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UNLOCKING THE COMMUNITY BIOENERGY POTENTIAL

D4.3. Deployment of the BECoop business and financial support services

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About

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

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

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

RESCoop	Renewable Energy Source Cooperative
KAM	Key Account Management
ESCO	Energy Service Company
NGO	Non-Governmental Organisation
NG	Natural Gas
LHV	Low Heat Value
VAT	Value Added Tax
SME	Small Medium Enterprise
EC	European Commission
RE	Renewable Energy
RES	Renewable Energy Sources
DH	District Heating
CHP	Cogeneration Heat and Power
PWB	Primary Woody Biomass
RED	Renewable Energy Directive
PM	Particulate Matter

ORC	Organic Rankine Cycle
BMC	Business Model Canvas
R&D	Research and Development
ROI	Return on Investment
NPV	Net Present Value
PV	Present Value
IRR	Internal Rate of Return
SWOT	Strengths Weaknesses Opportunities and Threats
KEP	Knowledge Exchange Platform
NoI	Network of Interest
CAPEX	Capital Expenditures
OPEX	Operational Expenditures
NEM	Net Energy Metering
NG	Natural Gas
NECP	National Energy and Climate Plans

Executive Summary

The current report represents the **summary of the business support that was offered to the BECoop RESCoop cases**. In the beginning, the report starts with the concept and the rational of the business deployment actions, then analyses the methodology and concludes on the final business profiles of our RESCoops that came up through a dedicated questionnaire (Annex I) developed for the particular identification of their business needs.

Later on, the current report mentions the process that was followed for the business deployment which mainly includes:

- The **responsibilities** of the involved BECoop partners.
- The **business services** that were offered.
- The **correlation** with the technical support.
- The **engagement** of external stakeholders.
- The **results** that each RESCoop case obtained.

Further down the road, this deliverable provides a description of each particular business service as it was created and updated under T2.5 "BECoop business and financial catalogues". The service delivery modalities of each service are also stated along with the process followed. To this end, our RESCoop cases obtained business support in the framework of:

- Business Modelling
- Business Planning
- Investment Planning
- Financial Support
- Mentoring
- Networking

In the end, the main results from particular services are presented as well as a section with the main conclusions of our business support along with the future needs of our RESCoops. The outline of the business support for each BECoop RESCoop case can be found in the **dedicated Business Plans** (see Annexes II, III, IV and V). These business plans will be the fundamental guides of our cases and will be lead them towards the establishment, operation and the implementation of their projects. These documents:

- properly structure the business concept of each energy community,
- assess whether their local market is suitable for their business,
- investigate the available funding and financial opportunities,
- demonstrate their business model through environmental, social and economic benefits,
- evaluate the profitability of their projects,
- design their project's roadmap considering the most critical milestones and risks,
- provide a risk assessment methodology in order to eliminate every possible danger.

To sum up this report "Deployment of the BECoop business and financial support services" includes a description of the provided support business services, the **developed set of commercially viable and sustainable business models along with respective business plans, and assessments of their future financial needs.** The final business plans that include all the above business support can be found in the Annexes.

1 Introduction

The deployment of the BECoop Business support actions stemmed from the existing findings of our RESCoop roadmaps[1] in T4.1 and capitalised on the business and financial support services identified in T2.5 matched with our BECoop RESCoops needs. To this end, **tailored business roadmaps** were designed which guided the overall process and assisted our RESCoops to first realise and then receive the most appropriate business and innovation support from the responsible partners (Q-PLAN in coordination with GOI and ESEK for the Spanish and the Greek cases and CBS in coordination with OBS and FIPER for the Polish and the Italian cases respectively). The primary aim was to develop the necessary tools and methodologies in order to support our RESCoop cases with the understanding of their project's business and financial needs.

In particular the initial process included the following steps:

- Identification of particular needs,
- Assessment of the impact of the selected technological options[2] from T2.4 and
- Selection of the most appropriate set of our business support services[3] from T2.5.

And then we proceeded with offering the respective business support of BECoop:

- **Business modelling and planning services** for replicating suitable business models which led to specific business models and plans for each case (See Annexes II, III, IV, V).
- **Financial support services** for assisting RESCoops in the introduction and testing of innovative self-financing models and finding alternative financing mechanisms as well as exploring possible EU and national funding opportunities.
- **Investment planning** for each project of our cases in order to provide valuable input to the technical partners for the elaboration of the feasibility analysis under T4.2[4].
- **Networking and investment readiness support** for RESCoops to collaborate with industry or finance actors.
- **Mentoring services** through a peer-to-peer program.

The report summarizes the BECoop efforts to support the identified local bioenergy communities through the provision of business and financial support services. It includes and highlights the overall process followed as well as the intermediate steps. It also provides the methodology for the identification of the business needs for each pilot along with a concrete description for each service deployment. The report also includes the main findings and results of our business support to our RESCoop projects and concludes with the respective Business Plans for each pilot case. These Business Plans are annexed in the end of this report and are the results from all the above services. They will operate as guides for the business co-creation and improvement of each RESCoop case and for the successful implementation of their projects.

[1] D4.1. Co-definition of community bioenergy heating roadmaps
[2] D2.7 BECoop catalogues for the provision of technical support services
[3] D2.9 BECoop catalogues for the provision of business support services
[4] D4.3 Deployment of technical support services

2 Rationale, Objectives and methodology of the services

2.1 Rationale and Objectives

The deployment actions of BECoop aim to provide concrete support services to the four (4) RESCoop cases in order to guide them through their creation and operation. These cases had already defined a distinct roadmap in T4.1 with their short- and long-term goals about the development of their community bioenergy vision and concrete projects. The business and technical deployment actions of BECoop step into the existing roadmaps and support the cases with the implementation of these initiatives. Our four different cases comprised of different modes in distinct situations but with clear objectives:

- The creation and the formation of a new RESCoop, which would set up a new bioenergy heating project with the support of third party (Italian case).
- An existing RESCoop (already active on other RE) that now focuses to expand activities to bioenergy heating (Spanish case)
- The expansion of the business activities of an existing RESCoop within a new bioenergy heating project (Greek case).
- A municipality that leads the development plans of a new RESCoop on bioenergy heating in a region where community energy and RE heating currently have a very low penetration (Polish case).

To this end, individual business plans and feasibility studies have been conducted in order to assist our RESCoop cases with the realisation and the implementation of their roadmap developed within BECoop. Both our business and technical support actions were provided to constitute the fundamental guide that will lead the vision of our cases towards their successful operation even after the accomplishment of BECoop. The diversity of the cases and models ensures that BECoop business and technical support services **have a high replication value as they have been tested and finetuned in real life situations**. Furthermore, the methodological tools have been developed so as to be easily adjustable to match different situations and needs in different contexts.

2.2 Methodology

The methodology applied for the overall process generally is based on the **Key Account Management (KAM)** approach so to engage market actors, communities and stakeholders with our RESCoops more effectively. The importance of KAM in building long-term and trustful relationships is widely acknowledged in theory and practice, even more so in complex market environments thus making it a great fit for the heating market. The figure below offers an overview of our approach.

KAM's initial aim is to understand our RESCoop needs, align on any relevant confidentiality issues and ultimately to develop per case Action Plans with specific activities and targets. Our BECoop RESCoop cases in collaboration with our business (Q-PLAN and CBS) and technical support partners (CERTH, CIRCE, WUELS), defined the most suitable set of business and technical support services (T2.5) to be delivered.

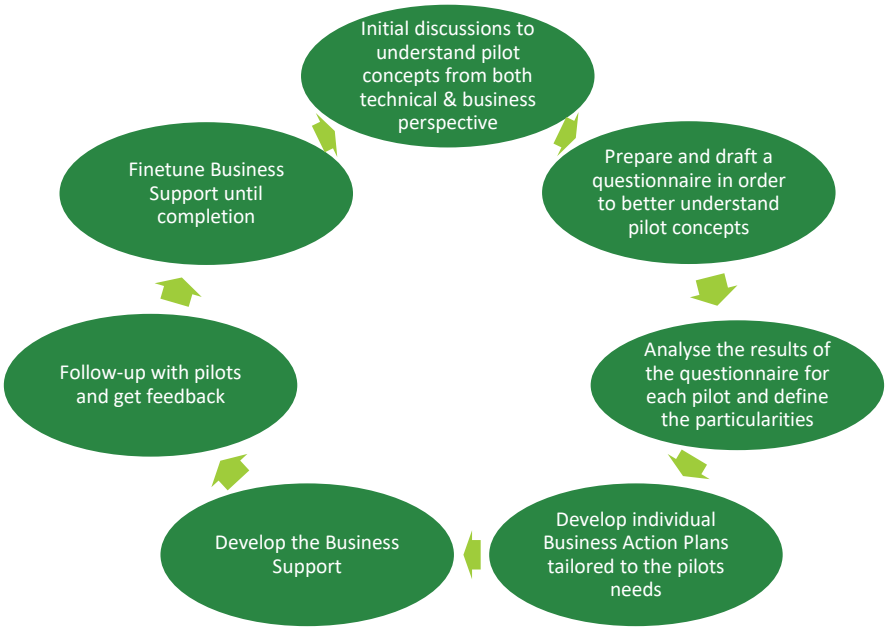


Figure 1. Key Account Management methodology (KAM)

The support services comprised of both business, financial and technical support services for enhancing our RESCoop cases with the bioenergy heating market uptake. These services build upon already established successful catalogues developed in T2.4 and T2.5 as well as well-tested methodologies and tools from partners experience ensuring that they can be delivered cost-effectively and efficiently, while also meeting the expectations of the RESCoops roadmaps T4.1.

Moreover, through the KAM methodology our services were adjusted to the needs of the respective BECoop RESCoops driving their bioenergy solutions in the heating market. The needs identification was built based on the outcomes from the questionnaires and the initial conversations with the pilot teams. The features, functions, processes and the delivery modalities were defined in detail by the respective business and technical partners. The description of each service in this report includes:

- A brief summary
- The required features and functions
- The service process
- The delivery modalities

Along these lines, our preliminary business service portfolio[5] is concisely outlined below.

- Business Modelling
- Financial support
- Investment Planning
- Business Planning
- Mentoring
- Networking

As already mentioned, the services were provided with the help of the KAM approach. The process began with a meeting (physical or digital) between the business partner and the BECoop RESCoop representatives,

[5] D2.9 BECoop catalogues for the provision of business support services

to analyse the results of their questionnaire in order to identify the specific needs and define the blend of services that could best meet them. Based on the outcomes of the needs analysis, the business partner developed a tailored Action Plan that guided the overall process. The business partners finetuned the particular service and follow up the findings with the RESCoop.

For the needs of the mentoring service, a pool of mentors with sector-specific backgrounds in community bioenergy, consisting of tech, business, legal experts and RESCoops leaders has been created and matched with the aspiring RESCoop communities and stakeholders. The mentoring service focused on promoting knowledge and skills transfer and providing tailor made support and guidance (e.g. on business models, design of economic and financially viable projects, funding and financing schemes, assessment of technological solutions, legal issues etc.) either face-to-face (in peer-to-peer meetings, seminars or other BECoop events) or via digital means (i.e. web-conferencing apps mainly through Microsoft Teams and Google Meet). The synthesis and composition of the pool of experts, the invitation process as well as the mentors' role was defined by Q-PLAN in collaboration with the pilot teams.

2.2.1 RESCoops profiling and needs analysis

Before starting with the deployment activities of business support in our RESCoops we needed to understand and analyse the current landscape of our cases. To this end, we created and distributed a questionnaire (Annex I) which was filled by each pilot case. Afterwards the respective business partner analysed the results led a coordinated efforts of the pilot teams with the aim to co-define and develop the tailored business roadmaps, for which dedicated calls took place with the pilot teams. The clarification of the fundamental starting points was crucial for the deployment actions of both business and technical support and needed to be done with due diligence.

The process of completing the questionnaire elements with the most suitable answers was challenging by the pilot cases, that's why dedicated calls took place both with business and technical partners. Defining the business concept along with the most suitable technological options was hard because our RESCoops had to select among various available choices (both from business and technical catalogues) that could potentially be matched with their case. On top of that the specific particularities of our cases made the process more difficult due to the early development stage of our newly formed RESCoops[6]:

- In Spain the formation of Aberasturi energy community.
- In Italy the co-creation of Mortirolo energy community.
- In Poland the kick-start of OBS activities and projects.
- In Greece the expansion of ESEK business activities within BECoop.

To this end, the most important points that we concluded that are essential for the deployment actions of our projects were:

- The definition of the RESCoop's business concept and legal form
    - Profitable cooperative,
    - Non-profit energy community
    - Other form
- The governance model of the RESCoop
    - Citizens based initiative
    - Collaboration with local authorities
    - Involvement of an ESCO or other private company

[6] D4.1. Co-definition of community bioenergy heating roadmaps

    - Other type of governance
- The definition of the technological solution and bio-based resources
    - Biomass boilers installation
    - Biomass District Heating plant
    - Biogas / Biomethane plant
    - Biomass cogeneration
    - Type of biomass
    - Other technologies
- The final approach of the local market
    - Provision of solid biofuels
    - Provision of heat energy
    - Provision of both heat and electrical energy
    - Other
- The evaluation of the financial or other resources required
    - For the creation / establishment of the energy community
    - For the capital investment of their project
    - For its operational expenditures

After the consideration of the above aspects the business partners in collaboration with the pilot teams designed the per case action plans and started the provision of our support services. The recognition of all the above specifications constituted as the basic elements and the steps of the business support. In the section below the summary of the questionnaire results is given in the form of RESCoops business profiles.

2.2.1.1 Greek pilot: Business Profile

Table 1: Greek pilot case profile

ESEK: Energy Community of Karditsa		
Current and future members / customers	**Customer needs**	**Stakeholders involved**
• Current members: 387 • Future members: no limit. RESCoop of Karditsa is an open community for everyone to join. **Current customers:** • Industrial pellet boilers for agricultural purposes • Households in the prefecture of Karditsa • Municipal buildings (kindergarten pilot case) **Future customers:** Expand the customers network including industries and hotel complexes	**Customer needs**: lower fuel prices, alternative renewable heating. **Our plan**: provide them direct heat (play the role of an ESCO). Produce renewable energy (electricity) from biomass. Hopefully they will opt for our services due to low cost, high quality and rally around a grassroots initiative in their prefecture (decrease energy dependence). They will be involved in the value chain and use the energy (thermal, electricity) in order to cover their heating demands.	• ESEK: Energy cooperative – biomass facility operator, responsible for storage and treatment of collected biomass. • Municipality of Karditsa: Provides urban pruning, potential end- user of biomass fuels (e.g., public buildings, swimming pools, schools etc.) • Municipality of Plastiras lake: Provides Forest residues (municipal forest), potential end user of biomass fuels (e.g., public buildings, schools etc.). • CERTH: Technical consultancy on new biomass-based activities. • University of Thessaly – Dept of Forestry Wood Sciences and Design: Provide scientific support to produce biofuels and to exploit forest residues. • Oksigono Agrafon (NGO): Possible contribution to the exploitation of the forest residues. • Ecoperativa (NGO): Possible contribution to the exploitation of the coffee residues.

		• Development Agency of Karditsa (AN.KA): Networking and consultancy. • Biomass boiler manufacturers: Provide support in the installation and operation of biomass boilers in the local area. • Citizens, farmers, forest cooperatives, coffee shops: Provide feedstock, end-users, general role in the community. • Local hotels and Tourism industries: Potential end users of biomass fuels.
Strong assets and competitive advantages	**Areas of improvement**	
The RESCoop can support the local community by creating a value chain, increase the social cohesion, create jobs and stir local economy growth whilst provide environmental benefits.	ESEK already owns a biofuel plant, but improvements and expansion of facilities is needed in order to increase the capacity process of more and new residual biomass streams. Improvement of public consultation mechanisms Provision of more training opportunities and raising awareness activities Areas need improvement: Communication with members, dissemination of the ongoing actions	
Best business practices		**Competitors analysis**
Innovations that the RESCoops is considering within its processes. • Use of coffee residues and various raw materials for pellets • experimental analyses to optimise the solid biofuels (content, emissions, LHV) • urban waste management (coffee residues, urban prunings) • forest waste management (forest residues) & forest regeneration • logistics process optimisation		Current and future competitors: fossil fuel networks that compete with the renewable energy solutions. Strengths: preferential tax arrangements (i.e only 6% VAT for natural gas compared to 24% VAT for biomass). State support for NG as a “transition fuel” Weaknesses: The increased energy prices. Geopolitical issues. The NG network is expanding inside the city but not in rural and mountainous areas.

Current and future collaborators	New markets
• Municipality of Karditsa: Provides the urban pruning, potential end- user of biomass fuels (e.g., public buildings, swimming pools, schools etc.). • Municipality of Plastiras Lake: Contribution to the exploitation of the forest residues (municipal forest), potential end user of biomass fuels (e.g., public buildings, schools etc.). • University of Thessaly - Department of forestry wood sciences and design: Provide academic support for the production of biofuels and the exploitation of forest residues. • NGOs: Possible contribution to the exploitation of the forest and coffee residues. • Biomass boiler manufacturers: Provide support in the installation and operation of biomass boilers in the local area. • Citizens, coffee houses: Potential end users, provide feedstock, general role in the community. • SME: Provide services related to unit maintenance. • Hotel complexes and industries: Potential end users.	Currently we produce biofuels and have a pilot case in a school in the sense of direct heat from a pellet boiler (play the role of an ESCO). New markets: • Small district heating model in the mountainous area of Plastira Lake to cover the thermal demands of the hotel complexes. • Provide direct heat through biomass boilers to industries. • Produce new solid biofuels in the form of briquettes. • Electricity from biomass / Photovoltaics.

Table 2: Greek pilot case business activity

Circumstances that affect the business activity of ESEK		
Domains	**Positively**	**Negatively**
Policy and Regulatory	• Ambitious goals of the Greek NECP through the promotion of the energy use of biomass. • The use of bioenergy considered in local development strategies.	• Lack of interaction between forestry / agricultural, energy and environmental policy • Lack of details about ways of implementing the goals of the country's energy transformation. Although the NECP seems promising regarding the biomass heating value chains, it lacks details on how these targets will be implemented (e.g., specific measures and support to be adopted) • Prohibition for the energy community to expand its activities. Except for the mandatory and optional activities listed in the law 1667/1986 on civil cooperatives, no further activity can be exerted by an energy community; this limits its scope
Economic	• Competitive prices of biomass fuel • RESCoop support programs • Rural development programs • Regional funds	• VAT differences between fuels • Small size of the biomass market
Social and Cultural	• Local activities related to RES development. • Problem of energy poverty in the country. • Younger people more ecological aware.	• Lack of trust to cooperative schemes due to their bad reputation • Increase of local people's knowledge on energy communities and bioenergy is needed.
Technological	Not applicable in this case	Not applicable in this case
Environmental	• Commitment to combat the smog problem. • Quantitative targets for reduction on national emissions of certain air pollutants for the period 2020-2029 and for 2030.	
Market trends	Not applicable in this case	Not applicable in this case

2.2.1.2 Italian pilot: Business Profile

Table 3: Italian pilot case profile

<table>
<tr><th colspan="3">Mortirolo: New Energy Community of Tovo St Agatha</th></tr>
<tr><th>Current and future members / customers</th><th>Customer needs</th><th>Stakeholders involved</th></tr>
<tr><td>Currently there are no members, even if there are stakeholders already involved.
As future members can be indicated:
• Local Mayors and Public Administrators,
• Local cooperatives and enterprises (e.g. Melavì in Tovo St. Agata)
• Local organizations in charge of the woodland management,
• Technical staff of local small enterprises and citizens, owners of woodlands, etc.

We can indicate only future customers such as citizens, local Public Administrations, and enterprises.</td><td>Future customers:
• Citizens
• public administrators
• local Enterprises

their needs:
To have secure and affordable energy, for thermal purposes. The RESCoop plans to offer renewable energy (by a CHP system able to produce heat and power) provided by local sources reducing also local pollutants and enhancing local circular economy by the creation of an improved local forest management. Trends are affected by the evolution of the energy market.</td><td>All the stakeholders of the biomass to energy chain, from the woodland to the final costumers and post-counter service.</td></tr>
<tr><th colspan="2">Strong assets and competitive advantages</th><th>Areas of improvement</th></tr>
<tr><td colspan="2">Strengths are represented by:
• Large availability of woody biomass at zero km.</td><td>Principals’ weakness:
• The biomass to energy supply chain must be implemented from the beginning.</td></tr>
</table>

• Strong involvement and determination of mayors in promoting the project. • Strong network of cooperation.	• Administrator uncertainty in the choice of governance. • Looking for the investors and the incentive opportunity.

Competitors analysis	**Best business practices**
The competitors are: • citizens that use their own biomass by domestic appliances. • Fossil energy providers. • Stakeholders that push the penetration of heat pumps. • Stakeholders that determine market conditions, since the prices of the different energy sources will guide the overall process.	Several documented best practices are available for CHP biomass District Heating (e.g. Tirano biomass system).
Current and future collaborators	**New markets**
The main collaborators are: • the mayors • local associations • cooperatives and enterprises	The RESCoop is under development and doesn't seek to be involved in new markets besides the three municipalities.

