UNLOCKING THE COMMUNITY BIOENERGY POTENTIAL

D3.3. Deployment of the BECoop Capacity Building Program – First

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Legal Notice

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.

The project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952930.

Project partners

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Abbreviations

BECoop	Bioenergy Cooperative
BMC	Business Model Canvas
CAPEX	Capital expenditures
CHP	Combined Heat and Power
DH	District Heating
EC	Energy Community
ESCO	Energy Service Company
EU	European Union
GDPR	General Data Protection Regulation
NECP	National Energy and Climate Plan
NGO	Nongovernmental Organization
ORC	Organic Rankine Cycle
RES	Renewable Energy Sources

Executive Summary

Task 3.2 holds a series of capacity building activities with a view to engage stakeholders, authorities and citizens by providing them adequate skills and knowledge around community bioenergy heating.

To this aim, at the onset of the task a training needs analysis took place, leveraging previous results and project findings *(e.g., **D1.3:** Stakeholders' perceptions, acceptance levels and needs on bioenergy heating, **D1.4:** Definition of community bioenergy heating uptake needs and challenges)* in order to (a) identify the gaps and misconceptions around community bioenergy and (b) draft and finetune the training material, as a baseline form, that could serve as capacity building repository.

After several internal discussions and consultations, consortium partners decided on the **training modules** to be developed and their respective objectives.

- technical bioenergy and sustainability aspects: WUELS, CIRCE, CERTH, FIPER
- policy relevant material: IEECP
- business and innovation aspects: Q-PLAN
- stakeholder engagement: CBS
- community bioenergy: SEV
- market research: WR

Partners serving as module experts meticulously drafted their modules' respective training content in slides format (ppt. presentations), which altogether shaped the BECoop **training material baseline**. This baseline was thoroughly presented to the project's pilot teams via internal training sessions, so that (a) pilots' know-how is enhanced and (b) the, so far, gathered content is cross-checked and validated. By the time of drafting this report (M18) and on, this baseline training material shall serve as a valuable reference for, in turn, establishing dedicated pilot-specific training content, tailored to the specificities of the BECoop pilot regions in Poland, Greece, Italy and Spain.

This report further presents the **training strategy for each pilot area** (target groups, time frame, indicative structure and content to be broadcasted) towards regional capacity building around community bioenergy. Building upon the training material baseline, presented herein, and taking into account the needs of each BECoop pilot region, a series of **external training workshops** (2 per pilot) is scheduled to take place, during which the project-developed tools (e.g., self-assessment tool, toolkit, e-market environment, Knowledge Exchange Platform) will also be presented.

Moreover, this report preliminarily presents an **indicative pool of training webinar topics**, being discussed amongst the project's consortium. At least 10 webinars are expected to be organised within the project's lifecycle.

A final deliverable (**D3.4** Deployment of the BECoop capacity building program – Final) will complement the current first report, presenting the outcomes of the BECoop capacity building program by M36.

1. Introduction

This report presents and reflects the results of Task 3.2 by M18. Based on the identification of the main training needs and gaps around community bioenergy, the task develops and offers the BECoop capacity-building program, which covers a variety of topics including political, legal, economic, environmental, social and technical aspects.

The main idea of Task 3.2 was to create appropriate training material allowing stakeholders (energy cooperatives, individual householders, actors) to develop skills and knowledge that can be used to tackle obstacles and challenges related to community bioenergy heating projects. The task started with an analysis of the training needs (based on previous results and complemented with desk research) of:

- **RESCoops, aiming to develop bioenergy heating projects** - taking into account the most essential factors strengthening and hindering their creation at the local level (e.g., technical, supply chain, business, financial, legal aspects – (distinguished under **D1.2** - Regional and EU framework and value chain conditions affecting community bioenergy uptake);
- **authorities, aiming at stimulating the adoption of bioenergy community heating** (e.g., training on local planning, financial policies, public procurement, etc. aspects that can promote community energy) based on taking into account the necessary elements of the bioenergy community concept (**D1.1** – State-of-play of community bioenergy across Europe: market size, applications and best practices);
- **actors of the bioenergy heating supply chain** (e.g. energy grid operators, community initiatives, citizens, feedstock providers, technicians, etc.) based on an analysis of challenges and needs related to bioenergy absorption at pilot and EU levels (**D1.4** – Definition of community bioenergy heating uptake needs and challenges), as well as on the challenges arising during the self- assessment process of an energy community (**D2.1** – Self-assessment tool for evaluating current regional status and future potential - first).

The capacity building program will be deployed through dedicated training workshops (2 per pilot area). The workshops will aim to transfer the wide range of knowledge related to bioenergy cooperative creation/development, as well as to train local stakeholders on how to use the BECoop tools, services and knowledge exchange platform (implemented under previous tasks - T2.1, T2.2, T2.3, T5.1). They will also aim to address stakeholders' skills, perceptions and knowledge gaps identified in previous deliverables.

The external training workshops will be designed, planned and developed by the pilot with the support of the task leader (WUELS). Pilot-specific training content will be generated by adjusting and/or translating the baseline training material presented herein, developed by the BECoop expert partners (e.g. WUELS, CIRCE, CERTH, FIPER for technical bioenergy and sustainability aspects; IEECP for policy relevant material; Q-PLAN for business and innovation aspects; CBS on stakeholder engagement; SEV on community bioenergy; WR on market research).

These (external) training workshops will be organized and performed by the local pilot partners and their national supporting partners. Before delivering their training workshops, local partners were trained accordingly by the BECoop expert partners in each training field.

In addition to the external training workshops, at least 10 webinars will be organized aiming to further to attract an international audience of RESCoops and other authorities. Webinars will be tailored to

the needs of local communities, distinguished and based on the findings of T1.3 and T1.4 and additional desk research. Calls for participation will be launched for the workshops and webinars well in advance to facilitate planning and date reservation. Both the physical and online training activities, will be supported by the BECoop Exchange Platform (T5.1) and its “Expert Panels” through peer-to-peer learning activities. A specific budget has been foreseen for the engagement of these experts to the planned capacity-building workshops. The task leader together with project partners will establish an action plan, including specific topics, responsibilities, tasks, and timeframes.

This deliverable (D3.3) aims at providing a baseline methodology for outlining the content and strategy for the envisaged external, pilot-specific, training workshops, adjusted to the needs and specificities of each pilot local pilot community.

2. Training Modules

The implementation of the capacity building program around community bioenergy heating will take place through the organization of dedicated training workshops in each pilot area. For this purpose, it is necessary to develop a "training material baseline" that will cover critical issues (technical, environmental, social, economic) related to the establishment of bioenergy communities and actively involve the local community.

2.1 Modules' Description

Based on the previous deliverables and the knowledge acquired during the internal meetings with BECoop project partners, as well as with different groups of stakeholders from local pilot areas located in Poland, Greece, Italy, and Spain, the strategy and the objectives for the BECoop capacity building programme were defined. The WUELS team together with all partners organised 3 brainstorming meetings, during which a matrix of general and more detailed objectives together with 6 main thematic modules was created. As Task 3.2 leader, WUELS prepared and circulated a template to gather the initial scope of each module. Bilateral meetings with pilot partners also took place, such as the calls among WUELS, CIRCE and CERTH for the technical module preparation. The internal training was also organised by WUELS, where consortium expert partners trained the pilot partners on these modules.

As a result, the six modules have been defined and training material in the form of ppt slides have been prepared for the modules below:

- technical bioenergy and sustainability aspects,
- policy-relevant material,
- business and innovation aspects,
- stakeholder engagement,
- bioenergy community,
- market research.

It should be marked that the content that will be used during the pilot-specific external training workshops may be adjusted to the local needs and specificities of each pilot area (Poland, Greece, Italy, Spain).

The following sections briefly present the **6 BECoop training modules**. The preparation and training content drafting for each of these modules led to the composition of the **BECoop training material baseline**, presented in Annex II.

2.1.1 Technical Bioenergy and Sustainability Aspects

This module aims to describe the technical possibilities of heat generation using biomass from forest and agricultural resources, taking into account the strategy of the bioenergy cooperative creation and energy community development, especially in the pilot areas defined within the BECoop project. An overview of the module, its goals and the scope of knowledge transfer to potential stakeholders

interested in establishing an energy cooperative is presented in Table 1 while **detailed content can be found in Annex II – Module 1.**

Table 1. Technical bioenergy and sustainability aspects.

Module 1 - Technical bioenergy and sustainability aspects
Responsible partners: WUELS (Leader), CERTH, FIPER, CIRCE
Description of the content of the module: – Introduction - theory of thermal processes and thermo-chemical processes classification. – Introduction – biomass logistics chain. – Introduction – biomass logistics chain standard pellets vs. torrefied pellets. – Direct heating – theory. – Types of boilers based on types of solid biofuels. – Types of boilers based on types of solid biofuels – briquetting systems. – Technologies – types of biomass boilers for direct heating biomass combustion. – Technologies – types of biomass boilers for direct heating biomass combustion – grate stove. – Złoczew – łódzkie voivodship center of Poland. – Spain best practices: use of biomass. – Indirect heating – theory. – Introduction to district heating (dh) concept. – Technologies used in DH units. – Technologies – types of biomass boilers for indirect heating biomass combustion – vibrating grate for straw combustion. – Technologies – types of biomass boilers for indirect heating biomass combustion – vibrating grate for straw combustion. – Technologies used in DH units. – Successful case studies of biomass district heating-Italy. – Successful case studies of biomass district heating- Greece detepa. – Lessons learned, challenges and benefits for using biomass DH. – Technologies, polygeneration units. – Technologies – polygeneration units: ORC power plants. – Technologies – polygeneration units: ORC cycle – example from lodzkie voivoidship: biomass boilers feed with straw. – Technologies – polygeneration units: biogas plants. – ENCE biomass plant. – SORIA district heating. – VILAFRANCA iniciative – VINEYARDS4HEAT. – VALDEMINGOMEZ biogas plant. – VILA-SANA biogas plant. – Technologies – polygeneration units: biogas plant.
Objectives of the module: The aim of this module is the knowledge transfer in terms of technical and sustainability aspects/solutions related to:

Module 1 - Technical bioenergy and sustainability aspects
– biomass resources and their valorisation/conversion to the form of fuel used by final consumers (fuel characteristics and quality), – biomass properties as a fuel for heating purposes, – comparison of the costs of heat from biomass and fossil fuels, – the operation principle of the direct heating and indirect heating systems (advantages and disadvantages, possibilities/conditions of application, etc.), – description of the possible biomass heating systems for households, schools, small buildings, or housing estates (designed for pellets, briquettes, logs, wood chips, and bales combustion), – the subject of 5 class Eco-Design boilers/gasifiers, – biogas plants (substrates, technology, solutions, conditions of operation and application, success cases), – polygeneration units (i.e., biomass boilers + ORC system).
Main gaps to be addressed: – benefits from local biomass utilization, – new jobs for the local community, – activation of local agriculture, – education of residents in the use of renewable energy sources, – biomass as a widely available renewable energy source, – biomass as a carbon-neutral fuel for heat production, – biomass reduces the overreliance on fossil fuels, – biomass is less expensive than fossil fuels, – biomass utilization provides additional benefits for each stakeholder of the value chain (farmers, processing company, boiler manufacturers, final user, local community, etc.), – reduction of biomass residues in landfills/forests, – application of ash from biomass combustion/fermentation as fertilizer.
Remarks: Based on the general technical bioenergy and sustainability issues described in this module, the annexed slides provide a baseline to the pilot partners, creating customizable material for the external workshops, which will be prepared and adjusted to the specific characteristics and needs of each pilot region.

2.1.2 Policy - Relevant Material

The aim of module 2 is to describe the main, relevant to energy communities, regulations and policy framework that is currently in place in Europe.

An overview of the module, its goals and the scope of knowledge transfer to potential stakeholders interested in establishing an energy cooperative is presented in Table 2 while **detailed content can be found in Annex II – Module 2.**

Table 2. Policy-relevant material.

Module 2 - Policy relevant materials
Responsible partners: WUELS (Leader), IEECP (expert)
Description of the content of the module: – Energy communities – the legal framework. – Other relevant legislation. – Institutional and policy factors relevant to energy communities. – Biomass in the EU green deal. – Further legislative and policy developments. – Energy communities – benefits. – Description of the key factors: political, economic.
Objectives of the module: The aim of this module is the knowledge transfer in terms of policy aspects related to: – increase public acceptance of new RESCoop project; – mobilise private capital for the energy transition; – energy communities which could be a tool to increase flexibility in the market.
Main gaps to be addressed: – Benefits from local biomass utilization. – New jobs for the local community. – Activation of local agriculture. – Education of residents in the use of renewable energy sources. – Biomass as a widely available renewable energy source. – Biomass as a carbon neutral fuel for heat production. – Biomass reduces the overreliance of fossil fuels. – Biomass is less expensive than fossil fuels. – Biomass utilization provides additional benefits for each stakeholder of the value chain (farmers, processing company, boiler manufacturers, final user, local community, etc.) – Reduction of biomass residues in landfills/forests. – Application of ash from biomass combustion/fermentation as fertilizer.
Remarks: Based on the policy relevant aspects described in this module, the annexed slides provide a baseline to the pilot partners, creating customizable material for the external workshops, which will be prepared and adjusted to the specific characteristics and needs of each pilot region.

2.1.3 Business and Innovation Aspects

The aim of module 3 is to describe the business and economic aspects behind the use of biomass from forest and agricultural resources to distributed energy systems for fostering heat generation. The module presents different business models that can be implemented to RESCoops, as well as different financial mechanisms to raise the initial capital needed for such an investment (e.g crowdfunding, bank loan etc.).

An overview of the module, its goals and the scope of knowledge transfer to potential stakeholders interested in establishing an energy cooperative is presented in Table 3 while **detailed content can be found in Annex II – Module 3.**

Table 3. Business and innovation aspects.

Module 3 - Business and innovation aspects
Responsible partners: WUELS (Leader), Q-PLAN (expert)
Description of the content of the module: – Accessing finance for bioenergy community projects. – Main financial solutions for bioenergy projects. – Self-financing. – Crowdfunding. – Bank loan (traditional and ethical banks). – Ethical or not traditional banks. – Public funding. – Joint ventures. – Business models and the business model canvas. – Business model canvas elements. – The 9 elements provide a coherent view of the business' key drivers. – BMC for RESCoops. – Local integrated group of citizens. – Regional-national RESCoop. – Network of RESCoops. – Multi stakeholder governance model. – Introduction to business planning. – Structure of the business plan. – Business description. – Products' – services' description. – Marketing plan. – Operational plan. – Management structure. – Financial summary. – Capital requirements. – When addressing the banks! – When addressing investors!
Objectives of the module: The aim of this module is the knowledge transfer in terms of business and innovation aspects related to: – increasing the knowledge related to RESCoops from a business point of view and how investors and society can get economic benefits from it; – gaining the knowledge of different business models for implementing them to RESCoops; – capital requirements, financial issues related to running RESCoops to get a positive cash flow rate;
Main gaps to be addressed: – Benefits from local biomass utilization.

Module 3 - Business and innovation aspects
– New jobs for the local community. – Activation of local agriculture. – Education of residents in the use of renewable energy sources. – Biomass as a widely available renewable energy source. – Biomass as a carbon neutral fuel for heat production. – Biomass reduces the overreliance of fossil fuels. – Biomass is less expensive than fossil fuels. – Biomass utilization provides additional benefits for each stakeholder of the value chain (farmers, processing company, boiler manufacturers, final user, local community, etc.) – Reduction of biomass residues in landfills/forests. – Application of ash from biomass combustion/fermentation as fertilizer.
Remarks: Based on the business and innovation aspects described in this module, the annexed slides provide a baseline to the pilot partners, creating customizable material for the external workshops, which will be prepared and adjusted to the specific characteristics and needs of each pilot region.

2.1.4 Stakeholder Engagement

Module 4 is dedicated to stakeholder engagement. The module presents the definition of stakeholder engagement and the actions that can mobilise relevant stakeholders especially around community bioenergy heating. The different types of stakeholders and their prioritisation is also described. Examples of real cases of engagement processes in energy projects are presented to be used as good example of replication.

An overview of the module, its goals and the scope of knowledge transfer to potential stakeholders interested in establishing an energy cooperative is presented in

Table 4 while **detailed content can be found in Annex II – Module 4.**

Table 4. Stakeholder engagement.

Module 4 - Stakeholder engagement
Responsible partners: WUELS (Leader), CBS (expert)
Description of the content of the module: – What are stakeholders and stakeholders engagement? – Stakeholder types. – Lead types of stakeholders in the pilot area. – Main engagement actions that could mobilize local populations around the concept – biomass owners, biomass management companies. – Main engagement actions that could mobilize local populations around the concept – equipment manufacturers, ESCOs & installers. – Main engagement actions that could mobilize local populations around the concept – cooperatives, public institutions. – Main engagement actions that could mobilize local populations around the concept – research centre/universities, investors.

Module 4 - Stakeholder engagement
– Main engagement actions that could mobilize local populations around the concept – end users (consumers of biomass). – Stakeholder engagement actions development. – General stakeholder engagement & mobilization actions in bioenergy community projects. – E-market environment as a tool to stakeholders engagement in bioenergy communities. – What is stakeholder engagement? – Stakeholder engagement & mobilization actions in bioenergy community projects. – Barriers to a successful stakeholder engagement. – Enhancement stakeholder engagement actions. – Potential benefits of strong stakeholder engagement. – Real cases of stakeholder engagement in energy projects - Kaunas, Lithuania. – Real cases of stakeholder engagement in energy projects - Zealand, Denmark. • Real cases of stakeholder engagement in energy projects - West Pomerania, Poland.
Objectives of the module: The aim of this module is the knowledge transfer in terms of stakeholder engagement aspects related to: – knowledge transfers, – what is stakeholder engagement, – how to identify and prioritise stakeholders, – ways to involve a community in bioenergy projects, – barriers and benefits of a successful stakeholder engagement.
Main gaps to be addressed: • how to identify stakeholders?: 1. Analysis and mapping of potential stakeholders based on type, interest and power 2. How to prepare stakeholder prioritization: The grid helps to prioritize them based on their interest and power. High effort & focus on key stake holders. 3. How to create communications plan: • type: what channels or means to be used, • frequency: how often, • content: what to communicate. 4. How to establish stakeholders' feedback incorporation. Respect and take into account feedback from the stakeholders regarding the project. 5. How to monitor and report project results for Stakeholders. Regular and transparent sharing of information and updates back to the stakeholders.
Remarks: Based on the stakeholder engagement aspects described in this module, the annexed slides provide a baseline to the pilot partners, creating customizable material for the external workshops, which will be prepared and adjusted to the specific characteristics and needs of each pilot region.

2.1.5 Community Bioenergy

Based on findings from previous tasks (T1.3), it was revealed that the general public is not very well acquainted with the term "energy community". To this aim, module 5, presents the definition of

energy communities, as well as the legal forms that energy communities may take. In addition, the main benefits from the establishment and participation in these projects are outlined, and the main challenges and obstacles during the development process are mentioned.

An overview of the module, its goals and the scope of knowledge transfer to potential stakeholders interested in establishing an energy cooperative is presented in Table 5 while **detailed content can be found in Annex II – Module 5.**

Table 5. Community Bioenergy.

Module 5 – Community Bioenergy
Responsible partners: WUELS (Leader), SEV
Description of the content of the module: • Definition of energy/ community bioenergy. • Advantages. • Limitations. • Legislation framework. • Legal form. • Existing RESCoops.
Objectives of the module: The aim of this module is the knowledge transfer in terms of community bioenergy aspects related to: • transfer knowledge about definition of energy / community bioenergy, • explain methods how to distribute true stakeholders and communication channels advantages coming from RESCoops and community bioenergy, • define and transfer to society, information about Legislation Framework, Legal Forms existing RESCoop models limitations and challenges related to RESCoops.
Main gaps to be addressed: – how to create optimal bioenergy community to increase numbers of RESCOOPS in EU, – how to design RESCoop and Bioenergy Community to get highest environmental benefits, – how to design RESCoop and Bioenergy Community to get highest financial benefits, – how to design RESCoop and Bioenergy Community to get highest social benefits.
Remarks: Based on the community bioenergy aspects described in this module, the annexed slides provide a baseline to the pilot partners, creating customizable material for the external workshops, which will be prepared and adjusted to the specific characteristics and needs of each pilot region.

