange for monetary compensation.
Housing associations	Housing associations are non-profit organizations that play a significant role in the housing sector. They aim to provide affordable and quality housing options, particularly for individuals and families with lower incomes or limited access to the private housing market. Housing associations own, manage, and maintain a portfolio of residential properties, offering them for rent at below-market rates to ensure affordability and access to suitable housing. Additionally, housing associations may provide support services to tenants, such as property maintenance, tenant assistance, and community development initiatives.
Tenants	Tenants are individuals or households who rent residential properties from landlords.
Private households	Private households encompass individuals or families who reside in privately owned residences and manage their own finances. They have primary decision-making authority regarding household budgeting, savings, investments, and financial planning.
Homeowner associations	Homeowner associations consist of individuals or families who own properties within a shared community or complex. These associations collectively manage and maintain common areas, amenities, and infrastructure, often through the payment of membership fees or dues.
Enterprises	In specific countries like Austria and Spain, enterprises, including both small and large businesses, are targeted by financial schemes supporting energy-driven interventions
SMEs	In the Netherlands, financial schemes are available specifically for small and medium-sized enterprises (SMEs). SMEs are defined as businesses with fewer than 250 full-time equivalent employees and either an annual turnover not exceeding EUR 50 million or a balance sheet total not exceeding EUR 43 million.
Large enterprises	Large enterprises in the Netherlands refer to businesses that exceed the thresholds set for SMEs in terms of employee count, annual turnover, or balance sheet total.
Energy communities	Energy communities are groups of individuals, households, or organizations that collaborate to collectively manage and optimize their energy resources, promoting sustainable energy production, consumption, and management.
Energy service companies (ESCOs)	ESCOs are specialized firms that offer a range of energy-related services to clients, including commercial, industrial, and residential sectors. They provide comprehensive energy solutions aimed at improving energy efficiency, reducing energy consumption, and implementing sustainable energy practices
Hotel facility owners	Hotel facility owners are individuals, companies, or organizations that own and operate hotel establishments. They are responsible for the ownership, management, and overall operation of the hotel property and its facilities.

7.3.1. Austria

Austria's nine regional governments are placing significant emphasis on prioritizing energy efficiency in the built environment, as they hold primary responsibility for creating energy efficiency policies. This focus on enhancing energy efficiency aligns with the country's commitment to the Paris Agreement and supports the transition towards a low-carbon society (IEA, 2020). The Austrian Energy Agency states that the built environment is responsible for around 40% of the country's final energy consumption (Bundeskanzleramt, n.d.). To address this issue, the current government program for the building sector aims to renovate 3% of the existing stock (*Formen Von Energiegemeinschaften – Energiegemeinschaften*, n.d.).

Financial schemes in Austria serve to facilitate the development of SPENs by supporting various interventions that promote energy efficiency, including insulation, the installation of new heating systems, and electricity generation. Six distinct financial schemes were identified (as detailed in Table 4)

Table 4 Financial Schemes Austria

Scheme Name	Source	Target Groups	Support Typology
Wohnbauförderung	Federal States	Owner-occupiers Landlords Housing associations	Subsidies Loans
Energieförderung des Landes Salzburg	State of Salzburg	Owner-occupiers	Subsidies
Sanierungsscheck	Federal Ministry of Austria	Owner-occupiers Enterprises Tenants	Subsidies
THEWOSAN	City of Vienna	Owner-occupiers	Subsidies
Klimaaktiv	Federal Ministry of Austria	Owner-occupiers Landlords Enterprises Housing associations	Advice
Befreiung elektrizitätsabgabe	Federal Ministry of Finance	Energy communities	Tax reduction

The Wohnbauförderung program provides subsidies and loans to owner-occupiers, private sector landlords, and housing associations to promote the development of affordable housing through the support of energy efficiency measures. Examples of such interventions include the thermal insulation of windows, outer walls, roofs, and ceilings, connection to district heating, and installation of central heating systems, solar thermal plants, heat pumps, and biomass heating systems. The level of subsidy is determined based on the achieved thermal quality or efficiency of the heating system. Alternatively, the Energieförderung program is available for owner-occupiers in the federal state of Salzburg and offers support for single actions such as the installation of PV panels and green energy heating systems. In Vienna, a similar subsidy program, known as THEWOSAN,

is provided to owner-occupiers, with non-repayable contributions ranging from EUR 25 to EUR 160 per m² of floor area depending on the achieved energy efficiency level, along with an additional EUR 60 per m² of floor area if the passive house standard is achieved. The maximum amount of the non-repayable contribution is limited to 30% of the total building costs. Furthermore, the Austrian federal government provides subsidies through the Sanierungsscheck program to incentivize retrofitting of private residential buildings and buildings used for business purposes that are over 20 years old. The subsidies cover costs associated with material, assembly, and planning and are determined based on the renovation depth and level of decrease in heat energy demand.