Table 4: Italian pilot case business activity

Circumstances that affect the business activity of Mortirolo		
Domains	**Positively**	**Negatively**
Policy and Regulatory	At the regional level, we are waiting for specific measures from the Lombardy Region to finance the start-up of biomass district heating networks in mountain areas (probably 2023).	In view of the Renewable Energy Directive (REDIII) trialogue negotiations, we hope the institutions involved taking a strong stance against the newly proposed definition for "primary woody biomass" (PWB). It is very important for our project and the bioenergy sector to have a workable framework, while at the same time, we believe strong requirements for demonstrating sustainability are necessary. We are particularly concerned given that the European Parliament's proposal defining PWB would place new and unnecessary burdens on the market, which would only constrict the supply of renewable energy without any clear benefits for sustainability.
Economic	The high price of fossil fuels represents a great opportunity to switch to bioenergy community.	The competitiveness of the district heating service is closely related to the number of households/buildings that decide to connect. Therefore, it is crucial to continue the awareness-raising and involvement of citizens and businesses at local level.
Social and Cultural	Young people can be convinced more easily. Environmental awareness can be an effective tool, but activities should be planned to that end.	Elderly people, which are the main inhabitant of these communities, are not so keen in switching to new energy systems.
Technological		The cost of the different possible technologies as investment and operative conditions should be investigated.
Environmental	The use of biomass in district heating could reduce the emissions of PM in comparison to domestic appliances.	The protection of the territory from hydrogeological risks is a fundamental driver.
Market trends		

2.2.1.3 Spanish pilot: Business Profile

Table 5: Spanish pilot case profile

New Energy Community of Aberasturi		
Current and future members / customers	**Customer needs**	**Stakeholders involved**
In the pilot case of Aberasturi live 133 people. 41 out of 54 buildings have participated in the thermal demand calculation (76%) so we can consider 76% (101 members), taking into consideration that the energy community is not still formalized. Besides population it is possible that future RESCoop could include the forest management companies or the local authorities.	The main customers will be the citizens of Aberasturi. Customer needs are the reduction of the current energy bills, advantages related to DH for final users, community building, benefits related to the energy and economic self-sufficiency and decarbonization. The RESCoop will provide thermal energy through a district heating for providing heat to the citizens of Aberasturi. Changes: Population can grow, Biomass availability needs to be assured for long term. Challenges: Perceptions and mistrust regarding biomass • Inconvenience of extraction and processing • High investment for DH network • Resource potentials evaluation • Heat demand identification GOI could get involved in the process of how shared bioenergy heating systems are developed, and heating retailing activities can be performed	• Consumers • Biomass management companies • Local authorities • ESCO • Other RESCoops

Strong assets and competitive advantages	Areas of improvement
• Access to local resource, biomass • Locally organized • High participation • Highly motivated • Local Authorities involvement	• Not yet defined the organization, legal entity, etc. of the RESCoop. • Lack of knowledge about biomass technology. • Lack of knowledge about financing projects. • Heat density it is very low (wide dispersion of houses).

Best business practices	Competitors analysis
• Biomass should be collected in the local area (by forestry services or by inhabitant that want to develop this service). • The RESCoop will contact boiler manufacturers for the design and construction of the DH. Lighthouse cases have been visited for lessons learnt sharing. • The operation of the DH will be done by experts or by the inhabitants; support in the advantages and disadvantages of these different business model should be provided.	The competitors for the future service are the fossil fuels suppliers. They take advantage of their much bigger company size i.e., they could lower the prices of their supplies for avoiding people connecting to the DH; Similar cases have been identified.

Current and future collaborators	New markets
• Other RESCoops: Such as Goiener who is helping in the design of the case. • Local authorities: Interested in this pilot for replication in other villages in the surroundings with similar characteristics. • Biomass management companies; interested in diversification of their activities. • ESCO can operate the DH (not defined yet).	

Table 6: Spanish pilot case business activity

Circumstances that affect the business activity of Aberasturi		
Domains	**Positively**	**Negatively**
Policy and Regulatory	Not all of the regional authorities are having the same understanding about the specific negative aspects.	Recently a regional authorities' report has been submitted to local institutions preventing the use of public installations or land for energy communities´ services saying that these activities could constitute criminal offenses such as prevarication or embezzlement of public funds.
Economic	• Biomass price • Synergies with other public investments	• Fossil fuels price • High initial investment
Social and Cultural	The specific case of this region that provides certain amount of biomass of public forest for each family for free helps to develop installations of biomass thermal production.	Traditionally the use of the forest has not been done with sustainability perspective but with an economic one.
Technological	In addition to the DH, the RESCoop could give other services such as energy efficiency recommendations. Including members to the RESCoop other than consumers with other capacities could be interesting.	
Environmental	Climate change could affect the biomass production in long term.	
Market trends	Given that fossil fuels are not anticipated to return to low prices, it is worth considering alternatives.	

2.2.1.4 Polish pilot: Business Profile

Table 7: Polish pilot case profile

New Energy Community of OBS		
Current and future members / customers	**Customer needs**	**Stakeholders involved**
The basic members of the BECoop development strategy planned for the Oborniki Śląskie commune are residents (end recipients) of rural areas who may or will be able to use pellets from local biomass for heating purposes. Members supporting the implementation are/will be entrepreneurs and institutions (farmers, state forests, sawmills, commune) that are related to the acquisition of biomass and its processing into pellets as well as formal, organizational and financial support. In the future, the main direction of development is primarily to further expand the group of end-user members. Currently, the main customers are household residents who can: (i) replace a classless (old-so-called Cinderella) coal-fired boiler with a pellet-fired biomass boiler, (ii) replace the current solid fuel in the form of coal with biomass pellets (without the need to replace the boiler), (iii) choose a biomass boiler fuelled with pellets as the basic heating system in a new or modernized building, (iv) replace another heating system (oil, gas) with a solution based on burning biomass pellets.	The most important needs of customers are: (i) offer of a cheap source of energy for heating, (ii) ensuring the possibility of heating while maintaining low investment and operating costs. The offer includes a solution in the form of providing biomass pellets that will be used for heating purposes. End customers should be interested in taking advantage of the offer/solution because: (i) it is attractive in terms of price, (ii) it enables long-term stability of access to heating fuel, (iii) it is easy to adapt to an automatic coal-fired boiler, (iv) it is a good alternative to hard coal, (v) is characterized by a significantly lower negative impact on the natural environment during its operation and on the health of residents. The solution, which is a biomass fuel in the form of pellets, can be used in automatic biomass and coal boilers. The needs of the end customer can always change, but the threat is not high due to the attractiveness of the price of biomass pellets compared to other energy sources, the popularity of solid fuel boilers in the region and the dominance of individual heating systems among households. From the experience gained in this topic - employees of the Department of Environmental	It is planned to involve various types of stakeholders in the project. It will bring together biomass owners (local farmers, planters, orchards), biomass management companies, manufacturers of heating boilers, installers and ESCO companies, public institutions, energy cooperatives and communities, research centres (University of Life Sciences in Wrocław) and final recipients - consumers of biomass (schools, single-family buildings, multi-family buildings, housing cooperatives).

	Protection of the Municipal Office in Oborniki Śląskie- financial support for the replacement of classless heat sources along with technical and advisory support is a necessity.	

Strong assets and competitive advantages	**Areas of improvement**
• An offer of a cheap source of energy for heating households. • An alternative fuel to coal and other fossil fuels. • Possibility of using local resources of the commune. • Reduce the problem of energy poverty. • Increasing the commune's energy independence.	• Increasing stakeholder interest and activity through their education. • Lack of good examples in Poland regarding the functioning of energy cooperatives in rural and urban areas. • Lack of direct incentives for the functioning of energy cooperatives based on heat generation. • Lack of programs supporting the establishment and operation of energy cooperatives. • Making the availability of local biomass dependent on many external factors (contradictory legal regulations, changes in fertilizer prices, unstable energy prices, there is still a strong pressure to subsidize the purchase of coal by the government - coal allowance and shifting the responsibility for the widespread sale of cheap coal by the government.

Competitors analysis	**Best business practices**
The commune does not have competitors in the form of other organizations such as an energy cluster or an energy cooperative, but similar projects may appear in the region in the future. The main ambition of the residents and the commune authorities is to create an energy structure that will be modern and will increase the “product responsibility” of the residents. The main strengths include the high commitment of the commune self-government in the development of renewable energy sources and the high bioenergy potential of the commune. Weaknesses hindering the development of the project include: restrictions and strict legal requirements regarding the establishment and operation of bioenergy cooperatives, lack of financial support programs	From the point of view of the Oborniki commune, technologies that allow replacing fossil fuels with renewable sources are of key importance. The main method of introducing new technologies should be a public-private partnership, partly co-financed by the municipality with the acceptance of its inhabitants. The best practices considered here include biomass boiler houses with external fuel preparation and feeding installations, small installations for electricity

dedicated to energy cooperatives, or low environmental awareness of the local community and continuous support for residents with attractive subsidies for fossil fuels, mainly coal. We believe that competition in the future may threaten us through pricing and marketing policies. If we do not monitor the local energy market on an ongoing basis and do not adapt our market strategy, we will lose our competitiveness if other entities appear.	production (e.g. ORC systems or biogas plants) as well as all projects that are part of "district heating". To obtain high rates of social and economic profits and environmental issues, the Municipality will offer stakeholders the best available technical solutions enabling the most effective exchange of heat sources in individual heating systems to reduce the emission of pollutants into the atmosphere as well as to be energy independent in the region.
Current and future collaborators	**New markets**
The main cooperating entities currently include: • Oborniki Śląskie Forest District • Suppliers of technology (components of installations for combustion, storage or waste disposal) • Transport and logistics companies • Local farmers • Representatives of the horticultural industry • Entrepreneurs in the wood industry - sawmills and carpentry shops. • Local community • Future collaborators also include current ones and: • KOWR (National Support Center for Agriculture) • Ministry of Climate and Environment • Ministry of Agriculture and Rural Development • Environmental Protection and Water Management Fund The level of satisfaction with the cooperation so far varies, but efforts and talks are being made to ensure that this cooperation is satisfactory for both parties. The most important competencies of our employees for the Commune of Oborniki Śląskie include reliability and keeping contracts, creativity, openness to innovation and willingness to explore technical, logistic, legal and social knowledge.	An in-depth analysis of the vertical market dedicated to bioenergy cooperatives is planned. In particular, it will concern goods and services for the specialized needs of customers planning to use biomass - i.e. boilers and related accessories, fuel storage facilities, transport solutions and similar elements. It is also planned to analyse the potential of biomass in terms of waste biomass, coming from both the agricultural and food sectors.

Table 8: Polish pilot case business activity

Circumstances that affect the business activity of OBS		
Domains	**Positively**	**Negatively**
Policy and Regulatory	Energy cooperative is legally defined, including bioenergy in local development strategies	Strict requirements for the establishment and operation of a bioenergy cooperative, no model agreement, inconsistency of legal provisions with the strategy enshrined in Poland's energy policy until 2040 (PEP 2040).
Economic	• Competitive prices of biomass fuels, • Relatively low capital expenditures for biomass heating installations	• Increased energy poverty in Poland caused, among others, by the COVID-19 pandemic and the war in Ukraine. • Lack of a dedicated support program for the creation of RESCoops in Poland. • Lack of discounts and other economic incentives for the heat generated by energy cooperatives.
Social and Cultural	Promotional campaigns organized by representatives of the local government	• Habits to use the current heating system (coal) and reluctance to change, • The term "cooperative" has a bad meaning for the local community (negative association with the previous political system), • Low social involvement in this type of bottom-up actions, • Little care for the environment by rural residents for generations
Technological	The business models described in the project are based on the latest technical and logistical knowledge	Rapid technological changes cause rapid ageing of the technologies selected for implementation
Environmental	• Applicable anti-smog resolutions, • The possibility of using ash after burning biomass as fertilizer, • Pro-ecological campaigns in the mass media	• Risk of negative impact on local biodiversity (e.g. through monoculture crops, deforestation), • Emission of harmful compounds into the atmosphere (including dioxins, furans) by burning low-quality biomass (e.g. with pesticides), • Coal subsidies, as a heating fuel, increase its use and environmental pollution • Due to the lack of good quality fuel - coal on the Polish market, the government gives official tacit consent to the use of fuels prohibited by anti-smog resolutions
Market trends	The support of local communities for renewables is growing continuously	There are lobby groups that are against the use of biomass for energy purposes (especially biomass of agricultural origin)

2.2.2 Co-creation of service concepts

Having analysed and studied the above profiles, the business partners started in co-designing the individual business concepts. So, the findings of the needs analysis concluded to a particular matching with our catalogues for each RESCoop case and then Q-PLAN co-created the service concepts. To this end, templates were designed for each service which were distributed among partners for optimization. These templates co-created the service concepts and guided the overall process for the service delivery within the business deployment actions of BECoop. The next figures are part of the service concepts and explains the overall process followed as well as the action plan for the deployment of the business support.

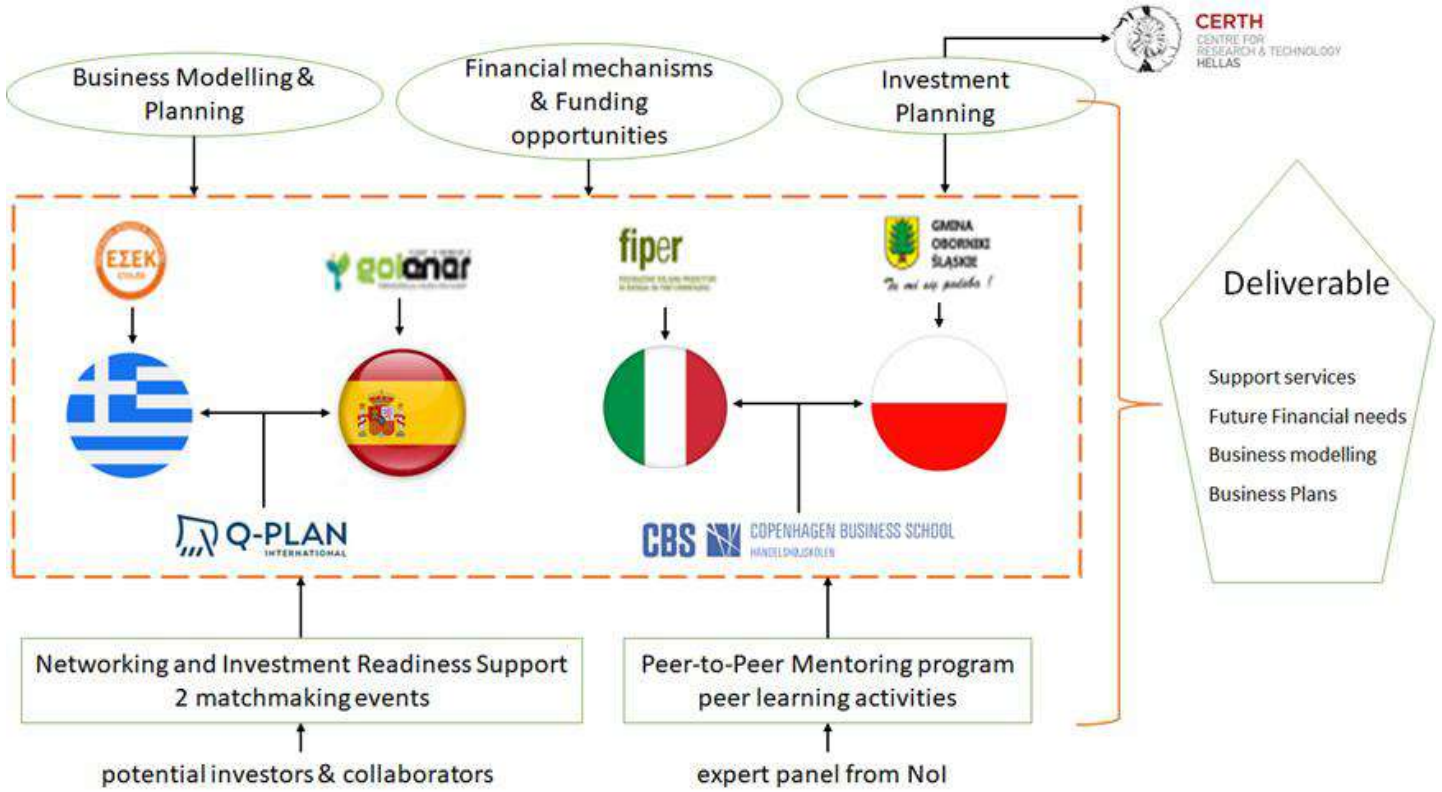


Figure 2: Business support service process

As can be seen in Figure 2, Q-PLAN, having analysed the RESCoops roadmaps[7] developed in T4.1, connected the business catalogue with the identified needs of the BECoop cases. To this end Q-PLAN and CBS worked closely with our RESCoops in order to co-define the individual business roadmaps which linked the RESCoops with the most suitable set of business and financial support services. Q-PLAN was responsible for the deployment action of the Greek and Spanish case, whereas CBS took the lead for the business deployment of the Italian and Polish case. Pilot and business partners worked closely for the successful service delivery.

The initial aim was to support the RESCoops in identifying the business and financial needs of their projects and match them with the profiled technological options of T2.4. The contribution of the technical partners (CERTH, CIRCE and WUELS) was crucial at this stage. Later on, the business and technical partners worked together into the correlation of the business and technical needs and to match them with our support services. To this end we provided:

- Business modelling and planning services for replicating suitable business models (leading to specific business models and plans for each particular RESCoop case.
- Financial support services for assisting our RESCoops in the introduction and testing of innovative self-financing models, finding alternative financing mechanisms (e.g. crowdfunding), or applying to further EU and national funding opportunities.
- Investment planning input to our technical partners in order to jointly conduct the feasibility studies under T4.2.
- Networking and investment readiness support for RESCoops to collaborate with industry or finance actors where we presented our RESCoops in 2 events for matchmaking with potential investors or collaborators.
- The set up of a peer-to-peer mentoring program, where experts that are participating in community energy projects and have successfully been rolled out in the market and have attracted external finance were identified and selected as mentors (also through T5.1 activities). These mentors were incentivized to engage the needs of our RESCoops with peer learning activities, which included:
  - Information and experience sharing
  - work shadowing
  - study tours

Q-PLAN defined an action plan for the successful implementation of the above concepts including the definition of physical and digital meetings for the provision of services and monitored the overall process. The developed action plan can be seen in the Table9 below.

[7] D4.1. Co-definition of community bioenergy heating roadmaps

Table 9: Action Plan for the deployment of business support

				Feb-22	Mar-22	Apr-22	May-22	Jun-22	Jul-22	Aug-22	Sep-22	Oct-22	Nov-22	Dec-22	Jan-23	Feb-23	Mar-23	Apr-23
Stages	**Actions**	**Participants**	**Lead**	**M16**	**M17**	**M18**	**M19**	**M20**	**M21**	**M22**	**M23**	**M24**	**M25**	**M26**	**M27**	**M28**	**M29**	**M30**
Initial Steps for the Deployment of the Business and Financial Support Services	Initial correlation between the business and the technical catalogue	QPL, CIRCE	QPL		CIRCE													
	Analyse Roadmaps to define the business strategy	QPL	QPL								CBS							
	Meeting with pilots to define the most suitable technological solutions	CERTH, QPL, GOI, CIRCE, FIPER, OBS, ESEK	CERTH			CERTH	pilots											
	Final correlation between the business and technical support services	QPL, CERTH	CERTH								CERTH							
	Definition of the business needs for each pilot case	QPL, CBS	QPL										pilots					
	Clarification of the business services to be offered for the Spanish pilot	QPL, GOI	QPL															
	Clarification of the business services to be offered for the Greek pilot	QPL, ESEK	QPL															
	Clarification of the business services to be offered for the Italian pilot	CBS, FIPER, QPL	CBS															
	Clarification of the business services to be offered for the Polish pilot	CBS, OBS, QPL	CBS															
Deploy the services	Deployment of the business modelling support service to the respective pilot	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL											pilots			pilots	
	Deployment of the business planning support service to the repsective pilot	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL											pilots			pilots	
	Deployment of the financial support services to the respective pilot	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL											pilots			pilots	
	Investment planning - input for the feasibility analysis in T4.2	QPL, CBS, CERTH	QPL											pilots		CERTH		
Run the Networking and Mentoring Events	Organise 2 matchmaking events apporaching potential investors and collaborators	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL												investors & collaborators	1st ▲▼	2nd ▲▼	
	Deploy Networking and Investment Readiness Support in the matchmaking events	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL															
	Set up a peer-to-peer mentoring program	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL												experts from NoI	mentoring		
	Approach experts from the Network of Interest	QPL	QPL											pilots				
	Engage the experts with the pilots into peer learning activities	QPL, Experts, GOI, FIPER, OBS, ESEK	QPL												peer learning activities			
Collecting feedback and Reporting the Deliverable	Collect feedback for the provision of the business and financial support services	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL														pilots	
	Describe the provision of the support services to the new BECoop cases	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL															
	Describe the set of commercially viable and sustainable business models to the new BECoop cases	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL															
	Describe the respective Business Plans to the new BECoop cases	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL															
	Describe the future financial needs of the new BECoop cases	QPL, CBS, GOI, FIPER, OBS, ESEK	QPL															

2.2.3 Iterative testing, validation and fine tuning in real life settings

With the help of BECoop our RESCoop cases managed to develop real plans for the implementation of their projects. The individual roadmaps designed in T4.1 are providing the overall vision of the cases up to 2030. The current business and technical deployment actions step into the existing roadmaps and offer the respective services for the elaboration of the initial short-term plans of the RESCoops. To this end and in collaboration with the pilot partners the specific projects were co-defined and in particular[8]:

- The Greek pilot case will install 20 biomass boilers in the local public buildings of Karditsa, with a total thermal capacity of 1 MW that will be fueled with pellets from the ESEK plant.
- The Italian pilot case will construct a 3 MW DH plant with another 3 MW backup boiler and a 700 kW CHP unit for cogeneration in the area of Tovo St Agatha. They will exploit the local forest residues for the provision of both thermal and electrical energy to the citizens.
- The Spanish pilot case will collect the local biomass that is mainly from forest residues and straw and will construct a 1 MW DH plant in the area of Aberasturi, with the aim to provide bioheat to the citizens.
- The Polish pilot case aims to make a pellet production plant with an annual production capacity of 3120 tn/year that will collect the local biomass residues and to install 830 domestic biomass boilers in the area of Oborniki Śląskie.