2.1.6 Market Research

Module 6 focuses on market research. Market research is a pivotal step before the establishment of an energy project to ensure its success. The investigation of positive or negative social perceptions around bioenergy communities in the area can play a key role to the development of the project. To this aim, this module offers the definition of market research, as well as the benefits and the main steps followed for its implementation. Different methods of market research are described in detail (surveys, workshops etc.), while a brief overview of the main results revealed in each pilot area in the

framework of the project *(D1.3 Stakeholders' perceptions, acceptance levels and needs on bioenergy heating)* are highlighted. An overview of the module, its goals and scope are briefly presented in Table 5 while **detailed content can be found in Annex II – Module 6.**

Table 6. Market research.

Module 6 – Market research
Responsible partners: WUELS (Leader), WR (expert)
Description of the content of the module: The aim of this module is the knowledge transfer in terms of market research related to: – explain what is market research? – analysing steps in market research, – explaining methods for market research, – descriptive analysis and Inferential statistics, – conducting workshop and interviews, – GDPR – General Data Protection Regulation, – why is social acceptance important? – main factors affecting re social acceptance, – example of local opposition (wind farms), – example of local opposition (bioenergy plant), – market research results in the BECoop pilot areas, – market research results for the Spanish, Greek, Polish and Italian pilots
Objectives of the module: The aim of this module is the knowledge transfer in terms of market research related to: – transfer knowledge about definition of market research, – explain methods how to use surveys in increasing potential markets for RESCoops and bioenergy community, – define and transfer to society information about Legislation Framework, Legal Forms existing RESCoop models limitations and challenges related to RESCoops, – how to use workshops an interviews to activate local communities in building RESCOOPS, – building local energy communities by education of residents in the use of renewable energy sources, in particular showing advantages of bioenergy.
Main gaps to be addressed: – Benefits from local biomass utilization. – New jobs for the local community. – Activation of local agriculture. – Education of residents in the use of renewable energy sources. – Biomass as a widely available renewable energy source. – Biomass as a carbon neutral fuel for heat production. – Biomass reduces the overreliance of fossil fuels. – Biomass is less expensive than fossil fuels.
Remarks: Based on the market research aspects described in this module, the annexed slides provide a baseline to the pilot partners, creating customizable material for the external workshops, which will be prepared and adjusted to the specific characteristics and needs of each pilot region.

2.2 External Training Workshops

The training content of the external training workshops will be adapted depending on the local strategies and specificities of the pilot areas. Due to the various challenges related to the creation and development of energy cooperatives in given areas, the interactions between pilots and experts will be based on the needs that specific pilot areas require.

Using the training material baseline as a reference, local pilot partners will select the most suitable content in order to address local stakeholders' skills, perceptions, and knowledge gaps identified in the T1.4 (Definition of community bioenergy heating uptake needs and challenges). As a general approach, the idea is to adapt and, if needed, translate the content baseline produced by the BECoop expert partners to the local specificities, in terms of biomass technologies to be explained, existing cases, business models/financial schemes, and bioenergy RESCoop creation process steps with the support of pilot partners.

The adjusted training material for the external training workshops for each pilot area will be developed by the pilot partners with the support of the consortium experts. It will lead to the preparation of the 4 different and specific training materials prepared by BECoop partners, namely:

- Polish Pilot Area (WUELS, OBS),
- Greek Pilot Area (CERTH),
- Italian Pilot Area (FIPER),
- Spanish Pilot Area (GOIENER, CIRCE)

2 (external) training workshops will take place per pilot area

The invitation for the external trainings will include the time, place and form of the meeting. Pilot partners will briefly define the purpose of the meeting and describe the target group of the training. The training agenda should be adapted to local bioenergy challenges and needs (including the technical, political, economic, environmental, and social aspects). At the same time, it is important to ensure that there will be interaction between experts and pilots in the form of discussion and dialogue.

The template for the invitation to external training is included in Annex I.

3. Pilot Training Strategies

2.3 Workshops at Local Level

This section includes the plans and strategies for the external trainings corresponding to the four pilot areas located in Poland, Greece, Italy, and Spain. As the communities' development stage is different in each region, the detailed training strategies can focus on and address the different respective needs. **An initial training strategy and plan for the organisation and implementation of pilot-level capacity building actions is already discussed and presented herein for each pilot area.**

2.3.2 Polish Pilot Area

Target groups:

final energy users, community initiatives, farmers, feedstock providers, local agricultural/energy advisers, authorities, NGOs, SMEs, investors, housing association representatives, local activists, forest cooperative.

Time frame for the organization of the workshops:

September 2022 – November 2022 (M23-M25)

Indicative structure of the workshops:

- brief presentation of the BECoop project (idea, target, impact),
- local strategy description (pilot-specific issues),
- presentation of the modules in terms of BECoop development in the OBS commune,
- presentation of supporting tools developed within the BECoop project,
- discussion with participants (feedback, remarks, engagement of stakeholders, etc.),
- conclusions (further actions).

Indicative content of the workshops (main focus areas):

- brief presentation of BECoop project (idea, target, impact): the aim of the project, the definition of the RESCoop, advantages, and limitations of the energy communities, the issues related to energy poverty, reduction of smog and fossil fuel utilization, energy costs and social awareness,
- local strategy description (pilot-specific issues): presentation of possible solutions for the use of local solid biomass for energy purposes in the region - scenario analysis; presentation of a real logistics chain aimed at creating a reasonable basis for a future energy cooperative,
- presentation of the modules in terms of BECoop development in the OBS commune: discussion of the specific modules (technical, social, environmental, business, stakeholder engagement, market research, energy community) in terms of local (Polish situation) conditions, environment and possibilities. Analysis of local biomass potential and end-users, options for founding acquisition, social benefits, biomass logistic chain, formal and legal aspects of REScoop creation, etc.,
- presentation of supporting tools developed within the BECoop project: discussion of the possibilities of using the developed tools by individual stakeholders interested in the

development of BECoop, training in the use of the developed tools, the impact of stakeholders on the development of the e-platform,
- discussion with participants (feedback, remarks, engagement of stakeholders, etc.): exchange of views among stakeholders on the limitations and barriers related to the creation of BECoop in the region, discussion on the method or actions necessary to achieve the final goal (local energy agreement, energy cooperative creation),
- conclusions (further actions): a wrap-up of the workshop, the proposition of the following actions, an invitation to the closer collaboration in the local bio-energy logistic chain leading to the BECoop creation.

2.3.3 Greek Pilot Area

Target groups:

municipalities (municipality of Karditsa, municipality of Lake of Plastira), member of the community (SMEs, citizens), hotel complex (high rural tourism interest in the municipality of Plastiras Lake), Development Agency of Karditsa, citizens, NGOs, academic institutions, forest cooperatives, farmers.

Time frame for the organization of the workshops:

M23 up to M25 (September 2022 - November 2022)..

Indicative structure of the workshops:

- brief presentation of the BECoop project,
- presentation of the modules (pilot-specific),
- presentation of the modules,
- presentation of tools developed in BECoop,
- discussion/ conclusions/ feedback.

Indicative content of the workshops (main focus areas):

- introduction to the workshop,
- presentation focusing on some hindering factors that constitute a barrier to the uptake of bioenergy community projects, such as:
  a) low ecological awareness of people; during the economic crisis in Greece, the phenomenon of smog was strongly observed, mainly in the big cities; the largest share of responsibility was given to the burning of biomass without giving the necessary clarifications; some research shows that biomass burning in a fireplace or woodstove was responsible almost exclusively (over 90%) for the high concentrations at night; on the other hand, specialists in wood science indicated that the smog problem is mainly directed to uncertified biomass combustion systems and from biomass that is not suitable for combustion (burning old furniture or old particleboard, fibreboard (MDF), plywood or melamine products) which contain synthetic materials and chemicals and produce toxic fumes and hazardous exhaust fumes when burned; we need to clarify this misconception,
  b) we can show the huge potential of local biomass exploitation towards bioenergy production; we should highlight the local types of biomass (e.g. forest residues, city tree pruning, agricultural residues etc.) that are not exploited and burned in open fires or disposed in landfills, instead of exploiting them for the production of heat or electricity,

c) lack of trust to cooperative schemes due to their bad reputation; the vast majority of cooperatives schemes (especially farmer cooperatives) often went bankrupt, mainly under their own mismanagement; as a result, local communities have lost confidence in cooperatives schemes; we need to increase the knowledge/ trust of local people's on energy communities,
d) disputes over sustainability of the biomass feedstock and the carbon neutrality of bioenergy. In general, bioenergy is the recipient of environmental criticism, mainly based on two aspects; firstly, the sustainability of the biomass feedstock and the carbon neutrality of bioenergy is disputed; we need to showcase that this aspect of bioenergy criticism is addressing mainly the large-scale biomass value chains and not local/small-medium scale value chains such as community bioenergy initiatives.

- Presentation of the critical points for the local area supporting factors:
  a) social benefits as a result of the development of RESCoops; there are not so much evidences since the concept is relatively new in Greece, however the most valuable profits that have been noticed are: 28 new jobs were created by ECs until August 2020; the creation of a positive attitude towards contributing to the local society; raising of environmental awareness; promotion of social acceptance to RES for energy production; reduction of energy costs; creating a local value chain; development of solidarity economy initiatives; promoting energy democracy and fighting energy poverty,
  b) competitive prices of biomass fuels; considering the fossil fuels and biomass fuels used for heating purposes, the biomass (as a source of energy) belongs to the relatively cheap sources of energy; we have momentum, since the increasing prices of fossil fuels are going even higher, the local community examines the possibility of other renewable heating solutions; independence prices from geopolitical issues of other countries,
  c) no negative impact of biomass harvesting on the carbon content in forests; sustainable forest management and its strict harvesting requirements are coordinated across the forest landscape to ensure the forest is in good condition, with the synergy of wood supply to society and the maintenance/expansion of wood volume in the forest.

Points regarding the Technical module:

a) mention the local amounts of available biomass in the local area that are not exploited until now,
b) give a brief overview of available technologies that utilizes biomass. Focus on the ones that make more sense for the local area (e.g. direct heating/ boilers in public buildings and small DH units),
c) make clear to attendants that the most important aspect in biomass value chains and technologies is the right and carefully design of the system that will be implemented; the carefully design of your boiler, based on the capacity, type of biomass along with its feeding system is important in order to have a techno-economically feasible bioenergy solution,
d) highlight the advantages of refined fuels over the standard fuels; many people believe that biomass is a traditional way of heating that need to have huge storages with biomass, to manually feed the heating medium and keep it on through the winter time; we need to highlight the advantages of refined fuels such as low cost renewable fuel, the existence of automatic feeding in the biomass boiler and combination with smart systems, higher

calorific value efficiency, no need of vast spaces to store significant volumes of biomass etc.,

e) need to focus on success cases. It is easier and understandable to the audience if we first point out theoretical technical factors about the heating systems that are suitable in the local area and then to focus to success cases in Europe and in Greece; in terms of direct heating, we need more details (cases from the general workshop) such as CAPEX, construction cost, production cost, maintenance cost, number of employees, quantities of biomass they use, combination of renewable energy (P/V systems), biomass yard area, filters for the pollutants (NOx, CO_2, etc.),
f) should emphasize on the strong local character and the short distances of ESEK from the sources of raw material (mountainous area, urban pruning, etc.) and the viability of the project,
g) a rough price comparison should be made between fossil fuels and biomass.

Points regarding the Policy - relevant module:

a) plans to establish new energy communities in Greece; the NECP highlights the importance of the contribution of the Energy Communities schemes, as they will contribute to the implementation of RES and energy-saving technologies investments and contribute to the more active participation of the local community in energy affairs; in this context, the goal is to develop innovative energy offset schemes in energy production and consumption, thus supporting decentralized energy production and management,
b) ambitious goals of the NECP in the field of energy transformation of the country. The NECP aims to achieve a minimum share of 35% RES in gross final energy consumption; the minimum share of RES per sector is as follows: 60% in gross final electricity consumption, 40% in heating and cooling needs, 14% in the transport sector; the NECP has also committed lignite phase-out in power generation by 2028, leading to a radical energy sector transformation; furthermore, NECP aims to transform Greece into a regional energy hub,
c) renewable energy communities concept defined at national legislation; the term Energy Community has been recently introduced in the Greek legislation, by means of Law 4513/2018; an EC aims to promote a social and solidarity-based economy and innovation in the energy sector, address energy poverty, promote sustainability, and improve energy efficiency at the local and regional levels; with the pioneering Law 4513/2018 Energy Communities and other provisions, Greece became the first EU member state to acquire an integrated institutional framework for energy communities and their involvement in energy markets,
d) mention/ highlight the need for more supporting policies regarding the uptake of bioenergy in Greece, along with the update/ review of some very old policies/legislations like the one related to the harvesting of forest residues,
e) unstable legal framework that constantly changing. Regarding biomass combustion in open fires, there may be a framework but it is does not apply. We need to focus on the fact that Greece have a legal framework regarding energy communities and the benefits that this gives to energy communities.

Points regarding the Stakeholders' management module:

a) lack of trust to cooperative schemes due to their bad reputation. The vast majority of cooperatives schemes (especially farmer cooperatives) often went bankrupt, mainly under their own mismanagement. As a result, local communities have lost confidence in cooperatives schemes,
b) increase of local people's knowledge on energy communities and bioenergy is needed. As it seems from the answers we received from the questionnaires (interviews of T1.2), the willingness of the stakeholders depends on the level of their knowledge about energy communities. There is a reluctance to participate due to the ignorance of some stakeholders about the purpose of energy communities, their operation, internal administrative structure, etc.,
c) highlight the benefits of biomass exploitation and bioenergy in local area. Highlight the local area development, the creation of new job positions, the environmental benefits from using biomass instead of fossil fuels and instead of burning biomass in the open-fields, the benefits for each participating stakeholder, the benefits of the energy community scheme, the tackling of energy poverty etc.

Points regarding the Business and innovation module:

a) connection of the financial tools with existing cases,
b) highlight the various available business models for community bioenergy projects,
c) highlight the various available funding schemes for community bioenergy projects.

Points regarding the Community Bioenergy:

a) provide definition of energy /bioenergy community (legal form, legislation),
b) highlight benefits and limitations of energy communities,
c) provide examples of RESCoops.

Points regarding the Market Research:

a) highlight the importance of market research for energy projects,
b) highlight the market research results in the local pilot area (T1.3),
c) highlight the importance of social acceptance in community bioenergy projects and present, some examples where local opposition stopped the development of (bio)energy projects.

2.3.4 Italian Pilot Area

Target groups:

technical experts, policy makers & authorities, industry actors, business networks & SMEs, investors, municipalities, energy grid operators, community initiatives, citizens, feedstock providers.

Time frame for the organization of the workshops:

M23-M25 (September 2022 - November 2022).

Indicative structure of the workshops:

- introduction,
- presentation of stakeholders,
- brief introduction to BECoop's project,
- presentation of the topics,
- dialogue with local stakeholders,
- conclusions.

Indicative content of the workshops (main focus area):

- training on local planning, financial policies, public procurement, etc. (aspects that can promote community energy),
- successful case study of biomass district heating in Italy,
- present the general data of DH in Italy.

Challenges:

- policy and regulatory challenges,
- feedstock unavailability: inefficient resource management and the government non-intervention approach are the key factor hindering the expansion of the biomass industry,
- unpredictable and risky investment in the connection of new consumers, they can change heating method any time.

Benefits for customers using biomass DH:

- price and security of fuel supply: is less expensive than fossil fuels; today due to the rising price of gas using a biomass DH is for sure an economic advantage,
- comfort: customers have no concern over fuel availability and the communal system is design to work automatically,
- maintenance: the equipment and plant used to generate heating and hot water is centrally located in the development therefore owners / tenants do not need to worry about the maintenance and upkeep of the system,
- local economy support: by having District Heating in your home, you will be supporting your local economy and local jobs, which is very important in this tough economic climate,
- health and safety: In a DH scheme, there is no need for a gas connection to the dwelling, provided occupants are happy to cook by electricity. This reduces the risk of fire and poisoning by carbon monoxide within the dwelling. District heating is odourless and therefore safer than gas.

2.3.5 Spanish Pilot Area

Target groups:

technical experts, policy makers & authorities, industry actors, business networks & SMEs, investors, municipalities, energy grid operators, community initiatives, citizens, feedstock providers, final energy users, community initiatives, farmers, feedstock providers, local agricultural/energy advisers, authorities, NGOs, housing association representatives, local activists, forest cooperatives.

Time frame for the organization of the workshops:

Table 7. Action plan for Murgia pilot case.

Action plan pilot case: Murgia	Participants	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT
		M17	M18	M19	M20	M21	M22	M23	M24
1-Identify the preliminary table of content and select the reference modules.	GOI /CIRCE								
2-Work on the content of the material: Elaboration and translation	GOI /CIRCE								
3-Organisation of the event and communication	GOI /CIRCE								
4-Holding training workshops	GOI /CIRCE								

1. Identify the preliminary table of content and select the modules from the elaborated training material baseline (Annex II).
2. Work on the material's content: Extract the reference material, adapt it to the pilot region characteristics, and do the translation during M18, M19, and M20.
3. Organisation: The events will take place in two different event rooms located in Navarre and Araba/Alava provinces of the pilot region, pending to be determined. In an initial communication, Local authorities/Municipalities, Energy market actors (energy suppliers, grid operators, commercial RE companies), and RESCoops will be contacted in order to ensure their participation in the event. The reason is that this target group seems to be critical in deploying BE RESCoop and engaging end-users or citizens in the process. However, the event will be open to any kind of participant.
4. Holding the events: In order to succeed in the capacity-building process at the pilot region level, we consider it important to plan and organize the event in advance and separately to other similar events from other projects that will take part before summer. Last but not least, it is important to leave some time from one event to the other in order to improve or implement any lesson learned that might be identified.

Indicative structure of the workshops:

The training material will be extracted from the training material baseline (Annex II) and re-defined in order to address the following needs / challenges identified during WP1 desk research:

- understand the legal framework related to the transposition of energy communities into Spanish national law,
- air quality standards criteria and requirements in the funding programs,
- how to raise local interest to create an energy community,
- how to ensure a robust BE business model that could cover all the value chain,
- local authorities to comply with sustainability, climate and energy legislation, without hampering development.

The following preliminary table of contents will try to tackle the needs and challenges identified above.

- introduction to the event: organisers and objective,
- BECoop reminder of concepts, activities to date and link to training sessions,
- local energy/regulatory context and the role of energy communities (RECs, CECs)-->*Introduction-The Role of Biomass for Heat production + Policy relevant materials*
- local potential and technical concepts of biomass based technologies for heating/thermal: forest, agricultural and other biomass such as Biogas. → *Technical Bioenergy and Sustainability aspects,*
- BECoop tools, services and knowledge exchange platform,
- existing cases: Bioenergies in community (include new cases e.g. sugarai)-->*Successful case study of biomass,*
- business models and plans for bioenergy cooperatives (financing, value chains,...) make the business models table for the cases we are going to analyse as an example.-->Business and innovation models,
- processes for the creation of bioenergy communities→ *Stakeholder Engagement + Community Bioenergy,*
- closing and next steps.

The two events will be organised in Spanish and an event room will be rented. However, it is expected to translate all the material into Basque with the aim of organising a third event later in the year.

Indicative content of the workshops (main focus areas):

The approach of the workshops: The proposal is to conduct two open call training workshops in the pilot region, trying to target specific local stakeholders (Local authorities/Municipalities, Energy market actors like energy suppliers, grid operators, commercial RE companies, and RESCoops) that could act as lead users or central points for further development of BE RESCoop apart from the general public. The aim is to activate this type of stakeholders aware of the potential participant/ end users' needs, following a bottom-up approach before scaling up and mobilizing further statements. Regarding the content to be presented, it will be the same in both events, focusing on the tools developed under the project, accompaniment resources, and possibilities that Bioenergy could bring about on the deployment of RESCoops beyond photovoltaic self-consumption installations. A mixed event (face-to-face and online) is foreseen to be held during the second week of September in Navarre-Iruña and one month after in the Basque Autonomous Region, most likely in Vitoria-Gasteiz. The length of these sessions will not be longer than 3 hours, including breaks.