There is an increasing trend among subsidy schemes to mandate compliance with the klimaaktiv building standard for newly constructed buildings. Under the klimaaktiv program “Bauen & Sanieren” (building and renovation), actors in the building sector can obtain guidance on energy-efficient measures. The primary aim of the klimaaktiv program is to foster the adoption and promotion of climate-friendly technologies and services.

Austria has emerged as a leader in providing financial incentives to empower consumers and small-scale energy providers, such as renewable energy communities (Erneuerbare-Energie-Gemeinschaft/EEG), to actively participate in the energy market. These energy communities can generate, store, consume, and sell energy to their members located in close proximity. Such communities promote the decentralization of renewable energy generation and increase citizen participation in renewable energy projects. The network usage fee is reduced through a nationwide uniform discount, which covers the average superimposed network costs. The purchase of energy from renewable energy communities is exempt from the renewable energy subsidy contribution (previously the green electricity subsidy contribution), and electricity tax is waived for electricity generated by photovoltaic (PV) systems and consumed within the EEG. From 1 July 2022, this exemption applies to electrical energy generated from all renewable energy sources. Furthermore, a market premium may support up to 50% of the renewable electricity produced within the energy community but not consumed.

7.3.2. The Netherlands

In the Netherlands, the built environment accounts for 40% of the total energy consumption (Klimaatmonitor, 2022). To reduce energy demand and greenhouse gas emissions, the Dutch government has launched several initiatives aimed at promoting investment in energy-efficient measures.

The Dutch government has implemented several initiatives to encourage the use of sustainable energy technologies and to support the energy transition. Seventeen distinct financial schemes have been identified (as detailed Table 5)

Table 5 Financial Schemes in the Netherlands

Scheme Name	Source	Target Groups	Support Typology
ISDE	Netherlands Enterprise Agency	Owner-occupiers Housing associations	Subsidies
Nationaal warmtefonds	Dutch government Rabobank ASN bank ING Council of Europe Development Bank European Investment Bank	Owner-occupiers Landlords Homeowner associations Housing associations	Loans
SAH	Netherlands Enterprise Agency	Landlords Homeowner associations Housing associations	Subsidies
SVOH	Netherlands Enterprise Agency	Landlords Housing associations	Subsidies Advice
RVV Nieuwbouw	Netherlands Enterprise Agency	Landlords Housing associations	Tax incentive
SEEH	Netherlands Enterprise Agency	Homeowner associations	Subsidies Advice
SCE	Netherlands Enterprise Agency	Homeowner associations Energy communities	Subsidies
Energy saving loan	Dutch government Rabobank ASN bank ING Council of Europe Development Bank European Investment Bank	Homeowner associations Housing associations	Loans

IRE	Netherlands Enterprise Agency	SMEs	Subsidies
ISDE	Netherlands Enterprise Agency	Enterprises	Subsidies
MEI	Netherlands Enterprise Agency	SMEs	Subsidies
UKR	Netherlands Enterprise Agency	SMEs	Subsidies
DEI+	Netherlands Enterprise Agency	SMEs	Subsidies
SDE+++	Netherlands Enterprise Agency	Enterprises	Subsidies
EIA	Netherlands Enterprise Agency	Enterprises	Tax incentives
VAMIL	Netherlands Enterprise Agency	Enterprises	Tax incentives
MIA	Netherlands Enterprise Agency	Enterprises	Tax incentives

One such initiative is the Investment Subsidy for Sustainable Energy (ISDE) scheme, which provides financial support to owner-occupiers and housing associations who purchase renewable energy systems such as solar panels, heat pumps, biomass boilers, and pellet stoves. This subsidy aims to incentivize the adoption of sustainable energy technologies in residential buildings.

Another Dutch government initiative is the National Heat Fund, also known as the Nationaal Warmtefonds, which aims to support the energy transition by providing low interest loans to households for energy-saving measures and sustainable heating solution. The loans can be used to finance up to 100% of the costs of energy-saving measures and sustainable heating solutions, with a maximum loan amount of EUR 25,000 per household. The fixed interest rate is currently set at 1.5% for a term of up to 10 years.

In addition, the Dutch government has launched the Incentive Scheme for Natural Gas-Free Rental Homes (SAH) to accelerate the transition to sustainable energy. The SAH provides financial incentives for social housing associations and landlords to make their rental homes more sustainable and to move away from natural gas as an energy source. To be eligible for the SAH, a plan for making homes natural gas-free is needed and interventions must be implemented within a certain timeframe. The scheme provides a subsidy for each home that is retrofitted, with the amount depending on the type of retrofit and the expected energy savings.

The Foundation for Social Housing of Dutch Municipalities (SVOH) is another initiative that aims to support the development of social housing in the Netherlands. The foundation provides financing for social housing projects and promotes cooperation between municipalities and housing associations to increase the availability of affordable housing. Additionally, the SVOH invests in research and development of sustainable and innovative solutions for social housing, such as energy-efficient construction and renovation methods.