Our support activities assisted the cases to develop in real life settings their projects. The deployment of the business services aimed to develop individual business plans that will guide the RESCoops in the real-life implementation of their project and will help them to improve their overall business performance. The business plans also include the results of the feasibility studies which were made in close collaboration with the technical partners combining the findings of the investment plannings and the technical specifications. The results of the feasibility studies provide an overview to the RESCoops about the future viability of their projects and the potential for profitability. The results are quite positive and will help our cases to move forward with the actual implementation of their projects and apply their business concepts having as guides the findings of our support services. The particular business plans for our cases can be found in the Annexes this report.

- Greek pilot Business Plan Annex II
- Italian pilot Business Plan Annex III
- Spanish pilot Business Plan Annex IV
- Polish pilot Business Plan Annex V

The deployment process of our services was constantly being tested, validated and fine tunned in close collaboration with both the RESCoop cases and our technical partners. There were a lot of project improvements in the pilot projects and therefore our support was always efficient with the latest updates of the local areas. On top of that our business and technical support was comprised also with mentoring where dedicated mentors worked together with our partners and pilot cases to offer their insights and valuable contribution on the specific RESCoop cases and their projects. Mentoring sessions took place where support and pilot partners presented their progress and received significant feedback that optimised, validated and finetuned the overall process towards the real-life implementation of our projects.

[8] D4.1. Co-definition of community bioenergy heating roadmaps

3 BECoop business and financial support services

The provision of business and financial support to our RESCoop cases was based on the business catalogue developed under T2.5. There, we created the list of the support services that our energy communities will use to develop their projects and improve their business performance.

3.1 Business modelling

3.1.1 Service summary

A business model describes the rationale of how an organization creates, delivers, and captures value, in economic, social, cultural, environmental and other contexts. The development of a business model forms a part of innovation, business strategy and sustainability, especially when dealing with Energy Communities.

Sustainable business models can de-risk and stimulate investments in Renewable Energy. Along these lines, this service[9] will support Energy Communities in designing or improving the business models of their renewable - bioenergy solutions with easy-to-use and effective tools employed in practice to facilitate sustainability-oriented business model innovation from an economic, environmental and social perspective (Business Model Canvas, Sustainable Business Model Canvas, triple layered Business Model Canvas).

3.1.2 Process, features and functions

For the development of the business model, we need to study and identify the Energy Community needs and challenges to make the product or service competitive to the market and increase the effectiveness of the organisation. Then develop its key figures, deliver and monitor the successful implementation of the service. In order to achieve it we need to conduct:

- Status quo analysis which can be seen in our questionnaire in Annex I.
- A series of topics-related meetings with the organisations.
- Design of the Sustainable BMC and preparation the respective report
- Evaluation of the process and definition of next steps in cooperation with the Energy Community.

3.1.3 Service delivery modalities

For the delivery of this service, we came up with the design of a new canvas model. This model combines the existing knowledge of our existing business models that developed in D2.9 and the updated version of D2.10 and illustrates the 3-dimensional aspects across environmental, social and economic benefits. Therefore, in our new Canvas model we have integrated the main findings of our business support and overall operates as a summary of the business case for each pilot. The prototype Canvas model can be seen in the figure below:

[9] D2.9 BECoop catalogues for the provision of business and financial support services

Figure 3: BECoop Sustainable Business Model Canvas

The results of our Canvas for the 4 BECoop RESCoop cases can be seen in the Annexes as part of the individual Business Plans and an outline of the analysis for the Sustainable BMC methodology as adjusted for RESCoops can be seen below, where:

- **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. (What is the KEY product)
- **Customer segments** include the potential stakeholders as beneficiaries from the community actions and projects.
- **Cost structure** comprises the most relevant Capital and Operational Expenditures within the community activities and running of the business.
- **Subsidisation** includes the possible available financial and funding resources at which the community operates.
- **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.
- **Social benefits** to the local and national societies and other communities

3.2 Financial support

3.2.1 Service summary

In the context of RESCoops, a finance solution must be defined as a type of investment which fulfils several objectives directly linked to the nature and identity of a RESCoop project. Finance solutions contribute in a broader sense to renewable energy and energy efficiency projects and are crucial for the development of such communities. The main purpose of this service[10] is to indicate available schemes relevant for RESCoops, coming from the private sector, while minimizing the negative impact of renewable energy projects on the environment.

3.2.2 Process, features and functions

For the development of this service, we are focusing on assisting RESCoops and its members and:

- Inform them about the available private financial opportunities for their projects and activities.
- Make clear the investment schemes that are suitable for them.
- Guide them on the different financing sources based on each project phase and activity.
- Support them in the selection of the correct financial scheme.

Financing required for:

- Equipment
- R&D
- Marketing
- Staffing, etc.,

It is important to note that this service requires the existence of an investment plan and cannot be effective without one.

3.2.3 Service delivery modalities

In the delivery of the particular service, we have created a table with all the available financial resources that a particular RESCoop can utilise. Dedicated results can be seen in the Annexes as separate sections of the individual business plans.

Table 10: Financial Support table template

	Financing & Funding schemes	Description	Applicability	Characteristics	Challenges & Risks
Financing Mechanisms	Self - financing				
	Bank loans				
	…				
EU Funding opportunities	ERDF				
	Cohesion Fund				

[10] D2.9 BECoop catalogues for the provision of business and financial support services

	Financing & Funding schemes	Description	Applicability	Characteristics	Challenges & Risks
	...				
National Funding opportunities	...				
	...				
	...				
Financial Incentives	Tax incentives				
	...				
	...				

We have also created a graph receiving inputs from particular reports[11,12] and BECoop deliverables[13] that match the specific financial resources with the maturity of the project and the investment amount which can be seen in the figure below. More information about the particular financial solutions can be found in the Annex section of D2.9 under T2.5.

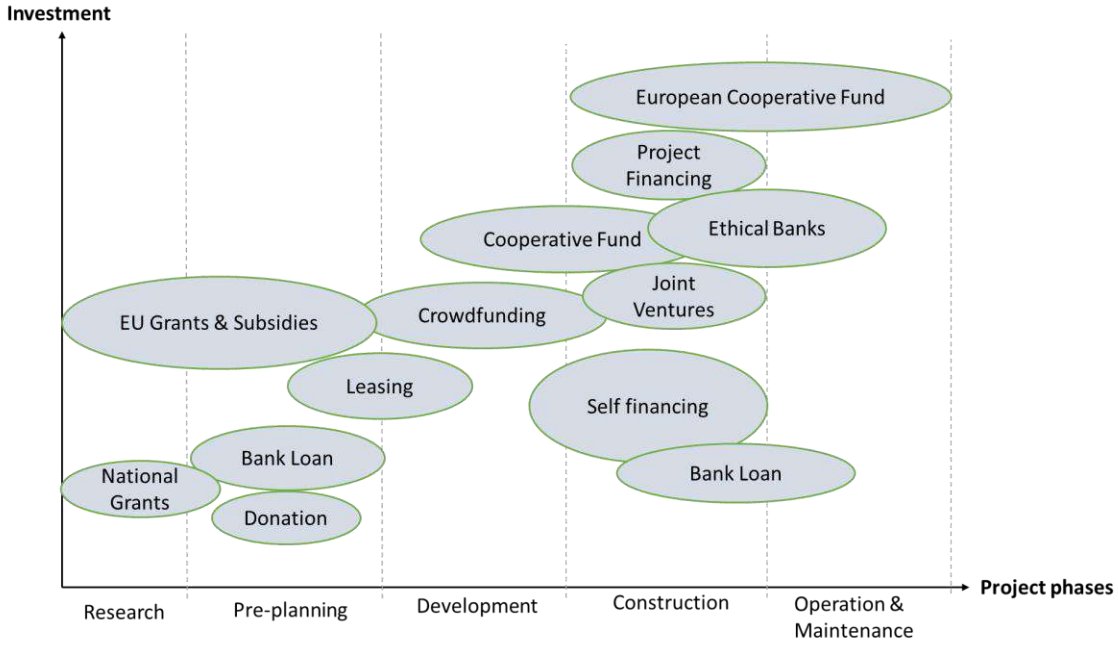


Figure 4: Potential financing options for RESCoop projects

3.3 Investment planning

This service[14] has been developed in parallel with the technical feasibility study and we worked together with the technical partners in order to evaluate the investment and demonstrate the profitability for our RESCoops. The results can be seen in the dedicated sections of the business plans in the Annexes.

3.3.1 Service summary

Investment planning is the process of identifying financial goals and converting them into a plan. This service is the main component of financial planning and a crucial element for RESCoops. The investment planning begins with the identification of goals and objectives and then the matching of those goals with the available

[11] D4.1.2 Compile "Financing Guide"
[12] Handbook on Investment schemes for RESCoop projects
[13] D2.9 "BECoop catalogues for the provision of business and financial support services"
[14] D2.9 BECoop catalogues for the provision of business and financial support services

financial resources. An estimation of the potential profitability of such an investment is also provided in this service.

3.3.2 Process, features and functions

In order to develop this service meetings should take place with the RESCoops in order to identify critical parameters into their organisational – financial framework as well as project aspects.

For the development of this service, we are proceeding with the below actions:

1. Define the financial goals of the RESCoop
2. Define the objectives of the RESCoop
3. Estimate the total expenses and potential revenues of its activities and project(s).
4. Calculate the cash flows and the investment evaluation indicators to provide valuable feedback into the feasibility analysis of T4.2:

- Costs estimation and analysis.
- CAPEX and OPEX calculation.
- Financial provision 5 years and lifetime of the technology.
- Integrate scenarios with the potential funding and financing options.
- Comparison of the current fossil-based energy system with the new bioenergy one.
- Cost – Benefit analysis.
- Cumulative Cash Flows.
- Investment evaluation criteria (in collaboration with the respective technical partners).
    a) Payback period
    b) Return on Investment (ROI)
    c) Net Present Value (NPV)
    d) Internal Rate of Return (IRR)

3.3.3 Service delivery modalities

Having all the above parameters, we developed the Cumulative Cash flow table in order to calculate the financial indicators[15] that can help our cases to evaluate the profitability of their investment and assist them to either move forward of not with the implementation of their projects. The results of our analysis can be seen in the individual business plans and are quite positive for all the BECoop RESCoops.

The current service steps into the existing roadmaps and offers the respective analysis for the elaboration of the initial short-term plans of the RESCoops. To this end and in close collaboration with the technical and pilot partners the specific projects were co-defined and in particular our analysis has been based on[16]:

[15] In collaboration with CERTH and D4.2 "Deployment of technical support services"
[16] D4.1. Co-definition of community bioenergy heating roadmaps

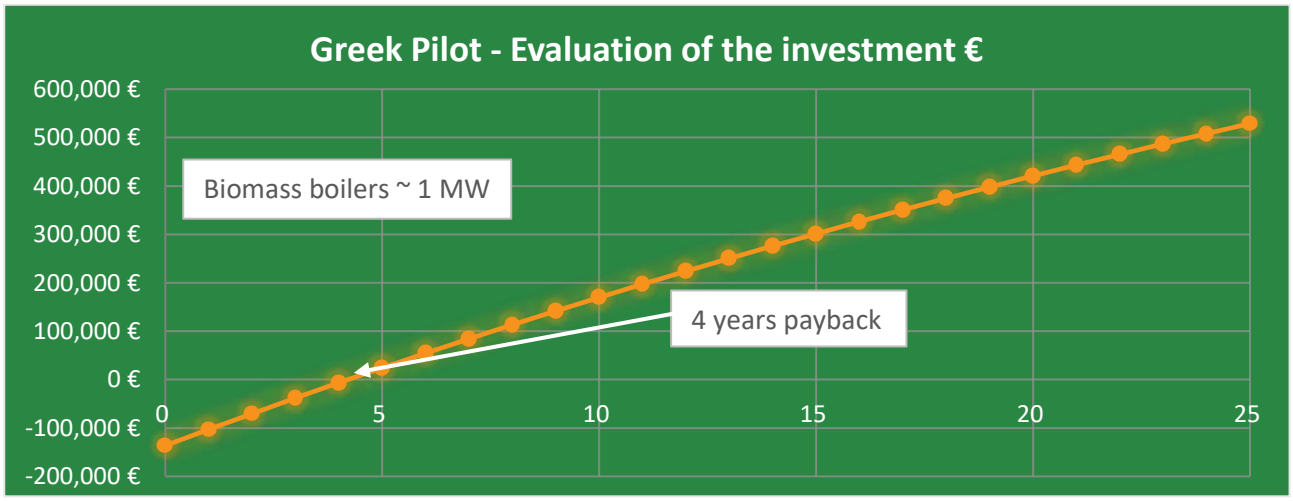
- The installation of 20 biomass boilers in the local public buildings of Karditsa (Greece), with a total thermal capacity of 1 MW that will be fuelled with pellets from the ESEK plant.
- The construction of a 3 MW DH plant with another 3 MW backup boiler and a 700 kW CHP unit for cogeneration in the area of Tovo St Agatha (Italy). They will exploit the local forest residues for the provision of both thermal and electrical energy to the citizens.
- The collection of the local biomass that is mainly from forest residues and straw and the construction of a 1 MW DH plant in the area of Aberasturi (Spain), with the aim to provide bioheat to the citizens.
- The creation of a pellet production plant with an annual production capacity of 3120 tn/year that will collect the local biomass residues and the installation of 830 domestic biomass boilers in the area of Oborniki Śląskie (Poland).

The prototype cumulative cash flow table as well as the results of the investment planning can be seen below.

Table 11: Cumulative Cash Flow table template

CUMULATIVE CASH FLOW ANALYSIS									
Years	CAPEX €	OPEX €	Total Expenses €	Interest Rate %	Inflation Rate %	Total Costs €	Total Revenues €	Present Value €	NPV €
0									
1									
2									
…									
Project's lifetime									

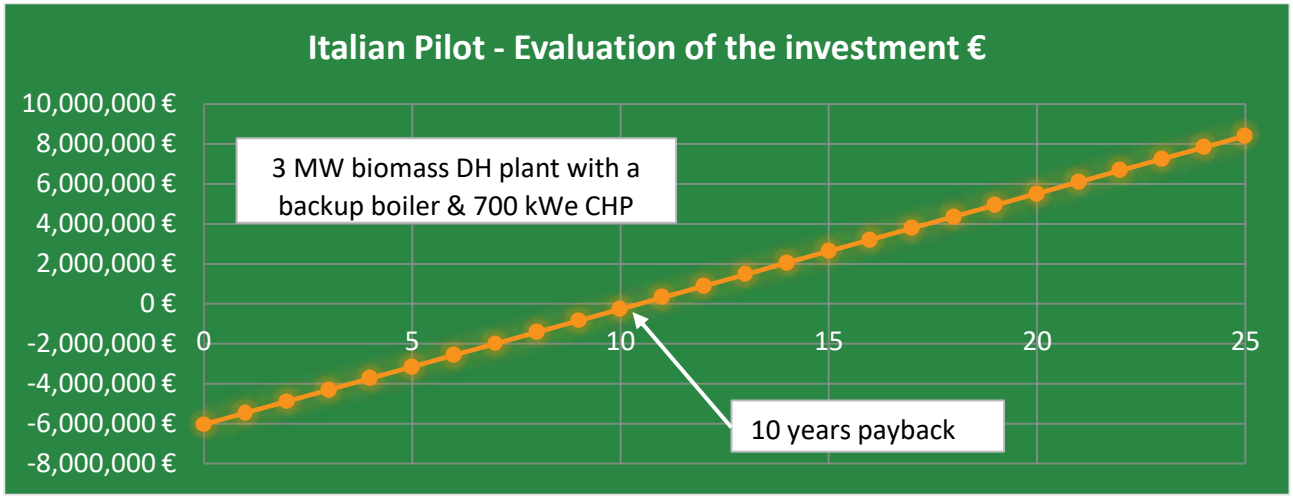
3.3.3.1 Results of the Greek pilot case



Net Present Value - NPV	528,935 €
Return On Investment - ROI	24.98%
Pay-pack period	4.00 years
Internal Rate of Return -IRR	22.23%

Figure 5: Greek pilot project investment evaluation

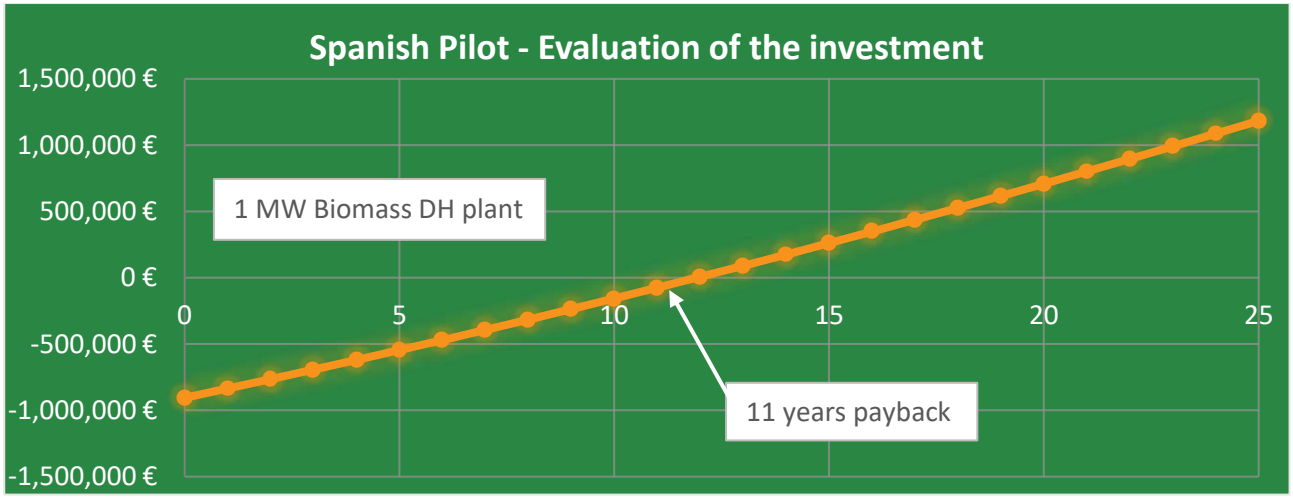
3.3.3.2 Results of the Italian pilot case



Net Present Value - NPV	5,243,354 €
Return On Investment - ROI	9.56%
Pay-pack period	10.46 years
Internal Rate of Return -IRR	6.12%

Figure 6:Italian pilot project investment evaluation

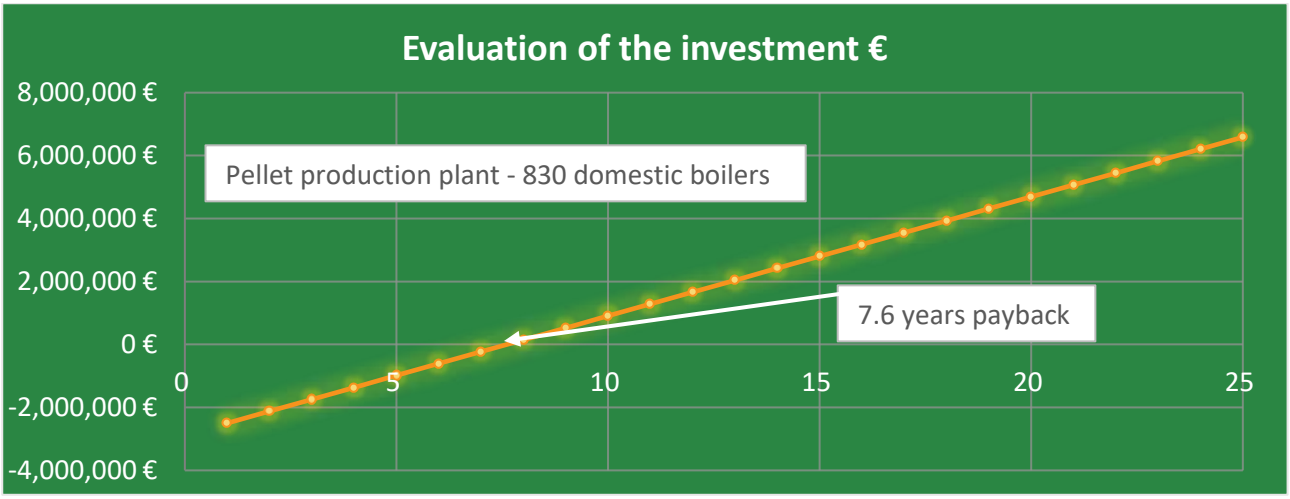
3.3.3.3 Results of the Spanish pilot case



Net Present Value - NPV	702,590 €
Return On Investment - ROI	9.12%
Pay-pack period	10.96 years
Internal Rate of Return -IRR	5.16%

Figure 7: Spanish pilot project investment evaluation

3.3.3.4 Results of the Polish pilot case



Net Present Value	4.511.605 €
Return On Investment	13.15%
Pay-pack period	7.60 years
Internal Rate of Return	6.98%

Figure 8: Polish pilot investment evaluation

3.4 Business planning

3.4.1 Service summary

A business plan is a formal written document[17] containing the goals of an organization, the methods for attaining those goals, and the timeframe for the achievement of the goals. It is essential for the Energy Communities and constitutes a wider and more complete version of the business model.