2.3.6 Summary of Workshops at Local Level

As depicted in the aforementioned training strategies, all pilot teams plan to deploy dedicated training workshops within the period of M20 – M25 of the project.
This section will be updated and presented in final deliverable at the end of the project (month 36).

4. BECoop Training Webinars

Note: An indicative list of webinars' topics is presented below, created based on the preliminary discussions between the task leader and the pilot and expert partners. This list will be enhanced, modified and adjusted based on the training needs that will be further identified in the course of the project. BECoop webinars are expected to take place within M23– M36 of the project's lifecycle.

A pool of more than ten, thematically diverse, webinar topics are recommended herein, allowing stakeholders to broadly develop their skills in the context of bioenergy projects and projects tailored to local and EU needs. Webinars are designed to raise stakeholders' level of knowledge and skills in the technical, economic, environmental, social, and legal aspects of community bioenergy heating. It is worth emphasizing that the BECoop webinars are planed to be open events, so in addition to the participation of stakeholders from the pilot areas, it is expected to attract an international audience related to RESCoops and local authorities. It is also planned to invite experts to participate in the webinar in order to build the potential of stakeholders as much as possible.

As already mentioned, the thematic list of webinars presented below is an initial orientation list that will be finalized in the coming months. Additionally to the webinars' topics presented below, further ideas are being developed such as the presentation of the BECoop services and tools.

Table 8. Webinar 1 description.

Webinar 1 - "General Information on biomass"	
Webinar Description	The webinar will cover the following topics: • biomass definition, types of biomass, biomass properties, biomass forms to be used for heating purposes in bioenergy cooperatives, • local biomass potential estimation, • biomass costs and heat costs compared to other fuels, • type of equipment used for biomass harvesting, • type of infrastructure for biomass storage, • biomass logistics. • examples of successful cases, biomass logistics.
Target Audience	Farmers, biomass producers, Individual stakeholders, in particular potential end-users of biomass (households, schools, multi-family buildings, housing cooperatives, public institutions).
Speakers	To be defined
Duration	Max 120-180 minutes.

Table 9. Webinar 2 description.

Webinar 2 - "Biomass Combustion"	
Webinar Description	The webinar will cover the following topics:

	• biomass combustion/gasification systems in local bioenergy cooperatives (direct and indirect solutions), • biomass boilers (small and middle capacity), • environmental issues related to solid biomass combustion/gasification in heating units, • success cases – best local practices.
Target Audience	Individual stakeholders, in particular potential end-users of biomass (households, schools, multi-family buildings, housing cooperatives), authorities, boilers manufactures.
Speakers	To be defined
Duration	Max 120-180 minutes.

Table 10. Webinar 3 description.

Webinar 3 - "District Heating"	
Webinar Description	The webinar will cover the following topics: • district heating – definition, examples, possibilities, • financial aspects of district heating, • current technologies and solutions about heat generation from biomass fuels in district heating, • pros and cons of district heating use in rural areas.
Target Audience	Local authorities, local government authorities, end users, individual stakeholders, potential biomass consumers, farmers, activists in rural areas, public institutions
Speakers	To be defined
Duration	Max 120-180 minutes.

Table 11. Webinar 4 description.

Webinar 4 - "CHP Plants"	
Webinar Description	The webinar will cover the following topics: • CHP principle and operation, • biomass storage and pre-treatment infrastructure, • biomass CHP plants – localization for the new plants: necessary natural resources, • efficiency of biomass chp plants systems: direct heating and district heating systems, • how to find financial support for chp plants run for biomass, • polygeneration units working with biomass CHP plants, • when it is possible to use local biomass resources for CHP production?

Target Audience	Local authorities, local government authorities, biomass management companies, individual stakeholders, equipment manufacturers, ESCOs and installers, investors
Speakers	To be defined
Duration	Max 120-180 minutes

Table 12. Webinar 5 description.

Webinar 5 - "Biogas Plants – Operation and Design in terms of RESCOOP"	
Webinar Description	The webinar will cover the following topics: • biomass resources and their potential estimation for local biogas plants, • biogas plants – localization and substrates logistic (transport and storage), • biogas plants – implementation for RESCoop, • biogas solid residues (BSR) – main operation problem?, • biogas plants – CHP unit the most electrical energy production?, • biogas plants – agri biomass or manure? pros and cons, • good practices and examples.
Target Audience	Investors, large farms, farmers, biomass owners, local authorities, public institutions, local government authorities, individual stakeholders.
Speakers	To be defined
Duration	Max 120-180 minutes

Table 13. Webinar 6 description.

Webinar 6 - "Business and financing aspects of RESCoops"	
Webinar Description	The webinar will cover the following topics: • how energy communities can access finance? • various financial solutions for bioenergy projects, • various types of business models for RESCoops, • national and European calls and national supporting measures for funding similar initiatives.
Target Audience	Investors, public institutions, potential end recipients (households, schools, multi-family buildings, housing cooperatives), local authorities, local government authorities
Speakers	To be defined
Duration	Max 120-180 minutes

Table 14. Webinar 7 description.

Webinar 7 - "Social aspects related to Bioenergy communities"	
Webinar Description	The webinar will cover the following topics: • what is a bioenergy cooperative (definition, aim, members)? • activation of local authorities and companies to established RESCoops, • activation of local farmers, residents and NGOs to establish RESCoops, • profits for local society by using bioenergy resources: new jobs, new knowledge about biomass processing and utilization, reduction of energy poverty, social integration, increase of local tax incomes, etc.
Target Audience	Individual stakeholders, inhabitants of rural areas, employees of public institutions, local authorities, NGOs, farmers
Speakers	To be defined
Duration	120-180 minutes.

Table 15. Webinar 8 description.

Webinar 8 - "Future legal frameworks related to RESCoops"	
Webinar Description	The webinar will cover the following topics: • what are RESCoops? • how to change local legislations to make bioenergy more profitable and attractive to fossil fuels, • how to faster implement new infrastructure bioenergy projects ? • actual legislations on RESCoops and bioenergy.
Target Audience	Stakeholders interested in establishing energy cooperatives, local authorities, local authorities, legal advisers.
Speakers	To be defined
Duration	Max 120-180 minutes.

Table 16. Webinar 9 description.

Webinar 9 - "EU Energy Generation 2030 – How to boost the Bioenergy potential in Europe?"	
Webinar Description	The webinar will cover the following topics: • how to empower cooperation between academia and industry to scale-up bioenergy technologies through EU? • strategy of development for 2030 for EU for increasing number of bioenergy installations, biorefineries to produce heat and electricity, • market research – the source of information for bioenergy cooperatives development.

Target Audience	Local authorities, national government authorities, public institutions, energy cooperatives, energy communities
Speakers	To be defined
Duration	Max 120-180 minutes.

Table 17. Webinar 10 description.

Webinar 10 - "Stakeholder engagement in bioenergy community projects"	
Webinar Description	The webinar will cover the following topics: • lead types of stakeholder in bioenergy projects, • barriers in stakeholder engagement in bioenergy projects, • main engagement actions that could mobilize local populations around the bioenergy concept, • example of real cases of stakeholders engagement in energy projects.
Target Audience	Local authorities, public institutions, energy cooperatives, energy communities, energy clusters, NGOs
Speakers	To be defined
Duration	Max 120-180 minutes.

Table 18 . Webinar 11 description.

Webinar 11 - "BECoop Services and Tools"	
Webinar Description	The webinar will cover the following topics: • the Self-Assessment Tool • the E-market environment • the Knowledge Exchange Platform • the BECoop Toolkit • the BECoop Catalogues (technical, business and financial)
Target Audience	Local authorities, public institutions, energy cooperatives, energy communities, energy clusters, NGOs, farmers, individual stakeholders
Speakers	To be defined
Duration	Max 120-180 minutes.

5. Conclusions

The initial internal training offered by the BECoop expert partners to the pilot partners has already been implemented. The baseline training material produced during the internal process, will be now adjusted to the local needs and specificities of each pilot region and employed during the implementation of the training strategies for each local region. That includes the organisation of 2 training workshops per pilot case.

Pilot partners, by using the developed material (Annex II), will transfer to the stakeholders in their local pilot areas (Poland, Greece, Italy, Spain) valuable knowledge related to the six main subjects areas (6 Modules) defined within the project. As there are different strategies in the selected regions, the external training will focus on their own needs and resources (mainly types of bioenergy/biomass as a heat/electricity resource in their pilot areas localizations, strategies for energy cooperative development, etc.). In addition, special attention during the training will be given to the promotion of the tools developed in the framework of the project (e.g. self-assessment tool, e-market environment, Knowledge exchange Platform etc.)

To increase the impact of the BECoop project also outside the defined local pilots areas, international online webinars, related to the bioenergy cooperatives development issues, will be organized. Ten thematic webinars will be prepared, accordingly. The selected trainers/experts in the given subject will be engaged to ensure fruitful experience exchange and transfer of knowledge to the targeted group of stakeholders (participants).

The BECoop capacity building program that entails a series of tailored training workshops and webinars, open to an international audience, is expected to significantly enhance the existing know-how on ways to further support and boost the uptake and establishment of community bioenergy.

References

- BECoop “Unlocking the community energy potential to support the market uptake of bioenergy heating technologies”. Coordination & Support Action Implemented under the Grant Agreement No 952930.
- The Sustainability Law in the EAE and the Energy Transition Law in Navarre.
- Law 4513/2018 on Energy Communities and Other Provisions.

Annexes

Annex I: Training workshops' invitation template

The topic of the training workshops

Date and time of the meeting

Form of the meeting: XXXX (if in a stationary form, provide the address, if online a link)

Target group: XXXX (please characterize the stakeholders to whom the training is dedicated)

Meeting goal: training of local partners by BECoop experts on the creation and operation of bioenergy cooperatives (including the technical, political, economic, environmental, and social aspects) to further transfer the acquired knowledge to those interested in being a member of the emerging RESCoop

Meeting agenda:

Time	Subject
XX. XX – XX. XX (up to 5 minutes)	Start of the training: welcoming and introducing the organizers and partners
XX. XX – XX. XX (up to 15 minutes)	Presentation of the purpose and thematic scope of the meeting Discussion of the goal and assumptions of the BECoop project
XX. XX – XX. XX (up to 90 minutes)	Presentation by BECoop experts of a prepared multi-aspect analysis of the possibilities of building and operating a bioenergy cooperative in a given Pilot Area
XX. XX – XX. XX (up to 10 minutes)	Coffee break

XX. XX – XX. XX (up to 45 minutes)	Discussion - questions from / to meeting participants Discussion on the development potential of the bioenergy community in the region Discussion on the factors facilitating/inhibiting the development of the bioenergy community in the region Discussion on experiences in the use of biomass for energy purposes Discussion on the appropriate transfer of knowledge to those interested in being a RESCoop member
XX. XX – XX. XX (up to 10 minutes)	Summary and conclusion of internal training

Organizer's contact details: phone number/ e-mail address

Project partners

Annex II: Training material baseline

Annex II includes the six modules' material presented at the internal training workshop, developed by WUELS in cooperation with each partner responsible (WUELS, FIPER, CERTH, CIRCE for technical bioenergy and sustainability aspects, IEECP for policy relevant material, Q-PLAN for business and innovation aspects, CBS on stakeholder engagement, SEV on community bioenergy, WR on market research).

Introduction

BECOOP

A rather slow penetration of renewables in the EU heating and cooling sector, which accounts for 51% of EU's total energy consumption and is expected to account for the largest share of demand by 2050.

A significantly untapped RE market uptake potential for bioenergy -> 96% OF ALL RENEWABLE HEAT PRODUCED COMES FROM BIOMASS !!!

BEcoop

1 INTRODUCTION HEAT PRODUCTION IN RESCOOP'S

Following the RED II Directive, Renewable Energy Community, means a legal entity:

(a) which, in accordance with the applicable national law, is based on open and voluntary participation, is autonomous, and is **effectively controlled by shareholders** or members that are **located in the proximity** of the renewable Energy projects that are owned and developed by that legal entity;

(b) the shareholders or members of which are **natural persons, SMEs or local authorities, including municipalities**;

(c) the primary purpose of which is to **provide environmental, economic or social community benefits** for its shareholders or members or for the local areas where it operates, rather than financial profits.

BEcoop

1 INTRODUCTION HEAT PRODUCTION IN RESCOOP'S

Renewable energy communities are entitled to:

a) produce, consume, store and sell renewable energy, including through renewable power purchase agreements;

b) share, within the renewable energy community, renewable energy that is produced by the production units owned by that renewable energy community, subject to the other requirements laid down in this Article and to maintaining the rights and obligations of the renewable energy community members as customers;

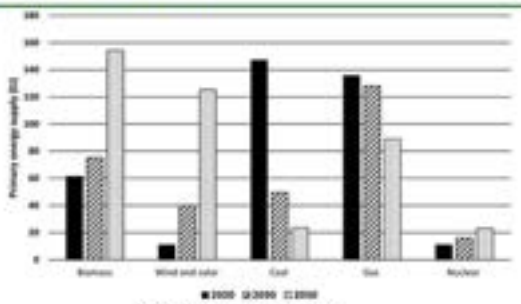
c) access all suitable energy markets both directly or through aggregation in a non-discriminatory manner.

1. INTRODUCTION – THE ROLE OF BIOMASS IN HEAT PRODUCTION

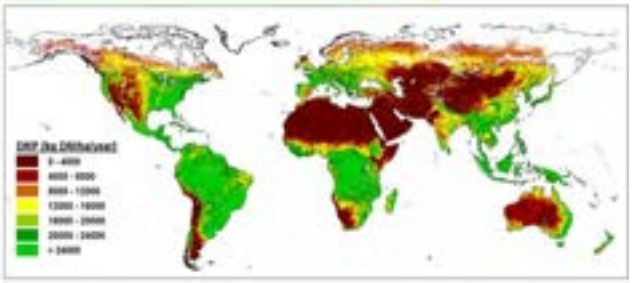
IN THE WORLD 96% OF ALL RENEWABLE HEAT PRODUCED COMES FROM BIOMASS !!!

I. In 2019, **15.5 EJ** of heat was produced globally via **heat plant** (HP) only and **combined heat and power plants (CHP).**
II. Europe is the world leader in producing heat from biomass in power plants with **a share of 88% globally**.
III. Renewable energy technologies including biomass, geothermal and solar thermal have **doubled** their share in the global heat production over the past 19 years. **97%** of all renewable heat produced was from biomass with minor contribution from geothermal and solar thermal technologies.

1. INTRODUCTION – THE ROLE OF BIOMASS IN HEAT PRODUCTION



Source: Reid et al. 2019



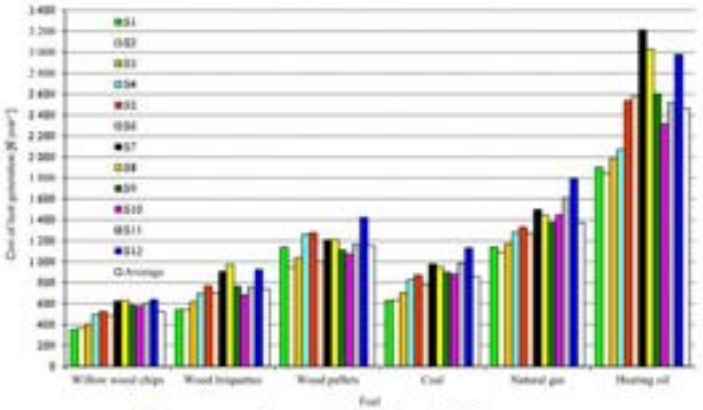
Source: Copernicus Global Land Service

- According to forecasts by Reid et al. the largest increase in primary energy supply will be for renewable sources. By 2030, the bioenergy potential will increase by **30%**, and by more than **150%** by 2050.
- According to Copernicus Global Land Service forecasts the bioenergy potential is most evenly distributed for South America and Europe.

1. INTRODUCTION – THE ROLE OF BIOMASS IN HEAT PRODUCTION

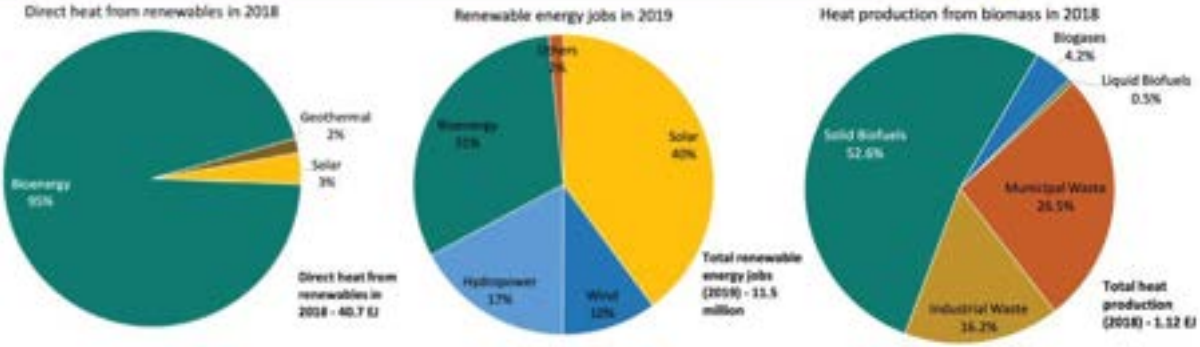
The annual cost of heat energy generation for the detached house from wood briquettes and other solid biofuels and fossil fuels for the consecutive 12 heating seasons (2006-2018).

Throughout the forecast period, biomass fuels turned out to be **the cheapest**.



Source: Stolarski et al. 2020

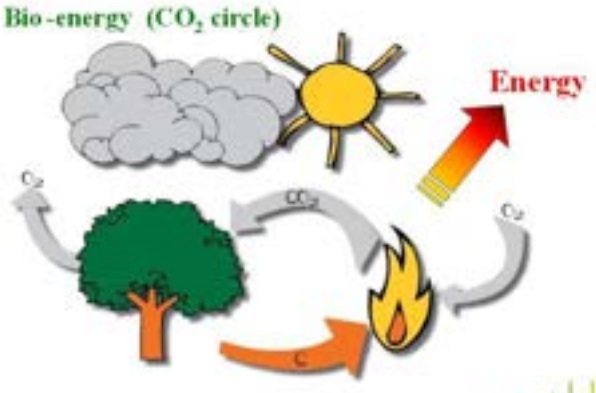
1. INTRODUCTION – BIOMASS GROWING POTENTIAL IN HEAT AND ELECTRICITY PRODUCTION – POTENTIAL OF BIOMASS



I. Use of biofuel for direct heat is more than twice the fuel used for electricity production.
II. 2000 – 2018, share of renewables in direct heat reduced from 24% to 20% globally.
III. Direct heat production around the world was 35 times higher than heat from power plants.
IV. In 2018, domestic supply of biomass was 55.6 EJ globally.
V. 85% of the domestic supply was from solid biomass sources.

1. INTRODUCTION – THE ROLE OF BIOMASS FOR HEAT PRODUCTION

CO_2 circle in terms of energy utilization of biomass



Type of contamination	Percentage reduction compare to hard coal
Carbon dioxide (CO_2)	100
Sulfur dioxide (SO_2)	88
Nitrogen dioxide (NO_2)	32
Carbon monoxide (CO)	79
PM total	43

1. INTRODUCTION – OTHER FACTORS INFLUENCING THE BIOMASS ENERGY COMMUNITY CREATION

I. Reduction of air pollution through the use of fossil fuels.

II. Gradual depletion of fossil fuel deposits (currently coal and natural gas have a combined share of more than 85% in the global heat production).