To encourage the construction of new rental properties and to help address the shortage of affordable rental housing, the Dutch government established the Regeling Verminderende Verhuurdersheffing Nieuwbouw (RVV nieuwbouw) program. Under this program, housing associations can apply for a reduction in the landlord levy for a period of up to 25 years for new-build residential properties that meet certain criteria, such as energy efficiency standards and affordability requirements.

Furthermore, the Dutch government has implemented the Stimuleringsregeling energieprestatie huursector (SEEH) subsidy program to improve the energy efficiency of rental housing. This program provides financial support to homeowner associations who undertake energy-saving measures in their properties, which could include upgrading insulation, replacing windows, improving ventilation systems, installing energy-efficient boilers, and more.

The schemes available to housing associations can be applied to individual buildings or implemented across a set of buildings through association-led initiatives. The Netherlands also has several programs that provide financial support for renewable energy projects. The Stimulation of Energy Transition (SCE) program offers a subsidy for the production of renewable energy, such as solar panels or wind turbines, while the Market Incentive for Energy (MEI) program provides subsidies to SMEs that invest in renewable energy projects. The Investment Subsidy for Sustainable Energy (ISDE) program provides financial support to all enterprises, large and small, that invest in renewable energy, such as heat pumps, solar water heaters, and biomass boilers. The Stimulating Sustainable Energy Production (SDE+++) program provides financial support to enterprises that invest in renewable energy production, such as wind turbines, solar panels, or geothermal energy.

The Energy Investment Allowance (EIA) program provides a tax deduction to enterprises that invest in energy-saving or renewable energy projects, such as insulation or solar panels. The Random Depreciation of Environmental Investments (VAMIL) program allows enterprises to accelerate the depreciation of environmental investments, such as electric cars or solar panels.

Finally, in addition to VAMIL and MIA, the Netherlands also offers the Clean and Economical Demonstration Projects (DEI+) scheme to promote sustainable innovations. The DEI+ program targets SMEs and provides financial support for projects that demonstrate innovative technologies and processes related to energy, climate, and sustainability.

Through the DEI+ scheme, SMEs can access financial support for a variety of energy efficiency measures, such as the development and implementation of energy-efficient technologies and buildings.

In summary, the Dutch government has implemented an array of financial schemes to facilitate the transition to sustainable energy. These initiatives support individuals, housing associations, and enterprises in adopting renewable energy systems, implementing energy-saving measures, and developing innovative technologies. The schemes cater to various sectors, including residential buildings, rental properties, social housing, and SMEs, aiming to create a more sustainable and energy-efficient future.

7.3.3. Norway

In Norway, approximately 47% of the existing residential buildings are more than 50 years old (Sintef, n.d.). This increases the energy demand of the housing sector. Two national organizations are responsible for managing financial schemes to incentivize efficient energy measures for buildings—Enova SF (owned by the Ministry of Climate and Environment) and the Norwegian State Housing Bank (Husbanken). Four distinct financial schemes have been identified (as detailed in Table 6).

Table 6 Financial Schemes in Norway

Scheme Name	Source	Target groups	Support Typology
Enova grant	Enova SF	Private households	Subsidies
Husbanken loans	Norwegian State Housing Bank	Private households	Loans
Enova answers	Enova SF	Private households	Advice
Enova support	Enova SF	Homeowner associations Housing associations	Advice

The Norwegian government has implemented various initiatives to promote energy efficiency and renewable energy use in private households. One of these initiatives is the Enova grant (Enova, n.d.-a), which targets private households with subsidies to encourage energy-efficient upgrades. The subsidies provide financial support for measures such as insulation, energy-efficient heating systems, and renewable energy installations. The aim is to reduce energy consumption and promote sustainable living.

Another initiative is the Husbanken loans (Husbanken, 2022), which provide loans to private households for energy-efficient upgrades. These loans are designed to help homeowners finance upgrades that will reduce energy consumption and promote sustainable living. The loans have low interest rates and flexible repayment terms, making them an accessible option for many private households.

In addition to financial support, Enova also provides advice on energy efficiency through Enova answers (Enova, n.d.-b). This service offers guidance and support to private households seeking to improve their energy efficiency, helping them to identify the most effective measures and technologies to reduce energy consumption.

Enova also provides support to homeowner associations and housing associations through Enova support. This service offers advice and support to associations seeking to improve the energy efficiency of their buildings, helping them to identify and implement energy-efficient measures and technologies. This is particularly important as the energy consumption of multi-unit residential buildings can be high, making them a key target

for energy efficiency measures. In addition it can also play a role in SPEN scale up in the private residential sector.

Overall, these initiatives demonstrate the Norwegian government’s commitment to promoting sustainable living and reducing energy consumption. By providing financial support, advice, and support to private households and associations, these initiatives aim to make energy-efficient upgrades accessible and achievable for all.