Business planning is an organizational process of defining the plan, or direction, and making decisions on allocating its resources to pursue the RESCoop's strategy. It also analyses key elements into supporting strategic decisions and empower the entrepreneurial of the whole project and also support the design of sustainable and commercially viable business models.

Business planning for potential implementation of Renewable Energy innovations within Energy Communities will play a vital role in the global energy transition. The steps follow the traditional cases of business planning tailored to the needs of the community and the essence of the technology – solution offered.

3.4.2 Process, features and functions

For the successful delivery of our service, we proceeded with the following actions:

- Meeting with the Energy Community to get insights about their business idea and define the relevant stakeholders and the clients' needs.
- Research and assessment to determine opportunities for new structures, initiatives and marketing.

[17] D2.9 BECoop catalogues for the provision of business and financial support services

- Joint Business planning, incl. clarifications on the implementation steps, potential funding opportunities and technical challenges to be surpassed.
- Visualize and present possibilities and roadmap on a business-specific pipeline.

Therefore, our service consists of the below components which are included in the dedicated business plans table of contents.

1. Executive summary
2. Concept
    a. Problem statement
    b. BECoop RESCoop solutions
3. BECoop RESCoop background and vision
    a. Characteristics & Specifications (legal status, products and services, long term aim of the business, objectives)
    b. Description of potential applications and projects (currently that are running as presented by the pilots along with their future plans)
    c. Short- medium-long term goals of the RESCoop
    d. SWOT (Strengths, Weaknesses, Opportunities, Threats) analysis of the RESCoop
4. Market Analysis
    a. Total market and market share
    b. Market segments
    c. Target market & customer profile
5. Competition Analysis
    a. Identify & analyse potential competitors
6. Business model
    a. Design & Develop a Sustainable Business Model Canvas
7. Project Schedule
    a. Critical project milestones
    b. High risk factors & mitigation strategies
8. Financial plan
    a. Financial assumptions & analysis
    b. Funding options & requirements
    c. Cumulative Cash Flows
    d. Payback strategy and investment evaluation

3.4.3 Service delivery modalities

For the sound development of the individual business plans[18,19,20] we first created particular templates that guided the overall process and helped our consortium partners to align expectations with the current business plan structure. To this end we created the below service delivery modalities.

The results of the Business modelling, Investment Planning and Financial Support are included in the individual Business Plans which can be found in Annexes II, III, IV and V.

[18] Happy Goats Business Plan
[19] LECo: Business Plan for energy communities
[20] RESCoop EU: People Powered Retrofit – Carbon Co-op – Business Model overview

RESCoop concept

Table 12: RESCoop concept table template

PROBLEM STATEMENT	
SOLUTION	
RESCOOP CHARACTERISTICS	• Legal status: • Products and services: • Objectives:
PROJECT DEFINITION	• Ongoing project: • Planned projects: • Future aims:
SHORT- AND LONG-TERM GOALS	• •

SWOT Analysis

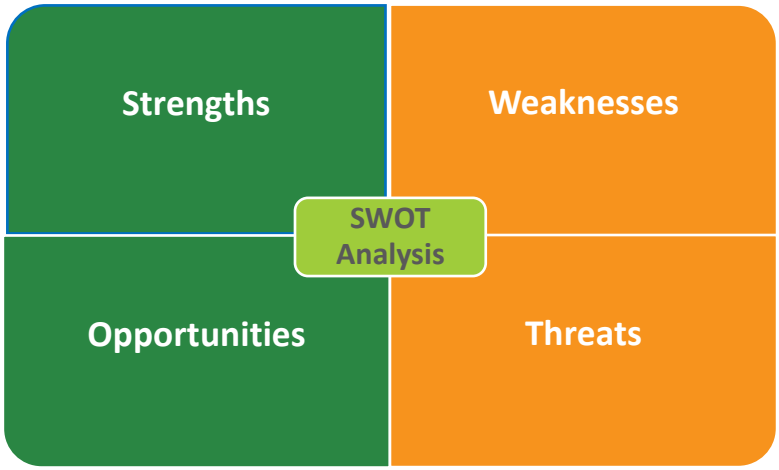


Figure 9: SWOT Analysis template

Market Analysis

Table 13: Market Analysis table template

TARGET MARKET AND MEMBERS – CUSTOMERS PROFILE	
Membership Segments	**Description**
Farmers	
Consultants	
Citizens	
…	
…	

Competition Analysis

Table 14: Competition Analysis table template

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
Competitor 1		
Competitor 2		
Competitor 3		

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
…		

COMPETITION ANALYSIS				
Customer need / problem	Relevance *(1-10)*	Coverage by RESCoop *(0-100%)*	Coverage by competitors *(0-100%)*	Unique Selling Point

Project Schedule

Figure 10: Project Schedule template

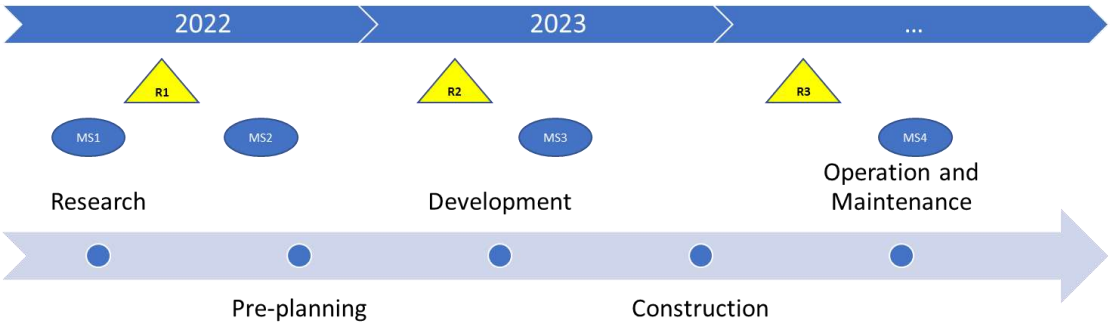


Table 15:Project Milestones & Risks table template

PROJECT SCHEDULE – CRITICAL MILESTONS & RISKS				
Critical Milestone	**Description**	**Due to date**	**Project phase**	**Stakeholders involved**
MS1				
MS2				
MS3				
…				
High Risk factors	**Description**	**Probability** *(high, medium, low)*	**Impact** *(high, medium, low)*	**Mitigation measure**
R1				
R2				
R3				
…				

3.5 Mentoring

The implementation of the BECoop mentoring service[21] started within the deployment activities of T4.3. In accordance with the business roadmaps, the pilots selected experts from members of the Network of Interest to act as mentors with our RESCoop cases. In total we gathered 24 mentors across Europe and the full list can be seen in KEP. In total we organised 9 peer–to–peer mentoring events (3 in Spain and 2 per pilot in Greece, Italy, Poland) exceeding the relevant KPI (Peer-to-peer mentoring events 8 in total and 2 per pilot). It is worth mentioning that BECoop pilots tapped on this opportunity to establish contacts and collaborations with experts either from the business, legal and technological sector but also with experts from Community Energy that will definitely continue their cooperation long after the completion of BECoop.

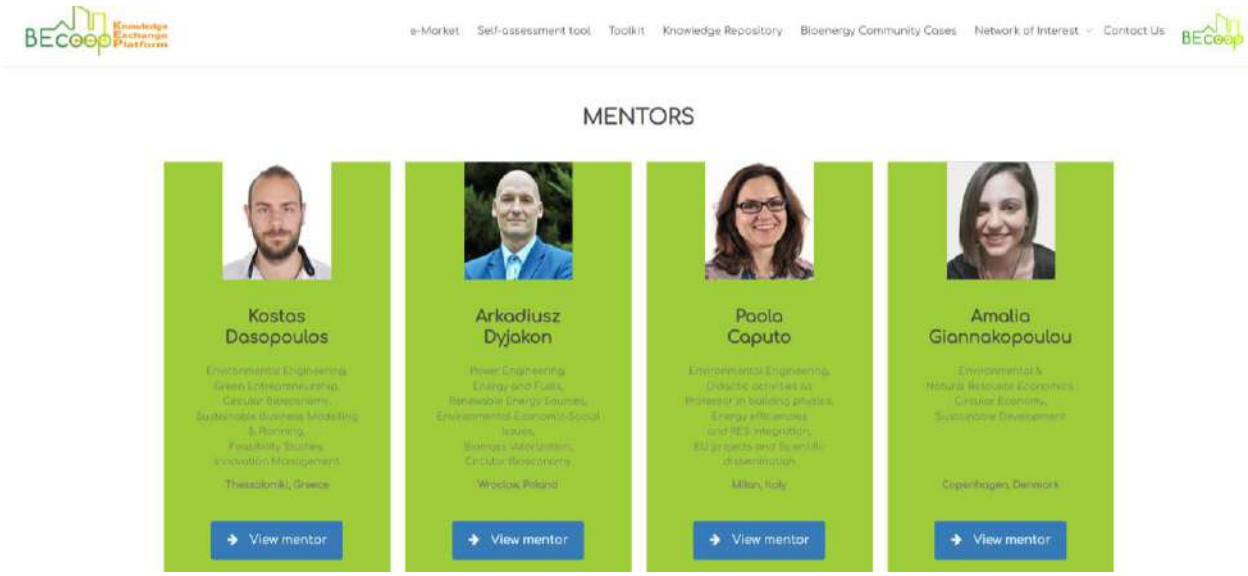


Figure 11: Mentor's page in our KEP

3.5.1 Service summary

This service provided individual support and partnering with suitable experts which are focused on the RESCoops business performance development. A mentoring scheme was established with the scope to implement specific sustainable solutions for the community. Mentoring was offered to:

- the initial phase of a development project mainly by mentors from the BECoop Consortium
- the planning and facilitating stakeholder involvement and citizen engagement processes,
- the training in project development and dissemination

3.5.2 Process, features and functions

For the development of this service, we proceeded with the following actions:

- Creation of a prototype template for gathering our experts' profiles

[21] D2.9 BECoop catalogues for the provision of business and financial support services

Table 16: Mentor's profile template

<table>
<tr><th colspan="3">NAME</th></tr>
<tr><td rowspan="6">PHOTO</td><td colspan="2">Keywords</td></tr>
<tr><td>QUOTE</td><td></td></tr>
<tr><td>COMPANY/POSITION</td><td></td></tr>
<tr><td>SECTOR</td><td></td></tr>
<tr><td>BASED IN</td><td></td></tr>
<tr><td>LANGUAGES</td><td></td></tr>
<tr><td>LinkedIn:

E-mail:</td><td>SHORT BIO</td><td></td></tr>
</table>

- Identification of suitable community (bio)energy mentors which have been divided in 3 main categories.
  a) Business mentors
  b) Technical mentors
  c) RESCoop mentors
- Development of the pool of mentors which are online in our KEP.
- Matching mentors with the suitable BECoop RESCoop cases.
- Perform at least 2 dedicated Peer-to-Peer meetings per case with the form of:
  a) online meetings
  b) work shadowing
  c) study tours

All mentors are members of the Network of Interest and have dully consented for their participation in this project's activity in accordance with GDPR rules and regulations and the BECoop Privacy Policy. More info can be found at the Knowledge Exchange Platform dedicated page about the NoI.

3.5.3 Service delivery modalities

All pilots dully reported back to the Task Leader about the organisation, content and achievements of their mentoring events. Their reports are presented below.

3.5.3.1 Greek pilot mentoring

Table 17: 1st Greek pilot mentoring

MEETING	***1st peer-to-peer Greek pilot***
DATE & PLACE	14/02/23, Karditsa Greece
AGENDA	• Technical assessment of pellets • Environmental monitoring of pellet combustion • Business development concept finalisation • Financial evaluation of the business concept
PARTICIPANTS	• Vasilis Filippou (ESEK) • Rania Mylona (ESEK) • Kostas Dasopoulos (Q-PLAN) • Michalis Kougioumtzis (CERTH) • Christina Louka (CERTH)
RESULTS	✓ Technical considerations discussed ✓ First version of business model ✓ First version of business plan ✓ Feasibility study finalisation
PHOTO	

The 1st peer-to-peer mentoring meeting for the Greek pilot took place in Karditsa on the 14th of February 2023, where BECoop partners ESEK, CERTH and Q-PLAN worked together to provide the respective technical and business support to the local energy community. The initial version of both the business plan and the feasibility study, along with the technical considerations for the activities of the BECoop RESCoop were analysed.

Table 18: 2nd Greek pilot mentoring

MEETING	*2nd peer-to-peer Greek pilot*
DATE & PLACE	03/03/23, Karditsa Greece
AGENDA	• ESEK concept and vision within BECoop • Technical considerations of pellets and combustion • Business Plan development • Investment planning & profitability • ESEK next steps
PARTICIPANTS	• Vasilis Filippou (ESEK) • Rania Mylona (ESEK) • Kostas Dasopoulos (Q-PLAN) • Michalis Kougioumtzis (CERTH) • Christina Louka (CERTH) • Dimitris Kitsikopoulos (ELECTRA ENERGY) • Takis Grigoriou (Hyperion Energy Community) • Clio Christopoulou (Incommon) • Damatis Nikolaos (HELLABIOM) • Ioanna Theodosiou (GREEN TANK) • Antonis Papadakos (Oxugono agrafon) • Evaggelos Sakallariou (AN.KA) • Kiki Metaxa (Heinrich Boll Greece) • Dimitris Stamatoukos (emission zero)
RESULTS	✓ Final version of SWOT analysis ✓ Final version of business model ✓ Final version of business plan ✓ Final version of feasibility study
PHOTO	

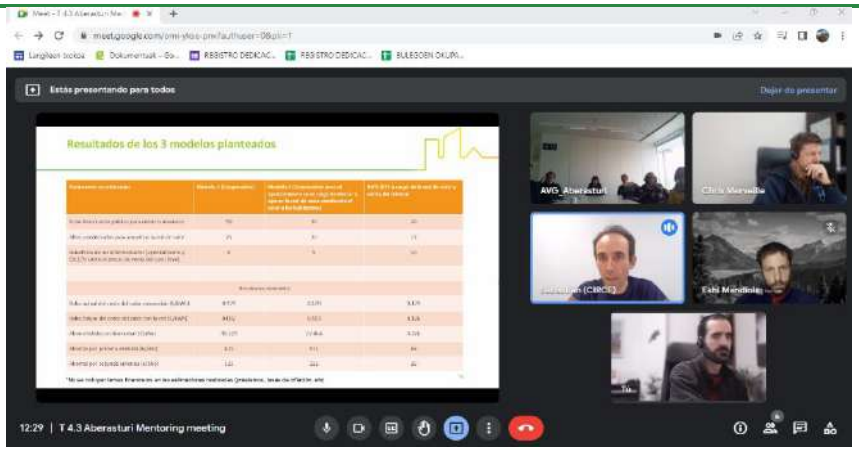
The 2nd BECoop Greek peer-to-peer mentoring meeting took place in Karditsa on the 3rd of March 2023, where our consortium partners Q-PLAN and CERTH had the opportunity to present their work in a dedicated

group of experts in the community bioenergy field in Greece. Project findings like the development of the business plan, the vision of ESEK within BECoop and the technical characteristics of the new biomass feedstocks were presented.

The group of experts who are also mentors of our project provided valuable insights on the further deployment of both business and technical support to our Greek pilot case as well as additional suggestions for the optimisation of the BECoop results so far.

3.5.3.2 Spanish pilot mentoring

Table 19: 1st Spanish pilot mentoring

MEETING	**1st peer-to-peer Spanish pilot**
DATE & PLACE	*23/01/23, online*
AGENDA	• Update & discussion on the technical design of the DH • Business development concept finalisation • Different organization model's discussion • Next steps coordination
PARTICIPANTS	• Sebastian Zapata (Circe) • Andrés Alonso, David Fermoselle, Mónica Ibarrondo, Ekhi Mandiola (Vitoria- Gasteiz Municipality) • Vicente Martinez, Lola Guzmayo, Cristina Sagasti (Aberasturi) • Chris Merveille, Pablo Castells (Goiener)
RESULTS	✓ Technical considerations discussed ✓ Biomass distribution agreed. ✓ Inputs for business plan agreed ✓ Date for the presential meeting with citizens agreed
PHOTO	

The 1st peer-to-peer mentoring meeting for the Spanish pilot took place online on the 23rd of January 2023, where BECoop partners Circe and GoiEner worked together to provide the respective technical and business support to the local energy community. The initial inputs of both the business plan and the feasibility study, along with the technical considerations for the activities of the BECoop RESCoop were analysed.

Table 20: 2nd Spanish pilot mentoring

MEETING	***2nd peer-to-peer Spanish pilot***
DATE & PLACE	*01/02/23, Aberasturi, Spain*
AGENDA	• Visit with Barrizar the location. • Confirm the selected place for the boilers room. • Data collection for the District Heating network design.
PARTICIPANTS	• Estebe García, Iñaki Gaztelu (Barrizar) • Mónica Ibarrondo, Ekhi Mandiola (Vitoria- Gasteiz Municipality) • Vicente Martinez (Aberasturi) • Pablo Castells (Goiener)
RESULTS	Barrizar mentor has all the required data for designing the DH and providing detailed inputs for the business model and the feasibility plan to be presented in the next meeting with citizens.
PHOTO	

The 2nd BECoop Spanish peer-to-peer mentoring meeting took place in Aberasturi on the 1st of February 2023, where our consortium partner Goiener introduce the selected mentor Barrizar for this task to the energy community. Barrizar has experience in designing and O&M of a nearby district heating to their knowledge is expected to improve the quality of the developed business model and feasibility plan.

This visit was required for Barrizar to have the minimum data collection required for their mentorship.

Table 21: 3rd Spanish pilot mentoring

MEETING	***3rd peer-to-peer Spanish pilot***
DATE & PLACE	*17/03/23, Aberasturi, Spain*
AGENDA	• Presenting the technical results. • Presenting the Business model and feasibility Study results • Presenting SWOT analysis. • Presenting the Funding strategy to be developed • Open discussion with regard to legal forms of communities.
PARTICIPANTS	• Sebastian Zapata (Circe) • Andrés Alonso, David Fermoselle, (Vitoria- Gasteiz Municipality) • Chris Merveille, Pablo Castells, Oier Etxebarria, Erika martinez (Goiener) • Estebe García, Iñaki Gaztelu (Barrizar) • 34 citizens from Aberasturi

RESULTS	✓ Great interest on the proposal. Questions with regard to O&M where answered by Barrizar. ✓ Huge implication of the institutions for finding funding solutions. ✓ Sustainability concerns with the Forestry biomass were discussed and agreed. ✓ Next steps questions on their community legal registration. ✓ Funding forecast and possible dates of construction.
PHOTO	

The 3rd BECoop Spanish peer-to-peer mentoring meeting took place in Aberasturi on the 17th of March 2023, where our consortium partners CIRCE and GOIENER had the opportunity to present their work to the citizens of the bioenergy community of Aberasturi.

BECoop project results such as local biomass properties and potential, DH design, CAPEX for the installation, OPEX and possible funding schemes were presented and discussed along with the expert mentors for communities from Goiener and for Biomass District heating installations from Barrizar and the representatives from the municipality.

Answers to the citizens provided rich discussion and further engagement to the proposal in Aberasturi.