III. Use of available local bioenergy resources.

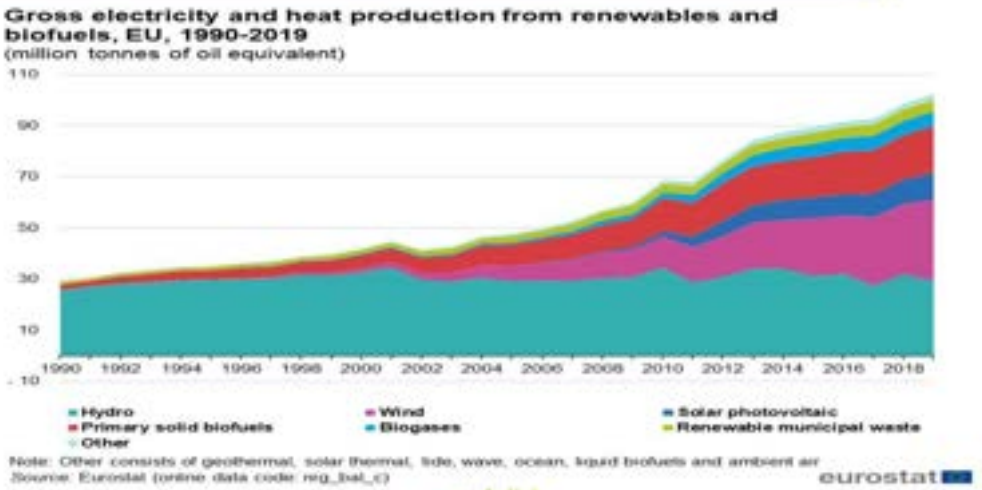
IV. Willingness to reduce the phenomenon of energy poverty.

V. Willingness to increase the ecological awareness of Poles.

VI. Implementation of local and national policies and legal acts.

VII. Increase in fossil fuel and energy prices.

1. INTRODUCTION – BIOMASS GROWING POTENTIAL IN HEAT AND ELECTRICITY PRODUCTION – ACCORDING TO EUROSTAT



1. INTRODUCTION – BIOMASS FOR HEAT AND ELECTRICITY PRODUCTION

Benefits from local biomass utilization:

I. New jobs for the local community.
II. Activation of local agriculture.
III. Education of residents in the use of renewable energy sources.
IV. Biomass is always and widely available as a RES.
V. It is carbon neutral.
VI. It reduces the overreliance of fossil fuels.
VII. Is less expensive than fossil fuels.
VIII. Biomass production adds a revenue source for manufacturers.
IX. Less garbage in landfills.
X. Ash from biomass as fertilizer.

SEEGER ENGINEERING GMBH

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MODULES

MODULE 1 – TECHNICAL BIOENERGY AND SUSTAINABILITY ASPECTS

MODULE 2 – POLICY RELEVANT MATERIALS

MODULE 3 – BUSINESS AND INNOVATION ASPECTS

MODULE 4 – STAKEHOLDER ENGAGEMENT

MODULE 5 – COMMUNITY BIOENERGY

MODULE 6 – MARKET RESEARCH

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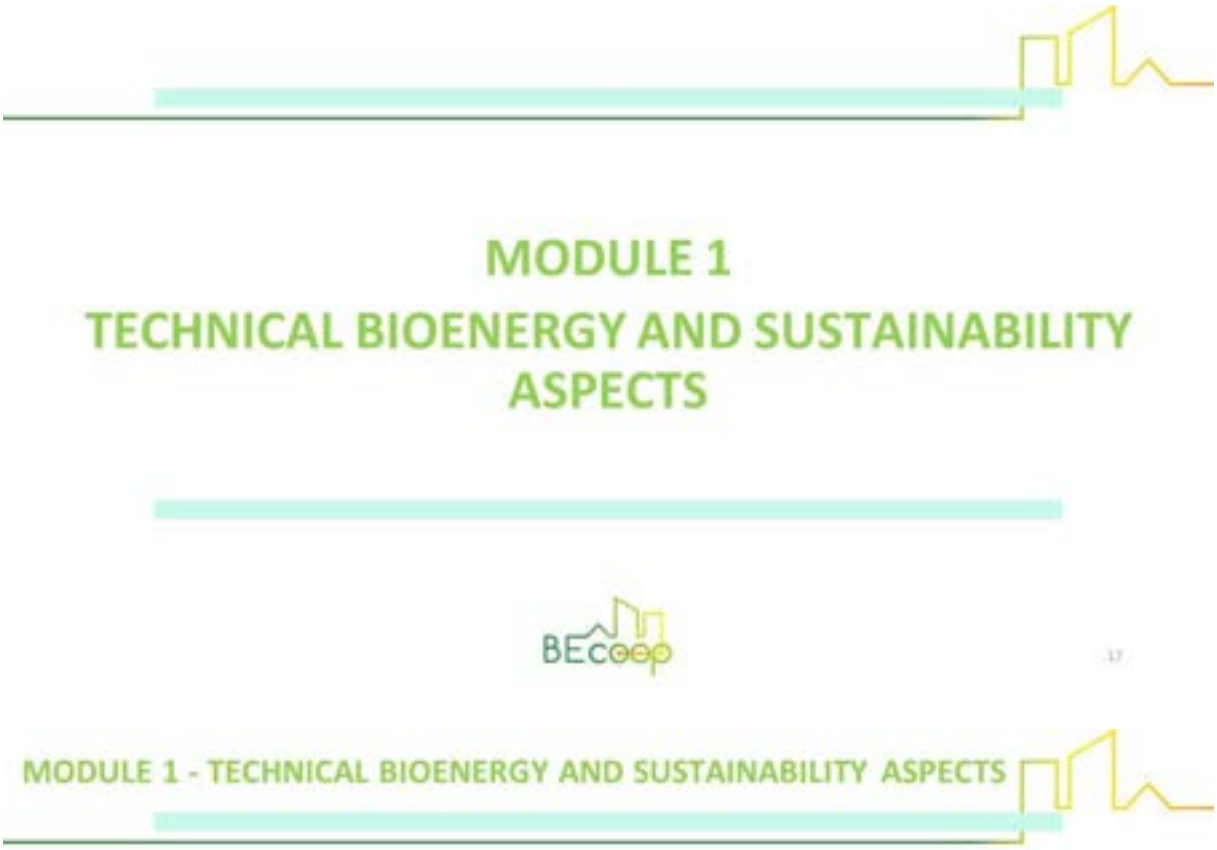
Module 1: Technical Bioenergy and Sustainability Aspects



MODULE 1 - TECHNICAL BIOENERGY AND SUSTAINABILITY ASPECTS

GENERAL OBJECTIVES: 1. Knowledge transfers:

- Biomass properties as a fuel for heating purposes.
- Biomass resources and their valorization/conversion to the form of fuel used by final consumers (fuel characteristics and quality).
- Biomass versus fossil fuels.
- Description of the possible biomass heating systems for households, schools, small building or housing estate (designed for pellets, briquettes, logs, wood chips and bales combustion).
- The subject of 5 class Eco-design boilers.
- Biogas plant (substrates, technology, solutions, conditions of operation and application).
- Polygeneration units: biomass steam boilers + ORC Cycle with turbine + PV + heat pump + hot water storage system,

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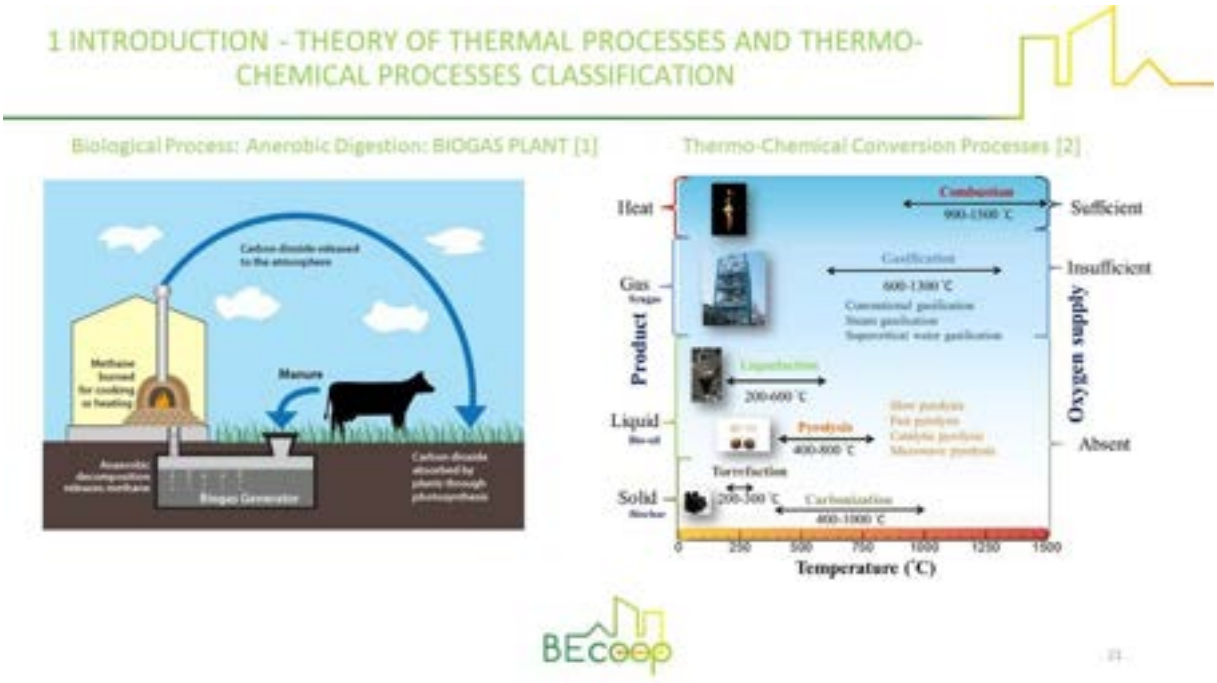
1 INTRODUCTION - THEORY OF THERMAL PROCESSES AND THERMO-CHEMICAL PROCESSES CLASSIFICATION
Biological Process: Anerobic Digestion: BIOGAS PLANT [1]
Thermo-Chemical Conversion Processes [2]
Carbon dioxide released to the atmosphere
Methane burned for cooking or heating
Manure
Biogas Generator
Carbon dioxide absorbed by plants through photosynthesis
Heat
Gas
Liquid
Solid
Product
Combustion
900-1500 °C
Sufficient
Gasification
600-1300 °C
Insufficient
Liquefaction
200-600 °C
Pyrolysis
400-800 °C
Torrefaction
200-300 °C
Carbonization
400-1000 °C
Absent
Oxygen supply
0
250
500
700
1000
1250
1500
Temperature (°C)
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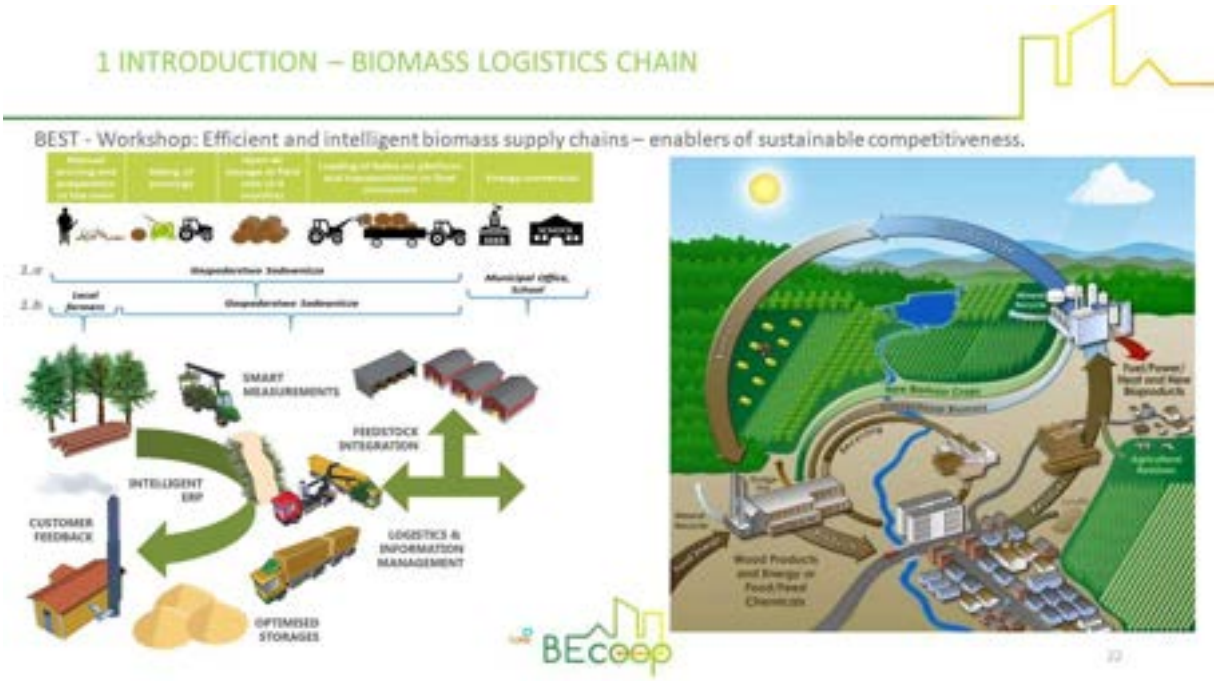
1 INTRODUCTION – BIOMASS LOGISTICS CHAIN
BEST - Workshop: Efficient and intelligent biomass supply chains – enablers of sustainable competitiveness.
SMART MEASUREMENTS
FEEDSTOCK INTEGRATION
INTELLIGENT ERP
CUSTOMER FEEDBACK
LOGISTICS & INFORMATION MANAGEMENT
OPTIMISED STORAGES
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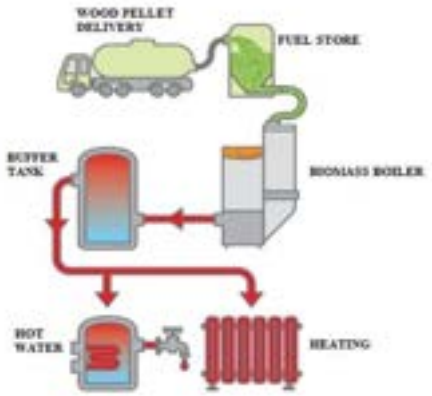
1 INTRODUCTION – BIOMASS LOGISTICS CHAIN STANDARD PELLETS VS. TORREFIED PELLETS

1 DIRECT HEATING – THEORY

Main components of typical biomass direct heating installations:



a) automatic system of direct heating;

b) manual system of direct heating.

2 TYPES OF BOILERS BASED ON TYPES OF SOLID BIOFUELS

Types of biomass different biomass boilers/technologies are developed. The following forms of solid biofuel can power the biomass boiler (Additionally, heat generation during thermal biomass utilization can be realized by combustion or gasification. According to the EU Directive, all new domestic boilers must comply with the requirements of ECODesign):

a) Pellets, BLACK PELLETS

b) Briquettes,

c) chips,

d) logs,

e) bales/cubes.

Fuel form Storage facilities

Biomass plant close in wood container

Currently, it is standard for solid fuel boilers to achieve thermal efficiency above 89% (up to a maximum of 91%). In the case of boilers up to 500 kW, this requirement results from the PNEN 303-5 standard and from the Regulation of the Minister of Development and Finance of August 1, 2017 on the requirements for solid fuel boilers (Journal of Laws of 2017, item 1690; amended. Journal of Laws of 2019, item 363). In the case of the majority of brand-name boilers available on the market, the characteristic values of the above-mentioned parameters are (for operation at nominal power): flue gas temperature 150 ÷ 160 C, O2 content in flue gas 8%.

2 Types of boilers BASED ON TYPES OF SOLID BIOFUELS

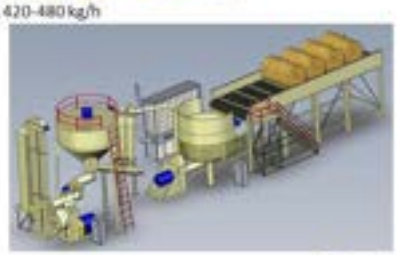
Pellet - is created by pressing waste from sawmills and carpentry shops (wood sawdust, wood chips and shavings). The resulting granules are approximately 6 mm in diameter and several centimeters long.

Briquette - pressed dry sawdust, peat, straw or cereals and wood waste. The briquette size is much larger (about 15x7x10 cm) and can be in the form of cubes or cylinders.

The calorific value of pellets and briquettes ranges from 16-19 MJ / kg.
Pellets and briquettes have three times greater density than wood.

2 TYPES OF BOILERS BASED ON TYPES OF SOLID BIOFUELS – BRIQUETTING SYSTEMS

30 kW, 420-480 kg/h



75 kW, 700-1300 kg/h

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2 TECHNOLOGIES – TYPES OF BIOMASS BOILERS FOR DIRECT HEATING BIOMASS COMBUSTION

- PLEASE SEE LINK TO REPORT (T2.7):

Pellet boiler EG PELLET with a power of 10-60 kW

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2 TECHNOLOGIES – TYPES OF BIOMASS BOILERS FOR DIRECT HEATING
BIOMASS COMBUSTION – GRATE STOVE

Fuel spilling over the grate:

mounted at an angle

moving

Advantages:

Simple design

Ease of use

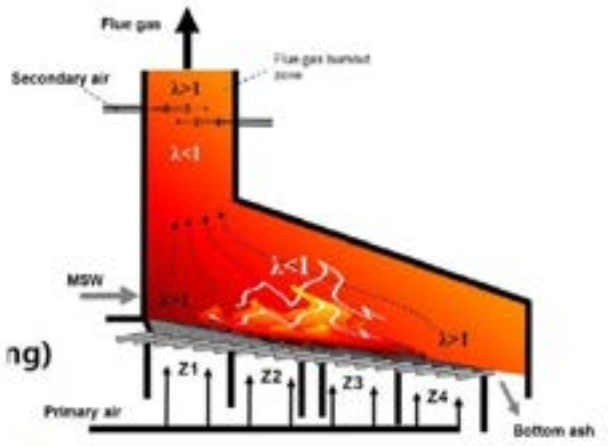
Low investment and operating costs

Disadvantages :

Firing the grate

Burning time

Low energy efficiency



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3 ZŁOCZEW – ŁÓDZKIE VOIVODSHIP CENTER OF POLAND

Fuel storage, silos, installation of 150 m3 and solar collectors on the area of 61.5 m2 on the roof of the boiler house. Basic installations of heat sources in the field of domestic water preparation and biomass solar energy obtained from the installation of drawn **solar collectors on an area of 122 sq m.** There are three boilers in the boiler room: **1000 kW (two) and 800 kW.** In addition, supporting the buffer water buffers (each with 30 m3 of tanks), which have improved the quality of boiler room operation and thus reduce fuel consumption. In a solar biomass dryer, wood chips are stored and dried with a bath roof, prepared by placing a solar tracker on the roof. In addition to **wood chips**, the plant can also burn **pellet.**

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3 SPAIN BEST PRACTICES: USE OF BIOMASS

District heating: Biomass Boiler en el Hotel Barceló Bobadilla*** Loja (Grenade)**

Bioler Model: HERZ boiler provind hot water to overall installations (hotel, swimming pool and spa)
Power: 700 kW
Fuel: Olive pit
Saves: 45% energy costs, 80% CO_2 emissions

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Unlocking the community energy potential to support the market uptake of bioenergy heating technologies

Biomass Gasification Plant INERCO Aoiz (Navarra)

Gasifier Model: INERCO Bubbling fluidized bed
Power: 3 MW
Fuel: Pellets of agricultural wastes and air as gasificant agent
Objectice: syngas combustion for steam production (external use)

Gasification plant

Combustion chamber and heat recovery

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 952930.