7.3.4. Spain

In Spain, residential buildings consume 17% of the total energy (Eurostat, n.d.-a). The Spanish National Climate Change Adaptation Plan 2021–2030, known as PNACC, aligns with the Paris Agreement of 2015 and sets ambitious targets for the next decade. These targets include reducing CO2 emissions by 39%, exceeding the European goal of 26%, achieving 42% renewable energy usage in end-use, surpassing the European average of 32%, and improving energy efficiency by 39.5%, higher than the European goal of 32.5% (European Commission, 2023). To promote energy-performance improvements in buildings, various financial incentives are available at the federal, regional, and municipal levels (Ministry for the Ecological Transition and the Demographic challenge, n.d.).

The Spanish government has implemented various initiatives to promote energy conservation, energy efficiency, and the use of renewable energy sources in existing buildings, regardless of ownership or use. Seven distinct financial schemes have been identified (as detailed in Table 7).

Table 7 Financial Schemes in Spain

Scheme Name	Source	Target Groups	Support Typology
PAREER CRECE	Institute for Energy Diversification and Saving	Owner-occupiers Housing associations Landlords Homeowner associations	Subsidies Loans
DUS EELL	Institute for Energy Diversification and Saving	Owner-occupiers Housing associations	Subsidies
State Housing Plan	Ministry of Transport, Mobility and Urban Agenda	Owner-occupiers Housing associations Landlords Homeowner associations	Subsidies

PREE	Institute for Energy Diversification and Saving	Owner-occupiers Landlords	Subsidies
PIMA SOL	Institute for Energy Diversification and Saving	Hotel facility owners	Subsidies Loans
Energy efficiency credit line	Institute for Energy Diversification and Saving	Enterprises	Loans
BIOM-CASA-SOLCASA-GEOTCASA	Institute for Energy Diversification and Saving	Energy service companies	Loans

The Ministry of Industry, Energy and Tourism through the Institute for Energy Diversification and Saving (IDAE) has launched the PAREER program to encourage comprehensive actions and integrated measures to improve energy efficiency and renewable energy use in residential buildings. This program provides subsidies and repayable loans for projects that involve the renovation of building envelopes, heating installations, and the use of biomass and geothermal energy instead of conventional energy sources. The aided actions should improve the energy rating of the building by at least one letter on the carbon dioxide emission scale (kg CO₂/m² year) compared to the initial energy rating of the building. Additional support is given to actions that achieve energy class A or B or increase the initial energy rating of the building by more than two letters.

The PREE program, which stands for Programa de Rehabilitación Energética de Edificios, is a government-subsidy program designed to encourage energy-efficient building renovations in both the public and private sectors. The program provides financial support for various energy-saving measures, such as insulation, heating and cooling upgrades, and renewable energy installations.

The Spanish Energy Efficiency Credit Line is a financing instrument that aims to promote energy efficiency and the use of renewable energy in Spain. It is managed by the Institute for the Diversification and Saving of Energy (IDAE), which is a public entity under the Ministry for the Ecological Transition and Demographic Challenge. The credit line offers financing to enterprises who want to carry out energy efficiency projects in their facilities. The loans are granted through collaborating financial institutions, such as banks or savings banks. The credit line covers up to 100% of the eligible investment and has a fixed interest rate. The repayment period ranges from 3 to 12 years, depending on the type of project and the amount financed. Eligible projects include those that improve energy efficiency in buildings, such as the installation of insulation, efficient heating and cooling systems, and energy-efficient lighting. The credit line also supports the use of renewable energy sources, such as solar panels, wind turbines, and geothermal systems.

In addition, the State Housing Plan in Spain has a program to promote the improvement of the energy efficiency and sustainability of houses by providing subsidies to improve building envelopes in residential buildings. The program covers the rehabilitation of buildings and houses, urbanization of public spaces, and

construction of new blocks or houses previously demolished, including shanties and shacks. While some actions are related to energy efficiency reduction, this program is generally aimed at improving conservation. Finally, with the plan to promote the environment in the hotel sector (PIMA SOL), assistance is provided to reduce greenhouse gas emissions (GHG) in the Spanish tourism sector through energy renovations of hotel installations. Renovation projects should improve the energy rating of the building by at least two letters or achieve letter B, taking into account the provisions stated in the Royal Decree 235/2013. The BIOM-CASA-SOLCASA-GEOTCASA program, managed by the IDAE, aims to promote energy service companies and encourage efficient hot water, heating, and cooling systems powered by biomass, solar, or geothermal energy.

7.4. Strategies to attract investors

7.4.1. Business models

SPENs give rise to new business models that can be applied to operate and finance the different elements of SPENs, e.g. energy sharing. The financial schemes outlined in this chapter have the potential to enhance these business models, particularly when applied to specific elements. To illustrate, securing a loan for energy storage enables SPENs to store energy and trade or sell it during non-peak demand hours. The relevant business models, along with the corresponding schemes, are detailed in Table 8 below, and more comprehensive information can be found in Deliverable 6.6.

The business models from D6.6 tailored for syn.ikia SPENs include:

- Self-Consumption
- Tax Exemption
- Peer-to-peer (P2P) energy trading
- Power purchase agreements (PPA)
- SPEN becoming a retailer/aggregator
- Shared ownership of energy assets in SPEN
- Inter-SPEN concept
- Green investors

Given that investments are often essential for financing SPENs and associated business models, a careful examination of these schemes provides insights into available financing options for a specific business model. This not only enhances security and recognition for SPEN operators but also serves as an attractive proposition for potential investors.