3.5.3.3 Italian pilot mentoring

Table 22: 1st Italian pilot mentoring

MEETING	***1st peer to peer mentoring meeting***
DATE & PLACE	*Tovo St. Agatha, February 3rd 2023*
AGENDA	Define and evaluate the stages of the road map planned within the BECoop project for the implementation of the woody biomass cogeneration district heating plant
PARTICIPANTS	• Gianbattista Pruneri (Municipality of Tovo St. Agatha) • Annamaria Saligari (Municipality of Lovero) • Franco Matteo Saligari (Municipality of Mazzo di Valtelina) • Walter Righini (president of FIPER) • Vanessa Gallo (FIPER) • Margherita Brambilla (FIPER)

RESULTS	✓ Governance model has been defined ✓ Creation of Mortirolo Energy Community ✓ Energy benefit concept for the new RESCoop ✓ 10,000 € each municipality to contribute ✓ Develop biomass DH CHP plant for the 3 municipalities
PHOTO	

A meeting was held on Friday, February 3rd, at 2 p.m. between Mayors Gianbattista Pruneri (Municipality of Tovo St. Agatha), Annamaria Saligari (Municipality of Lovero), Franco Matteo Saligari (Municipality of Mazzo di Valtelina) and the FIPER delegation composed of President Walter Righini, Dr Vanessa Gallo, national secretary, and Dr Margherita Brambilla, communications manager.

The subject of the meeting was to define and evaluate the stages of the road map planned within the BECOOP project for the implementation of the woody biomass cogeneration district heating plant.

The discussion started on the governance model, a *''conditio sine qua non''* for being able to pursue the path taken. FIPER illustrated the overview and examination of the different corporate options, explaining the costs/benefits of each; in particular, the implication that each municipality can play in the establishment of a company is explored in administrative and accounting terms, in accordance with the Consolidated Law on Local Entities (TUEL), which defines in Title IV, Part II, the financial and accounting system as well as the investments of responsibility of public entities.

Among several scenarios illustrated, FIPER delved into the opportunity offered by the establishment of a "Benefit companies", were introduced into Italian legal system by Art. 1 (paras. 376-384) of the Stability Law (n.208/2015).

"Benefit company" is a company that in the exercise of economic activity in addition to the purpose of earning profits, pursues one or more purposes of "common benefit." It operates responsibly, sustainably and transparently towards people, communities, territories and the environment, cultural and social goods and activities, organizations and associations or other stakeholders.

The benefit corporation defines from its charter to simultaneously realize social and environmental benefits while achieving its profit outcomes. Attention to the environment, social services, and financial gain represent three interconnected elements in the decision-making process. Social accountability and transparency are identified as tools for guiding behaviour and achieving corporate performance.

When setting up a benefit corporation, it is necessary to specify in the corporate purpose the specific purposes of common benefit that are to be pursued. The corporate purpose directs the actions of the managers and directors and, at the same time, assumes special relevance to the balance to be achieved between the interest of the shareholders and the pursuit of the purposes of common benefit, with repercussions also on the possible liability profiles in the hands of the relevant managers.

Mayors expressed their assent toward the establishment of a benefit corporation in which municipalities agreed to contribute 10,000 euros each in share capital. Citizens, businesses, and entities in the area that share the purpose highlighted within the charter will be able to participate in the company. The first objective of the newly formed company named "Mortirolo energy benefit" is the implementation of the executive project of the biomass cogeneration district heating network.

Table 23: 2nd Italian pilot mentoring

MEETING	*2nd peer to peer mentoring meeting*
DATE & PLACE	*SEV headquarters, Bolzano, Italy March 30th 2023*
AGENDA	• Finalise the technical scenarios to conclude on the technological option. • Finalise the business model and for the new energy community.
PARTICIPANTS	• Vanessa Gallo (FIPER) • Margherita Brambilla (FIPER) • Paola Caputo (Politecnico di Milano) • Michalis Kougioumtzis (CERTH) • Kostas Dasopoulos (Q-PLAN) • Amalia Giannakopoulou (CBS)
RESULTS	✓ Technological scenario determined: 3 MW biomass DH plant with another 3 MW backup boiler and a 700 kW CHP for cogeneration. ✓ Revenues estimation clarified: 0.12 €/kWh for thermal and 0.15 €/kWh for electricity.
PHOTO	

3.5.3.4 Polish pilot mentoring

Table 24: 1st Polish pilot mentoring

MEETING	**1st peer-to-peer Polish pilot**
DATE & PLACE	*06/04/23, Kuraszków, Poland*
AGENDA	• Opening of the mentoring workshop/meeting • Presentation of the BECoop project idea, characteristics of the OBS commune, introduction to the energy cooperatives • Legal aspects of energy cooperatives (legal status, current legislative work, available financial support programs) • Discussion and open questions • Refreshments and determination of the next plans
PARTICIPANTS	• Tymoteusz Mądry (Mentor, Aspiratio Consulting) • Arkadiusz Dyjakon (Mentor, WUELS) • Łukasz Sobol (WUELS) • Magdalena Zatońska (Mentor, OBS) • Monika Wiszniowska (OBS commune) • Arkadiusz Poprawa (Mayor of OBS commune) • 25 external participants (i.e. representatives of offices of other communes, farmers, people interested in the implementation of energy cooperatives, energy advisors)
RESULTS	✓ The participants were familiarized with the legal aspects of energy cooperatives. ✓ The biggest legal barriers that may hinder the development of energy cooperatives are discussed. ✓ Legal issues and the path of the RESCoop creation in Poland that are difficult to interpret have been clarified. ✓ It was explained what legal changes should be expected in the coming future in the context of establishing and functioning of energy cooperatives.
PHOTO	   

The first mentoring meeting took place on April 6, 2023 in Kuraszków. Mr. Tymoteusz Mądry, a lawyer and specialist in legal aspects of energy cooperatives, was invited to the meeting. The meeting was attended by about 25 invited guests, including the mayor of the Oborniki Śląskie commune, representatives of local governments from other communes, associations and farmers. After opening the meeting and presenting the basic ideas of the BECoop project, the invited mentor from Aspiratio Consulting performed a deep analysis of the legal aspects of establishing and functioning of energy cooperatives in Poland. The current legal status of energy cooperatives was outlined, and the ongoing legislative work was presented (including draft amendment No. UC99). At the end, the current rules of financial support for energy cooperatives were presented and participants' questions were answered.

It is worth emphasizing that the people taking part in the workshops were very involved, and the ensuing discussion was lively and full of emotions. During the discussion, technical issues (issues of high voltage in connection with photovoltaic cooperatives), legal issues (rules of accounting, minimum number of members, issues of democracy and legal personality of companies) and social issues (issues of ecology, the social awareness problem) were discussed.

Table 25: 2nd Polish pilot mentoring

MEETING	***2nd peer-to-peer Polish pilot***
DATE & PLACE	*13/04/23 physical, Kuraszków, Poland*
AGENDA	• Update & discussion on agricultural and forestry forms of biomass used for energy purposes. • Biomass properties in terms of pellets production. • Characteristics of pellets production line. • Pellets certification. • New technologies of direct pellets production in field/forest. • Discussion and open questions.
PARTICIPANTS	• Krzysztof Mudryk (Mentor, UR Krakow) • Arkadiusz Dyjakon (Mentor, WUELS) • Magdalena Zatońska (Mentor, OBS) • Arkadiusz Poprawa (Mayor of OBS Commune) • Representatives of Voivodeships Funds of Environment Protection and Water Management (Energy advisers) • Representative of National Forest (Head of the Department of Oborniki Śląskie Province)

	• Entrepreneur (biomass briquettes producer) • Farmers (biomass producers) • Local residents (biomass pellets final users, OBS)
RESULTS	✓ Critical biomass properties for pellets production discussed ✓ Capacity of pellets production line agreed ✓ Pellets storage and distribution system proposed ✓ Further social awareness and trust building campaigns required (to get rid of coal combustion in households)
PHOTO	

The 2nd peer-to-peer mentoring meeting for the Polish pilot took place in Kuraszków (physical meeting) on the 13th of April 2023. Key stakeholders related to the logistics chain (BECoop RESCoop) based on the pellets production and utilisation in the OBS commune, including the mayor of the Oborniki Śląskie commune, took part in the meeting. The technical aspects were discussed and critical points of the strategy realisation were analysed.

3.6 Networking

We linked this service[22] with the participation of our RESCoops in matchmaking events. Where our consortium partners presented our cases and particularly their maturity level for investments in a dedicated group of people with potential investors and collaborators.

3.6.1 Service summary

This service describes the capacity of a RESCoop to understand and meet the specific needs and expectations of its financial sources e.g. investors, and it plays a critical role in shaping whether a business receives and secures funding. Two key components influence a RESCoops' investment readiness: the business viability and the quality of investor materials.

Within the first aspect RESCoops demonstrated to investors that their businesses are sustainable, well-run organisations. Their businesses operate under a sound business model, with unique value propositions and a qualified team.

The second aspect is investor materials. Documents such as business plans, financial models, investor teasers and memoranda should be robust and make a compelling case for investment in the business.

To this end, in the framework of services provision within BECoop, we combined this service with our networking activities in order to connect our RESCoops with potential investors and market actors.

3.6.2 Process, features and functions

For this service the below actions needed in order to get in touch potential investors with RESCoops, that's why we merged investment readiness with networking events. The main actions we performed in collaboration with our RESCoop cases and respecting the dedicated local particularities were the:

- Guidance for preparing pitch presentations and improving pitching skills.
- Identification of suitable pitching events or individual investors, collaborators or funding providers.
- Introduction of our RESCoops in 2 matchmaking events within the participation of BECoop and presenting their investment readiness level based on the figure below.

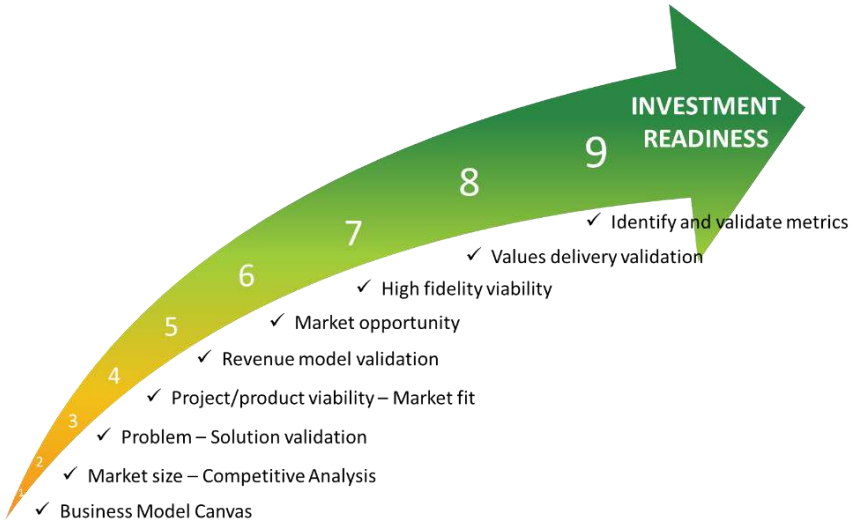


Figure 12: Investment Readiness Level

[22] D2.9 BECoop catalogues for the provision of business and financial support services

3.6.3 Service delivery modalities

To this end our consortium partners participated in the RENALDO conference on the 1st of March 2023 that took place in Warsaw Poland, where our energy community cases had the opportunity to introduce themselves and present their project development status within BECoop.

Dedicated presentations took place by our consortium partners and interesting discussions were made where our cases got in touch with particular entrepreneurs aiming to boost the community spirit on Renewable Energy with a special focus on rural areas.

Figure 13: BECoop participation in RENALDO conference

BECoop will also participate in the Community Energy Spring gathering that will take place in Athens Greece 8-10 May 2023 which will be organised by RESCoop EU and Electra Energy. Our project is a co-organiser and will contribute to many event's activities as well as will organise particular happenings like:

- BECoop Brokerage event under T5.1
- BECoop Greek policy workshop under T5.3
- Networking fair BECoop booth

There our energy communities will have the opportunity to present their cases and communicate with an interactive way with potential investors and collaborators in order to improve their networks, mobilise further collaborations and enhance their overall business performance.

Figure 14: BECoop participation in Spring gathering event

4 Conclusions and future needs

Taking into account all the above we have created specific business plans for each case. The business plans illustrate the results of our deployment actions and are aligned with the future needs of our RESCoops as defined in the D4.1.

Our cases will utilise the business and the technical support of BECoop in order to perform their roadmap towards the real implementation of their projects. The individual business plans that contain the results of our support will guide the energy communities and will overall assist them to improve their business performance. There are major documents that conclude the work done across T4.1, T4.2 and T4.3 because they contain the results of the feasibility studies, and the individual projects schedule is adjusted to their initial roadmap. During the deployment of the business support the following conclusions were drawn:

- Various governance models of RESCoops are applicable.
- A comprehensive needs identification process is both necessary and can unveil opportunities and barrier.
- The current energy crisis both for-profit and non-for-profit energy communities can be effective.
- Smart and efficient correlation between the business and technical aspects of BECoop is essential in order to define the business strategy and the tailored roadmaps for our cases.
- Biomass direct combustion within the installation of biomass boilers appears to be a more profitable scenario than the District Heating.
- Mentoring activities can significantly boost the performance of RESCoops.
- The contribution of the local authorities is crucial for the development of energy communities.
- The existence of available grants and subsidies at national level can facilitate the initial investment and make the bioenergy projects more attractive.
- Consultations with ESCOs can act as a catalyst in many cases in order to tackle technical barriers.
- Raising local awareness about the benefits of Community Bioenergy boosts the willingness of the citizens to participate in such communities.
- A proper and simple business model canvas can guide the development of a RESCoop.
- A sensitivity analysis is required for the proper investment planning.

This report summarized the BECoop efforts to support the local bioenergy communities through the provision of business and financial support services. The main result are the dedicated business plans per pilot that will guide the implementation the BECoop RESCoops cases and can be found In the Annexes. Specifically:

- Greek pilot case in Annex II
- Italian pilot case in Annex III
- Spanish pilot case in Annex IV
- Polish pilot case in Annex V.

Annexes

Annex I: Questionnaire for the RESCoop needs

General Info

Description of the RESCoop

Name:

Sector:

Contact info (address, t./f., contact e-mail):

Webpage:

Description of activity:

Interviewee

Name:

Contact info (t./ f, contact e-mail):

Position:

Other participants:

Discussion

Q1: What are your members? Please describe the membership base, its size and evolution over the last years.

Q2: Who are your customers? Please describe the customer base, its size and evolution over the last years.

Q3: What are your customers' needs? What do you offer them? Why do they purchase your product/service? How do they use it? Can their needs change over time (e.g. because of trends)?

Q4: What can your RESCoop do well? What are its key competences and strongest assets or unique resources? What is its competitive advantage? What do others think you do well? Please list 3-5 strengths.

Q5: What doesn't your RESCoop do well? Which are the areas where you need improvement? What are the problems encountered for this reason? Are there any knowledge/skills/resources/facilities missing? Please list 3-5 weaknesses.

Q6: Do you make enough profit?

a) Yes

b) No, the reason being

_____

Q7: Do you use state of the art technology/processes for your product/service? Which are considered as best practices for your business (think about e.g. supply chain management, production, packaging, logistics, water and energy efficiency, waste management, etc.)? Do you implement them? If not, please explain why.

Q8: How flexible and receptive to change are you? What is the RESCoop's capacity to introduce changes? Is the RESCoop's culture innovative?

Q9: Who are your competitors (current of future)? What are their strengths and weaknesses? In which areas do they have advantage over you?

Q10: Who are your collaborators? Please list all types of your partners and describe how you collaborate with them. Are you satisfied with them? What skills and competences do you seek in your partners?

Q11: What are the circumstances that affect your business positively or negatively?

a) Political and regulatory

b) Economic

c) Social and cultural (e.g. trends)

d) Technological (e.g. is the RESCoop able to keep up with the pace technology evolves?)

e) Environmental (e.g. weather, natural ecosystem)

f) Market trends

Q12: Does the RESCoop have access to external funding sources?

a) Yes, to the following:

_____

b) No, the reason being

_____

Q13: What do you need/wish to do but you lack the resources/expertise/skills?

Q14: Do you wish to examine new markets (vertically or horizontally)? If yes, which ones?

Q15: Do you wish to examine new markets (vertically or horizontally)? If yes, which ones?

Q16: Which stakeholders will be involved for your project? (Biomass logistics and system integration)

Q17: What are the current energy prices in your area? (Biomass as a fuel €/tn, bioheat costs and fossil-based heating costs €/kWhth)

Q18: Please define your heating system, the annually energy demands (kWh) and the thermal installation capacity (kW or MW)

Q19: What's the purchasing and installation cost of the whole system including the subcomponents (€/kW)? What's the operational and maintenance costs including biomass logistics (€/kW/year)

Q20: Are there any available national funding opportunities for such RESCoop initiatives? If yes please indicate them along with their basic characteristics.

Other notes:

Annex II: Greek RESCoop Business Plan

Executive Summary

Karditsa is a city in western Thessaly in mainland Greece with around 39,000 inhabitants. Currently, the main resources used for thermal purposes are oil (53%), electricity (22%) and natural gas (18%), while biomass represents only the 6%, despite the great untapped potential quantified in:

- 14,000 tn/year of wet biomass that can be collected from urban pruning in the whole prefecture of Karditsa; the pruning deriving from city trees are either left in the open-space or burned in open fires or disposed in landfills;
- 4,400 ha of forests (owned and managed by the municipality of Plastira, 35 km from Karditsa), i.e. about 5,000-8,000 tn/year (dry) as biomass residue, that is left inside the forests, without being exploited;
- 300 tn/year (dry) of coffee residues that are disposed in landfills.

ESEK already owns a pellet production facility in Karditsa. The pellet plant is currently operating by transforming sawdust and wood residues into pellet with a capacity of 1,200 tn/year. The goal of BECoop activities is to expand the currently sources of biomass that are used by ESEK to new local feedstocks that remain untapped, such as forest/agricultural residues, urban pruning and coffee residues. Furthermore, the aim for the Greek BECoop pilot is to also expand its existing activities into producing alternative biomass fuels e.g. pellets from such residual biomass sources, and the operation of ESEK as an ESCO by installing and operating biomass boilers in public buildings and by selling heat to customers.

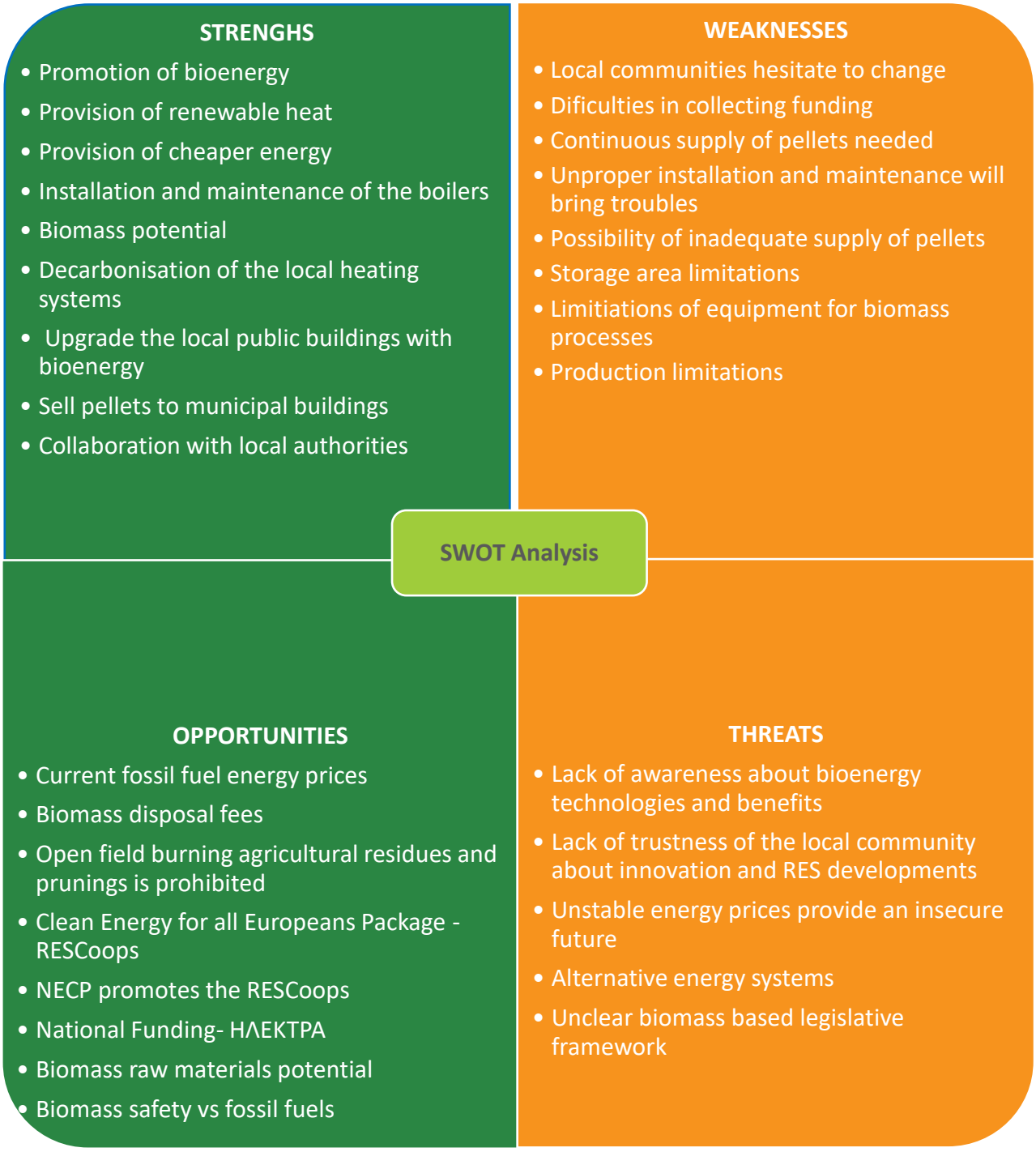
ESEK Concept and vision

PROBLEM STATEMENT	• Massive city pruning exists in the area. • Large quantity of coffee is emitted daily. • Forest residues are dangerous for fires in the nearby area. • Significant increase of fossil fuels has created energy poverty in the region. • There is a lack of local awareness about the potential of biomass for clean energy. • There are some regulatory and institutional barriers for the development of bioenergy.
SOLUTION	• Collect the local biomass to produce pellets in the ESEK plant. • Distribute the solid biofuels at the local community. • Install biomass boilers in the municipal buildings. • Offer a waste management solution for the city and the forest area. • Decarbonise the heating network with biomass. • Decentralised and democratised social awareness of local community.
RESCOOP CHARACTERISTICS	• Legal status: Profit cooperative organisation. • Products and services: Solid biofuels (pellets). • 400 members so far.
OBJECTIVES:	• Production and supply of solid biofuels to the citizens. • Awareness of the local community to sustainability matters. • Mobilisation of the citizens for social innovation within community bioenergy. • Increasement of its membership rate. • Planning more RES projects. • Exploration of potential opportunities and funding.

