



## D5.5 BECoop national policy roadmaps

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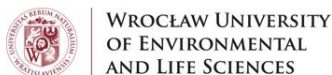
## About

Over the last years, the EU has witnessed some remarkable steps in Renewable Energy (RE) deployment. However, at the same time, we see an increasingly uneven penetration of RE across the different energy sectors, with the heating and cooling sector lagging behind. Community bioenergy schemes can play a catalytic role in the market uptake of bioenergy heating technologies and can strongly support the increase of renewables penetration in the heating and cooling sector, contributing to the EU target for increasing renewable heat within this next decade. However, compared to other RES, bioenergy has a remarkably slower development pace in the decentralised energy production which is a model that is set to play a crucial role in the future of the energy transition in the EU.

The ambition of the EU-funded BECoop project is **to provide the necessary conditions and technical as well as business support tools for unlocking the underlying market potential of community bioenergy**. The project’s goal is to make community bioenergy projects more appealing to potential interested actors and to foster new links and partnerships among the international bioenergy community.

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## Project partners



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# 1 National Policy Roadmap for Greece

## 1.1 Summary

This policy roadmap aims to offer practical and relevant policy suggestions for national policymakers, regional authorities, and participants in bioenergy communities, drawing on insights and discoveries from the BECoop project. It highlights the potential of community bioenergy in Greece to help achieve national energy and climate objectives while enhancing energy security and independence. Additionally, the roadmap seeks to initiate discussions on regulatory support for community bioenergy within the country.

The development of this policy roadmap is based on three methods for policy engagement and debate: a policy analysis, stakeholder consultations, and an expert workshop. The information and analyses stemming from these processes are outlined in an initial section that describes the current status of community bioenergy in Greece. It is followed by a section that presents the goals and visions for community bioenergy in 2030 and 2050, as articulated by national policies, and relevant stakeholders.

In the final section, the roadmap offers specific policy recommendations aimed at unlocking the potential of community bioenergy in Greece by 2030 and 2050. Five key recommendations emerge in relation to Greece's regulatory frameworks. To enhance social perceptions, it is vital to offer accessible information on bioenergy community benefits, recognise links to local democratic entities, and boost awareness of energy security and climate change. Improving the legal framework entails a specialised approach for energy projects, alongside a tax-exempt virtual net-metering system for small cooperatives. Decarbonising heating involves clean energy funding, agricultural cooperatives' promotion, and biomass utilisation. Supply chain integration involves agricultural biomass support. These measures align with NECP priorities, focusing on clean energy, forest management, energy crops, livestock cooperatives, and innovative solutions.

The roadmap concludes by providing a sequencing of the proposed measures, in four areas of activity: the decarbonisation of the heating sector, new regulatory measures, improved social perceptions as well as faster local diffusion. In the short term, it is crucial to prioritise the creation of integrated strategies for supply chains, along with providing financial incentives to promote heating system installations and efficiency standards within local supply chains. These efforts should be complemented by awareness campaigns and a long-term focus on establishing stable regulatory frameworks and partnerships.

## 1.2 Purpose and development of the roadmap

In Greece, community bioenergy can make a significant contribution towards decarbonising the economy, lowering energy bills, increasing energy independence and improving public participation in energy decision-making.

The purpose of this policy roadmap is to provide practical and applicable policy recommendations for national policymakers, regional authorities and bioenergy community actors based on insights and findings of the BECoop project. The roadmap outlines the opportunities of community bioenergy for Greece to meet national energy and climate targets and increase energy security and independence. Furthermore, the roadmap intends to open the policy debate around the regulatory promotion of community bioenergy in the country.

The policy roadmap has been developed based on three main methods: a policy analysis, stakeholder consultations, and an expert workshop. First, key policy documents at European and national level were reviewed to identify the policy frameworks and enabling mechanisms for bioenergy communities in Greece. We reviewed the Greek National Energy and Climate Plan (NECP) as well as other policies and legislation,

including directives on renewable energy, for their policy objectives and measures on bioenergy and community energy. The analysis enabled the development of draft policy recommendations to unlock the community bioenergy potential in Greece.

Second, we surveyed stakeholders and participants working with the BECoop network, to understand the findings of other relevant policy work within the project and beyond, and to compile insights into the structuring of strategic templates and recommendations.

Third, we held a national policy workshop (Figure 1) to discuss and validate the policy roadmap with key actors in the community energy-field in Greece. The workshop took place in Athens, on the 10<sup>th</sup> of May, parallel to the RESCoop Community Energy Spring Gathering. It was attended by 10 stakeholder representatives of energy communities and co-operatives, think tanks and foundations, as well as academic, technical, business and biomass associations.



*Figure 1: Participants at the BECoop national policy workshop in Greece.*

The findings of all three stages have been brought together in this document. The roadmap is structured as follows: Firstly, it outlines the current status of community bioenergy in Greece. Second, it presents the targets and visions for (community) bioenergy in 2030, 2050 as described by national policies and other relevant actors. Third, it proposes concrete policy recommendations to unlock the community (bio)energy potential in Greece by 2030 and 2050. The roadmap then provides a timeline with concrete measures and priorities.



## 1.3 Community (bio)energy – current state of play

In Greece, there is no specific legislative and policy framework targeted towards bioenergy communities and thus, the broader energy community policy framework applies.

Energy communities are defined the law 4513/2018. According to this statute:

- The mandatory activities of energy communities (ECs) are energy provision services, energy management and storage, and the production of raw materials for biomass.
- Optional activities of ECs include the management of funding programmes, raising awareness among local people, and supporting vulnerable groups against energy poverty.

In Greece, ECs are seen as promoting a social and solidarity-based economy and innovation in the energy sector, addressing energy poverty and promoting sustainability as well as improving energy efficiency at local and regional level.

From 17 to 27 of February 2023, the Minister of Environment introduced a new law regarding the use and production of electricity from renewables that affect ECs. It is not clear yet what is going to happen with ECs that formed as a result of Law 4513/2018. The new law promotes two other forms of ECs: renewable energy communities and citizen energy communities.

### Status of community (bio)energy projects in Greece

According to the Community Energy Observatory (<http://electraenergy.coop/observatory/>), as of November 2022 there were over 1400 energy communities in Greece (Table 1).

**Table 1: General characteristics of registered RESCoops in Greece**

Central Macedonia	263
Western Macedonia	261
Attica	176
Western Greece	171
Thessaly	137
Eastern Macedonia & Thrace	115
Central Greece	90
Epirus	56
Peloponnese	51
Crete	48
Ionian islands	25
South Aegean	10
North Aegean	3
<b>SUM</b>	<b>1406</b>

The majority of these initiatives were located in the north and west of the country, primarily thanks to the availability of agricultural residue and other resources. There is significant potential for the development of ECs in the rest of the country – particularly Thessaly, Epirus and the Peloponnese.

## Key barriers and challenges to community bioenergy

In Greece, the development of bioenergy communities is hampered by at least seven factors:

### 1. Lack of administrative measures and support

Despite the favourable provisions of Law 4513/2018, there is a lack of administrative decisions and support measures that will help a new tool such as Energy communities. A big problem for the future development of ECs is article 160 of the Law 4759/2020, according to which, from the 1st of January of 2022, each EC has to participate in competitive processes, including competing with private investors in bids to ensure the operational support of renewable energy projects.

### 2. Challenges surrounding the use of energy crops

The long-term (2050) energy roadmap for Greece foresees an increasing role of energy crops in domestic energy supply. However, short- and medium-term goals, as well as policy instruments promoting their use are insufficiently development. There is also a lack of coordination between the energy and relevant agricultural policy strategies – the latter do not really consider energy crops, nor do they promote their application. Some practical issues also remain to be solved – farmers switching to woody energy crops should have guaranteed that in the future their agricultural land will not change its character and be characterised as a forest.

### 3. Lack of financial tools

Greece, regardless of the legal framework regarding ECs, lacks basic financial tools to support them. There is difficulty in financing small projects due to absence of public policies and the general economic situation. When it comes to ECs, challenges in receiving funding is even greater as projects are operated by citizens with limited financial instruments, characterised by small profit margins.

### 4. The low social acceptance of co-operatives

In terms of the social challenges linked with the development of ECs, it has been pointed out that citizens are reluctant to get involved for different locally contingent reasons. However, the most common reason for the lack of participation is the low awareness and knowledge of, and the negative perception towards, co-operative schemes as a whole.

### 5. Lack of crisis-specific measures

No specific policy or legal environment change for bioenergy communities occurred in Greece due to the recent energy crisis. However, European Directives and programmes (such as REPower EU), are leading to a change in the NECP and an increase national RES target (to bring forward the date of achieving carbon neutrality). However, all of this is happening without a specific mention of bioenergy communities.

### 6. Carbon neutrality

From a technical and environmental point of view, ECs are not carbon neutral, as the majority operate RES projects with a low carbon footprint (such as photovoltaic power, wind turbines). In addition, there is absence of specific efficiency and emission performance standards – especially for the residential sector. There are no provisions that appliances reaching particular performance standards (e.g. Eco-design or equivalent) should be eligible for support.

### 7. Uneven regional development

Greece is characterised by large economic and infrastructural disparities among regions, worsened by the post-2008 financial crisis and the imposition of austerity. Some regions lack the knowledge base, labour force and infrastructural capacity to support the expansion of bioenergy communities. The promotion of this form of energy investment and organising does not feature in regional development strategies.

## Entry points for the adoption of community bioenergy

There are a number of advantages that Greece can build on in the further expansion of ECs:

- In case of bioenergy communities in Greece, value and supply chains are integrated. Specifically, farmers, foresters and enterprises in the agricultural and forestry sector create energy communities with the purpose of creation and management of the biomass supply chain or/ end installation and operation of bioenergy production units. Therefore, the biomass supply chain can provide the bioenergy unit with feedstock.
- ECs can implement net - metering and virtual net - metering between consumption and production facilities belonging to the community. The technical and regulatory pre-conditions are well established and functional across a wide range of ECs across the country.
- ECs can decide that the area of energy production will be equal to area of installation for energy consumption, or in an adjacent area. This allows energy bills to be significantly reduced.

## 1.4 Policy targets for, and visions of, community bioenergy for 2030 and 2050

Greece has ambitious renewable energy (RES) targets, which can also facilitate the promotion of ECs. Concerning the share of RES in general, Greece's current target is participation of RES in final gross energy consumption is 44% until 2030. RES participation in electricity generation is targeted to be 79% of the mix, while RES in heating is at 46%.

### Bioenergy in the National Energy and Climate Plan (NECP)

Regarding the residential sector, the 2019 NECP<sup>1</sup> sets high targets for energy efficiency in the residential sector. This mirrors earlier objectives in the 2010 Specifically, the roadmap for 2030 considers reduction of energy consumption targeted at higher energy efficiency. In residential buildings, the implementation of NECP objectives has led to a reduction in energy consumption for the residential sector as a whole, despite the increase in electricity consumption due to the electrification of an order of activities within the household.

In the years 2015-2040, the NECP for Greece expects an increase in the acquisition of solid biomass by 34%. This is a moderate increase that leaves Greece behind its national potential. The demand for biomass is expected to increase in all sectors. Along with the increase in the prices of CO<sub>2</sub> emission allowances, the profitability of the use of biomass in the power and heating sectors will increase both in dedicated boilers, hybrid systems and installations co-firing with coal. In households and services, greater use of biomass than before will be associated with the replacement of old coal-fired stoves modern by pellets-fired.

The Greek NECP highlights the benefits of biomass. In terms of economic benefits, the NECP discusses the sectors of bioeconomy, biomass, food and fertilizer, excavation and demolition waste, plastics, textiles and water reuse as areas of focus for the national strategy, which can contribute to the creation of sustainable work cycles, modern and quality jobs and improved quality of life through the provision of resilient and innovative products and services. The social benefits include circular economies, which are regarded as a catalyst for productive reconstruction and having an important environmental dimension. The environmental benefits are linked to the challenges regarding environmental impacts in terms of the emission problems (microparticles) due to open/free combustion spots and the absence of certification of the raw material used, which are the main obstacles to further promoting biomass for space heating. To further promote bioenergy,

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<sup>1</sup> The update of the 2019 NECP is still underway and is was not available on the site of the European Commission at the time of publishing this report.

specialised support programmes will be designed both for the development of efficient supply chains for residual biomass / biodegradable matter and for the support and implementation of optimal environmental and energy-efficient bioenergy applications.

In Greece's NECP, it is mentioned that the use of biomass for energy generation in Greece is limited in relation to the availability of residual biomass. The following measures are proposed to promote biomass for energy production:

- Priority in the use of waste (agri-livestock units and industries, urban).
- Supply chain organisation and land planning of sites for temporary storage of agricultural/forest residual biomass.
- Maintenance and extension of the sustainability certification scheme for biofuels, bioliquids and solid fuels.
- Sustainable forest management.
- Strengthening the primary sector through the promotion of energy crops of woody biomass or coppice plantations.
- Creation and enhancement of the domestic bioethanol market.
- Development of the biomethane market.

In terms of energy poverty alleviation, Greece's NECP, biomass/biogas projects are listed as a possible example of the development of clean forms of energy, which can promote renewable energy sources and reduce energy poverty. With regard to energy communities more generally, the NECP highlights the importance of the contribution of energy net metering schemes, as they will contribute to the implementation of RES and energy saving technologies investments, as well as they will contribute to the more active participation of the local community in energy affairs. The NECP mentions a quantitative goal of installing and operating new self-generating and net metering systems, mainly to cover own needs of over 600 MW by the year 2030 (to total more than 1GW of installed capacity), as well as the activation of cumulative representation bodies, providing the possibility to energy communities and citizens to participate in the energy markets. In Greek legislation, a key feature of energy communities is their local and regional scope of operation, and membership structure.

The Greek NECP highlights the benefits of energy communities. In terms of the economic benefits, the document mentions the benefits resulting for the local economy in the context of the development of a specific institutional framework for the promotion of energy communities. As for the social benefits, these are linked to net metering and active consumer schemes. The contribution of net metering and energy community schemes is twofold, as they will contribute both to the implementation of RES and energy saving investments, and to the more active participation of the local community and ultimately to the strengthening of the role of people in energy activities. Achieving a minimum number of projects through these schemes is deemed to be crucial for shaping and assessing the required implementation framework. In this context, the aim is also to develop innovative net metering schemes, both in energy generation and consumption, thus supporting decentralised energy generation and management. The quantitative objective is to set up and operate new self-production and net metering systems, primarily with a view to covering own needs of over 600 MW by 2030 (to reach in total more than 1 GW of installed capacity), and to engage aggregators through the possibility of participation of energy communities and of people in energy markets.