Table 8: schemes enhancing business models

Business model	Scheme(s)
PPA	Wohnbauförderung (Austria) ISDE (The Netherlands) Enova Grant (Norway)
Green investor	Wohnbauförderung (Austria) ISDE (The Netherlands) Enova Grant (Norway)
SPEN becoming a retailer/aggregator	Befreiung elektrizitätsabgabe (Austria) DEI+ (The Netherlands) Enova Support (Norway) BIOM-CASA-SOLCASA-GEOTCASA (Spain)
Shared ownership of energy assets in SPEN	Befreiung elektrizitätsabgabe (Austria) DEI+ (The Netherlands) Enova Support (Norway) BIOM-CASA-SOLCASA-GEOTCASA (Spain)
P2P Energy Trade	Befreiung elektrizitätsabgabe (Austria) DEI+ (The Netherlands) Enova Support (Norway) BIOM-CASA-SOLCASA-GEOTCASA (Spain)
Inter-SPEN concept	Befreiung elektrizitätsabgabe (Austria) DEI+ (The Netherlands) Enova Support (Norway) BIOM-CASA-SOLCASA-GEOTCASA (Spain)

Note that P2P Energy Trade encounters regulatory issues, as prosumers will then also be suppliers (de Almeida, 2021). As a result, it is currently not (yet) allowed in Spain, Norway and The Netherlands.

7.4.2. Using the EU taxonomy for sustainable activities

The EU Taxonomy serves as a framework that enables businesses and investors to identify economic activities that are considered environmentally sustainable. More information on the EU taxonomy can be found in deliverable 5.2.

Using the taxonomy to promote syn.ikia sustainable innovations that enhance energy efficiency in neighbourhoods have much potential because this helps investors in:

1) Guiding investment decisions

The taxonomy acts as a guideline for investors, enabling them to identify economically viable activities that align with the EU's environmental and climate goals. By providing clear criteria, it directs investments towards projects that contribute substantially to these objectives, thus ensuring a strategic allocation of funds. The delegated acts cover Climate Change Mitigation, Climate Change Adaptation, Circular Economy, Water and Marine Resources, Pollution Prevention and Control, and Biodiversity and Ecosystems.

2) Promoting environmental integrity

Sustainable plus energy neighborhoods that adhere to taxonomy standards gain a competitive edge. It will encourage investors to strategize their investments around environmentally friendly principles.

3) Enhancing market transparency

Transparency is fundamental to investor confidence. The taxonomy establishes a common language for sustainability, enhancing market transparency. Investors can make informed decisions, knowing that their funds are channeled into initiatives that uphold environmental and climate objectives. This transparency acts as a magnet for responsible investments.

7.4.3. Essential components for attracting funding

The following template with a fictional example provides essential information to attract various types of investors interested in financing sustainable innovations for sustainable plus energy neighbourhoods. Tailored to address specific investor interests, the template encapsulates key aspects of the innovation, ensuring a comprehensive and persuasive presentation to potential partners.

Table 9 Template to attract funding

Aspect	Content
Innovation Name	The Innovation <i>e.g. SolarVista Panels</i>
Problem Statement	Clearly articulate the problem or need the innovation addresses in the market. <i>e.g. Traditional energy sources contribute to environmental degradation, and communities face rising energy costs. There's a need for accessible, efficient, and sustainable energy solutions to meet growing demands.</i>
Solution	Describe the product or service and how it uniquely solves the identified problem. <i>e.g., SolarVista Panels offer advanced photovoltaic (PV) technology, harnessing solar energy to provide clean and cost-effective power. Our panels are designed for easy installation, making solar energy accessible to urban and rural communities alike.</i>
Market Opportunity	Outline the size and growth potential of the market the innovation operates in. <i>e.g., The solar energy market is booming, with an estimated worth of \$X billion and a Y% annual growth rate. SolarVista Panels tap into this market by offering an affordable and efficient solution for residential, commercial, and industrial use</i>
Business Model	Explain how the innovation makes money, including revenue streams and pricing strategies. <i>e.g., Our revenue model centers on selling SolarVista Panels directly to consumers and partnering with installation services. Additional revenue streams include maintenance packages and customizable panel configurations.</i>