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Technical workshop – Scope of workshop

1. **Introduction**: Theory and introduction to District Heating Concept
2. **Technologies:** machines, type of apparatus and technologies used in District Heating Units
3. **Case studies:** evaluation of success cases of biomass DH units- lessons learned

1 INDIRECT HEATING - THEORY

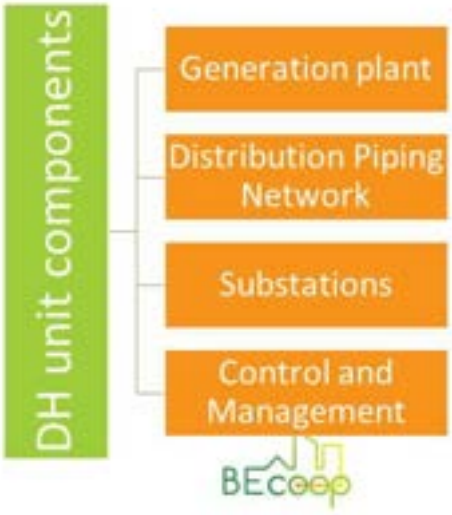
District Heating Concept: https://www.vyncke.com/industries/recovered-fuels/district-heating/

1. Introduction to District Heating (DH) Concept

- A "district heating" (DH) is a centralized system of production and distribution of thermal energy to an entire neighbourhood, district or municipality
- Allows connecting multiple energy sources to multiple points of energy consumption and distributing it to the buildings through a piping system
  - Piping system transports a thermal fluid (hot water, cold water, thermal oil...) to the exchange points in the buildings
- DH networks allow the efficient use of thermal energy generated by waste heat from industrial processes, natural geothermal sources, energy recovery from solid urban waste, biomass or solar energy
- Biomass DH enables the use of autochthonous and renewable energy resources while contributing to create local employment in the municipalities, and offering environmental benefits (reduction of CO_2 emissions due to the substitution of conventional fuels by biomass, cleaning of forests etc.)

Scheme of a District Heating

2. Technologies used in DH units



2. Technologies used in DH units

- Generation Plant
  - Storage Area
  - Feeding Systems
  - Thermal Power Plant

Generation Plant: where heat production is carried out centrally

Storage: enough space to store at least the amount of material necessary to supply the boiler for a minimum period of time (a minimum period of at least 2 weeks is recommended). Storage must be located adjacent to the room where the boiler is located and not together due to regulations. Important factors to consider for storage volume estimation:

- Bulk density of biomass to be stored (based on type of biomass)
- Average consumption of biomass per day

Feeding Systems: Critical system due to:

- Heterogeneity of biomass (can cause clogging)
- Possibility that the shredded material contains exogenous materials of non-negligible size (stones, wires, ...), mostly in agricultural biomass
- High inorganic content in the fines (soil, sand, dust) that can affect the accelerated wear of the feeding systems

The most common feeding system (in small installations) used is screw conveyors

- the angle should be as low as possible and should not

Feeding Screw

2. Technologies used in DH units

- Generation Plant
  - Storage Area
  - Feeding Systems
  - Thermal Power Plant

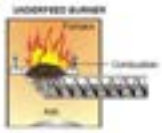
Thermal Power Plant: the core element of a district heating network where thermal energy is generated. Includes the boiler room and the main pumping units which drive the heat transfer fluid to the different consumption points. The thermal power plant operates automatically, depending on demand, regulating its operation with a control system that takes data from the consumption points and from the plant itself.

Main equipment:

- Boiler water-tube or pyrotube boilers with efficiences around 85-90 %
- Cleaning system, (e.g. cyclones and/or bag filters) in order to comply with the emissions directive (Ecodesign regulation 2015/1189 for boilers lower than 500 kW and MCPD directive 2015/2193 for biomass boilers lower than 50 MW and greater than 1 MW)
- Accumulation systems (thermal storage tanks) for improving the system's energetic performance
- A tank or expansion vessel that absorbs the increase in pressure of the fluid when its temperature rises as safety measure
- The pumping system that drives the heat transfer fluid from the plant, through the distribution network, to regulate the flow
- Other auxiliary equipment (e.g. compressors for the air supply of pneumatic drives, shut-off valves, hydraulic distributors, regulating valves, etc.)
- A first number to be considered for the space needed for this generation plant, could be 30-200 m² per MW$_{th}$ heat output

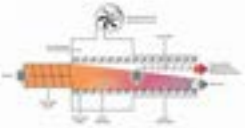
Main types of **biomass boilers** for small-medium heating applications:

- Underfeed boiler (20 kW– 2 MW)
- Fixed grate boiler (20 kW– 2 MW)
- Boiler with moving grate (200 kW



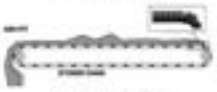
Underfeed boiler

Source: Alakangas, E., Paju, P., 2002



Fixed grate boiler

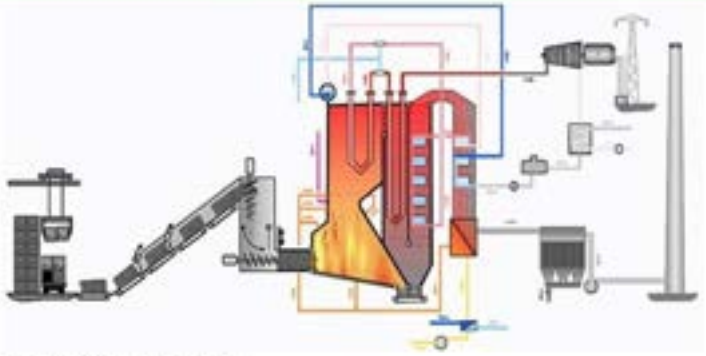
Source: Sustainable Energy Authority of Ireland, Biomass Boilers - Technology Guide



Traveling grate

Source: (Dahlquist, 2013)

2 TECHNOLOGIES – TYPES OF BIOMASS BOILERS FOR INDIRECT HEATING
BIOMASS COMBUSTION – VIBRRATING GRATE FOR STRAW COMBUSTION



- Specially designed vibrating grate
- Part of the combustion air is fed into the furnace from the bottom of the grate and further the combustion air is supplied to the furnace through nozzles located above the grate.

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2 TECHNOLOGIES – TYPES OF BIOMASS BOILERS FOR INDIRECT HEATING
BIOMASS COMBUSTION – VIBRRATING GRATE FOR STRAW COMBUSTION

- Air distribution system that optimizes the combustion process evenly on the grate
- Vibrations on the grate inhibit the formation of large slag particles, which are not recommended for burning straw and wood waste

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2. Technologies used in DH units

Distribution Piping Network

- Insulated pipes
- Two pipelines: i) supply and ii) return

Distribution Piping Network: a network of insulated pipes that distributes the thermal energy (thermal fluid) from the generation plant to the different buildings

The heat transport line consists of two pipelines: one for the supply and one for the return (in the case of centralized heating and cooling networks, the line consists of four pipes)

Factors to be considered:

- Where pipes should be located (underground → safer or surface → cheaper)?
- Type of material to be used (carbon steel for larger pipes, plastic materials for smaller diameter)
- Type of insulation (5-10% losses in distribution networks)

DH network

Source:

2. Technologies used in DH units

Substations

- Heat exchanger system
- Regulation and control elements and metering equipment

Substations: At the substations, the pressure and temperature of the network are adapted to the conditions of consumption.

Includes:

- a heat exchange system, through which heat is transferred to the terminal elements for heating, cooling and domestic hot water service.
- regulation and control elements and metering equipment for billing the thermal energy supplied from the network to each end user.

Control and Management

- Regulates the supply temperature and the flow of the thermal fluid

Control and Management:

Regulates:

- the generation of energy and the real demand in the network
- the control of the supply and return operating temperatures

This control is usually managed through a "supervisory control and data acquisition" (SCADA).

3. Successful case study of biomass district heating-Italy

Area: Lombardy Region
Province: Sondrio
Valtellina- Alpine Area
Cities: Tirano-Santa Caterina-Sondalo

3. Successful case study of biomass district heating-Italy

Background: TCVVV founded in **1997** owns and operates three plants located in the municipalities of Tirano, Sondalo and Santa Caterina Valfurva which serve approximately **1,250 customers.**

TCVVV

3. Successful case study of biomass district heating-Italy

Woody biomass district heating in Tirano/Santa Caterina/Sondalo (up to 2020)

	Tirano	Sondalo	Santa Caterina	TOTAL
Installed Capacities (MWth)	20 MWth + 1.1 MWel	10	12	42
Number of connections	787	388	76	1,251
Grids (km)	33.36	18.67	4.95	56.98
Biomass Consumption (t/y)	23,996	9,876	5,288	39,160
Flue gas treatment system	Multicyclone; bag filter On the co-generation line: multicyclone; electrostatic precipitator, gas condensation, DeNOx, SNCR	Multicyclone; bag filter	Multicyclone; bag filter; gas condensation	
CO2 reduction (t/y) from using biomass vs heating oil	9,582	2,886	1,884	14,352
CAPEX (M€), plant + network	27,8	12.9	13.8	54.5

3. Successful case study of biomass district heating-Italy

Forest-wood chips supply chain

40-46€/t forest wood chip, exl. VAT and transport, 45 % wt moisture

Wood-chips applied in tons (2000- 2020)

Updated up to	Tirano	Sondalo	S.Caterina V	TOTAL AMOUNT
2020	582,344	216,737	67,826	866,904

Value of the wood-chips applied in € (excl. VAT, 2000-

Updated up to	Tirano	Sondalo	S. Caterina V	TOTAL AMOUNT
2020	27,600,562	10,999,462	3,956,971	42,556,996

Wood-chips origin in the last 4 years

Sourcing of	2016-2017		2017-2018		2018-2019		2019-2020	
timber	t.	%	t.	%	t.	%	t.	%
Forest	30,466	65.0%	30,377	69.6%	30,899	70.6%	30,930	73.5%
Sawmills	14,285	30.5%	12,902	29.5%	12,466	28.5%	10,834	25.7%
Medium rotation	1,316	2.8%	0	0.0%	0	0.0%	0	0.0%
Prunings	448	1.0%	391	0.9%	413	0.9%	333	0.8%
Hazelnut shells	350	0.7%	0	0.0%	0	0.0%	0	0.0%
TOTAL AMOUNT	46,865	100.0%	43,670	100.0%	43,778	100.0%	42,097	100.0%

3. Successful case study of biomass district heating-Italy

€ 68.673.160 millions in investments
in 20 years

The current heat rate is € 0.12532/kWh, excl. VAT (10% for domestic use and 22% for all other uses).

At the heating rate, including VAT, there will be deducted the biomass discount and subsequent amendments that equal to € 0.021950 per kWh.

3. Successful case study of biomass district heating- Greece DETEPA

Area: Greece
Regional unit of Macedonia
Municipality of Florina
Town: Amyntaio

3. Successful case study of biomass district heating- Greece DETEPA

Background: DH started operating in 2005. Heat production derived from lignite power plant of Amyntaio. Since 2020, it operates on 2 new biomass boilers (2x15 MW) at 70% biomass, 30% lignite fuel mixture.

ΔΕΤΕΠΑ
ΔΗΜΟΤΙΚΗ ΕΠΙΧΕΙΡΗΣΗ ΤΗΛΕΘΕΡΜΑΝΣΗΣ ΕΥΡΥΤΕΡΗΣ ΠΕΡΙΟΧΗΣ ΑΜΥΝΤΑΙΟΥ

3. Successful case study of biomass district heating- Greece DETEPA

Since 2020, Combined biomass – lignite combustion (70% - 30%) district heating in Amyntaio area

Installed Biomass Capacity (MWth)

Since 2020
30

Numbers of connections

2000 - 2004	2008 - 2009	2014 - 2015	2015 - 2021	TOTAL
850	400	450	300	1.900

Km grids

2000 - 2004	2008 - 2009	2014 - 2015	TOTAL
33.42	16	27.5	76,92

From 2000- 2019: 24 M€ investment on DH fueled with lignite and piping network
2019 - 2021: 15.5 M€ investment for biomass DH and new connections

3. Successful case study of biomass district heating- Greece DETEPA

Biomass Supply chain

Biomass origin

Biomass type	2020-2021 t	%	€/t (excl. VAT)
Wood chips	8,700	22.82%	55- 65
Sawmills residues	9,550	25.05%	45- 50
Sunflower pellet	6,425	16.85%	84- 87
Corn residues (ball)	2,000	5.25%	50
Lignite	11,450	30.03%	36.6
TOTAL AMOUNT	38,125	100.0%	

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3. Successful case study of biomass district heating- Greece DETEPA

Woody biomass used: 18.000 t/year

The organizational structure of the company has in total: 40 employees

The current heat rate is € 0.05364 € /kWh, excl. VAT (6% for all other uses).

For example, an average household in Northern Greece to cover its heat demands (20 Mwh per year), it would cost (excl. VAT):

District heating: 1,073 € / year

Oil: 2,097 € / year

Natural Gas: 2,980 € / year

Electricity: 5,240 € / year

Wood pellets: 1,580 € / year

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3. Lessons learned, challenges and benefits for using biomass DH

Challenges:

- **Policy and Regulatory frameworks** may risk the viability of the biomass DH unit
- **Feedstock availability:** inefficient resource management is a key factor hindering the expansion of the biomass industry. Securing the required amounts of biomass is crucial
- **Unpredictable** and **risky investment** in the connection of new consumers, as they can change their heating method at any time.

Benefits for consumers using biomass DH:

- ✓ **Price and security of fuel supply:** is less expensive than fossil fuels; today due to the rising price of gas (energy crisis), using a biomass DH is more cost-efficient.
- ✓ **Comfort:** customers have no concern over fuel availability and the communal system is designed to work automatically.
- ✓ **Maintenance**: the equipment and plant used to generate heating and hot water is centrally located and operated, therefore end-users / tenants do not need to worry about the maintenance and upkeep of the system.
- ✓ **Local economy support:** by using biomass DH, you will be supporting your local economy and creating local jobs and have positive environmental impact
- ✓ **Health and safety:** In a DH scheme, there is no need for a gas connection to the dwelling, provided occupants are happy to cook by electricity. This reduces the risk of fire and poisoning by carbon monoxide within the dwelling. District heating is odourless and therefore safer than gas.

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3. Lessons learned, challenges and benefits for using biomass DH

Lessons Learned:

✓**Equipment selection**: the selection of appropriate equipment for the biomass supply chain and DH plant is crucial. The right selection increases the performance and reduces the operational costs

✓**Identification of the available biomass and secure supply**: The identification of the available biomass is crucial for the viability and operational outcome of the DH unit. Close collaboration with farmers, agricultural or forest cooperatives, biomass management companies should be encouraged in order to secure the biofuel supply.

✓**Stakeholders engagement**: a successful supply chain exists only when all required stakeholders are involved and all of them have benefits.

✓**Necessity of demand**: Secured demand of the heat produced is important for the viability of the DH.

✓**Economies of scale**: In the case of large supply chains, the large quantities of biomass that can be gathered, make the whole business supply of alternative fuel competitive to conventional fuels such as coal.

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2 TECHNOLOGIES – POLYGENERATION UNITS

100% of thermal energy produced from renewable energy sources!

100 kW PV farm

Air source Heat pump 150 kW

2 x 500 kW wood chips biomass boilers

Heat accumulator

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement N°857801

2 TECHNOLOGIES – POLYGENERATION UNITS: ORC Power Plants

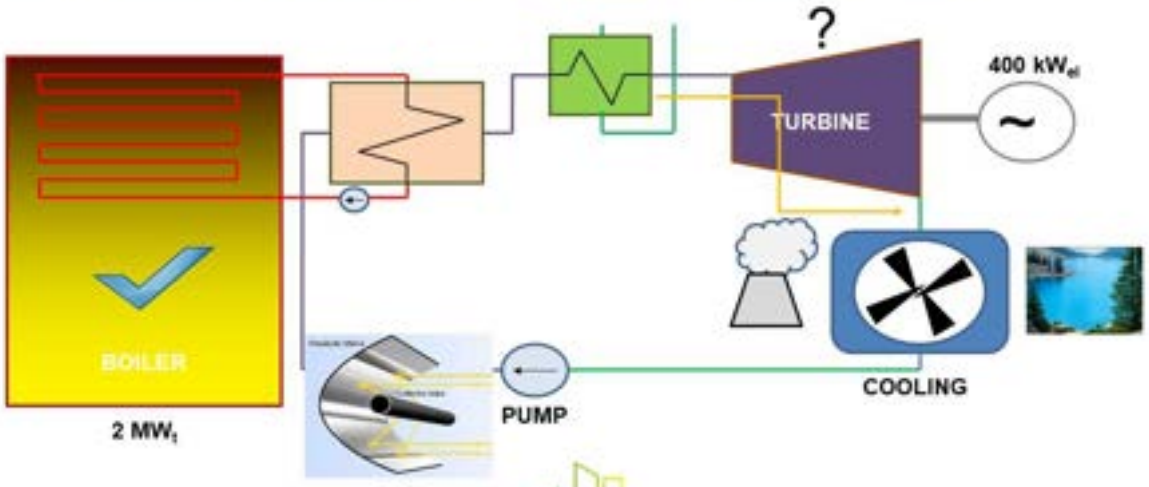
Pros (+)	Cons (-)
Easy to operate and maintain, as they run at low pressure	High initial outlay
Reasonably scalable for smaller applications	Low electrical efficiency
Reduction of fossil fuel consumption	Can only provide heat at a maximum of 90°C

PRINCIPLE OF OPERATION: based on a closed-loop thermodynamic cycle for the generation of electric and thermal power, especially suitable for distributed generation; it can generate electric and thermal power exploiting multiple sources, such as renewables (**biomass**, geothermal energy, solar energy), traditional fuels and waste heat from industrial processes, waste incinerators, engines or gas turbines.

2 TECHNOLOGIES – POLYGENERATION UNITS ORC Power Plants

Graphic scheme of ORC Power Plant:

2 TECHNOLOGIES – POLYGENERATION UNITS: ORC – CYCLE – EXAMPLE FROM LODZKIE VOIVOIDSHIP: BIOMASS BOILERS FEED WITH STRAW



2 TECHNOLOGIES – POLYGENERATION UNITS: BIOGAS PLANTS

Pros (+)	Cons (-)
Possibility of fertilizing agricultural fields with fermented sludge	High investment outlays
Reduction of fossil fuels consumption	Odor pollution of local atmosphere
Reduction of greenhouse gases emissions	Need for continuous access to substrates
Management of local waste materials	Seasonality of access to some substrates
Diversification of energy sources (increasing energy security)	Risk of an explosion in the case of unsealing of the biogas installation

PRINCIPLE OF OPERATION: the anaerobic (in the absence of oxygen) fermentation of the biomass (organic matter) in presence of water; the main product of the reaction is methane and carbon dioxide.

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2 TECHNOLOGIES – POLYGENERATION UNITS: BIOGAS PLANTS

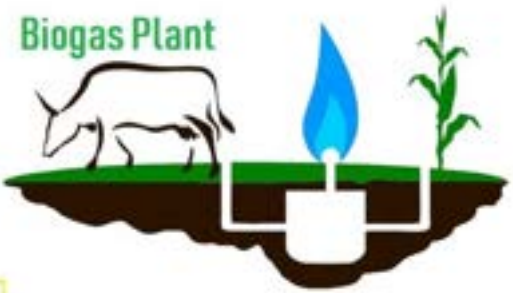
Biogas: Flue gas formed from the decomposition of organic matter (biomass).

The **main compound**, that gives it its energy value, is **methane, CH_4**, which accounts for 50-75% of the gas.

Most of the rest is carbon dioxide (CO_2), but it often contains other compounds, which act as impurities and may need to be removed, depending on the end use.

Biogas is produced in the absence of oxygen by the action of different types of bacteria, a process known as **anaerobic digestion**.

Sources of biomass for biogas: sludge from wastewater treatment plants (WWTPs); municipal solid waste (MSW) from landfills and dumps; manure, slurry and slurry from livestock operations; the remains of agricultural or industrial activity; and energy crops. These materials are often referred to as organic substrate



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2 TECHNOLOGIES – POLYGENERATION UNITS: BIOGAS PLANTS

Biogas applications: in boilers, to produce heat, as fuel for transport vehicles, in engines or turbines to generate electricity, purified for feeding into natural gas networks, or as a base material for the synthesis of methanol, a high value-added product.

An important by-product is digestate (or "digested sludge"), a liquid or solid material that remains at the end of the process. It is used as a fertilizer and soil improver because it contains nitrogen, phosphorus, potassium, calcium and other elements.

Biogas upgrading consists of a treatment operation to improve and enrich the methane present in the biogas with the aim of using it for injection into the network or for the production of LNG (Liquefied Natural Gas). Generically, the following processes are usually contemplated.