The environmental benefits of energy communities are discussed by mentioning sustainable forest management. The NECP mentions enhancing the role of energy communities and cooperatives in cleaning up forests to protect them against fires in accordance with specific technical specifications and utilising the

woody biomass removed for energy purposes. Poland indirectly discusses the environmental benefits of energy communities. The NECP states that, in line with the Responsible Development Strategy, it is proposed at the operational level to increase stable renewable energy sources - including energy clusters and cooperatives. The amended acts are intended to create a stable environment for the growth of generation in the renewable energy sector - including energy clusters and energy cooperatives.

In the NECP, it is mentioned that promoting energy crops, namely locally produced biomass for the supply of alternative district heating systems, and enhancing local crops with high added value (e.g. saffron, rose, oregano, tea), new innovative livestock activities, and promoting the export activities of existing cooperatives and their verticalised development. The NECP also mentions the support for the deployment of RES energy projects by energy communities also through the use of specialised financing tools. In addition, Greece has already taken measures to promote the participation of demand in the electricity market, both through by instituting aggregators as well as the ability for consumers to participate in energy communities.

The NECP discusses the development of clean forms of energy, funded by projects implemented by energy communities with the participation of natural persons, and/or local authorities and/or legal persons governed by private/public law, aiming to promote renewable energy sources and reduce energy poverty. And it mentions that this axis could include, inter alia, biomass/biogas projects, with the participation of local livestock cooperatives and generally self-production projects with the possibility of utilising existing energy infrastructure (e.g. distribution and/or transmission networks). A policy scorecard was developed for Greece, based on the available data in the 2019 NECP, while taking into account broader policy developments, stakeholder views, and the state of the art in bioenergy community development. The policy scorecard identified several areas for potential improvement (**Error! Reference source not found.**).

*Table 2: A policy scorecard for bioenergy community support – Greek NECP.*

Element	Scorecard (GR)
Overall regulatory framework and support for biomass development	Reasonably well-developed tools to biomass and energy communities as a whole
Economic benefits of bioenergy community development	Well-developed suite of economic measures
Social benefits of bioenergy community development	Need for further development of measures to support the social benefits of bioenergy communities
Environmental benefits of bioenergy community development	Detailed overview of the environmental benefits of biomass use
Poverty alleviation (bioenergy communities)	Need for further development of measures to enhance the poverty alleviation potential of bioenergy communities
Energy community support	Bioenergy communities specifically receive limited attention and support in the NECP

### Threats for future bioenergy community development

It is important to note that different threat for the future bioenergy community development exist that must be overcome to reduce both unfavourable environmental impacts and other potential risks.

### **Financing environment**

As was noted above, Greece lacks basic financing tools for ECs. There is a need to create a specialised framework for the conduct of competitive procedures that will concern exclusively ECs, as well as establishing stable tax legislation, ensuring by this way a sustainable economic environment for the growth of cooperative schemes. Furthermore, bioenergy plant developers require a guarantee of secure long-term supply contracts prior to proceeding with an investment in a plant. The lack of such tools will hamper the development of ECs in the future.

### **Logistics of biomass**

The logistics of biomass are an important challenge to deal with, as the emissions derived from the supply chain are highly depended on the transportation of the feedstock. Therefore, attention should be given to the type of equipment to be used, along with its emission characteristics and choice of the specific routes to be followed.

### **Lack of clear future projections**

Although it seems promising, the NECP lacks details on how these targets will be implemented (e.g. quantifiable outputs, specific measures / support to be adopted). Future projections regarding bioenergy use in the Greek NECP and long-term energy strategy remain unclear as to exactly what biomass assortments will be mobilised for which pathways, and a specific roadmap for promoting increased utilisation of biomass for energy – or other bioeconomy applications – is lacking. There is a need for developing a dedicated, national biomass strategy that properly takes into account the potential as well as the specific sector conditions in Greece. Based on it, the NECP projections should be updated. Otherwise, the development of bioenergy communities will remain suboptimal.

## **1.5 Recommendations for key policy measures – in the NECP and beyond**

Following the provisions laid out in current regulatory and policy frameworks, as well as the opportunities and threats to bioenergy community development in Greece, it is possible to highlight at least five areas where recommendations can be made. To improve social perceptions, priorities include providing accessible information on bioenergy community benefits, acknowledging energy communities' links to local democratic bodies, and raising awareness about energy security and climate change. In terms of legal framework enhancement, it's vital to establish a specialised framework for bioenergy projects targeting energy communities and design a tax-exempt virtual net-metering system for small cooperatives. Decarbonising heating involves funding clean energy via energy communities, promoting agricultural cooperatives' role, and utilising biomass and innovative livestock activities. Supply chain integration centres on technical support for biomass in agriculture. These measures align with NECP priorities, focusing on clean energy, forest management, energy crops, livestock cooperatives, and innovative energy solutions.

### **Improving social perceptions**

Relevant measures include (in order of priority):

1. Easy access to information regarding the benefits of being a bioenergy community member.
2. Acknowledging that energy communities are attached to local democratic organisations.
3. Provision of education and awareness raising in terms of the problems related with energy security supply and climate change.

## Improving the legal framework and regulatory environment

Relevant measures include (in order of priority):

1. Provision of a specialised framework for implementation of bioenergy projects, targeted to energy communities, thus excluding individual investors. If that is in place, energy communities will be involved in competitive procedures and consideration will be given to their specificities. The tendering procedure could also take into account social criteria, such as whether an energy community promotes the reduction of energy poverty, gender injustices, energy democracy or social justice more generally. Communities working on these topics could receive additional points in the tendering process.
2. Design of a virtual net-metering system adopted specifically by small cooperative schemes, with the aim of exemption from tax obligations.

## Decarbonising the heating sector more generally

Relevant measures include (in order of priority):

1. Development of clean forms of energy, funded by projects implemented by energy communities.
2. Development of agricultural cooperatives to allow them to act as a connecting link between the energy and agricultural sectors.
3. Promoting the export activities of existing cooperatives.
4. Use of existing biomass value chains to promote residual biomass.
5. Enhancing the role of energy communities and cooperatives in managing forests, to protect them against fires in accordance with specific technical specifications and utilising the woody biomass removed for energy purposes.
6. Promoting energy crops, namely locally produced biomass for the supply of alternative district heating systems, and enhancing local crops with high added value (e.g. saffron, rose, oregano, tea);
7. Technical support in the installation and operation of suitable boilers that can handle residual biomass.
8. Biomass/biogas projects, with the participation of local livestock cooperatives.
9. Innovative livestock activities.

## Supply chain integration

Relevant measures include (in order of priority):

1. Development of agricultural cooperatives to act as a connecting link between the energy and agricultural sectors.
2. Technical support in the installation and operation of suitable boilers that can handle residual biomass.
3. Use of existing biomass value chains to promote residual biomass.

## NECP priorities

Relevant measures include (in order of priority):

1. Development of clean forms of energy, funded by projects implemented by ECs.
2. Promoting the export activities of existing cooperatives.
3. Enhancing the role of energy communities and cooperatives in cleaning up forests to protect them against fires in accordance with specific technical specifications and utilising the woody biomass removed for energy purposes.
4. Promoting energy crops, namely locally produced biomass for the supply of alternative district heating systems, and enhancing local crops with high added value (e.g. saffron, rose, oregano, tea);
5. Biomass/biogas projects, with the participation of local livestock cooperatives.
6. Innovative livestock activities.

## 1.6 Timeline of measures

The prioritisation of policy measures above is based on the feasibility implementation tools and horizons, as well as the immediate needs that they serve. As a priority in the short term, the development of integrated strategies to support supply chains, as well as financial incentives to encourage the installation of heating systems and the development of efficiency standards and local supply chains are of key priority. These need to be supported by awareness campaigns, with a view to more stable regulatory frameworks and partnerships in the longer term.

The proposed measures are organised in four areas of activity (Figure 2): the decarbonisation of the heating sector, new regulatory measures, improved social perceptions as well as faster local diffusion.

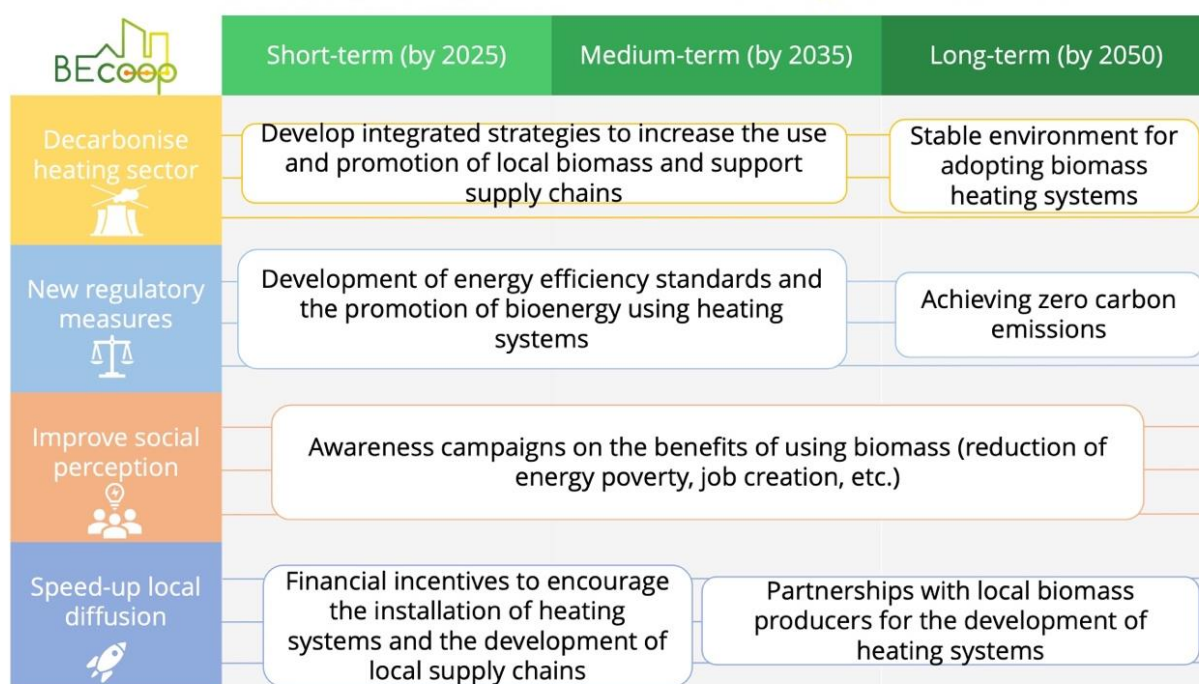


Figure 2: Indicative policy roadmap for the acceleration of bioenergy communities in Greece.



## 1.7 Conclusions

To summarise, Greece is facing an expansion of (bio)energy communities. However, their development faces obstacles. Administrative support is lacking, and energy communities are now required to compete with private investors for renewable energy project support, hindering their development. Challenges also include inadequate policies for energy crop promotion, limited financial tools, low social acceptance, and a lack of crisis-specific measures. Uneven regional development exacerbates these issues, making bioenergy community expansion difficult.

Proposed policy measures in this roadmap encompass improving social perceptions by enhancing information access, recognising the contribution of energy communities to local governance, and raising awareness of energy security and climate change through public campaigns and education. Legal framework improvements include developing specialised support for energy communities through tendering processes, and a virtual net-metering system for small cooperatives. Decarbonising heating, supply chain integration, and enhancing the NECP are all predicated upon further support for agriculture, as well as the utilisation local biomass resources with the participation of local livestock cooperatives.

## 2 National Policy Roadmap for Italy

### 2.1 Summary

This roadmap aims to provide practical and policy recommendations for Italian policymakers and decision-makers in the field of community bioenergy. It is based on various insights gathered through reviews of policy documents, decision-maker workshops, and insight from experts in the field. The roadmap includes an outline of the initial situation, challenges, targets, and recommendations, as well as a timeline and sequence of actions.

The roadmap provides specific policy recommendations in four domains: social perception, regulatory framework development, local diffusion, and heat decarbonisation. These include protecting the structural and functional diversity of forests, implementing the actions envisaged in the National Forestry Strategy, promoting a real sustainable forest management model (at European level) as to not remain locked-in to conservative approaches that do not favour carbon sequestration, establishing a clear medium- to long-term forest management policy, identify a framework for the promotion of thermal energy from renewables, including collective self-consumption, allocating specific resources present in the National Recovery and Resilience Plan (NRRP) with regards to circular economy measures to forest management and maintenance interventions, increasing the resource ceiling for the development of biomass district heating systems, and raising awareness among the end consumer about replacing outdated or inefficient appliances with new 4- to 5-star appliances or connecting to district heating networks.

The roadmap acknowledges the complexity of transitioning to bioenergy communities and emphasises the importance of proper legislation and support for local initiatives. Tailored, frameworks, financial risk mitigation, and awareness campaigns are needed to promote the growth of bioenergy communities in Europe. Engagement, clear communication, and access to information are crucial for successful implementation.

### 2.2 Purpose and development of the roadmap

The community bioenergy potential in Italy is untapped, despite its potential to decarbonise the economy, lower energy bills and increase energy independence.

The purpose of this policy roadmap is to provide practical and applicable policy recommendations for national policymakers, regional authorities and bioenergy community actors based on insights and findings of the BECoop project. This roadmap outlines the opportunities of community bioenergy for Italy to meet national energy and climate targets and increase energy security and independence. Furthermore, the roadmap intends to open the policy debate around the regulatory promotion of community bioenergy in the country.

This roadmap has been developed based on extensive policy analyses, surveys and direct evidence from regional actors that aim to implement community (bio)energy. This work involved detailed analyses of National Energy Climate Plans, National Renewable Energy Action Plans, as well as relevant legislative, policy, regulatory and strategic documents. We also surveyed stakeholders and participants working with the BECoop project.

In addition, we held a national policy workshop to discuss and validate the policy roadmap with key actors in the community energy-field in Italy. The policy workshop was held at the NOI Techpark in Bolzano on the 21<sup>st</sup> of April 2023 (**Error! Reference source not found.**). The event was attended by 50 people, ranging from enterprise and cooperative representatives to journalists and public officials. Key areas of action and

measures to foster bioenergy communities were discussed, with the aim of raising awareness among political representatives of the opportunities related to bioenergy.



*Figure 3: Speakers and participants at the BECoop national policy workshop in Italy.*

The experience of regional actors who have implemented or want to implement community (bio)energy has also influenced the development of the policy roadmap. The BECoop network also provided useful feedback on previous versions of the policy roadmaps.

The roadmap is structured as follows: Firstly, it outlines the initial situation of community bioenergy in Italy – where we are standing today. Second, it presents the targets and visions for (community) bioenergy in 2030, and 2050 – where we want to go. Third, it draws concrete policy recommendations to unlock the community (bio)energy potential in Italy – how do we get there by 2030/2050. A timeline with concrete measures and their prioritisation and sequencing is provided.

## 2.3 Community (bio)energy – current state of play

### Status of community (bio)energy projects in Italy

Energy communities were introduced into the Italian legal system through Decree-Law 162/19 (Article 42bis) and its implementing measures, such as ARERA's Resolution 318/2020/R/eel and Ministerial Decree of September 16, 2020.