Competitive Advantage	Highlight what sets the innovation apart from competitors, whether it's technology, expertise, or innovation. <i>e.g., SolarVista Panels stand out with their cutting-edge efficiency, durability, and affordability. Our streamlined design and superior technology provide a competitive edge, ensuring optimal performance in various environments.</i>
Traction and Milestones	Showcase any significant achievements, partnerships, or milestones the innovation has reached. <i>e.g., SolarVista Panels have undergone successful testing, achieving a Z% efficiency improvement compared to competitors. We've secured partnerships with local utilities for pilot installations, showcasing the adaptability and reliability of our panels.</i>
Financial Projections	Provide realistic and data-backed financial projections, demonstrating the innovation's growth potential and revenue forecasts. <i>e.g., With a \$A million investment, we aim to scale production, expand marketing efforts, and enhance technology. Conservatively, we anticipate generating \$B million in revenue within the first year, with a W% annual growth rate.</i>
Funding Ask	Clearly state the amount of funding you are seeking and how you plan to use the investment. <i>e.g., Seeking \$A million investment for production scaling, marketing, and R&D. Allocation: X% production scaling, Y% marketing, Z% R&D.</i>
Exit Strategy	Outline potential exit strategies, demonstrating the potential for investors to profit from their investment. <i>e.g., Potential exits include acquisition by a major energy company, IPO, or strategic partnerships with industry leaders.</i>
Risks and Mitigations	Address potential risks associated with the innovation and explain how you plan to mitigate them. <i>e.g., Market fluctuations and technological advancements pose risks. Mitigation involves ongoing research, agile adaptation, and diversification of our product range.</i>
Impact	Emphasize the positive social or environmental impact the innovation generates alongside financial returns.

	<i>e.g., Investing in SolarVista Panels aligns with environmental goals, promoting clean energy adoption. Join us in making sustainable energy accessible to all while ensuring a solid financial return.</i>
Call to Action	Clearly state what you are seeking from the investor (e.g., investment, partnership) and the next steps for potential collaboration. <i>e.g., Explore the opportunity to revolutionize the energy landscape. Contact us for investment discussions and collaborate in bringing SolarVista Panels to a brighter, greener future</i>

7.5. Policy recommendations

To conclude this study on financial schemes and mechanisms supporting the development of SPENs, we present a series of refined policy recommendations for regional and national levels in order to scale up SPENs.

7.5.1. Catalysing collective action and inclusivity

The driving forces behind the adoption of SPENs are two-fold: 1) the implementation of schemes and policies that foster collective action, and 2) the establishment of inclusive, accessible schemes catering to diverse target groups (IEA, 2013; Kata et al., 2021). It is imperative to address these aspects comprehensively in policy frameworks to maximize SPENs' effectiveness.

7.5.2. Balancing energy efficiency and production support

In examining financial schemes across four countries, it becomes evident that interventions pertaining to insulation and heating dominate energy efficiency measures. Although these interventions exert influence over building and unit energy consumption and are a necessary first step in achieving a positive energy balance within SPENs, greater emphasis should be placed on incentivizing shared energy production among interconnected structures, such as apartment complexes. To this end, successful models like Austria's energy communities (e.g., Schnifis), facilitated through tax reductions and subsidies, should be expanded upon (Süntinger, 2022). To facilitate the sustainability transition of neighbourhoods, a broader array of incentives for collective action is vital.

7.5.3. Empowering prosumerism through regulatory reforms

The past decade has witnessed the emergence of numerous renewable energy technologies available to citizens, propelling a shift from passive consumers to proactive prosumers (Bauwens & Devine-Wright, 2018). Nonetheless, existing regulatory barriers across most European countries impede this transition. Prosumers encounter challenges ranging from legal establishment of renewable energy communities to spatial restrictions and capacity limitations (Campos et al., 2020). For example in The Netherlands renewable energy communities can only exchange electricity if they share the same postal code (Postcoderoosregeling, 2021). Addressing these issues necessitates streamlining technical regulations, eliminating entry barriers, and reducing associated costs, thereby cultivating a more conducive environment for prosumerism. Renewable energy communities or citizen energy communities have been (partially) implemented in many countries. This presents barriers in allowing prosumers or smaller actors such as SPENs to enter the energy market.

7.5.4. Facilitating financial accessibility for all income groups

A prevailing issue observed within current schemes is the post-intervention financial support structure, which mandates that target groups bear the upfront retrofit costs to access subsidies. This poses a substantial

challenge for low-income individuals, constituting approximately 21.7% of the EU population (Eurostat, n.d.-b). To alleviate fuel poverty, policy interventions should explore alternatives beyond loans, as debt-based solutions inadvertently diminish disposable income, countering the intended incentive. Simultaneously, uncertainties linked to fluctuating energy prices and extended payback periods demand innovative solutions that can alleviate these concerns while maintaining the attractiveness of retrofitting initiatives (Hill, n.d.).

7.5.5. Diversification of target groups and addressing split-incentive issue

A strategic focus on diverse target groups is imperative, considering the multifaceted nature of neighbourhoods. This inclusivity should extend to both tenants and building owners, as exemplified by Austria's direct targeting of tenants and Spain's efforts to support lower-income groups. The persistent split-incentive issue, where building owners' investment interests misalign with tenants' energy-saving benefits, necessitates collaborative solutions. In addition, the schemes are currently only targeted at building level, not neighbourhood level. To cover a SPEN as a whole, it would be beneficial to design schemes at neighbourhood level as well. Introducing mechanisms to bridge this gap will be pivotal, especially in the context of social housing where rent regulations curtail owners' ability to pass on investment costs (Greco et al., 2016).