PROJECT DEFINITION	A biomass boiler has been installed in a public school. The boiler produces thermal energy from the pellets of ESEK. Coffee residues, urban pruning and forest residues are the main raw materials for the pellet production. 20 more biomass boilers will be installed in such municipal buildings in order to offer to the local community cleaner and cheaper energy. This project aims to tackle the local energy poverty and to attract more members for such RESCoop's initiatives. The collection of coffee residues, new feedstocks and raw materials for new mixed pellets as well as the installation of biomass boilers and the provision - selling of heat are part of the project.
SHORT- AND LONG-TERM GOALS	Short term goals: • Collection of new biomass streams. • Production of alternative and innovative solid biofuels. • Installation of appr. 20 biomass boilers in public buildings. • Encouragement of more people in using pellets instead of fossil fuels. • Further promotion of the RESCoop to engage more members. Long term goals: • Installation of 1 MW solar park to provide RE to the members through NEM. • Expansion of the activities in the municipality of Lake Plastira. • Further exploitation of the forest residues potential in the region. • Construction of a DHP to power the nearby hotels with bioenergy. • Construction of 1 MWe biomass power plant that will consume local residual biomass e.g. city pruning, forest and agricultural residues.

SWOT Analysis

As we can see from the analysis below, the weaknesses of the internal environment are mostly related with the drawbacks of the local community landscape and with potential technical limitations. These can be easily tackled with the strengths of ESEK's activities and collaborations both on the solid biofuel production and the awareness of the local community. The same stands also for the threats of the external environment which are mainly related with the biomass legislative conditions in Greece and the future of local bioenergy. Although the current opportunities of the energy prices, regulations and the benefits of biomass overcome by far the existing concerns and can boost the development of the community bioenergy in the local area.



Market Analysis

Target Market – Customers Profile

TARGET MARKET AND MEMBERS – CUSTOMERS PROFILE	
Membership Segments	**Description**
Agricultural sector	A group of local people and/or industries working mainly in agricultural activities and use pellet as energy source and can also be biomass providers for ESEK. • Agricultural organisations / cooperatives

TARGET MARKET AND MEMBERS – CUSTOMERS PROFILE	
Membership Segments	**Description**
	• Biomass owners • Farmers that are familiar with biomass as energy source • Agricultural industries
Local community	People from Karditsa and nearby areas are members of ESEK, mainly concerns the following groups: • Citizens • Local organisations • Business owners and SMEs
Local authorities	Local authorities at regional and city level are part of ESEK. • Municipal authorities (6 Municipalities) • Agencies (ANKA), Technical Chamber • Forest cooperative
Local coffee houses	ESEK in collaboration with InCommOn, are planning to utilise commercially the coffee residues of the city café's, which all of them can be considered as members.
Local companies	There are some local companies that have a special interest in bioenergy initiatives and are members of ESEK. Which are mainly involve: • industries that provide wood waste to ESEK plant for pellet • potential end users interested in developing a new bioenergy heating system in this area, mainly hotels, touristic shelters, restaurants, etc.

Competition Analysis

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
Fossil Fuel providers	• Current solution – no need to change. • Favourable legal framework for NG. • VAT for NG is 6%. • Existing knowhow. • Current infrastructure.	• Increasing energy prices. • Insecure energy future due to recent geopolitical reasons. • European regulations are against fossil fuels. • GHG's emissions and environmental degradation.
Heat pumps owners	• More innovative technology. • Higher thermal efficiency. • Provision of cooling energy as well. • VAT 6%	• Much higher installation costs. • Requires electricity which is mainly from fossil fuels in Karditsa. • Might need new radiators. • More complicated system design, integration and configuration.
Other biomass sellers	• Other alternative biomass options (woodchip, firewood, etc.). • Might have competitive prices.	• Unknown biomass characteristics. • Unknown biofuels quality.

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
		• Uncertain knowhow on biomass and such boilers.
Other RES (mainly solar and geothermal)	• High solar energy potential in Greece. • Solar heaters are easier to be installed and maintained. • Geothermal if exist is always available.	• Geothermal potential is unknown and should be investigated. • Solar energy requires space. • Difficult to cover thermal demands. • Geothermal restriction areas • Solar unavailability hours

COMPETITION ANALYSIS				
Customer need / problem	**Relevance *(1-10)***	**Coverage by RESCoop** *(0-100%)*	**Coverage by competitors** *(0-100%)*	**Unique Selling Point**
Solid Biofuel	10	100%	100%	• High quality pellet. • Tested biomass content. • Tested energy performance and LHV. • Monitored combustion & emissions.
Cheap energy	8	70%	70%	• 600 €/tn incl. installation & maintenance. • 450 €/tn in the near future. • Cheapest solution in the local market (see graphs below).
Renewable Energy Sources	10	100%	70%	• Replacement of fossil fuels to face the energy crisis. • Reliable biomass value chain. • Decarbonisation of local heating systems. • Tackle energy poverty. • Decentralised energy.
Installation & Maintenance of the boilers	7	100%	100%	• Boilers installation, integration and configuration • Yearly maintenance twice • Repair damages and failures • Monitor the operation

There are some competitors in the local market that can potentially challenge the business performance of ESEK. The various alternative heating concepts can compete pellets in specific occasions and periods. However, as we can see from our analysis, the weaknesses overcome the strengths of all our possible competitors. Therefore, our heating solution covers the majority of our target customers' needs with a highly competitive advantage our unique selling point. Overall, the ESEK's target market along with the competition analysis offers a fruitful ground in order to align its business development with profitability.

Sustainable Business Model

PROBLEMS & BARRIERS

- Non sustainable urban pruning waste
- Unused coffee residues
- Unexploited forest residues
- Significant local energy poverty
- Fossil fuel dominance of heating
- Lack of awareness of biomass benefits
- Regulatory & Institutional barriers

SOLUTIONS

- Affordable RH to the local community
- Decarbonization of heat energy for public buildings, local industries and households
- Production of solid biofuels from local waste
- Biomass boilers installation in municipal buildings

KEY PARTNERS

Local governance

- Urban pruning
- Forest residues
- Potential end users

Academia (UTH & CERTH)

- Scientific support
- Biofuels optimization

Biomass boilers firms

- Installation, O&M

Local community (InCommOn)

- Citizens
- Coffee houses
- Biomass owners
- Local industries (i.e hotels, ..)

KEY ACTIVITIES

- ✓ Biofuel production (pellets)
- ✓ Provision of bioheat
- ✓ Local awareness
- ✓ Installation & Maintenance of biomass boilers
- ✓ Municipal buildings energy upgrade
- ✓ Solar PV construction & NEM
- ✓ Future district heating network

KEY RESOURCES

Physical
- Residues
- Transport
- Equipment
- Experts

Financial
- Member's equity
- Bank Loan

Intellectual
- Partnership
- Knowhow

VALUE PROPOSITIONS

- NECP → local bioenergy
- Competitive biomass price
- Tackle energy poverty
- Unexploited residues for RE
- Local waste management
- Decarbonization of the local heating system
- Reliable access to RH
- Business opp. for biomass
- Direct RE to public buildings
- Biofuel to citizens

CUSTOMER RELATIONS

- Local Households → pellets/NEM
- Municipal buildings → pellets
- Local companies → bioheat

SUSTAINABLE CHANNELS

Pruning/Coffee → pellets → citizens

Forest residues → pellets → citizens

Pellets → school → boiler → heat

Solar → PV → NEM → members

CUSTOMER SEGMENTS

- Energy Community members
- Local community
- Municipalities of Karditsa
- Local Agencies
- Local coffee houses
- Local companies (i.e hotels)

END OF LIFE

The local exploitation of biomass offers a reliable waste management system aligned with the circularity principles and the bioeconomy.

COST STRUCTURE & ADDITIONAL COSTS

Production costs
- Equipment ~1MW biomass boilers (x20)

Installation Costs & Grid Implementation
- Transportation, connection, configuration

Other Costs
- R&D, Permits, Taxes, etc.

CAPEX est. 100,000€

Lifetime 25 years

OPEX est.= 30,000€
- Plant operation
- Maintenance
- Biomass logistics
- Labor costs
- Annual fees/other

SUBSIDISATION

Financing sources
- Self-financing (new fees)
- Bank loan (ΣΥΝ. ΚΑΡΔ.)
- Accumulation of inv. Capital
- Crowdfunding

EU & National Funding programs

ΕΞΟΙΚΟΝΟΜΩ ΓΙΑ ΝΕΟΥΣ

ΕΞΟΙΚΟΝΟΜΩ ΕΠΙΧΕΙΡΩ

ΗΛΕΚΤΡΑ

ΕΞΟΙΚΟΝΟΜΩ

EU Regional Dev. Fund

Cohesion Fund

Recover & Resilience.

REVENUE STREAMS

Renewable Energy Savings
- 730 MWhth annual production
- Public buildings demands covered
- Reduced Energy bills
- Pellets trade market

Other potential revenues
- Boilers maintenance
- Local/state/ EU incentives
- Installation in other buildings

Revenues: 65,000 €/year
ROI: 25% **Pay Back:** 4 years

ENVIRONMENTAL RISKS

- Air Pollution from materials manufacturing
- Exhaust emissions in transportation processes
- Unproper combustion may emit pollutants

SOCIAL RISKS

- Short term loss of fossil fuel-based jobs
- Competition of local beneficiaries on the produced energy

ENVIRONMENTAL BENEFITS

- ~ 3,000 tn CO2 saved → 600 cars
- Decarbonization of the thermal grid
- Clean energy to public buildings
- Circularity within local waste management
- Raised Environmental awareness

SOCIAL BENEFITS

- Creation of new jobs (biomass)
- Support of the local economy
- Improved conditions/clean air
- RE to the wider region of Karditsa
- RH comfort to public buildings

Financial Support

The most relevant financial resources that ESEK can utilize can be seen in the table below. These resources have been divided in 3 main categories according to their origin:

- Financing mechanisms that are mostly related with private sources of funding.
- EU and National Funding opportunities which is mainly funding from available programs.
- Financial incentives are also considered.

	Financing & Funding schemes	Description	Characteristics	Challenges & Risks
Financing Mechanisms	Self – financing	ESEK will finance the installation of the boilers and will receive profit from the selling of the pellets or the pricing of thermal energy.	• ESEK own shares • Members equity	• Limited resources • Negative willingness • Money allocation
	Bank loans	ESEK can apply for a loan at the local bank to minimise the capital investment and repay it through the selling of pellets or other arrangement.	• Simple loan • Banks with willingness to support community energy initiatives	• Interest rates • Repayment terms • Mortgage terms
	Joint Ventures	ESEK can co-create either a public partnership with the local authorities or with a private entity relevant with the installation and maintenance of the boilers to jointly contribute at the initial costs.	• Municipalities • Boilers manufacturers • ESCO's	• Capital distribution • Revenues allocation • Contractual obligations
	Leasing	ESEK can obtain the use of the biomass boilers for which it must pay a series of contractual, periodic, tax-deductible payments. At the end of the contract term, ESEK will become owner of the boilers by paying a fixed quota settled before the signature of the contract to the manufacturer.	• Renting the equipment • Obtain ownership	• Ownership time • Rental price • Ownership rights
EU Funding opportunities	ERDF	A European fund that can be exploited at regional level for the development of community energy initiatives.	• Regional and national initiative	• Difficult to be applied for this case

National Funding opportunities	ΗΛΕΚΤΡΑ	This is a national funding program which aims the energy upgrade of the public buildings in Greece. The installation of biomass boilers is applicable but is not enough for the proper energy upgrade of the building and can be combined with other activities based on the local regulation of KENAK. The program provides funding from 50% to 80% with a total budget of 640 million Euros.	• Upgrade the thermal systems • 50-80% subsidy • Public buildings	• Energy inspection and certification required • Multiple upgrades are necessary • Proper documentation needed
Financial Incentives	Tax incentives	Possibly near future reduction of energy taxes both for the purchase of biomass boilers and in the pellets trade market or the pricing of thermal energy.	• Tax reduction in boilers purchasing • Tax reduction in energy pricing	
	Feed in tariffs	Provision of fixed price for thermal kWh within a long-term contract to the energy producers.	• Fixed energy price for the energy producers	
	Carbon tax	The implementation of carbon tax is about to take place in the near future, where industries, authorities and companies will have to measure their environmental impact and comply with the EU standards.	• Avoidance of taxes and fees	

Investment Planning

This analysis was based on the ESEK initial concept through its roadmap and was made in order to calculate its feasibility. The concept is to install 20 biomass boilers in the local municipal buildings with a total capacity of 1 MW. To this end, we received the necessary inputs from the technical partners and we made the analysis. The breakdown of the capital and operational expenses as well as the revenues can be seen below. For the evaluation of the investment, we made this respective table where we calculated the crucial financial indicators in order to demonstrate the profitability of our case.

Before dive into the cost benefit analysis and the cumulative cash flow table, we need to state the assumptions and the formulas upon which we were based to conduct the feasibility study. These assumptions were received after careful considerations among the technical and pilot partners in order to reflect the most appropriate conditions for our analysis and align the profitability with the reality. The most important ones are:

- n = 20 years lifetime of the biomass boilers
- 20 boilers to be installed in the public buildings having the specifications of the one 45 kW that will be installed in a primary school.
- The technical specifications of the boiler have received from the manufacturer
- r = fixed inflation rate from 2026 onwards based on IMF data equal with 2%
- Fixed OPEX and revenues
- Cash Flow = CAPEX + OPEX – Revenues
- $Present\ Value\ (PV) = \frac{Cash\ Flow}{(1+r)^n}$
- $Net\ Present\ Value\ (PV) = \sum_0^n \frac{Cash\ Flow}{(1+r)^n}$
- $Return\ on\ Investment\ (ROI) = \frac{Revenues - OPEX}{CAPEX}$
- $Payback\ period = \frac{CAPEX}{Revenues - OPEX}$
- $Internal\ Rate\ of\ Return\ (IRR) = \frac{Cash\ Flow}{(1+r)^n} - CAPEX$

The breakdown of each cost is given below and the results of our analysis can be seen in the following cumulative cash flow table.

CUMULATIVE CASH FLOWS								
Years (n)	CAPEX €	OPEX €	Inflation Rate (r)	Revenues €	Cash flow €	Cumulative €	PV €	NPV €
0	105.800	30.614	2,00%	0	-136.414	-136.414	-136.414	-136.414
1		30.614	2,00%	64.693	34.079	-102.334	33.411	-103.003
2		30.614	2,00%	64.693	34.079	-68.255	32.756	-70.246
3		30.614	2,00%	64.693	34.079	-34.175	32.114	-38.133
4		30.614	2,00%	64.693	34.079	-96	31.484	-6.648
5		30.614	2,00%	64.693	34.079	33.984	30.867	24.218
6		30.614	2,00%	64.693	34.079	68.063	30.262	54.480
7		30.614	2,00%	64.693	34.079	102.142	29.668	84.148
8		30.614	2,00%	64.693	34.079	136.222	29.086	113.235
9		30.614	2,00%	64.693	34.079	170.301	28.516	141.751
10		30.614	2,00%	64.693	34.079	204.381	27.957	169.708
11		30.614	2,00%	64.693	34.079	238.460	27.409	197.117
12		30.614	2,00%	64.693	34.079	272.540	26.871	223.988
13		30.614	2,00%	64.693	34.079	306.619	26.345	250.333
14		30.614	2,00%	64.693	34.079	340.699	25.828	276.161

CUMULATIVE CASH FLOWS								
Years (n)	CAPEX €	OPEX €	Inflation Rate (r)	Revenues €	Cash flow €	Cumulative €	PV €	NPV €
15		30.614	2,00%	64.693	34.079	374.778	25.322	301.482
16		30.614	2,00%	64.693	34.079	408.858	24.825	326.307
17		30.614	2,00%	64.693	34.079	442.937	24.338	350.645
18		30.614	2,00%	64.693	34.079	477.016	23.861	374.507
19		30.614	2,00%	64.693	34.079	511.096	23.393	397.900
20		30.614	2,00%	64.693	34.079	545.175	22.934	420.834
21		30.614	2,00%	64.693	34.079	579.255	22.485	443.319
22		30.614	2,00%	64.693	34.079	613.334	22.044	465.363
23		30.614	2,00%	64.693	34.079	647.414	21.612	486.975
24		30.614	2,00%	64.693	34.079	681.493	21.188	508.163
25		30.614	2,00%	64.693	34.079	715.573	20.772	**528.935**

Cash flows breakdown

CAPEX breakdown:

- 20 biomass boilers approximately with total thermal capacity 1 MW
- Transportation, connection and configuration
- R&D, permits and taxes
- No use of subsidy or national grant

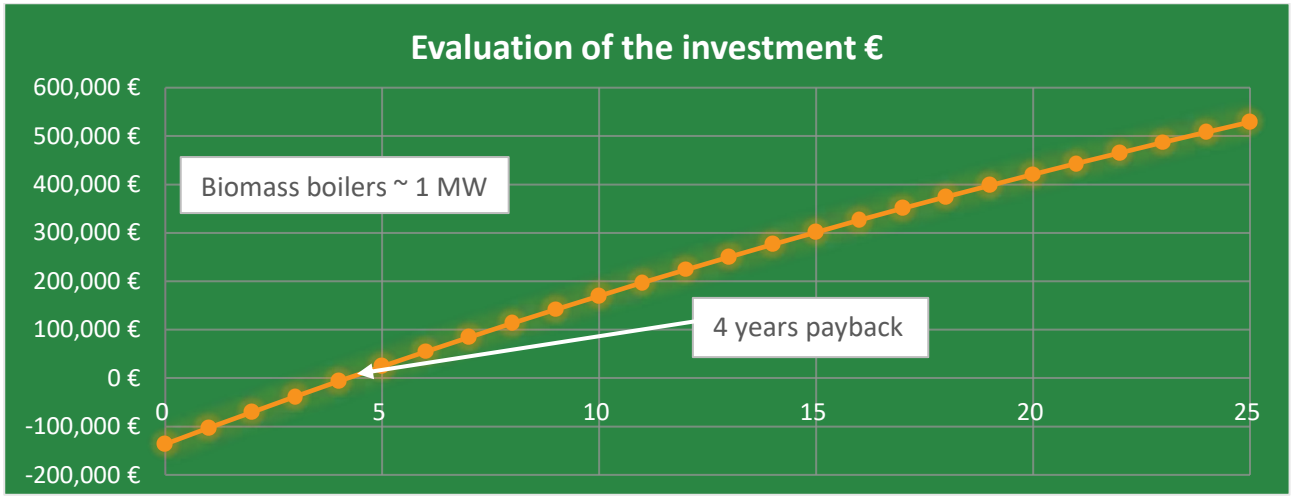
OPEX breakdown for the required pellet for the 20 boilers ~ 185 tn:

- Pellet production plant operational costs
- Thermal demands
- Electrical demands
- Dryness
- Pelletizing
- Packaging
- Machinery and vehicles maintenance and depreciation
- Biomass logistics (pruning, wood waste, forest residues and coffee residues)
- Collection
- Transportation
- Storage
- Labour costs
- Annual fees
- Other costs

Revenues breakdown:

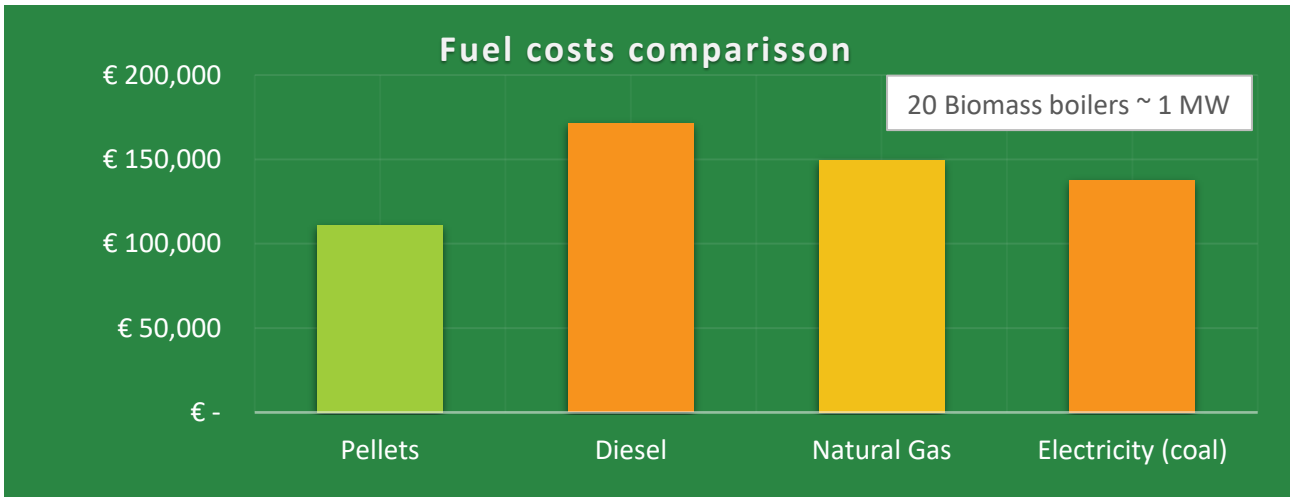
- Sell pellets to the public buildings at around 350 €/tn or
- Pricing the thermal kWh at approximately 0.10 €/kWh
- Installation and maintenance costs are included in the above pricings.