The renewable energy community must meet the following requirements: to be an autonomous legal entity which, acting in its own name, can exercise rights and be subject to obligations, having as its main corporate purpose (as evidenced by the Articles of Association) that of providing environmental, economic or social benefits at community level to its shareholders/members and/or to the local areas in which it operates. Additionally, rather than financial profits, it must have a statute or an instrument of incorporation providing participation in the open and voluntary community.

### The Italian legislative framework

The Renewable Energy Directive (RED) delineated by the European Commission, provides a definition of *renewable energy communities* including, and referring to, electricity, thermal energy, and cooling energy produced from renewable energy sources (RES). On the other hand, the Italian government incorporated

only electricity in the definition of *renewable energy communities*, hence de facto ruling out those communities producing and utilising thermal and cooling energy produced from RES; thus, also limiting the number, and source/end-use, of renewable energy communities. Therefore, since heating is not mentioned in the definition, only electricity is incentivised in collective self-consumption. Hence, no adequate economic support mechanisms are available for RES heating. Additionally, only the cooperative or association form is identified in the governance model, excluding the “benefit society” formula.

Another major gap is the lack of data on the heating and cooling market broken down by renewable source. The gas import figure is certain, while the diversification of final consumption in the heating sector is extremely fragmented. As a result, it can happen that the legislature intervenes in the RES heating sector without a holistic vision and approach.

Value and supply chains are integrated at the local level, while in terms of ministerial responsibility, the national forestry strategy is managed by the Ministry of Agriculture and the bioenergy sector by the Ministry of Environment.

### Key barriers for, and challenges to, community bioenergy

The main barrier for community bioenergy in Italy is that condominium-sized energy community is intended only for electrical generation. Even on the governance model, there are risks related to envisioning community bioenergy only as cooperatives or association forms. Another challenge is the high importing levels related to biomass in Italy. According to the Food and Agriculture Organisation (FAO)<sup>2</sup>, over the last few years the trend of Italian imports of assortments potentially destined for energy purposes has been continuously growing, reaching a value of 3.8 Mt in 2013. By virtue of this trend and these values, Italy covers the role of: 1<sup>st</sup> world importer of firewood, 3<sup>rd</sup> importer of pellets for civil use, 3<sup>rd</sup> importer of wood residues and waste, and 12<sup>th</sup> importer of wood chips from coniferous. Due to this high import dependence, there are risks of: energy inefficiency in the transport of biomass and consequent emissions of greenhouse gases in the atmosphere; inactive management of national forest resources; and the risk of stimulating the creation of oversized plants compared to the supply of biomass on a local scale. Thus, the main challenge is to place a medium- to long-term forestry policy and increase timber harvests.

## 2.4 Policy targets for, and visions of, community bioenergy for 2030 and 2050

Energy produced from biomass can be one of the winning sectors to focus on to encourage greater diversification of energy supplies. Italy is a biomass-rich country and should therefore strive to enhance the usage of these sources, particularly in the heating sector which accounts for 50% of Italy's energy end-use. This would allow the country to tackle effectively the recent energy price increases on the one hand and enhance local RES circular supply chains on the other. In Italy, the annual accretion from woods and forests (36% of Italian territory), corresponds to **20 million tonnes per year**; potential agricultural pruning waste (vines, olive trees, orchards, straw) corresponds to **8,7 million tonnes per year**; urban green pruning of parks, boulevards, and gardens corresponds to **3 million tonnes per year**. This results in a total of **31,7 million tonnes per year** of biomass which, if properly utilised, would avoid an import of at least 13 billion cubic meters of natural gas, producing a financial windfall of about 37-45 billion EUR per year (at current prices) corresponding to a value equal to 35/40% of Russian gas import recorded in 2021.

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<sup>2</sup> <http://www.fao.org/forest-resources-assessment/past-assessments/fra-2015/en/>

Energy communities represent a new model for local energy production and management. To promote them effectively, it is necessary to simplify the current legislation and promote heating consumption. Especially for inland areas and mountainous areas that have substantial renewable sources (biomass, hydropower), it is crucial to encourage the implementation of renewable energy communities as a tool for local development and territorial preservation. Cogeneration should be promoted to use biomass for energy purposes.

### **Bioenergy communities in the National Energy and Climate Plans (NECPs)**

Bioenergy communities are not specifically mentioned in the 2019 NECP and its draft revision, available in 2023 on the European Commission's website, nor in the 2010 National Renewable Energy Action Plan.

However, many elements of Italy's NECP (and the revision) highlight the drive to an energy transition, the circular economy, and related requirements for the development of the production system, with due regard for economic and social sustainability, aiming for carbon neutrality by 2050 and an invitation to strengthen the measures for the implementation of the INECP.

The 2019 NECP highlights a position paper issued by the Ministry of Agricultural, Food, Forestry, and Tourism Policies, focusing on significance of the bio-energy sector due to its broad availability (including residual, agricultural, and forestry biomass, cover crops, and second-harvest crops), the timely utilisation for energy purposes, and its potential to mitigate climate change by removing CO<sub>2</sub> through biomass supply chains. Concerning electricity production, it is believed that current levels can be sustained until 2030. Regarding thermal energy production, the Ministry advocates for increased bioenergy input by 2030, relative to current levels, while promoting greater forest growth. Lastly, in the transport sector, the Ministry believes that the conditions are favourable for a determined effort to advance biofuels, especially agricultural and zootechnical biomethane.

The revised NECP emphasises that the most widely used renewable source in the heat sector is solid biomass (6.8 Mtoe), mainly in the household sector as firewood and pellets. The NECP also finds that heating and domestic hot water (ACS) supplied by heat pumps (2.5 Mtoe) are also very important, while contributions from other sources (geothermal and solar) are still limited. In the context of the circular economy, the NECP emphasises that the local biomass with a short chain traceability procedure meets favourable environmental, social sustainability and balance sheet criteria.

Italy's 2019 NECP discusses the environmental effects due for the biomass use in terms of emissions. The development of the heating RES sector is influenced by environmental issues associated with the impacts of emissions from pre-existing solid biomass-fired heating systems. Therefore, the installation of new biomass-fired heating systems must be targeted towards promoting high-efficiency systems meeting high environmental quality standards, with consideration also being given to the possibility of introducing restrictions on new systems in areas characterised by critical air quality conditions. In order to stimulate the renewal of old systems using efficient, low-emission technologies, more stringent performance requirements on accessing incentives for biomass-fired heat generators will be introduced in the short term.

The 2019 NECP emphasises that Italy will aim to expand the use of efficient district heating and district cooling by relying on residual economic potentials. This is to be done in a manner consistent with related energy and environmental policy objectives, including reduced the demand for energy recovery from waste, and limiting the use of biomass to reduce emissions. Moreover, the role of bioenergy plants can also be understood as serving the very high level of development of non-programmable renewable energy. To this end, the existing production capacity of bioliquid installations also proves to be a useful source of transitional support, ensuring support for maintaining decarbonisation trajectories. The current situation of the biomass production stock is characterised by a capacity of approximately 4.100 MW of installations in operation by 2021.

The 2019 NECP does not particularly discuss the social benefits of biomass, apart from the reference concerning the local biomass supply. About biomass supply and the origin thereof, approximately 80% (in energy content) of biomass is domestic. Considering the stabilisation of consumption, this percentage should remain steady, or else slightly decrease, as a result of the projected increased degree of penetration of more highly efficient technologies, with the possibility of increasing the share of pre-processed fuels, such as pellets.

The revised NECP foresees multiple measures for the support of biomass production, including the promotion of certified biomass pathways for energy production, the introduction of more stringent performance and environmental requirements for biomass heat generators as well as a tax credit on supplied district heating networks with biomass and geothermal energy.

Italy indirectly considers energy communities by mentioning self-consumption systems. In both the 2019 and revised NECP, it is mentioned that the existing self-consumption structures may work alongside new forms of aggregation (such as, for example, the new figures of ‘self-consumer’ and ‘energy community’ established by the Clean Energy Package), which will require the definition of government instruments to ensure system security, consumer protection and the fair allocation of network and system charges. The spread of self-consumption will naturally be facilitated by technological developments able to deliver small and medium-sized production and storage systems, above all using renewable sources and high-efficiency cogeneration and entail smaller and smaller costs for users. It is highlighted that this is a development that should be supported through public policies enabling market actors to organise themselves based on efficiency criteria. To this end, the regulation of the new structures needs to be accelerated.

A policy scorecard was developed for Italy, based on the available data in the final and draft NECP, while taking into account broader policy developments, stakeholder views, and the state of the art in bioenergy community development. The policy scorecard identified several areas for potential improvement (Table 3).

**Table 3: A policy scorecard for bioenergy community support – Italian NECP.**

Element	Scorecard (IT)
Overall regulatory framework and support for biomass development	Reasonably well-developed tools to biomass and energy communities as a whole
Economic benefits of bioenergy community development	Well-developed suite of economic measures to support biomass as a whole
Social benefits of bioenergy community development	Insufficient attention to the social benefits of bioenergy communities
Environmental benefits of bioenergy community development	Detailed overview of environmental benefits of biomass use
Poverty alleviation (bioenergy communities)	Link between energy poverty and bioenergy communities insufficiently developed
Energy community support	Bioenergy communities specifically receive very limited attention and support in the NECP

### Subsidies for biomass energy production in Italy

Subsidies for biomass energy production in Italy are only present at a national level. The *Conto Termico* provides incentives for interventions to increase energy efficiency and the production of thermal energy from renewable sources for small-scale installations. The beneficiaries are mainly public administrations (PAs), but also businesses and individuals, who will be able to access funds amounting up to 900 million EUR annually,

of which 200 million EUR are allocated to PAs. The electricity incentive period for biomass producers ended<sup>3</sup>, with the feed-in tariffs ending in 2025. The operators are waiting the issuance of the FER 2 Decree which is foreseen to recognise the incentive on electricity production for new biogas/biomass plants. The supply chain will be influenced by the closure of national incentives, which will see a peak of expiry concentration in the period 2026-2028 which will affect 86% of the plants.

### **Possible limitations and drawbacks of bioenergy communities in Italy**

Most biomass district heating plants are in mountainous or non-urban areas where short supply chains are possible. Nonetheless, it is possible to imagine district heating plants in urban areas as well, in terms of diversification of resources. Particulate matter produced from biomass combustion is a drawback which conditions also economic policies both at regional and national levels.

### **Effects of the war in Ukraine on the policy debate in Italy**

The use of woody biomass (wood chips, pellets, firewood) for domestic use has increased. Several manufacturing companies have swung from the use of gas/diesel to pellets or wood chips. In terms of the energy community, no war-produced effects were recorded.

## **2.5 Recommendations for key policy measures – in the NECP and beyond**

Forests cover more than 36% of the national land area, play a key role in climate change mitigation and adaptation, provide multiple ecosystem utilities, and can contribute to the development of the circular bioeconomy, particularly in inland and mountainous areas. The conservation of this valuable heritage must focus on management that protects the structural and functional diversity of forests within the framework of the Sustainable Development Goals of the UN 2030 Agenda, the European Green Deal, the European Forestry Strategy, and the national Forestry Strategy currently being implemented.

Against this backdrop, it is a priority to adopt a pragmatic approach to the use of forest resources, implementing the actions envisaged within the National Forestry Strategy. The forestry sector for years has been considered an appendage of the agricultural sector without recognising its strategic value in economic, environmental, and social terms for the national territory. A conservative and romantic approach in which "nature takes its course" has prevailed in public opinion and sometimes even among decision makers.

### **Needed regulatory measures**

- From a general policy perspective: at the European level, promote a real sustainable forest management model as to not remain locked-in to conservative approaches that do not favour carbon sequestration.
- From a legislative perspective: establish a clear medium- to long-term forest management policy, identify a framework for the promotion of thermal energy from renewables, including collective self-consumption.

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<sup>3</sup> <https://www.gazzettaufficiale.it/eli/id/2011/03/28/011G0067/sg>

- From an economic perspective: allocate specific resources present in the National Recovery and Resilience Plan (NRRP) with regards to circular economy measures to forest management and maintenance interventions. Additionally, an increase in the resource ceiling for the development of biomass district heating systems is needed.

### Funding requirements and capacity

On December 23, 2022, the Ministry of Environment, and Energy Security (MASE) published the rankings of approved projects related to Measure M2C3- Investment 3.1- Promoting Efficient District Heating Systems of the NRRP. The Call for Proposals was met with strong interest from operators: 118 projects were submitted for start-up and extension of efficient district heating systems, reflecting a fermenting, capital intensive and low-risk business sector.

Of the 118 projects submitted, 29 were eligible for funding, 60 were assessed as eligible, however not eligible for funding due to exhaustion of funds, and the remaining 29 were excluded from the ranking list. The measure includes an allocation of 200 million EUR against a request for contributions of about 556 million EUR. The 60 positively evaluated projects excluded due to lack of financial resources amount to 233 million EUR. It should be noted that the value of the submitted projects corresponds to about 2 times the value of the requested funding; therefore, the total value of the 79 approved projects is about 1.1 billion EUR. Through measure M2C3 - Investment 3.1, resources amounting to approximately 0.4 billion EUR will be mobilised.

The data confirm the paucity of resources allocated to the promotion of efficient district heating development within the NRRP compared to the sector's potential. The need to invest more resources on the promotion of district heating renewable sources is in line with other European countries, including the German government, which has allocated 2.9 billion EUR to the cause, and the Swiss government, with about 1 billion CHF.

### Need to improve the social perception

It is essential to raise awareness among end consumers about replacing outdated or inefficient appliances with new 4- to 5-star appliances or connecting to district heating networks. Also, in terms of culture, a communication campaign explaining the importance of managing the forest heritage through sustainable management and scheduled withdrawals is vitally needed.

## 2.6 Timeline of measures

Starting from the indications of RED 3, it is a priority to invest in the biomass-energy supply chain to address the emergency that Italy's forestry heritage is experiencing due to various disasters, such as bark beetle and drought. Only through concerted and coordinated action within the framework of the National Forestry Strategy can we act effectively and prevent further environmental risks. Organisations such as FIPER (*La Federazione di Produttori di Energia da Fonti Rinnovabili*), as always, will facilitate exchange and dialogue among all the actors involved to achieve an important common goal.

To summarise, an improvement of the social perception related to bioenergy and bioenergy communities is immediately needed. We propose to do this by:

- The development of a government-led, national communications campaign about the management of forest heritage in particular.



- Raising awareness among end consumers about the benefits of passing to up-to-date appliances utilising bioenergy.
- Improving education and training processes to integrate biomass and energy community knowledge across the entire education sector.