- Improvement of the concentration of the biomethane present in the biogas by separation of CH4 and CO2.
- Removal and extraction of water
- Cleaning of the biogas by removing H2S (hydrogen sulphide), VOCs (volatile organic compounds) and siloxanes

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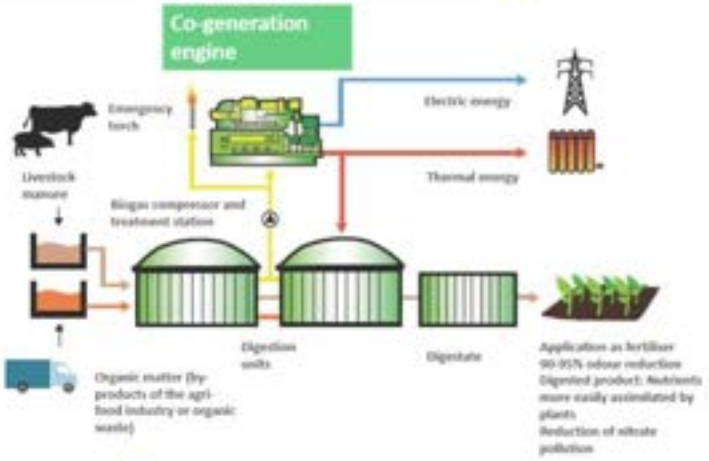
2 TECHNOLOGIES – POLYGENERATION UNITS: BIOGAS PLANTS

Biogas plants have very diverse designs, but in simplified terms they consist of the biomass reception facilities, the biodigesters or reactors where the anaerobic process takes place, the biogas and digestate storage structures, and the equipment for the generation of electrical or thermal energy.



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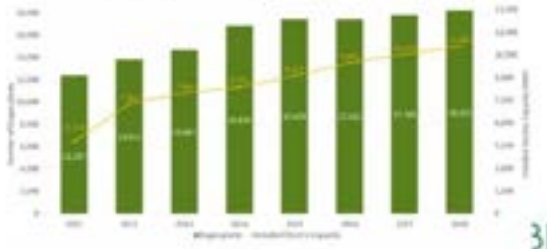
2 TECHNOLOGIES – POLYGENERATION UNITS: BIOGAS PLANTS

Division Criterion	Description
Process Temperature	Thermophilic (55-60°C), Mesophilic (34-37°C)
Dry Matter Content in the Substrate	Wet Process (<15% d.m.), Dry Process (>20% d.m.)
Material Filling Mode	Continuous, Quasi-continuous, Discontinuous
Type of Organic Matter	Agricultural Waste (Plant/Animal Production), Industrial Waste (Food, Paper, Biochemical Cosmetic Industries) , Municipal Waste (Food Scraps, Sewage Sludge)

Development of biogas plants:



Number of biogas plants in EU per 1 Mio capita:

ENCE BIOMASS PLANT

- ENCE has the largest biomass plant in Spain, located in Huelva, and is capable of producing 46MW of biomass fuel from agricultural and forestry by-products from areas close to the facility.
- This emblematic biomass power plant is considered one of the largest biomass plants in Europe. It came into operation in December 2012, and since then it has been providing a large part of the energy needed by the city of Huelva (Andalusia).
- The Huelva biomass plant has a grid export capacity of 299,000 MWh, which means the generation of more than 400 million kWh/year. This amount of energy covers the electricity consumption needs of more than 56,000 people.
- This plant consumes about 500,000 tons of biomass per year to produce 180 tons/hour of steam at 100 bar pressure and 500°C temperature.
- The plant includes the non-catalytic selective reduction system. This advanced system reduces nitrogen oxide emissions into the atmosphere. Other technologies used in this magnificent biomass power plant include: an electrostatic precipitator for capturing combustion gases at the boiler outlet, fluidized bed technology for the boiler, and the use of natural gas as an auxiliary fuel for one-off operations.

SORIA DISTRICT HEATING

- More than 28 kilometers of pre-insulated two-way pipe network under the streets of Soria to provide service to 16,000 Soria residents.
- 24-hour control center for alarms and emergencies. The only warning system with permanent assistance.
- First Heat Network in Spain to connect all its customers via optic fiber. Optimization of the operation of the network, early detection of faults.
- More than 16,000 Soria residents and a dozen public buildings connected to the Urban Heat Network in 2015. Commissioned on 8 January 2015.
- More than 8,000 homes and 30 non-residential buildings (public and private).
- Three 7MW boilers, 21MW in total.
- 5,000 m3 buffer tank which, together with a double pumping system, manages to bring heat to all points of the network.
- The network generates 80 million kWh/year, which replaces more than 8 million liters of diesel and almost 1 million m3 of natural gas every year.
- It avoids the emission of more than 16,000 tones of CO2/year.
- Minimum average reduction of 10 per cent in the Community of Owners' heating and DHW bills.

VILAFRANCA INITIATIVE – VINEYARDS4HEAT

- Virtuous Circle of the Vineyard (VVC) implemented with:
  - 2 wineries and 4 public facilities running with hot water produced from vineyard biomass.
  - 7 new jobs created
  - 800 people benefiting directly from the energy supply system
  - Mobilization of 3,5 M € of investment (energy supply system) Creation of a new local economy and energy model.
- A DH was made that is currently working giving heat to 5 buildings, and a couple of years ago a branch was made to a health centre that worked 24 hours a day, which is very important for the boiler. Some municipalities in the surrounding area have installed biomass boilers. One of the big handicaps of these initiatives is that they require a lot of maintenance work, which in comparison to the comfort of natural gas or other traditional heating means, they lose out.
- 500 kW boiler.

VALDEMINGOMEZ BIOGAS PLANT

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VALDEMINGOMEZ BIOGAS PLANT

- The Valdemingómez Technology Park e urban waste treatment facilities from Madrid.
- Three treatment centers: Las Dehesas, La Paloma and Las Lomas. The first two are two biomethanisation plants.
- Biogas is produced and then part of it is transformed into biomethane. 18,9 MW cogeneration plant that is fueled by biogas.
- One of the first and the largest biogas plants in Spain to inject biomethane into the conventional gas grid. Its measured operating capacity is 4,000 Nm³/h, and the processes of methane concentration, drying, compression, odorization, desulphurization and purification take place there.
- The biogas produced and treated in the Valdemingómez plants has a dual use: on the one hand, it is used as biofuel and, on the other, it is used to produce electricity.

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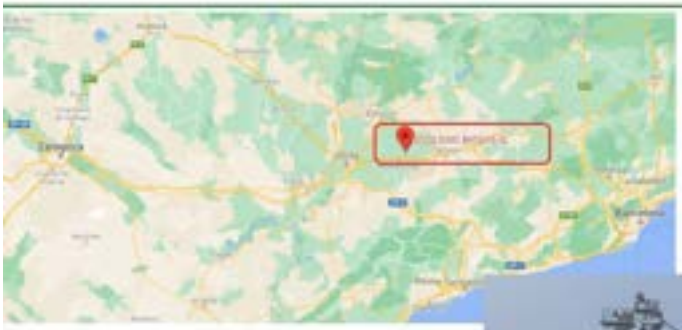
VILA-SANA BIOGAS PLANT

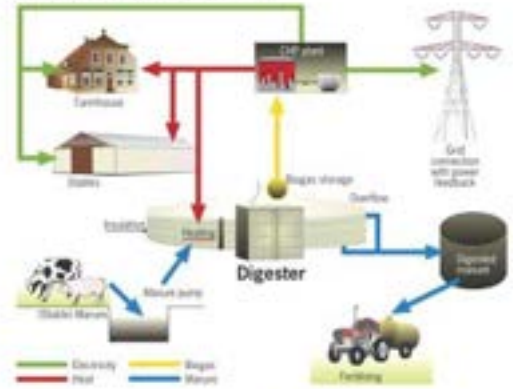


VILA-SANA BIOGAS PLANT

- Built in 2018. Upgrading unit built as part of the Life Methamorphosis project, located in an agro-industrial biogas plant in Catalonia.
- The technology used for methane purification is membrane technology and the capacity of the plant is 170-214 Nm^3/h of biogas with an input quality for upgrading:
- It can produce 100-135 Nm^3/h of biomethane with an output quality:
  - $CH_4 \geq 95\%$
  - $CO_2 \leq 2\%$
  - $H_2S \leq 5$ mg/Nm^3
  - Siloxanes ≤ 10 mg/Nm^3
- Other parameters according to regulations
- The agro-industrial biogas plant digests pig slurry, agro-food waste and sludge to generate fuel. The biomethane is planned to be injected into the natural gas network and is currently feeding two SEAT vehicles.

2 TECHNOLOGIES – POLYGENERATION UNITS: BIOGAS PLANTS

Elements of exemplary biogas plant:



Module 2: Policy relevant materials

MODULE II - POLICY RELEVANT MATERIAL: GENERAL OBJECTIVES

General Objectives:

Main Goals of RESCOOPS in EU -> Empowering citizens:

- Energy communities are an effective tool to increase public acceptance of new projects
- Energy communities are a tool to mobilise private capital for the energy transition
- Energy communities could be a tool to increase flexibility in the market

ENERGY COMMUNITIES – THE LEGAL FRAMEWORK

RED II - Recast of the Renewable Energy Directive.

- Approved by the EP plenary session in January 2018.
- Main changes regarding bioenergy are mentioned in Annex IX: under a 14% transport sub-target there is a dedicated target for advanced biofuels produced from feedstocks (a share of final consumption of at least 0,2 % in 2022, at least 1 % in 2025 ahd at least 3,5 % in 2030).
- By 2030, EU should boost energy efficiency by 35%
- Renewable energy sources should account for 35% of total consumption
- MEPs vote to ban palm oil in biofuels from 2021

Underpinned by the 2030 Climate and Energy Framework from 2014

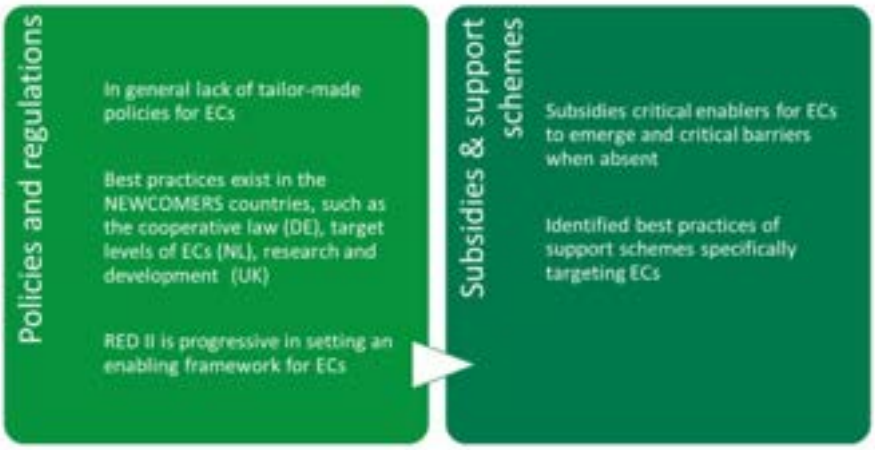
- Builds on the 2020 climate and energy package, and sets three key targets for the year 2030:
- At least 40% cuts in greenhouse gas emissions
- At least 27% share for renewable energy
- At least 27% improvement in energy efficiency

Other relevant legislation

- **EU Biodiversity Strategy 2030.** The main objective is to "put Europe's biodiversity on a - path to recovery by 2030". Highlights the need to assess the biodiversity and climate risks of the EU and global biomass supply
- **EU Bioeconomy Strategy.** providing concrete measures to scale up the bio-based sectors. Recognizes and acknowledges the ecological boundaries of the bioeconomy
- **The EU Taxonomy for Sustainable Finance**
- **Land Use, Land Use Change and Forestry Regulation (LULUCF).** Accounts for carbon emissions from biomass harvesting in land use.
- **EU Forest Strategy for 2030.** Need to sustainably manage forests to support biodiversity goals alongside the development of the circular bioeconomy.
- **Governance Regulation and National Climate and Energy Plans (NECP)**

(source: IEEP, 2021)

Institutional and policy factors relevant to Energy Communities



Source: Palm, 2021

Biomass in the EU Green Deal

- As a part of the European Green Deal, the European Commission raises the prospects of increased reliance on biomass sources for energy
- Recognition in the EU's bioeconomy strategy that the EU bioeconomy and use of biomass for energy needs to be sustainable and operate within ecological limits (IEEP, 2021).
- Shift towards growing woody biomass on cropland in a sustainable manner, including as a feedstock for advanced biogas and biofuels (Fleming and Mauger 2021).
- Just Transition Fund: align and minimise the negative effects of structural changes

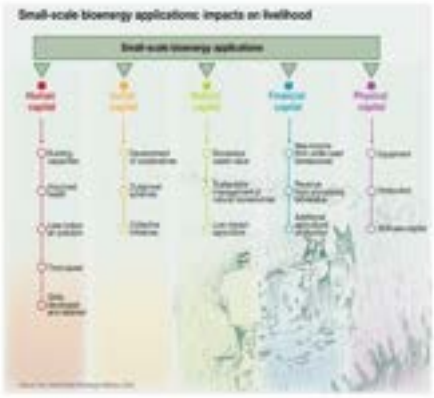
Source: Land Rover Our Planet

Further legislative and policy developments

- BeCoop analyses for D1.2
- Results of 2018 'trilogue': Clean Energy Package provisions should be made consistent with those in the Renewable energy Directive by aligning:
  - Definitions of 'renewable energy communities' and 'renewables self-consumers';
  - A right to participate as an active customer or in an energy community without losing consumer rights;
  - A right to access all suitable markets without discrimination or disproportionate treatment;
  - A right to sell energy through suppliers and peer-to-peer energy sharing;
  - Acknowledgement of the value that citizens and communities can bring to the energy system and the environment in network charges and remuneration they receive.

ENERGY COMMUNITIES - BENEFITS

- **Enhance access to new forms of financing** and allow individuals to benefit financially from renewable energy projects.
- **Wider Community Benefits** through community donations or job creation
- Improve the **local acceptance of renewable energy** projects
- **Empowerment of the community** in the development in their area
- **Profits** stay within the community and create local **value-added cycles**



Source: GRID-Arendal

3 DESCRIPTION OF THE KEY FACTORS: POLITICAL, ECONOMIC

Political aspects:

Highly used by polish society and stable policy towards energy efficiency and thermo modernizations is supported by national programs such as NFOSiGW National Fund for Environmental Protection and Water Management– **"Clean Air", "My Electrical Energy").** The innovation in this area is also supported by governmental institutions such as National Center of Research and Development (NCBR), which deliver programs such as "Fast Tract to Innovations" for **"Heating Devices", „Heat Storage Systems".** There are also policies at a local and regional level, such as the resolution in Śląskie voivodship. This resolution focuses on decreasing smog and forces to change the old, inefficient, highly polluting heating sources in favour of new low emission solutions. **Polish RES Act supports innovative biofuels such as stated in the Art.** 1. 4b) **biochar** – "a high-energy solid fuel with a calorific value of not less than 21 GJ/t produced in the process of thermal processing of solid substances of plant or animal origin, yielding biodegradable and derived from: (a) products, waste and residues from agricultural and forestry production and the industries processing them products b) parts of waste other than those referred to in point a, which are biodegradable, excluding waste from waste treatment installations and wastes from water and sewage treatment within the meaning of waste regulations - with the process taking place at 320-700 ° C in an anaerobic atmosphere or at significant temperatures oxygen deficiency and near atmospheric pressure without the use of catalysts or substances foreign; "

Economic aspects:

Very High investment and/or operational costs of renewable heating sources (in comparison to standard coal boilers) forces the operating bodies to use investment support (in many cases investor will not invest in DHC infrastructure without financial support). Very expensive investment and operation and maintatance costs of modern RES and hybrid (PV+Heat Pump+Biomass Boiler+Heat Storage)

Module 3: Business and Innovation aspects

Objectives

- ✓ Prepare Energy Communities for accessing finance
- ✓ Learn to analyze the basic Business Models for RESCoops
- ✓ Understand the Basic elements of business planning
- ✓ Prepare Energy Communities for accessing finance

Objectives

- ✓ Prepare Energy Communities for accessing finance
- ✓ Learn to analyze the basic Business Models for RESCoops
- ✓ Understand the Basic elements of business planning

1. Accessing Finance for Bioenergy Community Projects

- Two interrelated aspects:
  - Financing
  - Ownership
- Need for tailored advice and expert financial expertise on per project basis

2. Main financial solutions for bioenergy projects

- ***Self-financing:*** it concerns the shares acquired by members and/or the loans from members
- ***Crowdfunding***: an alternative form of funding attracting
- ***Bank Loans*** from traditional and/or cooperative and ethical banks
- ***Public funding*** in the form of subsidies and grants in capital and/or in investment from public funds (national and international)
- **Capital and/or investment** support from private funds
- **Venture capital** from RESCoops developers

Self-financing

- Project capital is raised from the members of the RESCoop (existing or new)
- The capital is raised in the form of equity, bonds or debt
- An annual share interest on that equity, relative to available profit is paid
- Projects may also combine equity and debt in the same way as a privately funded scheme.
- Members are given a single vote, no matter how much they invest in equity (no impact on democratic control)

Crowdfunding

- A form of crowdsourcing usually through open calls to the wider society to finance projects using internet platforms
- Through open Calls that state the funding needs and the benefits - purposes of the project aim to appeal both to small investors and environmentally aware citizens
- Crowdfunding campaigns aim to attract small individual contributions coming from the wider society, beyond local, or even national borders
- Crowdfunding platforms:
  - www.greencrowding.com
  - www.oneplanetcrowd.com
  - https://www.lumo-france.com
- Helpful material and guidelines about crowdfunding can be found at: http://www.crowdfundres.eu/

Bank loan (traditional and ethical banks)

- It is a financing in debt which requires guarantees and the payment of interests.
- The RESCoop should be ready to:
  - Describe why the funds are needed
  - state the amount needed for the project
  - Explain what will be achieved with this money and how the project will produce revenue
- The repayment terms of the loan as well as the years of repayment (time, interest rates)
- What are cash flows and how do they prove viable?
- The asset/collateral given as a guarantee (land, guaranteed feed-in tariff)

Ethical or not traditional banks

- Ethical Banks: aim for the allocation of funding towards investments for the common good by reallocating its forms of credits and the funds it collects to cultural, social and environmental projects rather than the exclusive pursuit of short-term profit as the only objective
- FEBEA is the European Federation of Ethical and Alternative Banks and Financiers. It gathers 33 financial institutions from 15 countries in Europe, with the aim of developing and promoting Ethical Finance principles.
- Learn more about FEBEA members in your country at: https://febea.org/

Public Funding

- Public funding programmes are in place in EU countries to support the development of RES and provide financing projects.
- The equity and debt financing mechanisms such as grants and loans through public institutions are part of specific national or regional programs that aim at directly financing projects during the construction and start-up phases of the initiatives

Joint ventures

- A joint venture refers to the creation of a partnership or conglomerate, in which different entities combine their assets (Capital, expertices etc)
- A new entity is created to share risk or expertise on a temporary basis or project basis
- The venture is regulated by a legal contract between the parties
- The return on investment will depend on the terms of the agreement between the parties reflecting their contribution

2. Business Models and the Business Model Canvas

- The purpose of a business model is to clarify how a **business creates, delivers, and captures value**
- **Innovation** can broadly be defined to include new forms of **economic, social and environmental value creation**
- RESCoops business models act as drivers for **innovation in the energy transition**
- The business model canvas is a common framework for **creating and evaluating a business model**.

Business Model Canvas Elements

The business model canvas consists of **9 blocks**.

- Each block should describe how an organization or business model should handle the different opportunities and
- threats that can occur in the given block

The 9 elements provide a coherent view of the business' key drivers

1. Customer Segments: Who are the customers? What do they think? See? Feel? Do?
2. Value Propositions: What's compelling about the proposition? Why do customers buy, use?
3. Channels: How are these propositions promoted, sold and delivered? Why? Is it working?
4. Customer Relationships: How do you interact with the customer through their 'journey'?
5. Revenue Streams: How does the business earn revenue from the value propositions?
6. Key Activities: What uniquely strategic things does the business do to deliver its proposition?
7. Key Resources: What unique strategic assets must the business have to compete?
8. Key Partnerships: What can the company not do so it can focus on its Key Activities?
9. Cost Structure: What are the business' major cost drivers? How are they linked to revenue?