Investment evaluation & profitability



As we can see from the graph and the results of our investment planning, it apperas that our concept is very profitable and offers a payback period of only 4 years. To the best of our results we integrated safety factors and conservtive scenarios due to the current energy crisis and the huge fluctuations of energy prices. The projection of our concepts profitability is highly related with the revenues which have been calculated as 350 €/tn including installation and maintenance costs whereas nowadays this cost meets the price of 600 €/tn. This concept as can be seen from the section below is about to be implemented from 2025 onwards where we excpet a decrease in all the energy prices. The results of the other financial indicators can be seen in the table below along with the formulas.

NPV =	528.935€
ROI =	24,98%
PayBack =	4,00 years
IRR =	22,23%

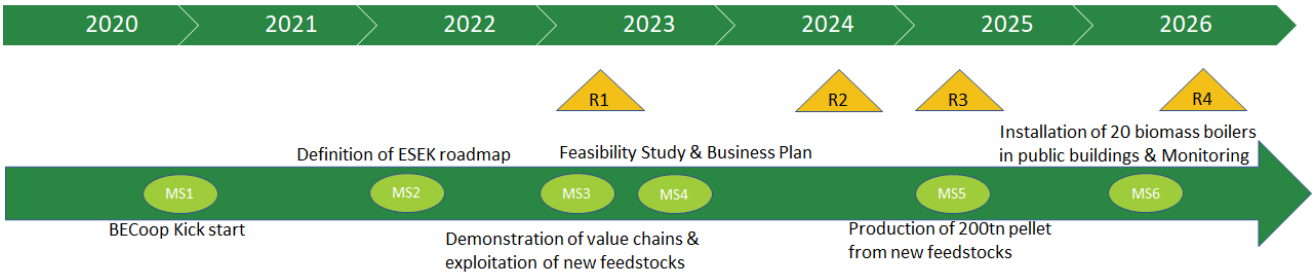


On the other hand if we want to compare the current prices of the existing heating solutions for the area of Karditsa, we realise that the pellet option is the most advantageous one from an economic point of view. These values represent the costs needed to be covered from the various heating sources for the thermal energy demand of the 20 boilers installation 1 MW. Along these lines we realise that solid biofuels like ESEK's pellet offer a lot of benefits to the local community across economic, environmental and social dimensions. Therefore should be considered both for the current period and in the short-term future as a solid biofuel which is a cheap and at the same time a sustaiable solution.

Project Plan

Schedule & Milestones

The graph below represents the short-term plan of ESEK and as we can see our RESCoop case is leveraging the BECoop activities and results so far for the creation of its own vision and initiatives. The installation of the 20 biomass boilers is scheduled for 2026 with the following intermediate critical steps. An analysis of the project milestones as well as a risk assessment with the necessary mitigation measures is also given below.



PROJECT SCHEDULE, MILESTONS & RISKS				
Critical Milestone	**Description**	**Due to date**	**Project phase**	**Stakeholders involved**
BECoop kick start	The beginning of BECoop project.	Oct'20	BECoop research	BECoop consortium
Definition of ESEK roadmap	The vision and the short - long term business concept.	Apr'21	BECoop research	BECoop consortium
Demonstration of value chains & exploitation of new feedstocks	Utilisation of urban, forest and coffee residues for the pellets production.	Feb'23	ESEK roadmap	ESEK members
Feasibility Study & Business Plan	Elaboration of the techno-economic assessment and business planning of the concept.	May'23	BECoop research	BECoop consortium
Production of appr. 185 tn pellet from new feedstocks	Production required for the business concept	Jan'25	ESEK roadmap	ESEK members
Installation of 20 biomass boilers in public buildings	Installation, integration and system configuration	Feb'26	ESEK roadmap	ESEK members, manufacturers
Monitor the operation	Consultancy, maintenance and repairs	2026 →	ESEK roadmap	ESEK members

Risk Assessment

High Risk factors	**Description**	**Probability** *(high, medium, low)*	**Impact** *(high, medium, low)*	**Mitigation measure**
High fluctuations of energy prices	The current situation with the high fluctuations of energy prices is giving an unclear landscape on the feasibility analysis and the reflection of profitability for such business cases.	High	High	In our analyses we are considering recent and proved data, provided by the vast experience of our consortium and/or scientifically proved online information. At the same time, we are also conducting risk assessments by applying safety factors and taking into account future projections in order to eliminate potential deviations.
Insufficient raw material quantities	There is a slight uncertainty about the quantities of the local residues to provide a sufficient substrate in order to form the proper content for the high-quality pellet.	Low	Medium	There is a wide list of the possible residues that can provide the necessary raw material. The perfect mix for the production of the high-quality pellet is being tested within our technical partners.
Production increase failure	With the installation of the 20 biomass boilers, the production capacity of ESEK plant will be increased accordingly, where there is a minor possibility for a potential failure during the processes.	Low	Medium	The production capacity has already been tested to handle such demands and the proper maintenance will eliminate any concerns. The existing capacity can handle the production requirements.
Installation and Maintenance failures	ESEK will be responsible for the installation and the maintenance of the biomass boilers as well as any advice and repair may needed. There is a slight probability for any failure during both processes.	Low	High	In case the responsible ESEK members are not convinced about a process or a technical functionality, the help of internal or external experts via subcontracting will be considered.

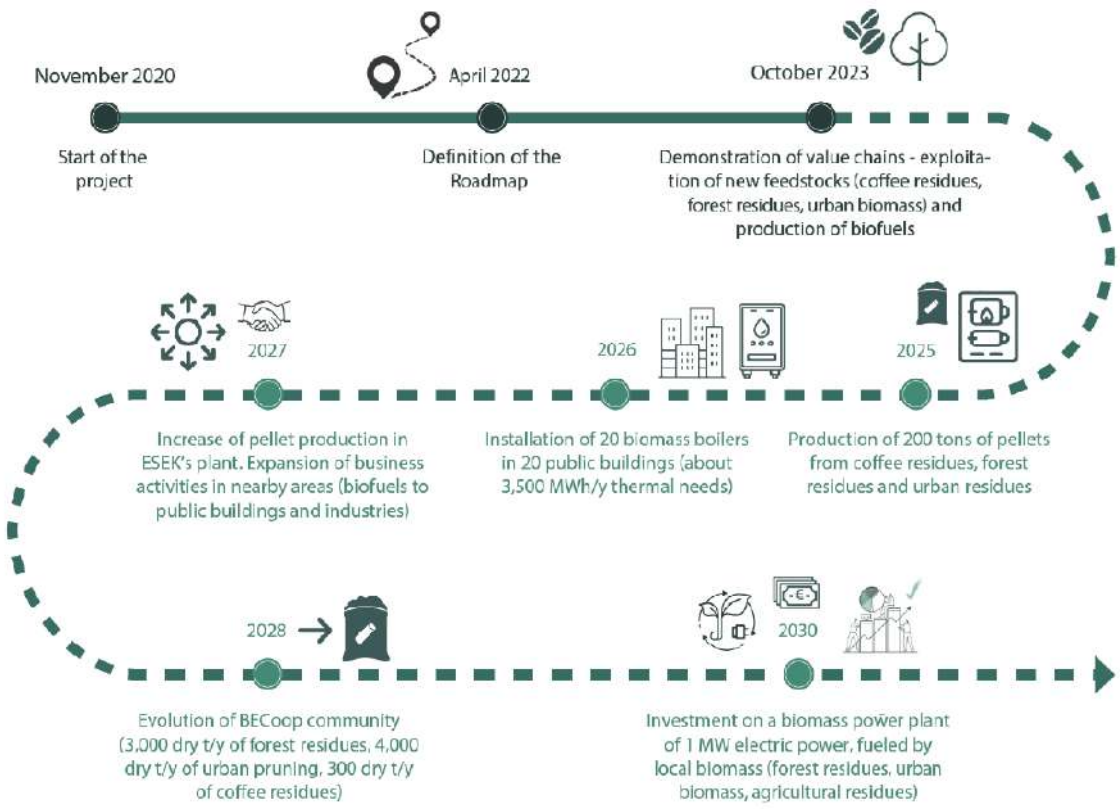
Next steps

The vision towards 2030 implies the implementation of the overall project, including the possible increase of the ESEK plant capacity and expansion of its activities. Based on the accumulating experience of the BECoop community in handling the new feedstocks and through its new business activities, the community would

continuously develop. The Greek BECoop community's plan in the following years, after the end of BECoop project, can be presented as a timeline with the following general objectives/milestones:

- By 2023 (end of BECoop project): Successful demonstration of value chains regarding the exploitation of new feedstocks (coffee residues, forest residues, urban biomass) and production of biofuels;
- By 2025: Production of 185 tn/year of pellets from coffee, forest and urban residues;
- By 2026: Installation of 20 biomass boilers in 20 public buildings. Covering of about 3,500 MWh of thermal needs in the area;
- By 2027: Increase of the productive capacity of ESEK pellet plant. Expansion of business activities in nearby areas and selling biofuels to public buildings and industries in neighbouring regions;
- By 2028: Building on the accumulating experience in handling the new feedstocks, and by acquiring the required equipment, the BECoop community will be able to harvest 3,000 dry tn/year of forest residues, 4,000 dry tn/year of urban pruning and collect 300 dry t/y of coffee residues from the local area;
- By 2030: Investment on a biomass plant of 1 MW of electric power, fuelled with local biomass.

The scheme of the roadmap is drawn in the figure below.



Annex III Italian RESCoop Business Plan

Executive Summary

After a few attempts in other areas rich in biomass sources, proved not appropriate to complete a finalized path towards the implementation of a BECoop RESCoop in a timeframe compatible with the project, the pilot case of Tovo S. Agata-Melavì was selected. The site is framed in the context of the non-methanized area of Valtellina (Province of Sondrio, northern Italy), where successful experiences of forest biomass DH systems and of wood biomass uses in domestic boilers and stoves are available.

The municipality of Tovo, sensitive to sustainability issues at community level as demonstrated by projects yet accomplished and in progress, has confirmed the intention of developing a biomass DH system in Tovo Sant'Agata, with the possibility to involve also other neighbouring municipalities such as Lovero and Mazzo. This project could contribute to decrease fossil fuels consumption, GHG emissions and particulate matter emissions derived by the wood combustion in obsolete domestic systems and to increase comfort conditions and price stability for the citizens. The co-creation of a new energy community through a joint collaboration of the citizens with the local authorities will play a catalytic role in the development of this project.

The business roadmap is focusing on the following points:

- Organization of the biomass supply chain;
- Approval and the pre-feasibility analysis of the biomass CHP DH plant;
- Create the business concept for the official involvement of the Municipalities of Tovo St Agatha, Lovero and Mazzo di Valtelina as well as their citizens for the establishment of an energy cooperative (Mortirolo energy benefit) towards energy self-sufficiency.

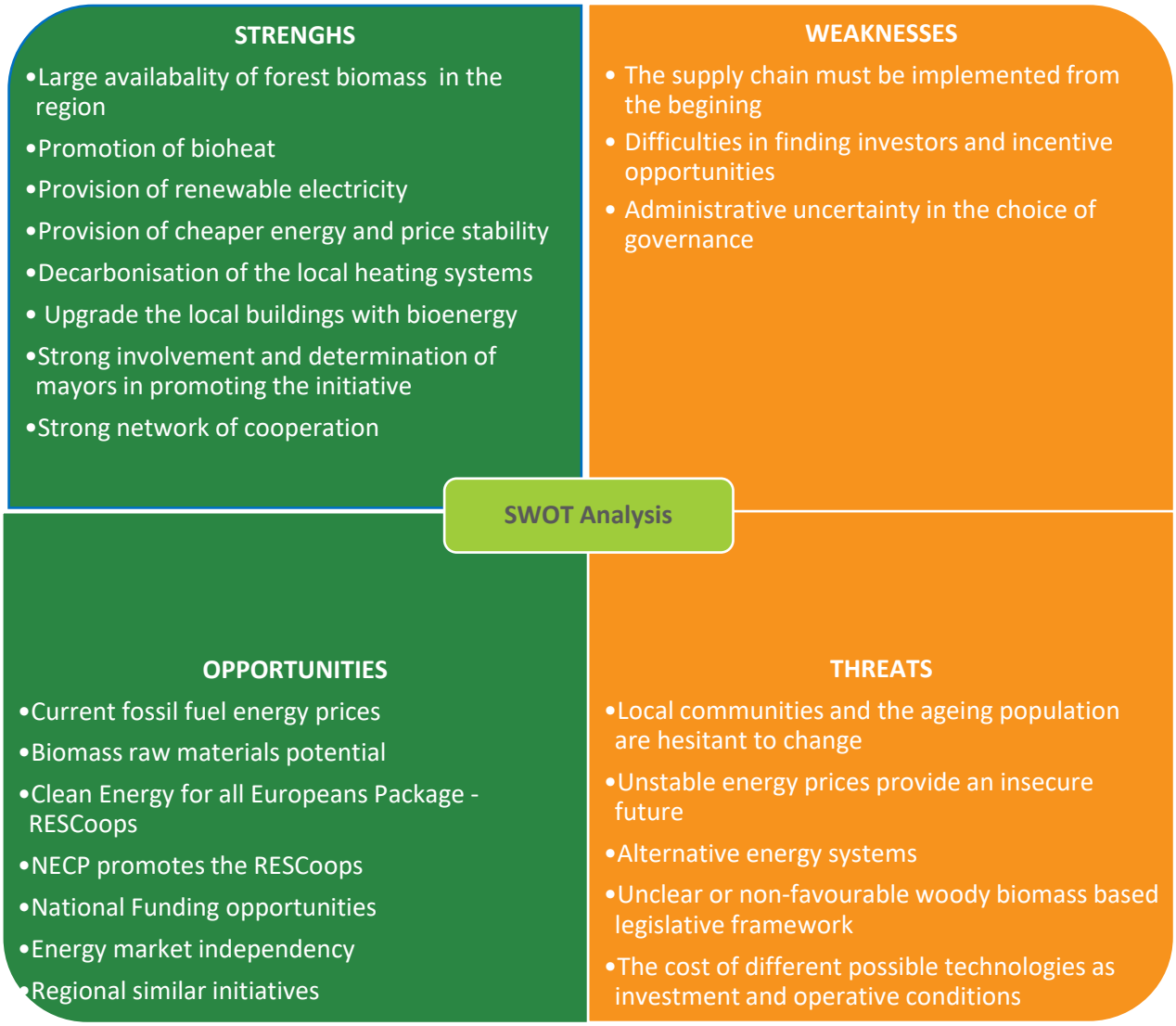
Mortirolo energy concept and vision

PROBLEM STATEMENT	• Unexploited forest residues – risk of fires in the nearby area. • Fossil fuel dominance in the heating sector. • Lack of local awareness about the potential of biomass for clean energy. • Elderly population not keen on switching to biomass solutions
SOLUTION	• Collection of the local forest biomass to produce thermal energy. • Construction of a CHP District Heating plant in the municipality of Tovo St. Agata. • Distribution of heat and power to the local community. • Offer a sustainable forest management system. • Decarbonise the heating network with biomass. • Decentralised and democratised social awareness of local community.
RESCOOP CHARACTERISTICS	• Legal status: Profit cooperative organisation with the collaboration of the municipality (Benefit company) • Products and services: thermal energy and electricity through a DH system. • RESCoop is currently under development without members so far.
OBJECTIVES:	• Production and supply of bioenergy to the citizens. • Awareness of the local community to sustainability matters. • Mobilisation of the citizens for social innovation within community bioenergy. • Increasement of its membership rate.

	• Exploration of potential opportunities and funding.
PROJECT DEFINITION	The implementation of a woody biomass cogeneration DH plant in the municipality of Tovo St. Agata, will exploit the forest and vinery residues of the area to cover thermal and power needs. The produced energy will be distributed to the citizens of the three municipalities involved (Tovo St. Agata, Lovero, and Mazzo di Valtelina) to decarbonise their heating system and offer chip and clean energy. A new RESCoop is to be created under the supervision and guidance of FIPER which will include the citizens of the local area as well as the local authorities who will fund and lead this initiative.
SHORT- AND LONG-TERM GOALS	Short-term goals: • Collection of biomass residues streams (forest/apple trees/ vineyards). • Creation of the biomass supply chain • Construction of a cogeneration DH plant and network • Encouragement of people in using bioenergy instead of fossil fuels. • Creation and establishment of the RESCoop • Further promotion of the RESCoop to engage more members. Long term goals: • The energy retrofit of the Melavì plant and the installation of PV panels

SWOT Analysis

As we can see from the analysis below, the weaknesses of the internal environment are mostly related with the drawbacks of the local community landscape and with potential technical and financial limitations. These can be easily tackled with the strong commitment of the involved stakeholders to create a RESCoop and strong network of cooperation both on the provision of heat and electrical energy and the awareness of the local community. The same stands also for the threats of the external environment which are mainly related with the biomass legislative conditions in Italy and the future of local bioenergy. However, the current opportunities of the energy prices, regulations and the benefits of biomass overcome by far the existing concerns and can boost the development of the community bioenergy in the local area.



Market Analysis

Target Market – Customers Profile

TARGET MARKET AND MEMBERS – CUSTOMERS PROFILE	
Membership Segments	**Description**
Local community	People from the region mainly concerns the following groups: • Citizens of Tovo St. Agata, Lovero and Mazzo di Valtelina • Research centres • Local Associations
Local authorities	Local authorities. • Municipality of Tovo St. Agata • Municipality of Lovero • Municipality of Mazzo di Valtelina • Forest cooperative
Local companies	• Local forestry companies • Melavi cooperative • Local biomass collection agencies • Other local entities

Competition Analysis

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
Fossil Fuel providers	• Current solution – no need to change. • Favourable legal framework for NG. • Reduced VAT for Natura Gas • Existing knowhow. • Current infrastructure.	• Increasing energy prices. • Insecure energy future due to recent geopolitical reasons. • European regulations are against fossil fuels. • GHG's emissions and environmental degradation.
Heat pumps owners	• More innovative technology. • Higher thermal efficiency. • Provision of cooling energy as well.	• Much higher installation costs. • Requires electricity which is mainly from fossil fuels. • Might need new radiators. • More complicated system design, integration and configuration.
Other biomass sellers	• Other alternative biomass options (woodchip, firewood, etc.). • Individual biomass boilers	• Needs to buy the solid biofuel and boiler. • Requires continuous refill. • Requires installation and maintenance of boilers.
Other RES (mainly solar and geothermal)	• Solar heaters are easier to be installed and maintained. • Geothermal if exist is always available.	• Geothermal potential is unknown and should be investigated. • Solar energy requires space. • Difficult to cover thermal demands. • Geothermal restriction areas. • Solar unavailability hours.