Additionally, funds of the NRRP related to forest management and maintenance need to be released immediately. Thereafter, by 2025, financial support to start-ups and pilot projects involved in bioenergy needs to be provided. This should ideally be supported by a real sustainable forest management model at European level. Finally, by 2030, a clear forest management policy should be established, and district heating be promoted, by setting concrete targets for the establishment of bioenergy communities. The sequencing of these measures is outlined in Figure 4, across four domains as identified through the stakeholder consultation process: social perception, regulatory framework development, local diffusion, and heat decarbonisation.

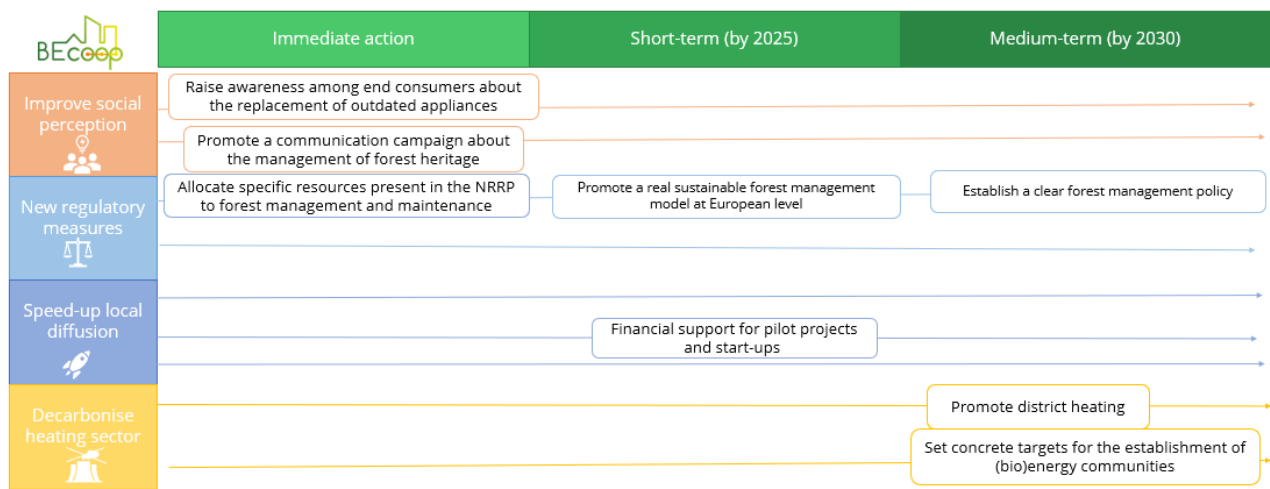


Figure 4: Indicative policy roadmap for the acceleration of bioenergy communities in Italy.

## 2.7 Conclusions

The production of biomass energy can increase in both the short- and long-term through a unified approach in the implementation of the forestry strategy. Cascading employment requires the Ministry of Agriculture, Food Security and Forestry to promote a biomass-energy supply chain.

To summarise, the key elements that future policies, including the NECP, should consider in relation to bioenergy communities in Italy include: RES heating valorisation; use of woody biomass; and the implementation of the national forestry strategy. In terms of the NECP specifically, there is significant room for improvement in developing the social benefits of bioenergy communities via public campaigns and educational systems.

Across all areas of action, there is a need for a clear definition and regulatory framework to support bioenergy communities specifically. Although energy communities are discussed indirectly in the NECP, not many details are delineated even when it is directly mentioned, especially in relation to biomass. In particular, the social and political benefits of energy communities require further attention, as exemplified by the fact that energy poverty alleviation is barely mentioned in relation to energy communities in the NECP.

## 3 National Policy Roadmap for Poland

### 3.1 Summary

This roadmap aims to provide practical and policy recommendations for Polish policymakers and decision-makers to enable community bioenergy in Poland. It is based on various insights gathered through decision-maker workshops, expert interviews and surveys, and reviews of policy documents. The roadmap includes an outline of the initial situation, challenges, targets, and recommendations, as well as a timeline and sequence of recommended actions.

The roadmap provides specific policy recommendations. These include increasing social awareness, improving legal frameworks, developing bioenergy-related district heating infrastructure, introducing new funding schemes, and speeding up local diffusion of bioenergy.

The proposed timeline suggests a focus on transposing EU directives, including the Renewable Energy Directive II, into national legislation, and raising awareness, building capacities among the public and businesses about the benefits of bioenergy, and simplifying legal requirements and procedures to establish energy communities and cooperatives by 2030. By 2050, efforts should continue to promote bioenergy by setting concrete targets and promoting district heating networks.

The roadmap acknowledges the complexity of transitioning to bioenergy communities and emphasises the importance of proper legislation and support for local initiatives. Tailored frameworks, financial risk mitigation, and awareness campaigns are needed to promote the growth of bioenergy communities in Europe. Engagement, clear communication, and access to information are crucial for successful implementation.

### 3.2 Purpose and development of the roadmap

The community bioenergy potential in Poland is untapped, despite its potential to decarbonise the economy, lower energy bills and increase energy independence.

The purpose of this policy roadmap is to provide practical and applicable policy recommendations for national policymakers, regional authorities and bioenergy community actors based on insights and findings of the BECoop project. This roadmap outlines the opportunities of community bioenergy for Poland to meet national energy and climate targets and increase energy security and independence. Furthermore, the roadmap intends to open the policy debate around the regulatory promotion of community bioenergy in the country.

The policy roadmap has been developed based on three main methods: policy analyses, stakeholder consultations, and two expert workshops. First, key policy documents at national level were reviewed to identify the policy frameworks and enabling mechanisms for bioenergy communities in Poland. We reviewed Polish National Energy and Climate Plans (NECP) and other policies and legislations, including directives on renewable energy, for their policy objectives and measures on bioenergy and community energy. The analysis enabled the development of draft policy recommendations to unlock the community bioenergy potential in Poland.

Secondly, we surveyed stakeholders and participants working with the BECoop network, to understand the findings of other relevant policy work within the project and beyond, and to compile insights into the structuring of strategic templates and recommendations.

Thirdly, two national policy workshops were organised (**Error! Reference source not found.**). The aim was to gather input for a policy roadmap on how to unlock the potential of bioenergy to be presented to European/national policy makers. The first policy workshop took place in Kuraszków, Poland on 12 April and brought together 2 speakers and 16 representatives from municipalities, NGOs and the bioenergy sector. The workshop started with an introduction to the policy roadmap and its development, followed by a discussion of the policy measures identified in the policy analysis. The workshop identified awareness raising and capacity building for bioenergy communities, as well as the development of business models and the establishment of pilots as key next steps. Missing policy actions were then added, different actions were prioritised and a timeline for action was developed.

A second policy workshop was held in Jelenia Góra, Poland on 12 June 2023. This was attended by 47 stakeholder representatives from different municipalities, waste management and energy industries participated. The workshop started with the presentation of the policy roadmap and a catalogue of topics for discussion on energy production, before participants were divided into groups to work on concrete actions and timelines. Key actions identified were the need to build new partnerships, optimise supply chains and launch a promotional campaign.

The experience of regional actors who have implemented or want to implement community (bio)energy has also influenced the development of the policy roadmap. The BECoop network also provided useful feedback on previous versions of the policy roadmaps.

The roadmap is structured as follows: Firstly, it outlines the initial situation of community bioenergy in Poland – where we are standing today. Second, it presents the targets and visions for (community) bioenergy in 2030, and 2050 – where we want to go. Third, it draws concrete policy recommendations to unlock the community (bio)energy potential in Poland – how do we get there by 2030/2050. A timeline with concrete measures and their prioritisation and sequencing is provided.



*Figure 5: Participants at the Polish national policy workshops.*

### 3.3 Community (bio)energy – current state of play

Community energy is defined in Polish law as the production of electricity or biogas, or heat in renewable energy sources installations and balancing the demand for electricity or biogas or heat, only for the own needs of the bioenergy community and its members, connected to an area-defined power distribution network with a rated voltage lower than 110 kV or a gas distribution network, or a district heating network.

The current law foresees restrictions on community energy:

- Restrictions on installed capacity – the total installed capacity is limited to 10 MW in the case of electricity, 30 MW in the case of heat; for biogas plants the annual capacity of all installations within one renewable-energy cooperative cannot exceed 40 million m<sup>3</sup> for biogas;
- location restrictions – it has to be located in the area of no more than three rural or rural/urban-rural communes directly adjacent to each other, in the area of one distribution system operator electricity or gas distribution network or heating;
- threshold for meeting the energy demand of cooperative members –renewable-energy cooperative has to cover their energy needs by their members in minimum 70%;
- the number of the energy cooperative members can not exceed 999 participant;
- ban on the sale of excess energy produced by renewable-energy cooperatives<sup>4</sup>.

### Status of community (bio)energy projects in Poland

In 2020, when BECoop project has started, there was no energy cooperative in Poland. In May 2021, the first energy cooperative was founded by two business entities using solar energy as a source of energy and registered by the National Support Centre for Agriculture (KOWR). Today, registered energy cooperatives with photovoltaic installations are focused solely on electricity production (Table 4), with a total of 18 registered co-operatives across the country<sup>5</sup>. The number of members is still low. There is no bioenergy cooperative in Poland that uses biomass for electricity or heat generation.

*Table 4: General characteristics of selected renewable energy cooperatives in Poland*

Registration date	Location (Voievodenship)	Number of members	Number of installations	Cumulated power of the RESCoop	Kind of installation
11.05.2021	Mazowieckie	4	2	20 kW	PV
21.12.2021	Śląskie	7	7	51 kW	PV
30.01.2023	Lubelskie	1 <sup>6</sup>	11	40 kW	PV
09.02.2023	Wielkopolskie	3	1	0.99 MW	PV
17.02.2023	Podlaskie	3	7	157 kW	PV

Nevertheless, there are potentials to establish bioenergy cooperatives/communities based on wood and agricultural residues.

Approximately 13% of the domestic biomass potential can be allocated for energy purposes without causing adverse effects in the form of soil degradation and a decrease in the supply of food while complying with the environmental protection requirements under the Common Agricultural Policy<sup>7</sup>.

<sup>4</sup> Monitor of Poland. Act of 19 July 2019 amending the Act on renewable energy sources and certain other acts. Warsaw, Poland, 2019. <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20190001524>.

<sup>5</sup> <https://www.gov.pl/web/kowr/wykaz-spoldzielni-energetycznych>

<sup>6</sup> Note that this renewable-energy cooperative is registered but cannot function as such because it does not have enough members.

<sup>7</sup> As assessed by the Institute of Agricultural and Food Economics (Instytut Ekonomiki Rolnictwa i Gospodarki Żywnościowej – IERiGŻ) of the National Research Institute (Państwowy Instytut Badawczy – PIB) in a study prepared at the request of the Ministry of Agriculture and Rural Development.

The energy potential of agricultural biomass in Poland, which includes both special purpose crops and agricultural and agri-food-processing industry by-products, is ca. 900 PJ annually<sup>8</sup>. The most commonly available raw material to be used for energy purposes is straw. On average, the yearly straw yield for energy purposes in Poland amounts to approximately 10.3 million tonnes, depending on cereal yields in a given year<sup>9</sup>. Biomass stocks from energy crops are estimated to range from 120,000 to 130,000 tonnes of dry matter, and orchard wood stocks are estimated to amount to ca. 88,700 tonnes annually<sup>10</sup>. Along with the development of the agricultural biogas production sector, the importance of the use of agricultural by-products and agri-food industry residual products has been increasing. Their use in 2017 reached approximately 3.8 million tonnes. The energy potential of the agri-food processing industry as regards the production of agricultural biogas is estimated to exceed 7.8 billion m<sup>3</sup> annually.

However, to unlock the (community) bioenergy potential, several barriers must be overcome.

### Key barriers and challenges in relation to community bioenergy

- **Society's environmental awareness is insufficient.**

Citizens have a generally low environmental attitudes and a low awareness about opportunities for or co-benefits of community (bio)energy. In contrast, price matters to most people.

Inhabitants, especially those with low incomes, do not care for the environment and often burn very low-quality fuels or simply rubbish in domestic boilers (tires, PET bottles, MDF furniture boards, etc.). Fossil fuels (in direct and indirect form) are still the dominant source of energy, especially in rural areas.

- **Lack of knowledge about bioenergy.**

Citizens have minimal knowledge of solid fuels properties and their behaviour during combustion, as well as how to burn them properly in the heating boiler. Little is known about the emission of pollutants into the atmosphere from coal-fired boilers, incredibly harmful and hazardous compounds. There is no wide education related to the energy-saving techniques in the households. For example, some sceptics may obstruct operations among the local community by spreading rumours about the harmful effects of building a bioenergy community.

But not only local communities but also many representatives of local, local government and state authorities still have a low level of knowledge about energy cooperatives, their business model as well as regional benefits it can provide, especially in terms of biomass utilisation for energy purposes in rural regions.

- **Problem with the processing of raw biomass material.**

The lack of sufficient ecological awareness or knowledge by final biomass users regarding its proper processing and utilisation leads to the combustion of wet biomass and significant pollutants emissions to the atmosphere. This is due to the unappropriated processing and storage of biomass caused by a lack of appropriate knowledge about biomass storage of processing among local people. Still little is known about the processed biomass, such as pellets or briquettes, their properties, storage requirements and combustion procedures.

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<sup>8</sup> Estimates of the Institute of Agricultural and Food Economics (IERiGŻ).

<sup>9</sup> Central Statistical Office. "Preliminary estimate of the main agricultural and horticultural crops in 2022". Warsaw, 2022. <https://stat.gov.pl/obszary-tematyczne/rolnictwo-lesnictwo/uprawy-rolne-i-ogrodnicze/wstepny-szacunek-glownych-ziemioplodow-rolnych-i-ogrodniczych-w-2022-roku,3,16.html> (accessed on 9 March 2023).

<sup>10</sup> The presented solid agricultural biomass estimates are based on crops harvested every year, having regard to the demand for it in agriculture.

- **Culture of coal and lack of alternatives.**

Poland has a long tradition of generating heat from coal. Coal is a cheap heating fuel.

There is still a lack of knowledge about the potential of local biomass, its properties and practical possibilities of using it for heating purposes. Specifically, there is a lack of knowledge about biomass pellets as a good alternative to hard coal, which can easily replace coal. Moreover, every coal fired boiler (fed manually or automatically) can be replaced by biomass (in the appropriate form).

- **The reluctance of local society towards cooperatives.**

The negative experience of rural residents related to the concept of cooperative, the effects of which can also be observed today, was the experiment of the communist authorities related to attempts at forced collectivisation of agriculture. The idea was associated with the nationalisation of agriculture and state control to all independent social initiatives, including cooperatives. Farms were forcibly taken from people to nationalise them. The exploitation of workers, and corruption of heads of work units often took place in state-collective farms. Thus, the term is negatively annotated among citizens.

In addition, there is a lack of mutual social trust to create such bottom-up initiatives among communes, especially for those requiring joint financial resources.