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BMC for RESCoops

- Key partners involve the most leading members of the community profile, either person or entities (NGOs, associations, local or regional government etc)
- Key activities mainly concerning the ways that the Energy Community utilises renewable energy to the local markets and its stakeholders (electricity generation, heating etc)
- Key resources are dealing with the renewable energy sources and their core technologies that are usually implemented within the community projects (e.g. electricity generation connected to the grid, electricity generation for self-consumption)
- Value propositions have to do with the possible utilisation pathways of the produced renewable energy or the community activities.
- Customer segments include the potential stakeholders as beneficiaries from the community actions and projects.
- Cost structure includes the possible available financial and funding resources at which the community operates. It also comprises the most relevant Capital and Operational Expenditures within the community activities.
- Revenue streams refers to all the possible pathways that can bring value to the community within its activities and projects.
- Environmental benefits as an outcome of the community actions respecting the local/national ecosystems.
- Socio-economic benefits to the local and national societies and other communities.

BEcoop

Local integrated group of citizens

Regional-national RESCoop

Network of RESCoops

Multi stakeholder Governance Model

Introduction to Business planning

- ✓ Understanding and making a Business plan
- ✓ The components of a Business plan
- ✓ Addressing potential financiers

Structure of the Business plan

1. Executive summary
2. Business Description
3. Products / Services
4. Marketing Plan
5. Operational Plan
6. Operations and Management
7. Financial Plan

Business Description

Business Description

- What form of business are you in?
- What type of business is it (e.g. manufacturing, consulting, reselling, services)?
- Is it a new business, an expansion of activities, franchise?
- What is your product or service?
- What are the strong points ?
- What are the competitive advantages ?
- What is the marketing plan?
- Which are the links / network etc

Products' – Services' description

Products and Services

- How will the products be made or the services performed?
- What will they do for the customers/clients?
- What is different about the product or service your business is offering?
- What value do you add to your product?
- What is it that separates your company from the rest of the pack?

Marketing Plan

The Market

Provide a brief description of the market you will be competing in What are the key drivers, trends, and influences in the market?

- To whom do you market your products and services?
- How will you educate your customers to buy from you?
- Who is your target market?
- What will be your market strategy

Operational Plan

Operations is defined as the processes used to deliver your products and services to the marketplace and can include manufacturing, transportation, logistics, travel, printing, consulting, after-sales service, and so on.:

- Are your **staffing requirements** aligning with the rest of the industry, is your pay and benefits package appropriate?
- Have you contacted **suppliers and distributors** and decided which you will choose?
- Have you prepared a **contingency plan** if some difficulties should occur?
- What **facilities and equipment** do you require? How much does they cost?
- What **inventory** will you have on hand? Where will you keep it?

Management structure

Management Team

The quality of a company's management team is one of the best predictors of success. Can the current management team reach the desired goals set by the business?

- What about the future **needs of management**, will you hire new team members? What if a member of your management team leaves?
- What is the **chain of command**?
- Why did your **current management** leave their previous position?
- What will be the main **duties of each individual member** of management?

Financial Summary

The financial section of the business plan will help you and potential investors (or loan officers) estimate **how much money will be required** and **how much profit and sales will be generated**. Be sure to answer the following questions that are usually asked by potential investors:

- Have you stated your **break-even point**?
- What are the **potential problems** you are certain your business will face and what are the **solutions** to these problems?
- Are the **balance sheet** and **income statement** completed?

Capital Requirements

Clearly state the **capital needed** to start or expand your business

Describe **why you need the funds** and why the opportunity is exciting

Investors and loan officers want to know **when they will get their money back**, so be sure to explain how and when they will recoup their investment or when you will repay the loan. If the loan for initial capital will be based on security instead of equity, you should also specify the source of collateral.

When addressing the Banks!

The Plan should include:

- The loan amount the business needs
- The way the loan money will be used
- What will the business achieve with this money
- How this money will make the business profitable and stronger
- The repayment terms of the loan as well as the years of repayment (time, interest rates)
- What are cash flows and how do they prove viable?
- The asset given as a loan guarantee

When addressing investors!

The Plan should include:

- The required short-term and long-term (in two to five years) funds
- The way the funds will be used
- How will this money contribute to the growth of the business and make it profitable?
- Estimated return on investment (ROI, etc.)
- Exit strategy for investors (refund or sale)
- Ownership percentage that will be available to investors
- Milestones or terms that the company will accept
- Financial statements to be provided
- Investors' participation

3 DESCRIPTION OF THE KEY FACTORS: SOCIAL, TECHNOLOGICAL, LEGAL, ENVIRONMENTAL

Social aspects:

Polish nationwide supporting programs and high media coverage slowly **increases the energy and environmental awareness of local communities and rescoops**. This is happening due to the fact that it is followed by growing number of specialists in the field of renewable energy and efficient technologies. Those factors increase social acceptance and support for innovative efficient investments.

Technological aspects:

Since 2022 a several new solutions for **high calorific low emission biomass fuels are tested in Poland**. Rising number of RES such as PV is significantly increasing on the market making investment and maintenance cost of those technologies lower. Lack of space for retro-fitting coal-fired plants with polygeneration unit **(lack of space for biomass logistics, biomass storage and for heat storage systems).**

Legal aspects:

Good changes in Ministry of Energy – which since 2019 start to listen scientifi advisory boards: biomass, hydrogen and other RES grups (KIS - **National Smart Specialization** network working with Ministry of Development, new KIS groups: Cricular Economy Gruop), stable regulations concerning innovative biomass fuels, thermal standards for buildings and PV installations enables higher market uptake of such solutions. The BAT standards force ineffective heating sources to modernize. Moreover the availability of additional funding for efficient district heating and cooling networks supports more investments in RES and cogeneration in this sector.

Environmental aspects:

Air pollution in many polish cities and regions calls for urgent actions!: the worst air quality is in: Nowy Targ, Pszczyna, Nowa Ruda, Goczałkowice Zdrój, Myszków, Nowy Sącz, Oświęcim Skawina, Sucha Beskidzka, Zgierz, Zabierzów, Rybnik, Zawiercie, Żywiec, Radomsko, Racibórz, Wodzisław Śląski, and from the bigger cities: **Katowice, Wrocław, Kraków, Poznań, Warszawa had the worst air quality in the year 2021.** Smog is one of the most important issues concerning environment protection and health in Poland. Innovative and sustainable solutions for district heating can be a very good response to those kind of problems. According to the authors of the study, Poland is the infamous leader in terms of deaths from smog in Europe. The share of **deaths related to air pollution is 23.8%, which translates into 93.842 deaths per year!**

Module 4: Stakeholder engagement

MODULE 4

STAKEHOLDER ENGAGEMENT

RESPONSIBLE PARTNERS:
CBS

MODULE IV - STAKEHOLDER ENGAGEMENT:

GENERAL OBJECTIVES: 1. Knowledge transfers:

- What is stakeholder engagement
- How to identify and prioritise stakeholders
- Ways to involve a community in bioenergy projects
- Barriers and benefits of a successful stakeholder engagement

TABLE OF CONTENTS

Please, provide/add materials for 15 minutes of presentation,

Do not forget to refer also to elaborated materials or toolkits (if applicable) - during the presentation we should „click" to reach the toolkit and describe how it works !!

Be creative and smart here

What are Stakeholders and Stakeholders Engagement?

Definitions

"Any group or individual who can affect or be affected by the achievement of an organization's objective" (Freeman, 1984)

- **Stakeholder**: Anyone that has some sort of interest or concern about a bioenergy project from suppliers, investors, customers, authorities, regulators to the general public
- **Stakeholder Engagement:** is the systematic and the conscious process of positively engage and involve stakeholders throughout the project life cycle in order to align its goals with stakeholders' expectations

MODULE 4 – STAKEHOLDER TYPES

Stakeholders types	
Unaware	Unaware of a project's existence
Reluctant	Aware of a project, but hesitant to change
Neutral	Aware of a project, but not fully understand or like it
Supportive	Like and support a project and potentially create an impact
Leading	Actively participate in a project's success

Lead types of stakeholders in the Pilot Area

Main Engagement actions that could mobilize local populations around the concept – Biomass Owners, Biomass Management Companies

Example: Local Farmer, Planter

- Income from the sales of biomass
- Low expense on the transport of biomass
- Ensuring continuity of supplies
- Management of post-harvest residues
- Local use of the raw material

Example: Company that produces pellets / briquettes

- Additional income
- Additional advertising of services
- No need to import raw materials
- Ensuring permanent cooperation
- Synergy of financial profits and work for the local community

Main Engagement actions that could mobilize local populations around the concept – Equipment Manufacturers, ESCOs & Installers

Example: Producers of pellet boilers (Town and commune of Pleszew)

- New customers (additional income)
- New cooperation market
- Ensuring continuity of supplies
- Possibility of future servicing of boilers
- New advertising opportunities

Example: Local companies offering energy-related services

- New customers (additional income)
- New order options, audits, reviews
- New cooperation market
- Orders related to the reconstruction of infrastructure
- New advertising opportunities

Main Engagement actions that could mobilize local populations around the concept – Cooperatives, Public Institutions

Example: Energy Clusters in Poland, Energy Co-operatives

- Independence from energy supplies
- Deciding on your own energy capabilities
- Partnering and the use of local raw materials
- Support for local businesses
- Financial savings

Example: National Agricultural Support Center, Lower Silesian Chamber of Agriculture, Oborniki Śląskie Forestry Inspectorate

- New jobs creation
- Use of raw materials / surplus raw materials
- Greater activation of local forestry / agriculture
- Ensuring energy security for residents
- General development of the region

Main Engagement actions that could mobilize local populations around the concept – Research Centre/Universities, Investors

Example: Wroclaw University of Life Sciences and Environmental, Institute of Rural Development and Agriculture of the Polish Academy of Sciences

- Offering technical support
- New areas of research
- Possibility to apply for grants and projects
- Performing physicochemical tests on request

Example: Housing Communities, Private Companies, Private Investors, Farms

- Income opportunity
- Synergy of financial profits and work for the local community
- Ensuring long-term cooperation
- New cooperation market

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Main Engagement actions that could mobilize local populations around the concept – End Users (Consumers of Biomass)

Example: Households, schools, multi-family buildings, housing cooperatives

- Cheap source of heat (savings)
- Provision of biomass supplies
- Ecological source of heating
- Synergy of financial savings and work for the local community
- Limiting the possibility of energy poverty

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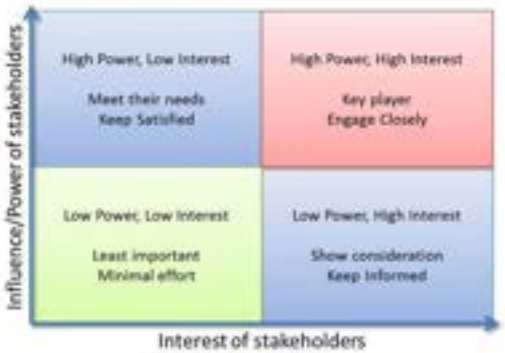
MODULE 4 – STAKEHOLDER ENGAGEMENT ACTIONS DEVELOPMENT

1. Stakeholder identification

- analysis and mapping of potential stakeholders based on type, interest and power

1. Stakeholder prioritization

- The grid helps to prioritize them based on their interest and power
- High effort & focus on key stake-holders



Source: Monday.com

MODULE 4 – STAKEHOLDER ENGAGEMENT ACTION DEVELOPMENT (continue)

3. Communications plan

- Type: what channels or means to be used
- Frequency: how often
- Content: what to communicate

4. Stakeholders' feedback incorporation

- Respect and take into account feedback from the stakeholders regarding the project

5. Monitor and report

- Regular and transparent sharing of information and updates back to the stakeholders

Source: Monday.com

General Stakeholder engagement & mobilization actions in bioenergy community projects

- **Regular personal meetings and small-scale events (offline & online)** with key stakeholders to keep them up-to-date
- **Warm-up events & information campaigns** to raise awareness around bioenergy communities
- **Community events (physical and online)** to identify the most suitable entities to represent and promote community bioenergy heating projects.
- **Info days, training workshops and open discussions** to, among else, define modes to remove or eliminate any legislation barriers that prevent the deployment of RECs etc
- **Emails/Newsletters to other relevant stakeholders** to keep them posted
- **SoMe outreach** to share updates on the project with other stakeholders (of lower interest)

E-Market Environment as a tool to Stakeholders Engagement in Bioenergy Communities

E-MARKET ENVIRONMENT

https://becoop.fcirce.es/emarket/

This tool, provided by BECoop project supports stakeholders when developing a community bioenergy project and defining the required services and activities for supporting their own cases.

Here, you will be able to identify other stakeholders to contact to carry out your project, see the experience of others and similar initiatives, etc.

The e-market environment connects supply chain stakeholders to support the creation and operation of new and existing energy communities.

MODULE 4 – What is STAKEHOLDER ENGAGEMENT

Definitions

"Any group or individual who can affect or be affected by the achievement of an organization's objective" (Freeman, 1984)

- **Stakeholder:** Anyone that has some sort of interest or concern about a bioenergy project from suppliers, investors,customers, authorities, regulators to the general public
- **Stakeholder engagement:** is the systematic and the conscious process of positively engage and involve stakeholders throughout the project life cycle in order to align its goals with stakeholders' expectations

MODULE 4 – STAKEHOLDER ENGAGEMENT & MOBILIZATION ACTIONS in BIOENERGY COMMUNITY PROJECTS

- **Regular personal meetings and small-scale events (offline & online)** with key stakeholders to keep them up-to-date
- **Warm-up events & information campaigns** to raise awareness around bioenergy communities
- **Community events (physical and online)** to identify the most suitable entities to represent and promote community bioenergy heating projects.
- **Info days, training workshops and open discussions** to, among else, define modes to remove or eliminate any legislation barriers that prevent the deployment of RECs etc
- **Emails/Newsletters to other relevant stakeholders** to keep them posted
- **SoMe outreach** to share updates on the project with other stakeholders (of lower interest)

MODULE 4 – BARRIERS TO A SUCCESSFUL STAKEHOLDER ENGAGEMENT

- Possible conflicting interests, benefits and consequences for each group of stakeholders
- Low levels of knowledge and social acceptance around bioenergy topics
- Different socioeconomic, technical and environmental factors
- Local cultural aspects
- And/or political perceptions

MODULE 4 – ENHANCEMENT STAKEHOLDER ENGAGEMENT ACTIONS

- Early and constant stakeholder participation and involvement in the design/planning stages
- Transparent communication systems, where all stakeholders can express their recommendations and concerns
- Educational strategies focused on renewable energy
- Visible and tangible compensation and/or profit sharing schemes

MODULE 4 – POTENTIAL BENEFITS OF STRONG STAKEHOLDER ENGAGEMENT

- Trust and acceptability development among stakeholders
- Understanding, accountability, transparency
- Decisions' durability and quality
- Promotion of social learning
- Local priorities and needs more likely to be met
- Non-scientists can provide non-technical information in the decision-making process
- Sustainability and resilience
- High possibilities for a successful development and implementation of renewable energy projects

MODULE 4 – Real Cases of Stakeholder Engagement in Energy Projects - Kaunas, Lithuania

Type of RES	Mix - Biomass, Solar Heat
Involved Stakeholder groups	Internal: representatives from the municipality; fuel suppliers; heat producers and consumers External: professional heating and biomass associations; consultants; experts; scientists; consumers' rights bodies.
Stakeholder involvement: process	Between Sep 2015 - June 2016, five (5) stakeholders events took place Various events: to **inform, involve and discuss** the pilot project with the representatives from internal and external groups: spatial planning issues, conflicts while developing new and reconstructing old biomass boiler-houses, operating DH network, bioenergy development, spatial planning problems concerning different RE projects.
Stakeholder involvement: lessons learnt	• Some conflicts with the population easy to solve via discussions and some positive actions.Others with partners/independent producers are more complicated • Planning based on clear criteria should be introduced to avoid "chaotic" development • Introducing a new legal environment to heat producers solves some generation problems, but there are still conflicts in the activities of heat supply, which should be solved via discussions with authorities and among stakeholders.

Source: BEA-APP: Handbook of stakeholder engagement

MODULE 4 – Real Cases of Stakeholder Engagement in Energy Projects - Zealand, Denmark

Type of RES	Smart heating system: Surplus heat from a factory into large heat-pumps and onto the district heating system
Involved Stakeholder groups	Energy suppliers; utility company; energy distributors; energy consumers; representatives from municipalities; citizens; local investors and Roskilde University.
Stakeholder involvement: process	• In total, 8 stakeholders' events were held between May 2017 – February 2018. • Climate action, producing long-term political commitment and local political leadership • Local involvement - through the establishment of activities that have given insight into options for conversion of energy supply - open invitation to all interested parties in the municipality • Citizens' Meetings: Creating interest in being part of the energy transformation process • Citizens' Meetings: Suggestions and presentation of possible solutions (several public meetings) • Citizens' Meetings: Tent meetings, district heating festival, etc. At the festival all were offered a calculation of the expected heating costs, when connected to the DH system • Communication through two-step communication (through climate agents to the local community) • Pre-feasibility studies - presentation of solutions corresponding with expressed interests and wishes of the involved stakeholders.
Stakeholder involvement: lessons learnt	• Successful involvement of participants is mainly based on clear political commitment (municipal climate action plan and by training of local climate agents) • Continuous involvement is important • Broad involvement ensures comprehensive understanding

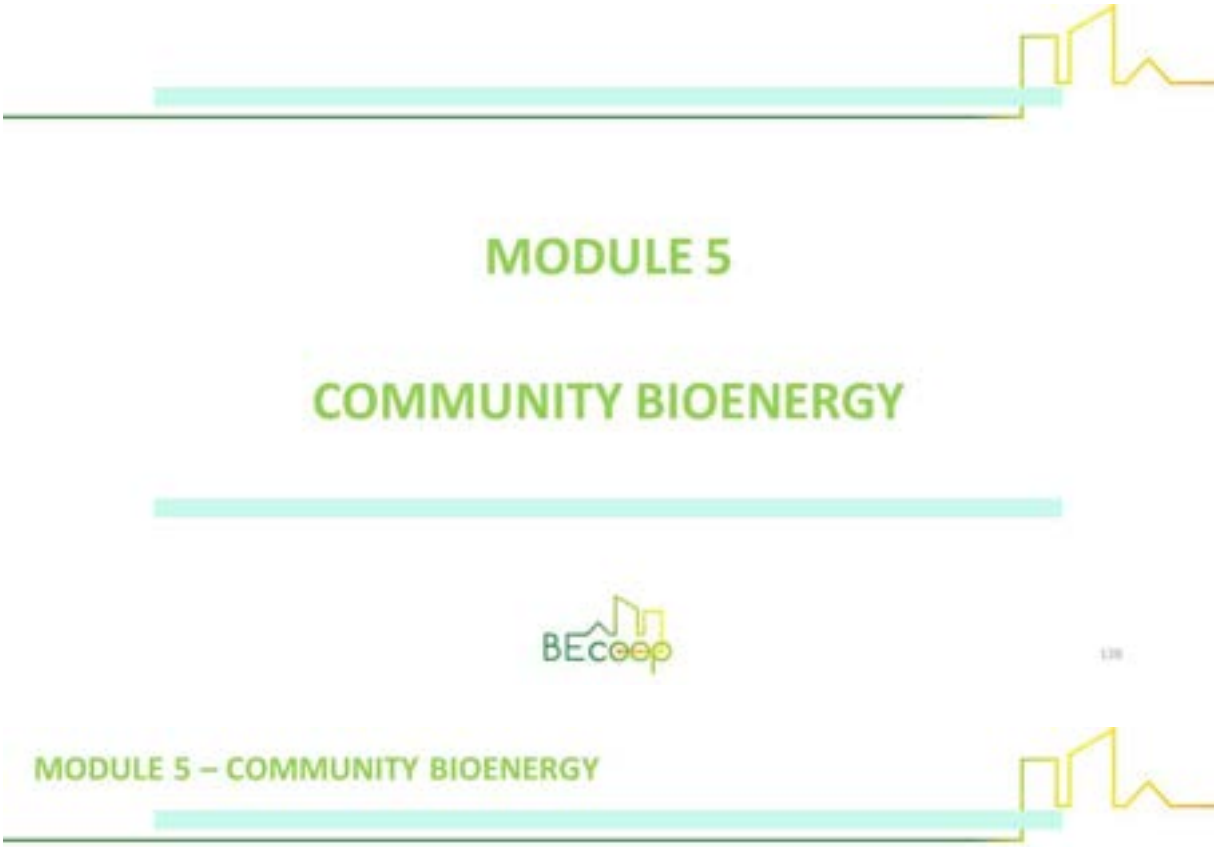
Source: BEA-APP: Handbook of

MODULE 4 – Real Cases of Stakeholder Engagement in Energy Projects - West Pomerania, Poland

Type of RES	RES Mix
Involved Stakeholder groups	Representatives of municipalities and counties of the Central Functional Zone; Regional Office for Spatial Planning of Westpomeranian Voivodeship (ROSPW); Representatives of planning offices and companies; Municipality of Połczyn-Zdrój; Westpomeranian University of Technology and external experts.
Stakeholder involvement: process	• In total, 12 stakeholders' events were held between August 2016 – August 2018. • A series of events were organised to inform, involve and discuss the pilot project and raise awareness • Individual meetings were held • A study visit of students and meeting with local and regional stakeholders (including the Voivodeship's Monuments Conservationists and the representatives of the heat plants) to agree on the project's results
Stakeholder involvement: lessons learnt	• Best practices can be used as examples of practical and location-based use of RES - a useful tool during the social awareness raising process • Practical results of the project should be discussed with all interested institutions, especially those responsible for spatial planning to prevent misunderstandings by them • The main issue in all projects is the financing. During most of the meetings, the stakeholders expected concrete suggestions about the financing sources • RES investments are risky due to the constant changes in the legal system in Poland • It is important to network stakeholders from different areas (e.g. heritage conservationists and representatives of the municipalities), so they can point out the problems and solutions on a neutral ground.