In summary, to advance the development of Sustainable Plus Energy Neighbourhoods (SPENs), policies should encompass multifaceted initiatives that promote collective action, inclusivity, regulatory reforms, financial accessibility, and stakeholder engagement. By strategically addressing these aspects, the transition towards sustainable energy and resilient neighbourhoods can be accelerated effectively.

8. Conclusion

In conclusion, report D.6.5 has provided a comprehensive analysis of the critical role that financing opportunities play in the realization of SPENs across multiple countries. The report successfully met its objectives, offering a thorough review of financial mechanisms, schemes, and resources, proposing strategies to attract investors, and presenting valuable policy recommendations.

Through an extensive desk research, the report identified the limitations of current financial schemes, which often focus on individual buildings rather than neighbourhoods. Limited transpositions of collective self-consumption, renewable energy community and citizen energy community frameworks by demo site countries are important barriers for SPEN business models. The absence of a designated entity responsible for energy management among diverse stakeholders further complicates the SPEN landscape. Existing energy

business models pose challenges, and the utilization of financial schemes is currently fragmented and limited. The report also highlighted the temporal vulnerability of SPEN innovations within the current financial market. To address these challenges and attract investors, the report proposed a set of strategies. Enhancing business models with specific financial schemes that align with key elements of these models was suggested. Compliance with the EU Taxonomy, which gauges the climate and environmental sustainability of investments, was recommended to incentivize future investments in SPENs. In addition, a template to summarize information to attract investors was designed.

The policy recommendations presented in the report serve as a roadmap for policymakers and stakeholders in the sustainable energy sector. They emphasize the importance of collective action, inclusivity, and shared energy production. Streamlining regulations to promote prosumers and small energy market actors such as SPEN engagement in renewable energy and exploring alternative financing solutions are key steps toward ensuring accessibility and sustainability across various income levels. Lastly, embracing diverse target groups and addressing split-incentive challenges are vital for the comprehensive development of sustainable neighbourhoods.

9. References:

- Bauwens, T., & Devine-Wright, P. (2018). Positive energies? An empirical study of community energy participation and attitudes to renewable energy. *Energy Policy*, 118, 612–625.
<https://doi.org/10.1016/j.enpol.2018.03.062>
- Bird, S., & Hernández, D. (2012). Policy options for the split incentive: Increasing energy efficiency for low-income renters. *Energy Policy*, 48, 506–514. <https://doi.org/10.1016/j.enpol.2012.05.053>
- Bundeskanzleramt. (n.d.). *Regierungsprogramm 2020-2024*. Retrieved April 23, 2023, from <https://www.bundeskanzleramt.gv.at/bundeskanzleramt/die-bundesregierung/regierungsdoku%20mente.html>
- Campos, I., Luz, G., Marín-González, E., Gähns, S., Hall, S., & Holstenkamp, L. (2020). Regulatory challenges and opportunities for collective renewable energy prosumers in the EU. *Energy Policy*, 138, 111212. <https://doi.org/10.1016/j.enpol.2019.111212>
- Cohesion Fund*. (2023). European Commission - Inforegio. Retrieved August 16, 2023, from https://ec.europa.eu/regional_policy/funding/cohesion-fund_en
- de Almeida, L. a. (2021). Peer-to-Peer Trading and Energy Community in the Electricity Market - Analysing the Literature on Law and Regulation and Looking Ahead to Future Challenges. *Robert Schuman Centre for Advanced Studies*.
- Egner, L. E., Klöckner, C. A., & Pellegrini-Masini, G. (2021). Low free-riding at the cost of subsidizing the rich. Replicating Swiss energy retrofit subsidy findings in Norway. *Energy and Buildings*, 253, 111542. <https://doi.org/10.1016/j.enbuild.2021.111542>
- Energy and climate*. (n.d.). <https://www.triodos-im.com/looking-for-funding/energy-and-climate>
- Enova. (n.d.-a). *Borettslag og sameier – Søk om støtte | Privat | Enova*. <https://www.enova.no/privat/borettslag-og-sameier/>
- Enova. (n.d.-b). *Smarte energi- og klimatiltak | Enova*. <https://www.enova.no/privat/alle-energitiltak/>
- European Commission. (2023, August 3). EU Building Factsheets. https://ec.europa.eu/energy/eu-buildings-factsheets_en
- European Regional Development Fund*. (2023). European Commission Inforegio. Retrieved August 16, 2023, from https://ec.europa.eu/regional_policy/funding/erdf_en

Eurostat. (n.d.-a). *Analysis of the Energetic Consumption of the Residential Sector in Spain*.

Eurostat. (n.d.-b). *Living conditions in Europe - poverty and social exclusion*.

https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Living_conditions_in_Europe_-_poverty_and_social_exclusion&oldid=584082#:~:text=In%202021%2C%20there%20were%20an,21.7%20%25%20of%20the%20total%20population

European Social Fund Plus. (n.d.). <https://ec.europa.eu/european-social-fund-plus/en>

Fernandez, A., Haffner, M., & Elsinga, M. (2022). Comparing the financial impact of housing retrofit policies on Dutch homeowners. *IOP Conference Series*, 1085(1), 012044. <https://doi.org/10.1088/1755-1315/1085/1/012044>

Formen von Energiegemeinschaften – Energiegemeinschaften. (n.d.). Energiegemeinschaften.