- **Discouragement of the population with the decline of activities related to the local renewable-energy developments.**

In 2017, five municipalities near Wrocław: Prusice, Oborniki Śląskie, Wisznia Mała, Wołów and Żmigród created the Renewable Energy Cluster of Trzebnickie Hills. As part of their activity, photovoltaic and bio-power plants were to be built. However, it collapsed due to a failure to obtain external funds for its development. The communes were not sufficiently involved in applying for external funds, hence the effect.

Poland has no experience with a functioning energy cooperative, in particular those based on biomass. It makes people question the feasibility of such community initiatives. The society is also reluctant as there are no good practises and examples of bioenergy cooperative in Poland.

- **Insufficient governmental support.**

Several legal and legislative obstacles to the creation of energy cooperatives exist, such as long formalisation of the existence of renewable-energy cooperatives by legal authorities, complicated registration procedure of the cooperative, lack of templates of documents necessary for the functioning of renewable-energy cooperatives (e.g. status of the cooperative, renewable-energy cooperatives contract with the energy distributor), lack of assigning the initial costs of creating cooperatives to the appropriate entities (it is not known who covers, among others, costs of legal assistance, stamp duty). There are also inconveniences regarding the form of financing cooperatives in Poland. In fact, in February 2023, a first dedicated fund, “Energy for Rural”, has been opened by national government to support a renewable-energy cooperatives creation/development. It covers only financial support for energy cooperatives based on wind and solar energy (loans up to 100% of eligible costs), or energy from biogas and water (loan up to 100% of eligible costs or 20% non-repayable subsidy)<sup>11</sup>. Thus, there is a non-uniform form of co-financing. In addition, installations based on biomass combustion were not included in this, which is also an objection to the incompleteness of the financing program. Such installations must use indirect forms of support like Clean Air program to subsidize the replacement of obsolete heating devices with low-emission boilers. Moreover, these are periodic recruitments, and it is unknown what these types of funding will look like in the future.

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<sup>11</sup> National Fund for Environmental Protection and Water Management. Priority Program "Energy for Rural". Warsaw, 2022. <https://www.gov.pl/web/nfosigw/energia-dla-wsi>.

Only limited funds and a small number of programs support the creation of energy cooperatives in Poland. It lacks incentives or discounts to create heat-producing energy cooperatives.

- **Infrastructural limitations.**

There is a lack of district heating networks in most of the rural areas (communes). For example, this has been found to be a main barrier to in the BECoop OBS PILOT AREA, because there are no good local practices on which renewable-energy cooperatives could draw inspiration, alongside wider problems connected to the lack of industrial demand for these services.

There is a large dispersion of heat consumers in rural areas, which makes local heat supply without distributed grids challenging.

- **The rise of energy poverty.**

The low income of a significant group of inhabitants of rural areas limits their investment opportunities, which also blocks their interest and activity in this area.

Scientists from the University of Szczecin, in a study of the impact of the COVID-19 pandemic on the phenomenon of energy poverty in Poland<sup>12</sup>, confirmed that in 2020 (up to and including May) the share of expenditure on energy carriers in relation to disposable income per person increased by an average of 1.3% compared to 2019. Following a higher share of expenses on energy carriers in relation to disposable income, according to the authors, energy poverty in 2020 (until May) increased to 21.4%, i.e., by 13.7% compared to 2019 and it was compounded by job loss and reduction earnings, especially for those with the lowest and middle income. Other sources indicate 30% of the energy poverty in Poland. It can be expected that the scale of the phenomenon could be even more significant. Many people have lost their jobs and are unable to pay their energy bills regularly. Not to mention invest money in the energy transformation of the region<sup>13</sup>. In addition, the fuel and energy crisis caused by the war in Ukraine, which resulted in cutting off fuel imports from Russia as a result of the imposed sanctions, has a large impact on the increase in energy poverty. Also, the growing inflation in the country (close to 20%), and thus the increase in the prices of necessities, does not encourage investing money in renewable energy, including bioenergy.

## Entry points for the adoption of community bioenergy

However, there are also **entry points for the adoption of (community) bioenergy** in Poland.

First, citizens are used to burn solid fuels in domestic boilers. Here, a fuel switch is possible. Second, there are tax reductions for bio-based electricity production but not for heating. The existing scheme could be however expanded to support heating with bioenergy. This makes also sense in light of the significant local biomass potential in most of the rural communes. Third, value and supply chains are closely related to the bioenergetic cooperative. It enables efficient delivery of the product (in the case of bioenergy cooperative fuel or energy) to the end customer by organising all processes related to transport, storage and processing of materials. In the case of Poland, however, there is no logistic chain related to the bioenergy cooperative, because there is no renewable-energy cooperative powered by energy from biomass. It will be created only with the launch of the first cooperative of this type.

Fourth, after the start of the war in Ukraine, a slow increase in the interest of municipalities in energy cooperatives was observed. Some rural municipalities began to look for information on renewable-energy cooperatives. This grown interest could be used to targeted information about potentials for (bio)energy

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<sup>12</sup> <https://www.mdpi.com/1996-1073/13/18/4977>

<sup>13</sup> Polish Economic Institute. COVID Energy Bill. *Economic Weekly* 2021 19, p. 8-9. [https://pie.net.pl/wp-content/uploads/2021/05/Tygodnik-Gospodarczy-PIE\\_19-2021.pdf](https://pie.net.pl/wp-content/uploads/2021/05/Tygodnik-Gospodarczy-PIE_19-2021.pdf).

communities and opportunities to increase local energy security and energy independence. During the current energy crisis, energy prices have been rising. Energy poverty in Poland is another topic currently high on the political agenda and "favourable driver" in initial discussions about the idea and concept of an energy cooperative.

### 3.4 Policy targets for, and visions of, community bioenergy for 2030 and 2050

Currently, bioenergy in Poland is considered mainly as the production of pellets (on a small scale) and the use of biomass by large power plants. This is coupled with a growing awareness of high temperature corrosion, slagging and other operational issues. The actor supporting the development of our pilot installation was recently the mayor of the city of Trzebnica (the district in which Oborniki Śląskie is located) and he declared his support. His main expectation was favourable economic indicators such as reduction of the cost of energy supplied to recipients (cooperative members) through a shorter logistics chain, or the possibility of generating additional revenues for the commune budget from taxes resulting from the activation of local entrepreneurs.

#### Bioenergy in the National Energy and Climate Plan (NECP)

Bioenergy communities are not specifically mentioned in the 2019 NECP<sup>14</sup>, nor in the 2010 NREAP. The NECP, however, outlines different financial measures to support the development of bioenergy in Poland:

- Funds of the National Fund for Environmental Protection and Water Management, including: Energia Plus, District Heating - pilot, Agroenergy, HEAT FLAT, Clean Air Program - for actions improving energy efficiency, low-emission energy sources, including renewable energy sources and high-efficiency cogeneration system heating ecological education and other green investments;
- European funds - operational programs in the financial perspective 2021-2027 - for the support of RES, energy efficiency in buildings, energy efficiency in enterprises, heating networks, high-efficiency cogeneration;
- InvestEU – for low-emission infrastructure;
- LIFE programme - activities for environmental and climate protection;
- Norwegian Financial Mechanism, EEA Financial Mechanism - activities for high-efficiency cogeneration, modernisation of networks and sources in district heating systems;
- loans from international financial institutions (e.g. World Bank, European Investment Bank, Council of Europe Development Bank) - support for anti-smog activities related to the transformation and modernisation of the energy sector, improvement of energy efficiency.
- New national program "Energy for Rural" – first direct funds to support RESCoop in Poland.

Due to the use of financial support, the Polish NECP considers two development scenarios of Polish energy sector.

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<sup>14</sup> The update of the 2019 NECP is still underway and is was not available on the site of the European Commission at the time of publishing this report.



With the application of the policies and measures contained in the NECP (scenario 1), in 2015-2030, solid biomass purchases are expected to increase by about 56% and by 63% by 2040. Demand for biomass will increase in all sectors. Together with the increase in CO<sub>2</sub> emission allowance prices, the profitability of biomass use in the power and heat sectors is expected to increase in dedicated boilers and hybrid systems as well as in coal-fired plants. In households and the service sector, the use of biomass will be more strongly associated with the replacement of old coal-fired stoves with modern pellet-fired stoves. An important risk element in this context is the introduction of biomass certification from 2021 to confirm compliance with EU-wide sustainability criteria. By 2030, biomass consumption for heat generation in heating plants is expected to increase almost tenfold to 346 ktoe (in 2015, 36 toe of chemical energy from solid biomass was consumed in all heating plants in Poland, in 2016 and 2017 it was 58 and 66 ktoe, respectively). Due to limited biomass resources, it will probably be necessary to introduce mechanisms that promote the use of this raw material in plants with the highest production efficiency, i.e. primarily in CHP plants and boilers.

Biomass will become the most important renewable energy source for heating in Poland, especially in rural areas. In the municipal and private sectors, taking into account the measures planned in the framework of smog abatement, no widespread increase in the use of biomass for heating purposes is expected, although it is noticeable. However, a much wider use of biomass in CHP plants is assumed.

An important element of the development of the national grid is also the expansion and modernisation of distribution. Currently, approximately 65% of municipalities in Poland have access to natural gas, with the gasification rate expected to increase to approximately 77% in 2022 and to be further increased in subsequent years in line with market needs. In rural areas, it is assumed that biomethane (purified biogas upgraded to natural gas quality) from local biogas plants (if there is potential for its production in the region) will be used instead of natural gas.

Without the application of the policies and measures contained in the NECP (scenario 2), in 2015-2040, solid biomass purchases are expected to increase by 34% - this is a moderate increase that makes limited use of the national potential. In particular, current trends towards the development of power plants and cogeneration units with dedicated boilers of less than 50 MW<sub>el</sub> and 150 MW<sub>th</sub>, as well as low-capacity decentralised units using local resources, are expected to continue. The maximum overall pace of construction of biomass power plants and CHP plants until 2020 was assumed to be 30 MW and in the following years 75 MW/year, while the minimum pace of construction was assumed to be 50% lower. For biogas, the assumed growth of this technology (minimum 30 MW/year, maximum 50 MW/year) was set based on historical data and the auction volumes proposed so far. Primarily, an increase in the use of agricultural biogas is assumed, as the potential of untreated organic waste from landfills and wastewater treatment plants is limited. The resources of wet household waste biomass of agricultural origin that can be used on-site for energy production in agricultural biogas plants allow reaching a production level of about 4.4 TWh in the 2030 perspective and up to 5.1 TWh in 2040. for the significant development of agricultural biogas plants producing heat energy in cogeneration. The heat generation potential is estimated at 45 PJ in 2030 and 105 PJ in 2040<sup>9</sup>.

The Polish NECP does not deal directly with the issues of energy communities, but the NECP plans to identify obstacles and support the development of energy sustainable areas at the local level. Therefore, it is planned to identify obstacles to the implementation of local investments - especially those resulting from the lack of social acceptance necessary to implement the development of local distributed energy and their reasons, e.g. the lack of acceptance for biogas plants, biomass CHP plants, etc. activities aimed at explaining and introducing possible metering of energy facilities that may emit noise, odours and other negative aspects, influencing the reluctance of local communities to this type of investment. The NECP discusses the social benefits of socialising renewable energy sources in relation to energy communities. The document states that the greatest values resulting from the existence of self-organisation at the local level are the contribution it makes to the development of specific regions, local economies and the development of the local labour market. The document also explains the reasons for such action, which is the management of locally available

resources in the form of energy substrates, energy carriers as well as human and financial capital. The Plan does not discuss energy poverty alleviation in relation to energy communities.

A policy scorecard was developed for Poland, based on the available data in the 2019 NECP, while taking into account broader policy developments, stakeholder views, and the state of the art in bioenergy community development. The policy scorecard identified several areas for potential improvement (Table 5).

*Table 5: A policy scorecard for bioenergy community support – Polish NECP*

Element	Scorecard (PL)
Overall regulatory framework and support for biomass development	Reasonably well-developed tools to biomass and energy communities as a whole
Economic benefits of bioenergy community development	Well developed suite of economic measures
Social benefits of bioenergy community development	Need for further development of measures to support the social benefits of bioenergy communities
Environmental benefits of bioenergy community development	Detailed overview of environmental benefits of biomass use
Poverty alleviation (bioenergy communities)	Link between energy poverty and bioenergy communities insufficiently developed
Energy community support	Bioenergy communities specifically receive limited attention and support in the NECP

### Other policy strategies and their impact on bioenergy

Beyond the NECP, there are other policy strategies and plan that support the development of bioenergy communities.

The Energy Policy of Poland until 2040 (EPP2040) set some targets for the development of local bioenergy markets and energy communities, such as:

- Increase the share of renewable energy sources in heating and cooling by about 1.1% per year in 2020-2030.
- The use of biomass is to play a key role in this (due to the availability of the fuel and the technical and economic parameters of the plant).
- By 2030, the number of energetically sustainable areas is to increase to 300.
- The creation of regional local heating systems should have a positive impact on the local labour market, improve transport infrastructure, generate tax revenues for local budgets and increase the overall economic development of the region.
- Generation plants using biomass should be located close to their production (i.e. in rural areas) to minimise environmental impacts and transport costs.

Policymakers set a goal in EPP2040 to create hundreds of energy-sustainable territories, but the document does not define measures on how to achieve this<sup>15</sup>.

<sup>15</sup> Ministry of Climate and Environment. Energy Policy of Poland until 2040 (EPP2040). Warsaw, Poland, 2021. <https://www.gov.pl/web/climate/energy-policy-of-poland-until-2040-epp2040> (accessed on 9 March 2023).

Also, the strategic document, the National Environmental Policy 2030, contains goals related to the development of Polish bioenergy, such as:

- Preserving and, if possible, rationally increasing the availability of forest biomass (including energy wood) to meet local energy self-sufficiency needs.
- Promoting the idea of using wood waste as a raw material for energy, according to the principle of cascade use of wood.
- Introducing legislative changes that facilitate trade in wood biomass<sup>16</sup>.

Furthermore, the amendment to the Renewable Energy Sources Act of 2021 constitutes the solutions analysed in BECoop<sup>17</sup>.

Finally, developments at the EU level are driving developments at the national level. These include the Energy Union and the EU Green Deal, both of which emphasise the role of citizens in the energy transition and the need to leave no one behind.

### Recent policy debate for the role of (community) bioenergy change under the war in Ukraine

The war in Ukraine has shown that energy security is a major value. The sense in the society that the local energy economy provides this security has grown. This was confirmed during numerous conversations with potential participants of the pilot energy cooperative in Oborniki Śląskie. The second important argument that increases the value of solutions such as BECoop is the military security of distributed generation. Small energy centres are much more difficult to destroy than centralized sources based mainly on hard coal.

### Threats for future bioenergy community development

It is important to note that there are several threats to the future development of the bioenergy community that need to be overcome in order to reduce negative environmental impacts and other potential risks.