Source: BEA-APP: Handbook of stakeholder engagement

Module 5: Community Bioenergy



MODULE V - COMMUNITY BIOENERGY:

General Objectives:

1. Definition of energy /bioenergy community
2. Advantages
3. Limitations and Challenges
4. Legislation Framework
5. Legal Forms
6. existing RESCoop models

1. Definition of energy/bioenergy community

Energy communities can take any form of legal entity, for instance that of an association, a cooperative, a partnership, a non- profit organization or a small/medium-sized enterprise.

It makes it easier for its citizens, together with other market players, to team up and jointly invest in energy assets.

This in turn, helps contribute to a more decarbonized and flexible energy system, as the energy communities can act as one entity and access all suitable energy markets, on a level-playing field with other market actors.

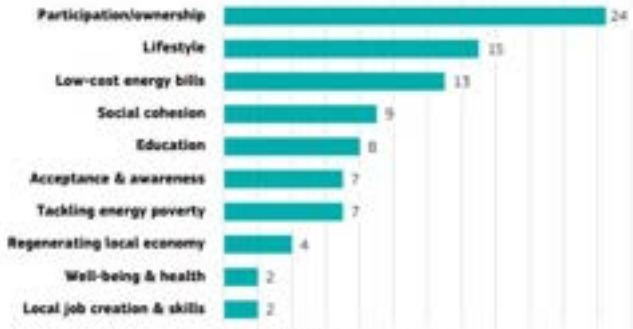
Source: https://energy.ec.europa.eu/topics/markets-and-consumers/energy-communities_en

2. Advantages

- local value
- organize collective and citizen-driven energy actions → social cohesion
- help pave the way for a clean energy transition
- move citizens to the fore → education and mobilization of citizens
- increase public acceptance of renewable energy projects
- make it easier to attract private investments in the clean energy transition
- have the potential to provide direct benefits to citizens by advancing energy efficiency and lowering their electricity bills
- provide flexibility to the electricity system through demand-response and storage

Source: https://energy.ec.europa.eu/topics/markets-and-consumers/energy-communities_en

2. Advantages



Source: JRC based on the case studies, 2019

Source: file://acsnet.it/Users$/240016/2400%602/Downloads/energy_communities_report_final.pdf

3. Limitations

On EU level

- the community has to be under effective control of shareholders and members located in the vicinity of the renewable energy projects
  - whose shareholders or members have to be natural persons, local authorities, including municipalities or SMEs
  - the primary objective is not a financial gain, but to bring environmental economic or social community benefits

In Italy

- users must be within primary energy
- the plants can have max. 1 MW of production capacity
- only 30 % of the power in kW of already existing plants can be integrated into the community project

Source: https://energy.ec.europa.eu/topics/markets-and-consumers/energy-communities_en

4. Legislation Framework

Clean energy for all Europeans package (CEP)

published in 2016 and completed in 2019

- set of eight legislative acts on the energy performance of buildings, renewable energy, energy efficiency, governance and electricity market design,
- EU has introduced the concept of energy communities in its legislation

The Renewable Energy Directive 2018/2001 (**RED II**)

Directive on common rules for the internal market for electricity 2019/944 (**IEM**)

Source: https://euagenda.eu/upload/publications/eges-bn2521662619-en.pdf

4. Legislation Framework

RED II: EU Directive 2018/2001	
established a common framework for the promotion of energy from renewable sources in the EU and set a binding target of 32 % for the overall share of energy from renewable sources in the EU's gross final consumption of energy in 2030. It also established sustainability and greenhouse gas emissions saving criteria for biofuels, bioliquids and biomass fuels and lays down rules on financial support to enhance the use of renewable energy usage. The REDII is a recast of the Directive 2009/28/EC (REDI). The recast was made as part of the 'Clean energy for all Europeans package'.	Renewable Energy Community (REC)
IEM: EU Directive 2019/944	
The directive on common rules for the internal market for electricity 2019/944 (IEM) includes new rules that enable active consumer participation, individually or through citizen energy communities, in all markets, either by generating, consuming, sharing or selling electricity, or by providing flexibility services through demand-response and storage. The directive aims to improve the uptake of energy communities and make it easier for citizens to integrate efficiently in the electricity system, as active participants.	Citizens Energy Community (CEC)

Source: https://euagenda.eu/upload/publications/eprs-bn2021662619-en.pdf

4. Legislation Framework

Through the "Clean energy for all Europeans package", the EU has introduced the concept of energy communities in its legislation, notably as **citizen energy communities** and **renewable energy communities**.

Citizen Energy Communities	Renewable Energy Communities
Common use of energy (also non renewable) on a nationwide level	Common use of locally produced renewable energy (also heat production through biomass), e.g. within a neighbourhood
Similarities	
• voluntary association of people, public entities or companies • common production and consumption of energy and distribution among members • No profit purpose	

Source: https://energy.ec.europa.eu/topics/markets-and-consumers/energy-communities_en

5. Legal Form

Possibile legal forms
Energy cooperative
Limited partnerships
Community trusts and foundations
Housing associations
Non-profit customerowned enterprises
Public-private partnerships
Public utility company

The majority of citizen-led initiatives are cooperatives:
- cooperatives are a type of social and economic enterprise that enables citizens to collectively own and manage renewable energy projects
- the distribution of profits is limited and surpluses are reinvested to support its members and/or the community
- the allocation of revenues from the projects is regulated by the statutes of the cooperative
- based on democratic governance - i.e. decisions made on a 'one member – one vote' principle

Source: file://aconet.it/Users$/240016/24001602/Downloads/energy_communities_report_final.pdf

6. Existing Rescoops

RESCoop.eu
is the European federation of citizen energy cooperatives with a growing network of 1.900 European energy cooperatives and their 1.250.000 citizens

Ecopower
Where: Belgien
Members: 60.000
Projects: production and distribution of energy and hear, EU—projects, research projects, production and distirbution of raw materials (e.g. pellets), creation of APP EnergieID

Module 6: Market Research

Objectives

- Raise awareness around the **importance of market research** for energy projects
- List the main **market research results in the BECoop pilot areas**
- Inform about the **ways that someone can conduct a short market research** in their area prior to the installation of an energy project
- Define which **factors can affect social acceptance** of energy projects and consumers' behavior

1. What is market research?

Market research, which includes social and opinion research, is the systematic gathering and interpretation of information about individuals or organisations using the statistical and analytical methods and techniques of the applied sciences to gain insight or support decision making.

The official ESOMAR definition

2. Steps in market research

3. Methods for market research

Primary research: Directly gathering new data from the targeted audience. There are different ways to obtain the data.

Secondary research: Acquire already existing data from relevant sources and databases (e.g Eurostat).

Methodology	Cost	Time	Comments
Secondary Research	Varies (depending on the dataset you want to use)	Medium	-
Surveys	Varies (cost can include participants incentives, survey distribution, survey's design	Medium	For large populations Specific questions
Workshops	Venue/platform, moderators	Medium	Good for deep research
Interviews	Free or low	Medium	Good for deep research and for specific topics

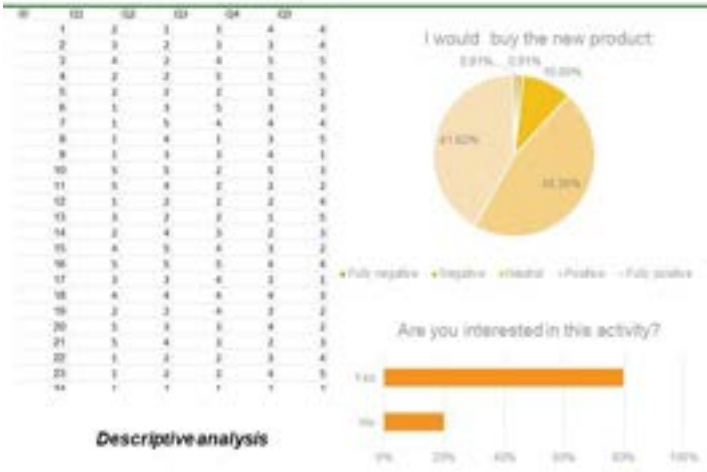
3.1.1 Survey

The question blocks of the survey will be preceded by an introductory section including:

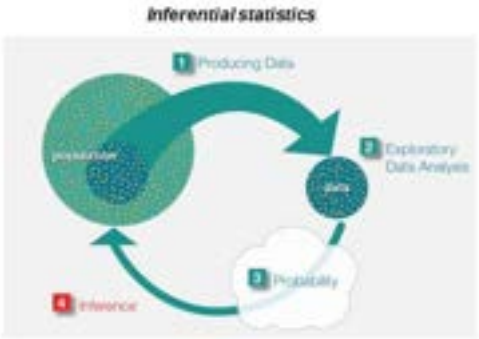
- An explanation of the purpose of the study
- An indication of the time it will take to complete the questionnaire
- An explanation of what the respondents will be asked to do
- A privacy notice, to ensure potential respondents can give informed consent

The questionnaire will be composed of a list of questions to be answered in various ways (binary, categorical, likert scales, nominal).

3.1.2 Descriptive analysis and Inferential statistics



Descriptive analysis



3.2 Workshop

Workshops' objectives are to:

- Collect useful insights on local perceptions towards the development of an energy project
- Identify existing perceptions of consumers and general public and capture the social dimensions that need to be further explored.
- Identify key factors, knowledge gaps, acceptance factors, opportunities and barriers

Possible Method	Description
Open (panel) discussion	A group discussion about a specific topic among a selected group of panellists, that allows its participants to share their views and opinions with other participants
Brainstorming session	A technique by which a group attempts to find solutions to a specific problem by amassing ideas spontaneously
KJ-Method	A technique to better organize ideas and deal with large numbers of participants
The Charette Procedure	A technique to solve more than one problem at a time
Focus Groups	Facilitated group discussion to explore issues in depth and seek views of particular interest groups
Fuzzy Cognitive Mapping Method	A semi-quantitative and dynamic method that aims to capture a person's perception of a particular issue

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3.3 Interviews

- Qualitative market research method
- Could be a free discussion or a highly structured interview with specific questions.

Tips

- Use simple language
- last maximum **1 to 1.5 hours**
- Keep questions short
- Avoid ask two questions at once
- Avoid questions that encourage a particular answer
- Use primarily open-ended questions but mixing in some closed and direct questions.
- Ensure that the questions mean the same thing to different interviewees.

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4.1 GDPR - General data protection regulation

- **Since 2018**
- **EU regulation** (directly binding) for how companies should use personal data
- **Personal data:** any information that can directly or indirectly lead to a living person.

- ✓ *Same law throughout Europe*
- ✓ *Processing data must have a specific/defined purpose*
- ✓ *Use must be legal*
- ✓ *Must respect individual's rights*
- ✓ *Data breaches should be reported within 72 hours*
- ✓ *Business should ensure that their suppliers are compliant with GDPR*
- ✓ *The sanctions are very significant and can even reach 20 million.*

4.2 GDPR - General data protection regulation

Research participants should be informed about the purpose of the activity and how their data will be used. In addition, research participants should sign a consent form.

Information that we should offer to the participants:

- ✓ *Information about the activity*
- ✓ *What the involvement require*
- ✓ *What we need from the participant*
- ✓ *What we will do with their data*
- ✓ *Any risks*
- ✓ *Access, deletion and consent withdrawal*
- ✓ *Who to contact*

5. Why is social acceptance important?

- Social acceptance is the approval by the public of a project or policy.
- Generally, across EU countries there is a high public acceptance around Renewable Energy (RE) technologies.
- The high-level support of RE as a technology is not always reflected in the degree of support faced by local projects.
  - RE and RE community projects are particularly susceptible to the NIMBY (Not In My BackYard) effect , employed to further explain public opposition.

6. Main factors affecting RE social acceptance

- *Trust:* Trust between local community and people leading the initiatives is fundamental for the development of the project.
- *Fairness:* is an additional factor boosting social acceptance around energy communities' projects. Such projects can develop fair, open and transparent processes as they are relying on democratic practices. The benefits should be equally contributed to the local community
- *Socio-Demographics:* Different demographic groups have different perceptions around energy projects. Therefore, a preliminary study of the composition of the local residents is pivotal in order to draw the most suitable strategy. For instance, younger or more educated people tend to be more positive towards green energy technologies.
- *Siting issues:* Local community may be hesitant regarding environmental or health impacts (e.g odour, noise, change in the landscape)
- *Ecological awareness, environmental beliefs and personality traits:* High awareness around environmental issues and climate change are connected with high levels of social acceptance around energy projects.
- *Knowledge and awareness around renewables and RE technologies:* Lack of knowledge is linked to low levels of acceptance. Bioenergy seems to be one of the "less recognisable" renewable energies.
- *Economic motives:* Energy bill reductions or local benefits such as the creation of new jobs can play a fundamental role for the acceptance of an energy project.

7.1 Example of local opposition (wind farms)

Little opposition: few individuals (press interviews etc.)

Moderate opposition: many individuals that participate in organized opposition actions

High opposition: many individuals supported by organized groups (lawsuits, political parties)

Wind Farm	Location	Scale	Developer	Level of Controversy	Status
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Wind Farm	Location	Scale	Developer	Level of Controversy	Status
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
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[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

7.2 Example of local opposition (Bioenergy plant)

Place: North Wiltshire , town of Cricklade

Company: Ambient Energy Ltd.

Project: a 5MWe wood gasification plant

Status: Failure of the project to gin planning permission.

Residents created a group - BLOT(Biomass Lumbered On our Town).They have also created a home page on the Internet. The main concerns of the residents were:

- Odour, dust, noise
- Long-term health impacts
- Affect the view and the landscape
- Negative effects on property prices in the area
- Not clear if a compensation would be provided to those affected

Explanation of the opposition:

- Unfamiliar with biomass energy
- Public mistrust

Anger over a 'blot on the landscape'

PROTESTERS against a controversial green power station were encouraging the people of Cricklade to make their feelings known by holding a letter-signing session in the town hall.

On Saturday, members of the pressure group BLOT (Biomass Lumbered on Our Town) invited people to sign one of two prepared protest letters against the proposed power station, or put pen to paper to make their own points.

One of the founder members of BLOT, Mike Toms, said: "I am not against the building of the power station, I just think it is in the wrong place.

8. Market research results in the BECoop pilot areas

8.1 Spain - Market research results

Drivers

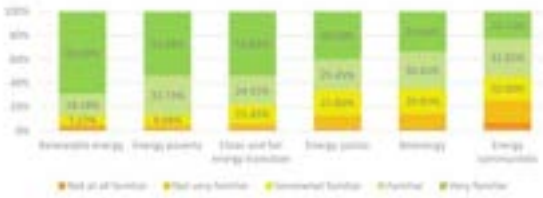
(i) reduction of energy bills for heating and creation of profit
(ii) citizens participating in decision making
(iii) open and transparent procedures

Awareness of existing community energy projects

Willingness to join

Barriers

(i) the complex regulatory and administrative procedures
(ii) the lack of public awareness
(iii) the lack of governance support



Familiarity with the terms

8.2 Greece - Market research results

Drivers

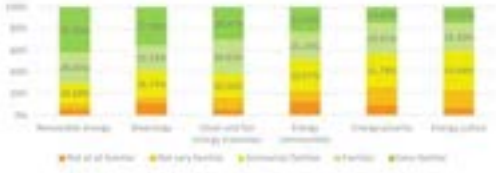
(i) promotion of citizens' participation in decision making
(ii) getting more involved with the local community
(iii) the participation of local trusted organisations in such projects
(iv) setting the right example for community

Awareness of existing community energy projects

Willingness to join

Barriers

(i)bureaucracy
(ii)complex regulatory and administrative procedures
(iii) lack of governance support and financial mechanisms



Familiarity with the terms

8.3 Polish - Market research results

Drivers

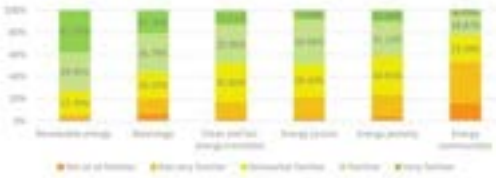
(i)Climate protection
(ii)circular economy and waste management
(iii)support of the local economy
(iv) alleviation of energy poverty

Awareness of existing community energy projects

Willingness to join

Barriers

(i)complex regulatory administrative
(ii) lack of financial mechanisms
(iii) risk of investment
(iv) lack of governance support



Familiarity with the terms

8.4 Italian - Market research results

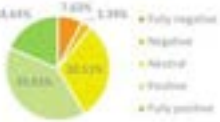
Drivers

(i)climate protection
(ii) the support of the local economy
(iii) reduction of energy bills

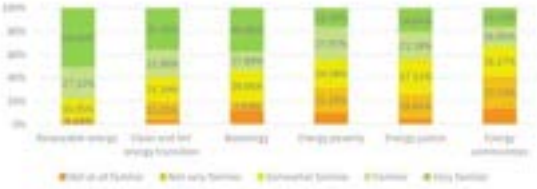
Barriers

(i) bureaucracy
(ii) lack of governance support
(iii) complex regulatory and administrative procedures

Awareness of existing community energy projects



Willingness to join



Familiarity with the terms

8.5 Market research results

- Market research results revealed the barriers and the driving factors to the participation of local residents in bioenergy communities
- Their familiarity with different terms such as "energy justice", "bioenergy", "energy poverty" and "energy communities" was also revealed
- In addition, their willingness to join such projects was gauged

- The findings will be used in order to fine-tune future project activities such as:
  - Local raise – awareness campaigns
  - Stakeholders' engagement
  - Support of BECoop RESCoops
  - Future training activities
  - Improve dissemination efforts

Pilot partners can find the results of the market research performed in the framework of the BECoop in the submitted report **"D1.3_Stakeholders'_perceptions_acceptance levels_and_needs_v1.0"**

Availability of individual stakholders

To locate your nearest stakeholders (boiler manufacturers, service technicians, etc.), visit the website: https://www.becoop-project.eu/tools/e-market-environment/