<https://energiegemeinschaften.gv.at/grundlagen/>

Get involved in JPI Urban Europe | JPI Urban Europe. (n.d.). JPI Urban Europe. <https://jpi-urbaneurope.eu/get-involved/>

Greco, A., Konstantinou, T., Schipper, H. R., Binnekamp, R., Gerritsen, E., De Graaf, R., & Van Den Dobbelaars, A. a. J. F. (2016). Business case study for the zero energy refurbishment of commercial building. Sustainable Built Environment Regional Conference 2016, Zürich, Switzerland. Hill, D. R. (n.d.). Energy Efficiency Financing: A review of risks and uncertainties. 42nd IAEE International Conference 2019, Montréal, Canada.

Hill, D. R. (n.d.). *Energy Efficiency Financing: A review of risks and uncertainties*. 42nd IAEE International Conference 2019, Montréal, Canada.

Husbanken. (2022). *Loans from the Housing Bank to individuals - Husbanken*.

<https://www.husbanken.no/english/loan-from-the-housing-bank/>

IEA. (2013). Transition to sustainable buildings. In *IEA*. Retrieved April 23, 2023, from <https://www.iea.org/reports/transition-to-sustainable-buildings>

IEA. (2020, September 14). *Energy Strategy of Austria*. Retrieved April 23, 2023, from <https://www.iea.org/policies/5018-energy-strategy-of-austria>

Innovation Fund. (2023, July 13). European Climate, Infrastructure and Environment Executive Agency.

https://cinea.ec.europa.eu/programmes/innovation-fund_en

Kata, R., Cyran, K., Dybka, S., Lechwar, M., & Pitera, R. (2021). Economic and Social Aspects of Using Energy from PV and Solar Installations in Farmers' Households in the Podkarpackie Region. *Energies*, 14(11), 3158. <https://doi.org/10.3390/en14113158>

Kerr, N., & Winskel, M. (2020). Household investment in home energy retrofit: A review of the evidence on effective public policy design for privately owned homes. *Renewable & Sustainable Energy Reviews*, 123, 109778. <https://doi.org/10.1016/j.rser.2020.109778>

Klimaatmonitor. (2022). *Rapportage Energietransitie gebouwde omgeving 2019*.

<https://klimaatmonitor.databank.nl/content/gebouwde-omgeving>

Ministry for the Ecological Transition and the Demographic challenge. (n.d.). *The Spanish National Climate Change Adaptation Plan 2021-2030*.

OnePlanetCrowd. (n.d.). Oneplanetcrowd. <https://www.oneplanetcrowd.com/en>

Panteli, C., Klumbyte, E., Apanavičienė, R., & Fokaides, P. A. (2020). An Overview of the Existing Schemes and Research Trends in Financing the Energy Upgrade of Buildings in Europe. *Journal of Sustainable Architecture & Civil Engineering*, 27(2).

Painter, M. (2020). An inconvenient cost: The effects of climate change on municipal bonds . *Journal of Financial Economics* , 468-482.

Postcoderoosregeling. (2021, April 8). *Wat houdt de PCR-regeling precies in? - Postcoderoosregeling / Regeling verlaagd tarief*. Postcoderoosregeling / Regeling Verlaagd Tarief.

<https://www.postcoderoosregeling.nl/wat-houdt-de-pcr-regeling-precies-in/>

Recovery and Resilience Facility. (2021, February 12). European Commission.

https://commission.europa.eu/business-economy-euro/economic-recovery/recovery-and-resilience-facility_en

RVO. (n.d.). *Wetgeving zonne-energie*. RVO.nl. <https://www.rvo.nl/onderwerpen/zonne-energie/wetgeving>

Schönherr. (2023, April 3). *Green finance in Hungary*. Retrieved from Lexology: <https://www.lexology.com/library/detail.aspx?g=690a3913-b97f-454e-8310-e3551e4ce2c0>

Sintef. (n.d.). *Energy analysis of the Norwegian dwelling stock*.

Süntinger, H. (2022, May 3). *Austrian community creates circular energy from regenerative agriculture*. IO.
<https://innovationorigins.com/en/austrian-community-creates-circular-energy-from-regenerative-agriculture/>

Vlaamse Overheid . (2023). *Vlaanderen.be* . Retrieved from Vlaanderen.be:
<https://www.vlaanderen.be/en/property-tax>

Walls, M. (2014). Comparing subsidies, loans, and standards for improving home energy efficiency.
Cityscape, 16(1), 253. <https://www.questia.com/library/journal/1P3-3279528321/comparing-subsidies-loans-and-standards-for-improving>

10. Acknowledging EU funding



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 869918