- **Risk of biodiversity reduction.**

There is a potential risk of reducing biodiversity with the introduction of energy plant monocultures in case of the significant increase in biomass usage for energy production and lack of control of energy crops development.

- **Extensive deforestation.**

The biomass harvesting should be realised sustainably. The uncontrolled woody biomass acquisition from forests due to the increase of biomass demand can lead to the deforestation.

- **Development of new nuclear energy plants by the Polish government.**

The Polish government plans to build new nuclear power plants that can compete with the development of (municipal) bioenergy if government subsidies lead to low energy prices that attract energy consumers.

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<sup>16</sup> Ministry of Climate and Environment. The 2030 National Environmental Policy. Warsaw, Poland, 2019. <https://www.gov.pl/web/climate/the-2030-national-environmental-policy--the-development-strategy-in-the-area-of-the-environment-and-water-management> <https://www.gov.pl/web/climate/energy-policy-of-poland-until-2040-epp2040> (accessed on 9 March 2023).

<sup>17</sup> Ministry of Climate and Environment. *Act of 17 September 2021 amending the Act on renewable energy sources and some other acts.* Warsaw, Poland, 2021. <https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20210001873> (accessed on 9 March 2023).

- **The risk of problems with boiler operation.**

Boiler is too large for the heat supply demand

Biomass boilers are designed for a long period of operation. If a biomass boiler is too large, it only has to burn for a very short time to meet the heat demand placed on it. This results in many short firing periods during operation, called cycles. When a boiler is cycled regularly, it goes through several start-up and shutdown periods that are known to reduce efficiency, increase emissions, increase component wear and increase electricity consumption for components such as fans that run at higher speeds than in continuous operation. For boilers with automatic feeding, excessive cycling means that the boiler does not reach its most efficient operating state and the temperatures required for optimal combustion and heat transfer are not achieved. This leads to increased emissions.

Poor quality fuel

Biomass combustion is strongly influenced by the type and quality of fuel burned in the boiler. The biomass boiler should be designed for clean and efficient combustion of a specific type and quality of fuel. This will be specified by the manufacturer. The use of inferior fuels will result in increased emissions, lower efficiency, component failures, increased repair costs, high running costs and poor performance of the system. Fuels with a high moisture content can cause difficulty in maintaining the operating temperature, resulting in an increase in particulate emissions, incomplete combustion, loss of efficiency and even damage to the boiler or chimney.

Poor adjustment of boiler and system controls

Well-adjusted controls ensure the safe, efficient and optimal operation of the biomass boiler while meeting the heating needs of the site. If the control is unavailable, incorrectly set or not regularly checked, the performance of the biomass system can suffer. Poor control can result in the boiler operating when there is little demand for heat. This leads to multiple start-up and shut-down phases, known as cycles. This leads to an increase in electricity consumption. In many systems using solid fuels combustion, the heat tank is very often too small to meet current requirements related to Eco-Design standards.

## **3.5 Recommendations for key policy measures – in the NECP and beyond**

We propose five key policy areas to unlock the community bioenergy potential in Poland and to increase energy security and independence.

### **Increasing social awareness and building capacities**

- Empower farmers and citizens to actively engage in community (bio)energy project through targeted information campaigns and capacity building programmes. Capacity should be built about what energy cooperatives are, what benefit they offers, and wo can be a member etc.
- Increase the involvement of most Polish local authorities in the development of energy cooperatives to increase the knowledge among local governments and municipal officials.
- Support the creation of a Polish community energy network that can bring different experts and interested parties together to share experiences and best practices.

- Increase awareness that domestic burning coal is a primary source of local pollution and has a measurable impact on carbon dioxide emissions. Compared to coal, the use of biomass significantly reduces the negative effects. Therefore, campaigns are needed to explain the procedures for storing, transporting and burning processed biofuels (pellets).
- Strengthening the real sense of responsibility for the environment through education, campaigns, generally available monitoring of air quality in the region, and the introduction of charges for pollutant emissions.
- Creating awareness of the need for cooperation between local communities in the energy sector. This will facilitate a rebranding of 'cooperatives' into opportunities for regional economic value creation, decision-making and financial participation.
- Empower agricultural advisory units to actively participate in energy cooperatives.

### Regulatory measures and changes

- Transpose related EU directives, including the Renewable Energy Directive, into national law. This must include a clear definition and scope of activities for energy communities.
- Clarify the definition of a legal energy cooperative and the subject of activity, stating that its subject of activity is the production of electricity or biogas or agricultural biogas, or biomethane, or hydrogen, or heat from renewable sources in renewable energy source installations, and then trading them or their storage only for the own needs of the energy cooperative or its members.
- Reduce or eliminate the minimum requirement to cover the energy needs of members by their energy cooperative (currently the minimum share is 70%).
- Remove the cap on the number of members in an energy cooperative (currently no more than 999 members).
- Clarify the issue of contracts concluded by the energy seller with individual members of the energy cooperative, as well as with the operator of the power distribution network.
- Develop a uniform agreement between the energy cooperatives and the distribution network operator (currently there is no such agreement).
- Extend the tax reduction for community (bio)energy from electricity generation to heat generation to identify additional benefits.
- Provide tax relief to raise awareness of cooperatives in the renewable energy sector.
- Develop simple procedures and agreements related to the creation and establishment of renewable-energy cooperatives.

### Implementing financial support schemes

- Introduce a dedicated programme of targeted financial support for the establishment of energy cooperatives in Poland. Provide simple subsidies and other forms of support (loans, grants).
- Introduce transparent and earmarked funds to support the establishment of energy cooperatives. This fund should cover costs related to the feasibility study, settling formal and legal matters, etc.

- Create both legal and economic incentives for energy cooperatives, net metering and other actions (including promotional activities) to encourage conscious consumer behaviour.
- In order to achieve the target set in the Polish NECP (about 300 energy sustainable areas at the local level in the country by 2030), the relevant authorities should launch a promotional campaign with financial incentives for these types of energy solutions.

### Low-carbon heating sector transitions

- Introduce incentives for energy cooperatives to produce heat or heating fuels for their members.
- Promote district heating and integration of community (bio)energy.
- Remove the obligation to have a heat network in connection with heat generation, which significantly restricts distributed energy production (direct heating).
- Abolish coal-fired heating units by replacing them with biomass boilers (over 50% of households in Poland are still heated with coal).
- End the support for fossil fuels, in particular coal, as it will help residents to the search for new energy sources, including biomass.

### Speeding up local diffusion

- Facilitate the process of establishing an energy cooperative to encourage individuals to participate. A public position or institution should be established in to assist in the establishment of energy communities and cooperatives.
- In the biomass sector: Enable the use/transfer of the full potential of biomass produced in local state forests by local residents or local energy cooperatives.
- Promote and finance community bioenergy pilot project to demonstrate that this is economically and socially feasible in Poland.
- Promote energy crops, namely locally produced biomass to supply of alternative district heating systems and enhance local crops with high added value.
- Collect Polish experiences and best practices based on the renewable energy cooperatives that are currently emerging and functioning, on the basis of which a set of "best practices" for Polish conditions should be created (including models of existing solutions with well-described technologies, costs and formal and legal procedures).
- Disseminate knowledge about energy cooperatives, e.g. through local promotional campaigns.
- Improve the quality of the existing electricity grid (avoiding grid bottlenecks and enabling fast connections to energy cooperatives).

## 3.6 Timeline of measures

Based on the background analyses and consultations leading to the roadmap, we would propose the following sequencing of measures (Figure 6):

1. **Immediate action: Education and sharing of knowledge** about energy communities are crucial to raise social awareness about opportunities and benefits of energy communities and to overcome reservations in Poland. Targeted **communication campaigns** and **capacity building programmes** can be means to engage citizens, business and local authorities.
2. **Until 2025:** The **Renewable Energy Directive** must be effectively transposed into national law to give energy communities **specific legal recognition and support**. This must include a **clear definition** of renewable energy communities and energy cooperatives to enable a clear understanding of eligibility requirements and encourage investment decisions.
3. **Until 2025:** Support the creation of an institutionalised **Polish community energy network** that will assist interested parties and people to explore ideas, find partners and set up bottom-up initiatives. The network, or organisation, could collect **“best practices”** from across Poland that can be scaled and replicated. Furthermore, it can enable collaboration between distribution network operators and energy communities.
4. **Until 2025: Ease legal requirements and procedures for energy cooperatives**, including the maximum number of members and the minimum requirement to cover the energy needs of members by their energy cooperative. Specific legislations and enabling frameworks tailored to **bioenergy and heating** are needed.
5. **Until 2025:** The introduction of **new financing mechanisms** and the expansion of **tax reduction from the electricity to the heating sector** are critical to increase the share of bioenergy communities and in heating in particular. Concrete **funding models** must be made available and information about funding options disseminated to raise awareness the possibilities. **Financial support for concrete pilot projects** can make it possible to demonstrate the social and economic feasibility in the context of Poland. It is necessary to quickly gather practical experience, e.g. examples of business models that prove profitable under Polish conditions.
6. **Until 2030:** Promote **district heating** as it offers opportunities for the integration of biomass as a heat source. It should be considered as a **priority infrastructure**.
7. **Until 2030 and 2050:** Set concrete **targets for the establishment of (bio)energy communities** to promote their recognition for the Polish energy transition. We propose that Poland should have 100 operating energy communities by 2030. By 2050, there should be at least one energy community in each commune to support the scaling of the approach at local and regional level.

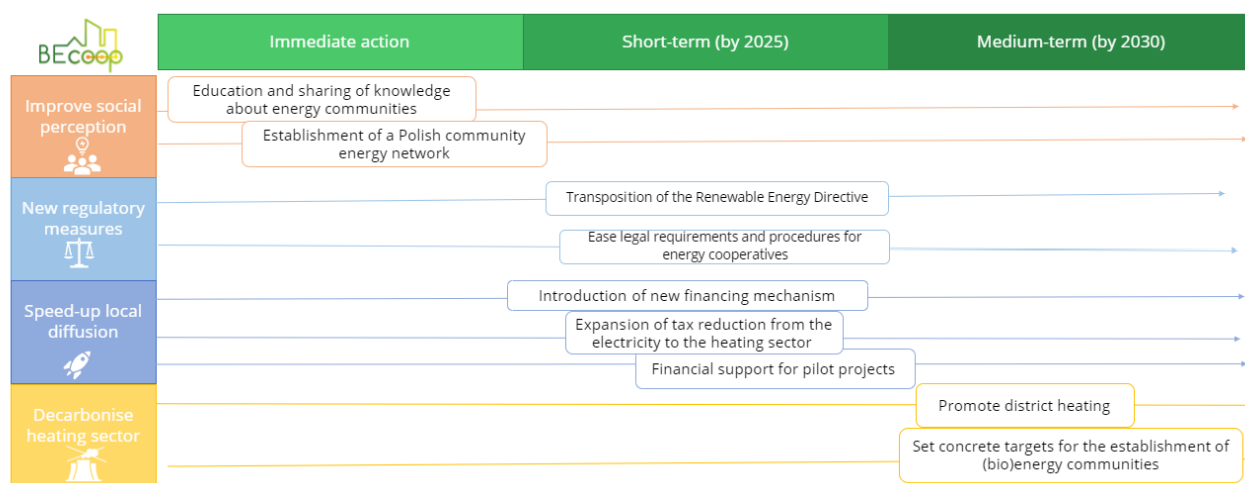


Figure 6: Indicative policy roadmap for the acceleration of bioenergy communities in Italy.

## 3.7 Conclusions

In summary, lack of incentives and low awareness of the use of local bioenergy have completely halted the development of municipal bioenergy in Poland. Regulatory changes, communication campaigns and capacity building are crucial to unlock the municipal bioenergy potential. Clear definitions and legal frameworks must form the basis for the introduction of bioenergy communities. Special financial support is needed for the successful establishment of pilot projects for bioenergy communities. Subsidies and tax exemptions are crucial incentives to accelerate local diffusion. The use of bioenergy community as a tool for energy poverty alleviation is a further area of activity, and one which has received very limited attention within the NECP.

Community bioenergy could make a significant contribution to clean and locally independent energy production in Poland. Overall, the Roadmap recognises the complexity of the transition to bioenergy communities, the need for appropriate legislation and the intensification of efforts to support local initiatives.



## 4 National Policy Roadmap for Spain

### 4.1 Summary

The roadmap aims to provide practical and policy recommendations for Spanish policymakers and decision-makers in the field of community bioenergy. It is based on various insights gathered through reviews of policy documents, decision-maker workshops, and insight from experts in the field. The roadmap includes an outline of the initial situation, challenges, targets, and recommendations, as well as a timeline and sequence of actions.

Energy communities with a focus on bioenergy are slowly emerging in Spain. Biomass energy has a high potential in Spain. It has the future to be a sustainable and renewable energy source for heating purposes in Spain. A funding program for energy communities is in place and consists of 3 phases, CE Aprende, CE Planifica y CE Implementa, and has been started with the implementation phase. The last phase (promotion, and implementation of energy communities) is currently active. The legislation is behind, and the establishment of energy communities needs to be legally well articulated. The current legislation does not always comply with the European Directive. A Draft version is available with many comments from different stakeholders.

Overall, the implementation of biomass for heating purposes in Spain will require a multi-faceted approach that involves policy solutions, education, and collaboration with stakeholders. In this way, the government can help to promote the use of biomass for heating and achieve a more sustainable energy future.

The roadmap acknowledges the complexity of transitioning to bioenergy communities and emphasizes the importance of proper legislation and support for local initiatives. Tailored frameworks, financial risk mitigation, and awareness campaigns are needed to promote the growth of bioenergy communities in Europe. Engagement, clear communication, and access to information are crucial for successful implementation.

### 4.2 Purpose and development of the roadmap

The community bioenergy potential in Spain is untapped, despite its potential to decarbonise the economy, lower energy bills and increase energy independence.

The purpose of this policy roadmap is to provide practical and applicable policy recommendations for national policymakers, regional authorities, and bioenergy community actors based on insights and findings of the BECoop project. This roadmap outlines the opportunities of community bioenergy for Spain to meet national energy and climate targets and increase energy security and independence. Furthermore, the roadmap intends to open the policy debate around the regulatory promotion of community bioenergy in the country.

The policy roadmap has been developed based on three main methods: a policy analysis, stakeholder consultations, and an expert workshop. First, key policy documents at European and national level were reviewed to identify the policy frameworks and enabling mechanisms for bioenergy communities in Spain. We reviewed the Spanish National Energy and Climate Plan (NECP) and other policies and legislation, including directives on renewable energy, for their policy objectives and measures on bioenergy and community energy. The analysis enabled the development of draft policy recommendations to unlock the community bioenergy potential in Spain.

Second, we surveyed stakeholders and participants working with the BECoop network, to understand the findings of other relevant policy work within the project and beyond, and to compile insights into the structuring of strategic templates and recommendations.

Thirdly, a national policy workshop, titled ‘Hoja de ruta sobre Comunidades Bioenergéticas’ was organised on the 6th of June 2023 (see Figure 7). The aim was to obtain input for a policy roadmap on how to unlock the potential of bioenergy to be presented to national policy makers. The workshops brought together 119 stakeholder representatives: 35 national, regional and local administrators, 48 biomass related companies, 14 researchers, 10 RESCoop members and 12 citizens. The workshop started with an introduction of the project, the policy roadmap and its development, followed by a discussion of the policy measures identified in the policy analysis (‘What is required for busting the biomass in Energy Communities’). Missing policy measures were added and the main findings for the roadmap were identified.



Figure 7: Participants at the BECoop national policy workshop in Spain.

The experience of regional actors who have implemented or want to implement community (bio)energy has also influenced the development of the policy roadmap. The BECOOP network also provided useful feedback on previous versions of the policy roadmaps.

The roadmap is structured as follows: Firstly, it outlines the initial situation of community bioenergy in Spain – where we are standing today. Second, it presents the targets and visions for (community) bioenergy in 2030, and 2050 – where we want to go. Third, it draws concrete policy recommendations to unlock the community (bio)energy potential in Spain – how do we get there by 2030/2050. A timeline with concrete measures and their prioritisation and sequencing is provided. In line with stakeholder views, the timeline concerns four areas of policy development: social perception, regulatory framework development, local diffusion, and heat decarbonisation.

This roadmap has been developed based on policy analysis and experiences from regional actors that have or aim to implement community (bio)energy. In addition, we held a national policy workshop to discuss and validate the policy roadmap with key actors in the community energy field in Spain.

## 4.3 Community (bio)energy – current state of play

In 2021 the share of energy from renewable sources was 21%<sup>18</sup>. Figure 8 shows the development of the fuel mix over the years<sup>19</sup>.

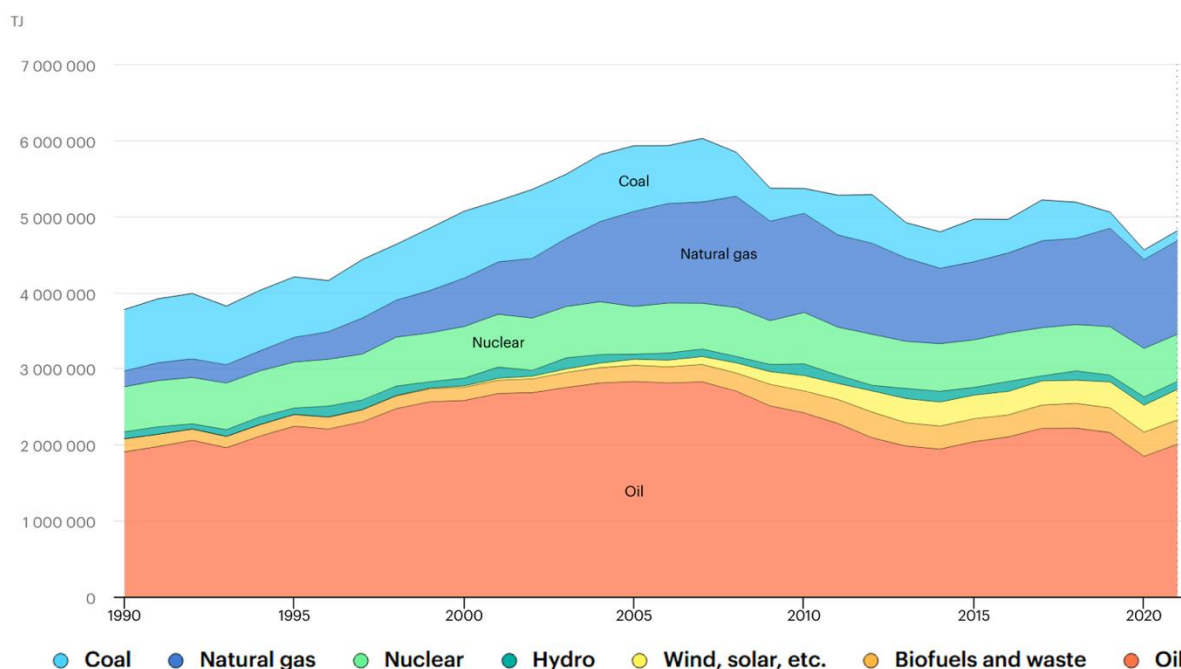


Figure 8: Development of the Spanish fuel mix since 1990.

The European Renewable Energy Directive 2018/2001/EU come into force in 2018<sup>20</sup> and provides the main legal framework for the establishment of energy communities and the development of bioenergy in the European Union. In this directive, the ‘renewable energy community’ has been defined as a legal entity.

### The Spanish funding programme and plan

On a national level, a funding program for energy communities are administered by the [IDAE](#) (Instituto para la Diversificación y el Ahorro de la Energía, the national energy agency). This program is part of the PRTR (Plan de Recuperación, Transformación y Resiliencia; national plan for recovery, transformation, and resilience) and is financed by the Next Generation EU funds.

The program has three phases, CE Aprende, CE Planifica y CE Implementa, of which only the third one has been activated so far:

- *CE Aprende* is directed at empowerment and learning so that citizens can start to organize into energy communities.
- *CE Planifica* geared towards initiatives in the planning stage: with objectives and members, but no clear (technical) project plan.

<sup>18</sup> Source: [https://ec.europa.eu/eurostat/databrowser/view/NRG\\_IND\\_REN\\_custom\\_4597401/bookmark/table?lang=en&bookmarkId=018cdfbd-739c-4d71-acdd-22c782999b37](https://ec.europa.eu/eurostat/databrowser/view/NRG_IND_REN_custom_4597401/bookmark/table?lang=en&bookmarkId=018cdfbd-739c-4d71-acdd-22c782999b37)

<sup>19</sup> Source: <https://www.iea.org/countries/spain#data-browser>

<sup>20</sup> Source: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018L2001>

- *CE Implementa* promotes (developed) projects for the production of renewable energy, energy efficiency, and sustainable mobility, including demand-side management and storage. 4 calls for projects have been executed: 2 for small projects (<1M€/project) and 2 for medium-sized to large projects (>1M€/project).

This three-phase program has been executed in reverse, starting at the end. The *CE Implementa* calls were directed at existing energy communities, even without a regulatory framework and a clear definition regarding energy communities and their constitution, activities, governance, etc. As a result, only established legal entities that had self-proclaimed themselves as energy communities and who had been informed in advance had access to the funding and time to respond in time for the first round of calls. Very few true citizen initiatives were able to request funding in this first round. In contrast, commercial actors had been sufficiently informed to prepare successful proposals. Especially in the medium-to-large scale projects, citizen initiatives were caught out. For the second round, which closed on February 13th of this year, it is expected that more citizen organisations participated. Most projects were oriented at photovoltaic collective self-consumption schemes, and some at e-mobility (charging infrastructure). As far as we know, no bioenergy communities have been funded. It is unclear if any bioenergy community applied for funding.

The funding program has been designed as a scheme of subsidies awarded on a competitive basis. Projects that need less financial support are preferable above those that need more support. This is a disadvantage for thermal installations in comparison with PV projects. In this scheme, it is more difficult for biomass projects to receive funding.

As an accompanying measure, the *CE Oficinas* program, oriented at establishing Community Transformation Offices, was launched. These CT Offices have to promote the creation of energy communities. The first call with a budget of 20M€ closed in November 2022. Project partner GoiEner was adjudicated 15000€ for helping with the constitution of 10 RECs. Some of these renewable energy communities have put the use of local biomass as an energy resource in their exploitation plans.

At this moment, it is unknown if specific support measures for bioenergy communities, or for bioenergy installation in general, exists. However, most subsidies for RES or Energy Efficiency are also applicable to bioenergy. A specific aid program for rural villages (fewer than 5000 residents) can also be used for bioenergy infrastructure such as a district heat network.

## Key barriers for and challenges to community bioenergy

### Legislation for energy communities

The definition of energy communities is missing in the regulation. CEC EU 944/2019 & CER EU 2001/2018 are not yet transposed to Spanish law. This uncertainty on the legislation increases the risk of investments. Several self-named “energy communities” received funding for energy communities but were not eligible according to the definition of energy communities in the EU legislation. This unclarity increases when projects relate to governance and meet geographical limits.

### Regional opportunities in Spain

Spain is administratively divided into 17 Autonomous Regions. These regions can each develop their regional energy strategy and support mechanism. These regions can be more active, supportive, or strict in their rules for bioenergy and (bio) energy communities. For example, investment in bioenergy is eligible under the aid instruments from regional entities in Euskadi and in Navarre.

### Communication and public acceptance

We have not noted any social or environmental pushback from pressure groups or individuals against bioenergy, in the way that it seems to exist in some other European countries. In the pilots, the sustainability and local nature of bioenergy communities in our communication has been emphasised. The effective management of the community and the responsibility for the promotion of renewable energy production is unclear or lacking. There are no signs that the involvement of the public is organized in a structural way.

#### **Is all of this adequate?**

The CE programs seem to be implemented out of sequence and a large share of the available funds has been handed out to a “privileged” target group. There are no signs that funding is impediment in the pilot cases involved. However, the Spanish legislation for (bio)energy communities is not in place yet, as recommended in the EU Directive for energy from renewable sources. Therefore, the establishment of the (bio)energy communities take more time, causes institutional unclarity, and delays the local production of renewable energy.

## **4.4 Policy targets for, and visions of, community bioenergy for 2030 and 2050**

For heat and electricity with biomass, it can be expected that the greatest development will occur with biomass of forest or agricultural origin (in industry, in general, it is already being used). An additional 1,600 ktoe/year is required for the increase in electricity generation and an additional 411 ktoe/year for thermal uses. In the Renewable Energies Plan (PER) 2011-2020, it was conservatively estimated that the additional potential in Spain is 17,286 ktoe/year, of which 10,433 ktoe/year is sustainable agricultural or forestry waste and the difference is new woody or grassy mass.<sup>21</sup>

Forests cover a significant percentage of the national land area, play a key role in climate change mitigation and adaptation, provide multiple ecosystem utilities, and can contribute to the development of the circular bioeconomy, particularly in inland and mountainous areas. The conservation of this valuable heritage must focus on management that protects the structural and functional diversity of forests within the framework of the Sustainable Development Goals of the UN 2030 Agenda, the European Green Deal, and the European Forestry Strategy.

### **Social or environmental challenges**

There are several social and environmental challenges associated with the use of biomass by society. Some of these challenges include:

- **Competition with food crops:** The use of biomass can compete with food crops for land and other resources, leading to food insecurity and increased food prices, this is mainly related when the biomass is coming from primary dedicated resources (as for instance maize, sugar cane, etc).
- **Deforestation:** The use of wood and other plant materials for biomass can lead to deforestation, which can result in soil erosion, loss of biodiversity, and other environmental problems.
- **Air pollution:** Burning biomass can release pollutants such as carbon monoxide, particulate matter, and nitrogen oxides, which can have negative effects on human health and the environment.

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<sup>21</sup> BECoop Analysis of Spain’s National Energy and Climate Plan NECP, page 100.

- Social conflicts: The production of biomass can sometimes lead to social conflicts, particularly when local communities are not consulted or involved in decision-making processes.

Overall, while biomass has the potential to be a renewable and sustainable energy source, it is important to carefully consider and address these social and environmental challenges in order to ensure that its use is truly beneficial. In the particular case of Spain:

- Biomass from food crops is not commonly used.
- The rate of forest growth is increasing annually, as is the propagation of fires, and the loss of certain forests due to high forest density. There is a need for better practices to keep forests in good condition, and therefore controlled forest maintenance operations would improve forest health and additionally biomass extraction.
- Burning biomass produces emissions, it is, therefore, necessary to do so in suitable equipment that minimizes them. In most cases, when biomass is not used for energy purposes, the current practice in Spain is to burn it in the open air, in which case the pollution is considerably higher.
- The owners of the biomass should agree to the use of this biomass, sometimes are private owners (and they have the power of decision), but others (and this is very typical with forest biomass) are public institutions for instance municipalities or regional governments which sometimes do not take into account the opinion of citizens on this type of issues.

### Threats to future bioenergy community development

There are several potential threats to the development of the bioenergy community in Spain, including:

- Competition from other thermal renewable energy sources such as for instance geothermal, solar thermal, or electricity for thermal uses from other renewable sources such as solar or wind power.
- Social acceptance: The development of bioenergy projects could also face opposition from local communities who may have concerns about the environmental or social impacts of these projects (mentioned above).
- Lack of awareness: There may be a lack of awareness or understanding of the benefits of bioenergy for thermal applications in Spain, which could limit the demand for this technology and hinder its development.
- Technical challenges: The use of bioenergy for thermal applications can be technically challenging, especially in terms of equipment and system design.
- Economic challenges: The implementation of a district heating, biogas plant, cogeneration plant, etc, requires a huge investment that could be a threat in order to select this type of technology over other technologies from other sources (renewable and non-renewable).
- Financial incentives: The availability of financial incentives and support programs for bioenergy thermal projects may be limited, which could make it more difficult for companies and organisations to invest in this technology.
- Fuel quality: The quality of the fuel used for bioenergy production can impact its efficiency and emissions. If the fuel quality is not consistent or sufficient, it could limit the potential for bioenergy to be used for thermal applications.

- Guarantee of fuel supply is often another concern on the part of society. Climate change, draughts, etc could put at risk the guarantee of fuel supply in the future.
- Not drawing up plans for the sustainable management of biomasses.
- Large companies taking power in this model and people are not being represented.
- Another major threat would be the depopulation of certain rural areas, which are prime candidates for bioenergy communities and are running out of people.
- Biomass projects are much more technologically complicated than self-consume photovoltaic ones.

## Bioenergy communities in the NECP and NREAP

Bioenergy communities are not specifically mentioned in the 2019 NECP and its draft revision, available in 2023 on the European Commission's website, nor in the 2010 NREAP.

In the 2019 NECP, Spain discusses the social benefits of biomass development as able to revitalise rural areas, mitigate the risk of depopulation and encourage better adaptation to the effects of climate change in some territories. In Spain's NECP, it is mentioned that self-consumption with renewables brings energy generation closer to its consumption and, therefore, reduces losses, increases the involvement of consumers in the management of their energy and reduces the territorial impact of renewable production. Turning consumers into producers is a way to expand possible future sources of financing for the development of renewables. Combating energy poverty is mentioned as an application that should be highlighted in this regard. In Spain's NECP, energy communities are mentioned in the context of discussing development of own consumption using renewables and distributed generation. Collective own consumption, developed in Royal Decree 244/2019, is regarded as enabling several consumers within the same community (residents' association, a neighbourhood, an industrial park, etc.) to benefit collectively from the same nearby generation facilities, located within the community, which means that they can take advantage of the generation capacity and, therefore, of the investment. The country mentions the definition of European legislation, which defines renewable energy community (as defined in Directive 2018/2001 on the promotion of the use of energy from renewable sources) and citizen energy community (as defined in Directive 2019/944 on common rules for the internal market for electricity).

The revised NECP pays extensive attention to biomass development and energy communities alike. Measure 1.21, for example, outlines a comprehensive strategy for advancing biomass harvesting in a sustainable manner. It encompasses several key components, including the development of regulatory frameworks along the entire biomass value chain, promoting the use of pruning waste for energy in agriculture while adhering to air quality standards for both new and existing biomass facilities, and advocating for certification and proximity-to-origin principles in biomass utilisation. Additionally, the measure encourages the dissemination and adoption of efficient, low-emission local heating equipment, along with providing specific training for professionals in the biomass sector. Furthermore, economic support measures are integrated into the strategy, encompassing financial assistance for biomass logistics and processing facilities, references to taxation related to waste management to discourage landfilling, incentives for utilising biomass in public facilities, and the role of Royal Decrees 477/2001 and 1124/2021, operating within the PRTR (Recovery, Transformation, and Resilience Plan) framework, in bolstering biomass installations for thermal applications across various consumer sectors. This multifaceted approach aims to promote sustainable biomass harvesting, fostering both environmental responsibility and economic growth.

The NECP also mentions the Spanish Strategy for Advancing the Utilisation of Forest Biomass in Energy Production focuses on promoting the use of residual forest biomass for energy purposes. It recognises that establishing a sustainable energy model, centred on conservation, efficiency, and source diversification,

necessitates a significant push in developing residual forest biomass as a renewable energy source. The NECP thus serves as a strategic planning tool aligned with Spain's commitments to address climate change, and its goals and measures align with the objectives set forth in the Spanish Strategy for Advancing the Utilisation of Forest Biomass in Energy Production.

Aside from Measure 1.21, The NECP presents a range of policy actions and interventions to promote the use of biomass as an energy source. This includes:

- Measure 1.10. Decarbonisation of the industrial sector.
- Measure 1.11. Framework for the development of thermal renewables.
- Measure 1.21. Specific programmes for biomass harvesting.
- Measure 1.33. Reduction of GHG emissions in waste management.
- Measure 1.35. Forest sinks.
- Measure 2.10. District heating and cooling networks (where it is pointed out that biomass can be integrated into heat and cold networks to meet the thermal needs of large urban areas).
- Measure 2.12. District heat and cooling networks in the tertiary sector.
- Measure 5.3. Complementary plans in the energy and climate sectors.
- Measure 5.4. Scientific and technical infrastructure in the energy and climate sectors.
- Measure 5.13. Technology platforms and ALINNE alliance.

The revised NECP also pays attention to biogas. It states that while biomass exhibits growth potential, it may not be sufficient to fulfil the demand for decarbonised air conditioning. Nevertheless, it is stated that these clean technologies can be seamlessly incorporated into heat and cold networks, offering flexible, environmentally friendly, and efficient solutions to meet the thermal requirements of expansive urban areas.

Additionally, self-consumption and distributed generation, demand management, the promotion of energy communities, as well as specific measures to encourage citizens' proactive involvement in decarbonisation, are anticipated by the NECP to enhance the diversity of participants and services, fostering participatory initiatives. These initiatives span activities related to the generation and storage of renewable energy, demand management, and the increased adaptability of the entire energy system. The revised NECP states that substantial advancements have already been achieved in these domains since the 2019 NECP, with expectations of further consolidation and enhancement over the ensuing decade, as outlined in this updated plan. Specifically, the plan proposes regulatory developments to empower energy communities in their ability to produce, consume, and trade renewable energy. It also advocates for a suite of administrative and economic measures while promoting the expanded use of electricity for heating.

The NECP asserts that energy communities will serve as a tool to bolster social acceptance and facilitate the implementation of citizen-driven demand management initiatives. It underscores that collective self-consumption schemes and dynamic energy management mechanisms enable public authorities or social organisations to address instances of energy poverty, not only through financial assistance but also by facilitating participation in collective self-consumption initiatives promoted by these entities, which directly alleviate the electricity expenses of at-risk energy-poverty consumers. Given their primary mission in the context of previous initiatives, energy communities will play pivotal roles in implementing effective solutions in this domain.

Specific measures to support energy communities include:



- Measure 1.23. Energy Communities. This includes a network of offices throughout the country through dissemination and training activities, Training and capacity building programmes. Among other forms of support, it is foreseen that regulatory mechanisms will be put in place to promote the diversity of actors and the existence of participatory citizen projects, to promote both social and territorial cohesion and the just transition and to seize the opportunities of the new decarbonised generation model. An accession mechanism is to be established, to allow participating projects to access a contract for the sale of their electricity at a fixed price linked to the outcome of the auctions.
- Measure 1.28. Review and simplification of administrative procedures. The measure concerns regulatory barriers or gaps that prevent local energy communities from participating in the system as well as the deployment of decentralised generation (self-consumption and energy communities).
- Measure 1.29. Knowledge generation, dissemination and awareness raising. Energy Communities as a communication tool for the energy transition.
- Measure 2.10. District heating and cooling networks – including the development of renewable energy communities linked to air-conditioning and cooling networks, including technical training at municipal level.
- Measure 4.6. Integration of the electricity market. Here, the development of energy communities (both renewable energy communities and citizens’ energy communities) is seen as crucial in terms of enabling new vehicles for public participation in self-consumption activities, contributing to consumer empowerment and facilitating demand flexibility.

Biomass and energy communities are also seen as key points of synergy between the policy components of the PRTR and the measures of the NECP, as well as the NECP and the Sustainable Development Goals.

A policy scorecard was developed for Spain, based on the available data in the final and draft NECP, while taking into account broader policy developments, stakeholder views, and the state of the art in bioenergy community development. The policy scorecard identified several areas for potential improvement (Table 6).

*Table 6: A policy scorecard for bioenergy community support – Spanish NECP.*

Element	Scorecard (ES)
Overall regulatory framework and support for biomass development	Reasonably well-developed tools to biomass and energy communities as a whole
Economic benefits of bioenergy community development	Well-developed suite of economic measures to support biomass as a whole
Social benefits of bioenergy community development	Need for further development of measures to support the societal benefits of bioenergy communities
Environmental benefits of bioenergy community development	Detailed overview of environmental benefits of biomass use
Poverty alleviation (bioenergy communities)	Strong connection between biomass, energy communities and energy poverty development
Energy community support	Need for more specific measures to support bioenergy communities

## European situation

Since the *war in Ukraine*, the energy supply system is experiencing increased stress. The regulatory framework presented to fight against the Ukraine war consequences regarding energy has aimed to lower the high energy prices produced with fossil fuels instead of looking for alternative fuels for energy production. However, a relevant increase in renewable sources demand has been recorded, and the demand for biomass increased remarkably. The usage of biomass is in its early stage, and a thorough clear decision about its usage has not been made. Biomass usage has great potential to be optimised with efficient technologies.

## 4.5 Recommendations for key policy measures – in the NECP and beyond

We propose the following key policy areas to unlock the community bioenergy potential in Spain and to increase energy security and independence.

### Increasing social awareness and building capacities

- Empower forest owners, citizens, and farmers to actively engage in community (bio)energy projects through targeted information campaigns and capacity-building programs.
- Increase the involvement of most Spanish local authorities in the development of energy cooperatives to increase the knowledge among local governments and municipal officials.
- Structure the responsibility for **communication with the public** and make it transparent.
- Make a strategic plan for the engagement of the local people.
- Increase awareness that bioenergy projects create jobs in disadvantaged environments.
- Support the creation of a Spanish community energy network that can bring different experts and interested parties together to share experiences and best practices.
- Creating awareness of the need for cooperation between local communities in the energy sector. Facilitate a rebranding of 'cooperatives' into opportunities for regional economic value creation, decision-making, and financial participation.
- Assure the public that the use of biomass in Spain is carried out in accordance with strict regulations that guarantee sustainability and that what is used for energy is a by-product.
- Create awareness that in Spain there is technical capacity to build heat networks.

### Regulatory measures and legislation

- Transpose of related EU directives, including the Renewable Energy Directive, into national law. This must include a **clear definition** and scope of activities for energy communities.
- Create a legal framework for public goods (forests, roofs, DH networks...) to award energy communities the exploitation to speed up the establishment and production of RES.
- Make local participation mandatory, (25%, 50%, 100%) for new local pilots and RES projects.

### Adjustment of financial support

- Assign financial support for the establishment of energy cooperatives in Spain. Provide simple subsidies and other forms of support (loans, grants).

- Introduce transparent and earmarked funds to support the establishment of energy cooperatives. This fund should cover costs related to the feasibility study, settling formal and legal matters, etc.
- Avoid large companies or incumbent industries which claim to develop an energy community or cooperate with energy communities.

#### Stimulation low-carbon heating for energy cooperatives

- Introduce incentives for energy cooperatives to produce heat or heating fuels for their members.
- Promote district heating and integration of community (bio)energy.
- Participate in local initiatives dedicated to heat networks.

#### Supporting local participation and energy communities

- Facilitate the process of establishing an energy cooperative to encourage individuals to participate.
- Structure the responsibilities for communication with the public
- Appoint a local policy officer who supports the local energy community with initiatives.
- Provide information to energy communities and the public, and support local initiatives.
- Participate in local energy communities (municipalities, local policy officers)
- Consider energy vectors as a possible activity of the energy communities (for example Pellets production), since energy communities should not only be focused on end-consumption.
- Stimulation of social inclusion and fight against energy poverty.

## 4.6 Timeline of measures

The Spanish pilots, experiences, interviews, consultation of different stakeholders, analysis and reflection of the information leads to the following sequence of measures<sup>22</sup> (see Figure 3):

### 1. Immediate action:

**Communicate** with the public about the opportunity of local renewable energy production and its benefits. **Share knowledge** about the importance of energy communities **to engage inhabitants** in the different aspects of energy transition, their help with **raising social awareness** and their role **in local participation** and mitigating local resistance.

**Facilitate the process of establishing energy cooperatives and their operation** with clear legislation and funding schemes. **Appoint a local policy officer** who supports the local energy community with initiatives.

Bring the legislation **in harmony with the Renewable Energy Directive**. Formulate a clear definition of energy communities/cooperatives.

**Promote district heating** and integration of community (bio)energy. Adjust funding scheme (*CE Implementa*) with ear marked funding scheme for (bio) heat for energy communities.

### 2. Until 2025:

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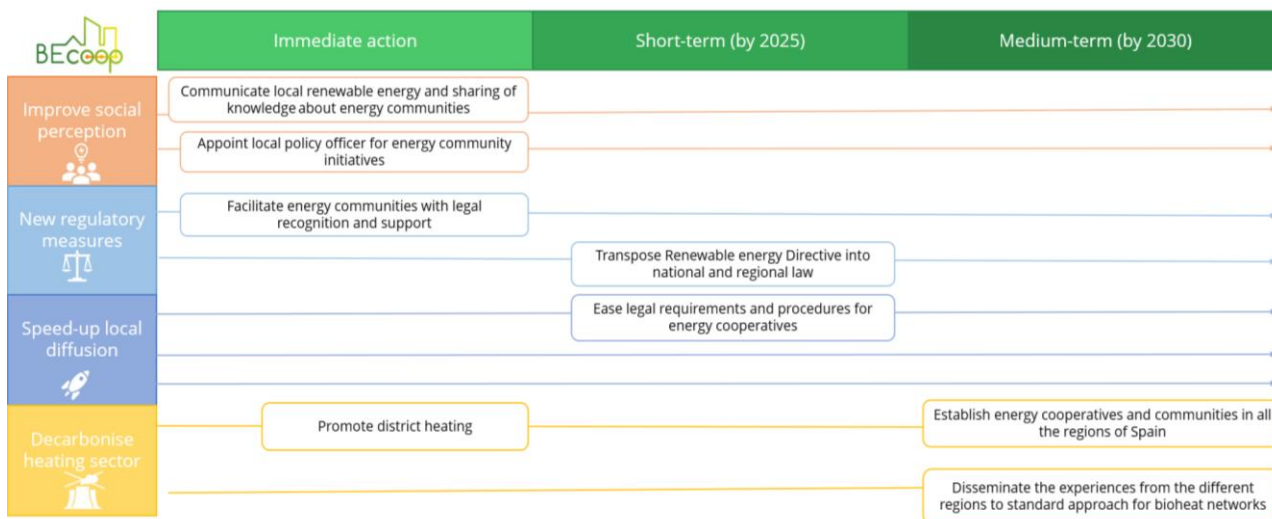
<sup>22</sup> Vasco, E.J.- G. (2018) Elektrizitatea Ekoizteko energia Berriztagarrien Bidezko instalazioetan Inbertsioak Sustatzeari Begirako Laguntzak. 2018, Eusko Jaurlaritza. Available at: [https://www.euskadi.eus/web01-tramite/eu/contenidos/ayuda\\_subvencion/eve\\_renovables\\_prod\\_elect\\_2018/eu\\_eve\\_re/eu\\_arch.html](https://www.euskadi.eus/web01-tramite/eu/contenidos/ayuda_subvencion/eve_renovables_prod_elect_2018/eu_eve_re/eu_arch.html).

The **Renewable Energy Directive** must be effectively transposed into national law to give energy communities **specific legal recognition and support**. This must include a **clear definition** of renewable energy communities to enable a clear understanding of eligibility requirements and encourage investment decisions.

**Ease legal requirements and procedures for energy cooperatives.**

**3. Until 2050:**

Set **concrete targets** for the establishment of (bio) energy cooperatives and communities in all the regions of Spain. **Disseminate the experiences** from the different regions to a set of standard approaches for bioheat networks operated by local energy communities.



*Figure 9: Indicative policy roadmap for the acceleration of bioenergy communities in Italy*

## 4.7 Conclusions

The policy analyses and deliberations presented in this paper identified several areas of improvement with regard to the NECP and other relevant policy documents. There is a pressing requirement for additional efforts to enhance the measures that promote the societal advantages of bioenergy communities. It is essential to provide a comprehensive framework to social merits associated with the utilisation of biomass. Consequently, there is a demand for more precisely tailored measures aimed at bolstering bioenergy communities.

In the short term, immediate actions proposed by this Roadmap involve communicating the benefits of local renewable energy production to the public and raising awareness about energy communities' vital role in the energy transition. This includes supporting the establishment of energy cooperatives through clear legislation and funding, along with the appointment of local policy officers. Harmonising legislation with the Renewable Energy Directive and defining energy communities is crucial in this context. Promoting district heating and adjusting funding schemes for (bio)heat for energy communities are also priorities. By 2025, transposing the Renewable Energy Directive into national law for specific recognition and support of energy communities is essential, with streamlined legal requirements for cooperatives. Looking ahead to 2050, setting concrete targets for (bio)energy cooperatives and communities across Spain and sharing experiences to develop standard approaches for bioheat networks operated by local energy communities is the long-term vision.