COMPETITION ANALYSIS				
Customer need / problem	**Relevance *(1-10)***	**Coverage by RESCoop** *(0-100%)*	**Coverage by competitors** *(0-100%)*	**Unique Selling Point**
Thermal comfort	10	100%	100%	• Provision of heat energy equal to the local demands.
Cheap energy	10	100%	70%	• The RESCoop in collaboration with the local authorities will provide renewable heat and electricity at low price. 0.12

COMPETITION ANALYSIS				
Customer need / problem	**Relevance *(1-10)***	**Coverage by RESCoop** *(0-100%)*	**Coverage by competitors** *(0-100%)*	**Unique Selling Point**
				€/kWh for thermal and 0.15 €/kWh for electricity.
Renewable Energy Sources	10	100%	70%	• Replacement of fossil fuels to face the energy crisis. • Reliable biomass value chain. • Decarbonisation of local heating systems. • Tackle energy poverty. • Decentralised energy.

There are some competitors in the local market that can potentially challenge the business performance of the Mortirolo energy benefit. The various alternative heating concepts can compete with bioenergy in specific occasions and periods. However, as we can see from our analysis, the weaknesses overcome the strengths of all our possible competitors. Therefore, our heating solution covers the majority of our target customers' needs with a highly competitive advantage with our unique selling point. Overall, the RESCoop's target market along with the competition analysis offers a fruitful ground to align its business development with profitability.

Sustainable Business Model

PROBLEMS & BARRIERS

- Unexploited forest residues
- Fossil fuel dominance of heating
- Regulatory & Institutional barriers
- Lack of awareness of biomass benefits
- Elderly population not keen on switching

SOLUTIONS

- Creation of a local energy community
- Residential decarbonization of heat and electricity
- Affordable and secure local bioenergy
- Bioenergy from forest residues
- Biomass CHP DH Plant

KEY PARTNERS

''Establishment of Mortirolo energy cooperative''

Local governance

- 3 Municipalities
- Forest Management firms

Academia

- Politecnico di Milano

Local communities

- Citizens
- Local Associations/Entities
- Local Businesses/Cooperatives

KEY ACTIVITIES

- ✓ Bioenergy production CHP DH
- ✓ Provision of bioheat and electricity
- ✓ Local forest residues management
- ✓ Local residential energy upgrade
- ✓ Local awareness of bioenergy

KEY RESOURCES

Physical
Residues
- Transport
- Equipment
- Experts

Financial

- 10,000 € municipalities share capital.
- Member's equity

VALUE PROPOSITIONS

- NECP → local bioenergy
- Competitive DH service
- Tackle energy poverty
- Unexploited forest residues
- Local forest management
- Decarbonization of the local heating system
- CHP also for electricity
- Business opp. for biomass
- Local forest upgrade (fire prevention)

CUSTOMER RELATIONS

- Local Households → bioenergy
- Local Authorities → bioenergy
- Local enterprises → bioenergy
- Forest management → residues

SUSTAINABLE CHANNELS

Forest residues → Collection & Distribution →CHP DH plant → bioenergy → DH network → households & municipal buildings

CUSTOMER SEGMENTS

- Local citizens
- Local public administration
- Enterprises & Businesses
- Cooperatives

END OF LIFE

The local exploitation of biomass offers a reliable waste management system aligned with the circularity principles and the bioeconomy.

COST STRUCTURE & ADDITIONAL COSTS

Production costs:
CHP DH plant, network
Installation Costs & Grid Implementation:
Transportation, connection, configuration, installation units
Other Costs: R&D, Taxes, Permits etc.

CAPEX est:
6m€ with 50% funding

Lifetime
25 years

OPEX est: 1.2 million€

- Plant operation
- Maintenance
- Biomass logistics
- Labor costs
- Annual fees/other

SUBSIDISATION

Financing sources
- Shares - Equity
- Self-financing (new fees)
- Bank loan
- Accumulation of inv. capital
- Crowdfunding

EU & National Funding programs

Lombardia Fund

EU Regional Dev. Fund

Cohesion Fund

Just transition fund

Recover & Resilience.

Horizon Europe

REVENUE STREAMS

Renewable Energy Saving
- Local thermal demands covered
- Reduced energy bills
- Local/state/EU incentives
- Hot water from biomass

Energy revenues
- Thermal Energy: 1.44 million €
- Electricity: 0.5 million €

ROI: 12.3% **Pay Back:** 8 years

ENVIRONMENTAL RISKS

- Air Pollution from materials manufacturing
- Exhaust emissions in transportation processes
- Unproper combustion may emit pollutants

SOCIAL RISKS

- Short-term loss of fossil fuel-based jobs
- Competition of local beneficiaries on the produced energy

ENVIRONMENTAL BENEFITS

- Decarbonization of the thermal grid
- 3,700 tn CO2/year → 800 cars
- Clean energy to the local area
- Harmful emissions reduction
- Circularity within local forest management

SOCIAL BENEFITS

- Creation of new jobs (biomass)
- Improved conditions/clean air
- High involvement in RESCoop
- Local forest upgrade
- Residential bioenergy

Financial Support

The most relevant financial resources that the Mortirolo energy benefit cooperative can utilize can be seen in the table below. These resources have been divided in 3 main categories according to their origin:

- Financing mechanisms that are mostly related with private sources of funding.
- EU and National Funding opportunities which is mainly funding from available programs.
- Financial incentives are also considered in this report.

	Financing & Funding schemes	Description	Characteristics	Challenges & Risks
Financing Mechanisms	Self – financing	Mortirolo energy cooperative will finance the DH plant and network offering to its citizens thermal and electrical energy	• Members equity • Crowdfunding	• Limited resources • Negative willingness • Money allocation
	Bank loans	Mortirolo energy can apply for a loan at the local bank to minimise the capital investment and repay it through the provision of thermal and electrical energy	• Simple loan • Banks with willingness to support community energy initiatives	• Interest rates • Repayment terms • Mortgage terms
	Joint Ventures	Co-creation of a joint action with the three municipalities of Tovo St. Agata, Lovero and Mazzo di Valtelina for the establishment of the CHP DH plant.	• Municipal funds • DH manufacturers • ESCO's	• Capital distribution • Revenues allocation • Contractual obligations
	Leasing	Mortirolo energy can obtain the use of the CHP DH plant for which it must pay a series of contractual, periodic, tax-deductible payments. At the end of the contract term, Mortirolo will become owner of the CHP DH plant by paying a fixed quota settled before the signature of the contract to the manufacturer.	• Renting the equipment • Obtain ownership	• Ownership time • Rental price • Ownership rights
EU Funding opportunities	ERDF	A European fund that can be exploited at regional level for the development of community energy initiatives.	• Regional and national initiative	• Difficult to be applied for this case

National Funding opportunities	Regional program	Lombardia Fund		
Financial Incentives	Tax incentives	Possibly near future reduction of energy taxes both for the purchase of biomass boilers and in the pellets trade market or the pricing of thermal energy.	• Tax reduction in boilers purchasing • Tax reduction in energy pricing	
	Feed in tariffs	Provision of fixed price for thermal kWh within a long-term contract to the energy producers.	• Fixed energy price for the energy producers	
	Carbon tax	The implementation of carbon tax is about to take place in the near future, where industries, authorities and companies will have to measure their environmental impact and comply with the EU standards.	• Avoidance of taxes and fees	

The Mortirolo energy benefit cooperative will be created in a joint collaboration with three local municipalities. Together as one entity will lead the construction of the CHP DH plant and will financially contribute on that. The most popular financing option is a mix of various mechanisms from the above table in order to collect the necessary capital needed. One possible scenario upon which the current analysis has be done is the combination of:

- Municipal funds
- Regional Fund
- Bank loan in case the collected funds are not enough for the development of the project.

Investment Planning

This analysis was based on the initial concept through the FIPER roadmap and was made in order to calculate its feasibility. The concept is to construct a biomass 3 MW DH plant with a backup 3 MW boiler and network in the local area, a CHP unit 700 kW for the cogeneration of electrical power as well is considered. To this end, we received the necessary inputs from the technical partners and we made the analysis. The breakdown of the capital and operational expenses as well as the revenues can be seen below. In particular in this analysis we display the revenues as the provision of both thermal and electricity, because Mortirolo energy benefit cooperative operate with the scope of profitability. Considering also the energy demands of the DH plant we have calculated a net electricity production after self-consumption 3,293,481 kWhe and a net heat production 8,086,313 kWhth that will be sold as revenues.

For the evaluation of the investment, we made the table below where we calculated the crucial financial indicators in order to demonstrate the profitability of our case. Before dive into the cost benefit analysis and the cumulative cash flow table, we need to state the assumptions and the formulas upon which we were based to conduct the feasibility study. These assumptions were received after careful considerations among the technical and pilot partners in order to reflect the most appropriate conditions for our analysis and align the profitability with the reality. The most important ones are:

- n = 25 years lifetime of the biomass DH plant and the CHP
- The technical specifications of the boilers have received from the technical partners CERTH and FIPER
- r = fixed inflation rate from 2026 onwards based on IMF data equal with 2%
- Fixed OPEX and revenues
- Cash Flow = CAPEX + OPEX – Revenues
- $Present\ Value\ (PV) = \frac{Cash\ Flow}{(1+r)^n}$
- $Net\ Present\ Value\ (PV) = \sum_0^n \frac{Cash\ Flow}{(1+r)^n}$
- $Return\ on\ Investment\ (ROI) = \frac{Revenues - OPEX}{CAPEX}$
- $Payback\ period = \frac{CAPEX}{Revenues - OPEX}$
- $Internal\ Rate\ of\ Return\ (IRR) = \frac{Cash\ Flow}{(1+r)^n} - CAPEX$

The breakdown of each cost is given below and the results of our analysis can be seen in the following cumulative cash flow table.

CUMULATIVE CASH FLOWS									
Years	CAPEX €	OPEX €	Inflation Rate	Thermal Revenues €	Electricity Revenues €	Cash flow €	Cumulative Cash Flow €	PV €	NPV €
0	6.047.500		2,00%			-6.047.500	-6.047.500	-6.047.500	-6.047.500
1		1.362.337	2,00%	1.446.637	494.023	578.323	-5.469.178	566.983	-5.480.517
2		1.362.337	2,00%	1.446.637	494.023	578.323	-4.890.855	555.866	-4.924.652
3		1.362.337	2,00%	1.446.637	494.023	578.323	-4.312.533	544.966	-4.379.685
4		1.362.337	2,00%	1.446.637	494.023	578.323	-3.734.210	534.281	-3.845.405
5		1.362.337	2,00%	1.446.637	494.023	578.323	-3.155.888	523.805	-3.321.600
6		1.362.337	2,00%	1.446.637	494.023	578.323	-2.577.565	513.534	-2.808.066

7		1.362.337	2,00%	1.446.637	494.023	578.323	-1.999.243	503.465	-2.304.602
8		1.362.337	2,00%	1.446.637	494.023	578.323	-1.420.920	493.593	-1.811.009
9		1.362.337	2,00%	1.446.637	494.023	578.323	-842.598	483.914	-1.327.095
10		1.362.337	2,00%	1.446.637	494.023	578.323	-264.275	474.426	-852.669
11		1.362.337	2,00%	1.446.637	494.023	578.323	314.048	465.123	-387.546
12		1.362.337	2,00%	1.446.637	494.023	578.323	892.370	456.003	68.458
13		1.362.337	2,00%	1.446.637	494.023	578.323	1.470.693	447.062	515.520
14		1.362.337	2,00%	1.446.637	494.023	578.323	2.049.015	438.296	953.816
15		1.362.337	2,00%	1.446.637	494.023	578.323	2.627.338	429.702	1.383.518
16		1.362.337	2,00%	1.446.637	494.023	578.323	3.205.660	421.277	1.804.795
17		1.362.337	2,00%	1.446.637	494.023	578.323	3.783.983	413.016	2.217.811
18		1.362.337	2,00%	1.446.637	494.023	578.323	4.362.305	404.918	2.622.729
19		1.362.337	2,00%	1.446.637	494.023	578.323	4.940.628	396.978	3.019.707
20		1.362.337	2,00%	1.446.637	494.023	578.323	5.518.950	389.194	3.408.902
21		1.362.337	2,00%	1.446.637	494.023	578.323	6.097.273	381.563	3.790.465
22		1.362.337	2,00%	1.446.637	494.023	578.323	6.675.595	374.082	4.164.547
23		1.362.337	2,00%	1.446.637	494.023	578.323	7.253.918	366.747	4.531.293
24		1.362.337	2,00%	1.446.637	494.023	578.323	7.832.240	359.556	4.890.849
25		1.362.337	2,00%	1.446.637	494.023	578.323	8.410.563	352.505	**5.243.354**

Cash flows breakdown

CAPEX breakdown: 6 million Euros

- Biomass DH plant, network and residential installation units. CHP also included.
- Transportation, connection and configuration
- R&D, permits and taxes
- Use of the available national grant 50% of the total investment

OPEX breakdown: **1.3 million Euros**

- Plant operation
- Maintenance
- Biomass logistics
- Labor costs
- Annual fees/other

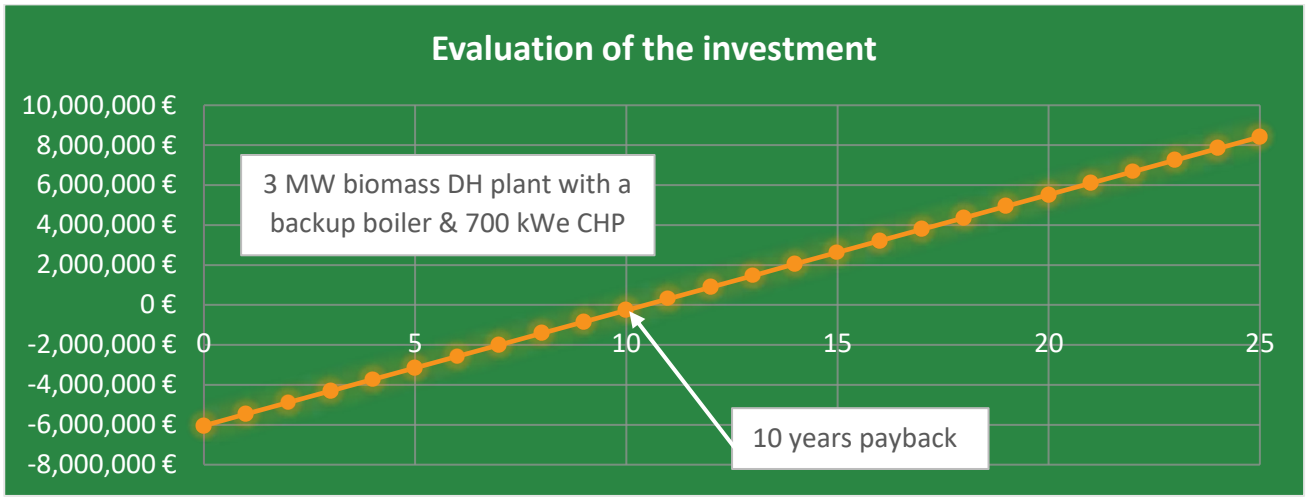
Revenues breakdown:

- Thermal energy to the citizens 0.12 €/kWh
- Electricity to the Italian grid 0.15 €/kWh

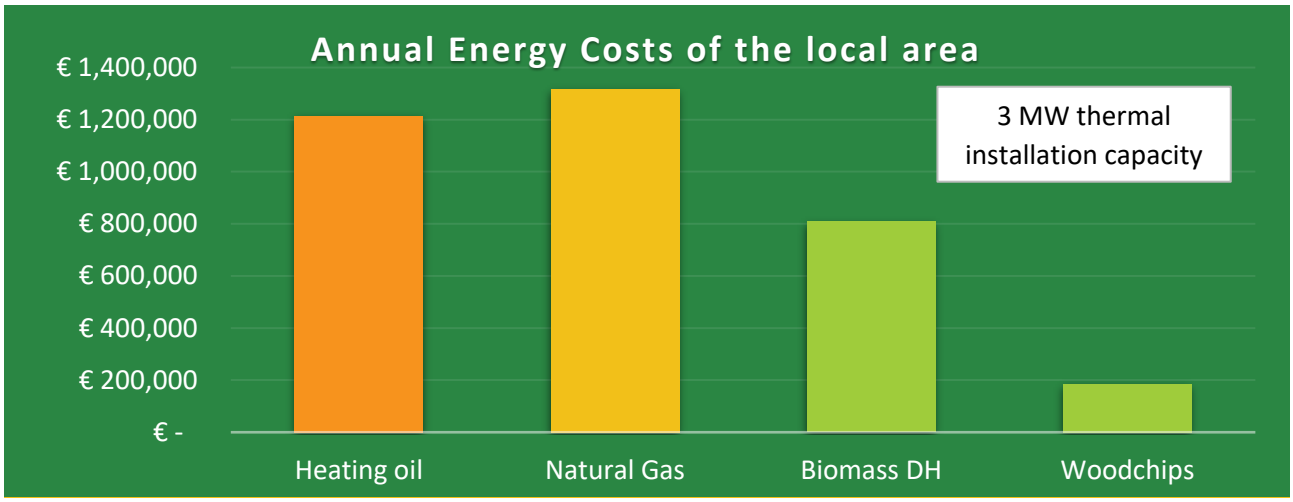
Investment evaluation & profitability

As you can see from the graph and the results of our investment planning below, it apperas that our concept is profitable and offers a payback period of 10 years. To the best of our results we integrated safety factors and conservative scenarios due to the current energy crisis and the huge fluctuations in energy prices. The projection of our concept's profitability is highly related to the energy prices of heat and electrical energy which were received in careful consideration and analysis with the technical partners CERTH and FIPER. These

values have been also adjusted with the safety factors that we are taking into account due to the unstable fluctuations of energy prices and to the best of our results reflecting the reality and the consistency as much as possible for this study.



Net Present Value	€ 5.243.354
Return On Investment	9,56%
Pay-pack period	10,46 years
Internal Rate of Return	6,12%



On top of that, as we can see from the graph above, the current energy costs are favoring the development of biobased energy sytems for heating purposes. In order to cover the calculated energy demand of the area the cost for the citizens appears to be at least 40-50% more for using fossil fuels than bioenergy.

By constructing the CHP DH plant will offer significant relief to the citizens by reducing their energy bills to the minimum. The creation of the Mortirolo energy benefit community will be initiated by the local municipalities and co-assisted by FIPER for sound establishment.

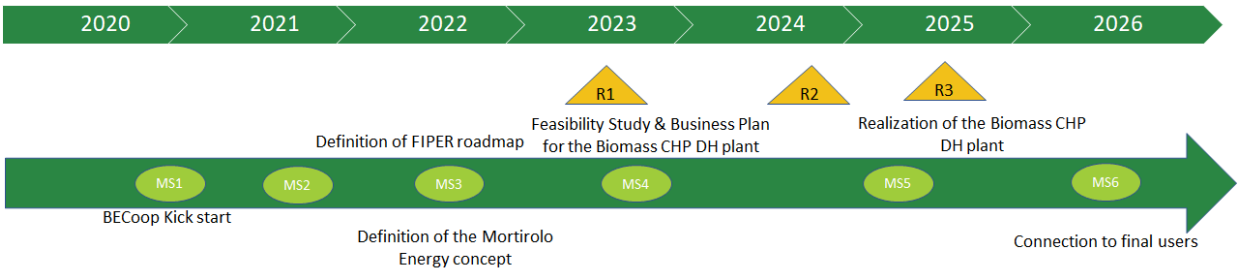
Along these lines, we realise that the biomass CHP DH plant will offer a lot of benefits to the local community across economic, environmental and social dimensions. Therefore should be considered a viable project both for the current period and the short-term future which offers a cheap and at the same time sustaiable solution.

Project Plan

Schedule & Milestones

The graph below represents the short-term plan of Mortirolo energy for the upcoming years.

The realization of the biomass CHP DH system is scheduled for 2025-26 with the following intermediate critical steps. An analysis of the project milestones as well as a risk assessment with the necessary mitigation measures are also given below.



The table below provides a description of the most critical milestones and risks towards the development and establishment of the Mortirolo energy benefit community.

PROJECT SCHEDULE, MILESTONS & RISKS				
Critical Milestone	**Description**	**Due to date**	**Project phase**	**Stakeholders involved**
MS1: BECoop kick start	The beginning of BECoop project.	Oct'20	BECoop research	BECoop consortium
MS2: Definition of the Tovo St. Agata case	The woody biomass potential of the area and the willingness for community heat energy project.	Dec'21	BECoop research	FIPER
MS3: Definition of FIPER roadmap and the Mortirolo concept	Our consortium partner roadmap within the BECoop project and afterwards for its development on assisting the creation of the new energy communities in Tovo Sant Agata.	Apr'22	BECoop research	BECoop consortium
MS4: Pre-Feasibility Study & Business Plan	Elaboration of the techno-economic assessment and business planning of the Mortirolo energy concept.	May'23	BECoop research	BECoop consortium
MS5: Realization of CHP DH system	Beginning of the construction works for the biomass DH and CHP plant.	End of 2025	Post project monitoring	FIPER & Mortirolo energy
MS6: Connection to the final users	Maintenance and operation of the system as well as connection to the final users	2026 →	Post project monitoring	FIPER & Mortirolo energy

Risk Assessment

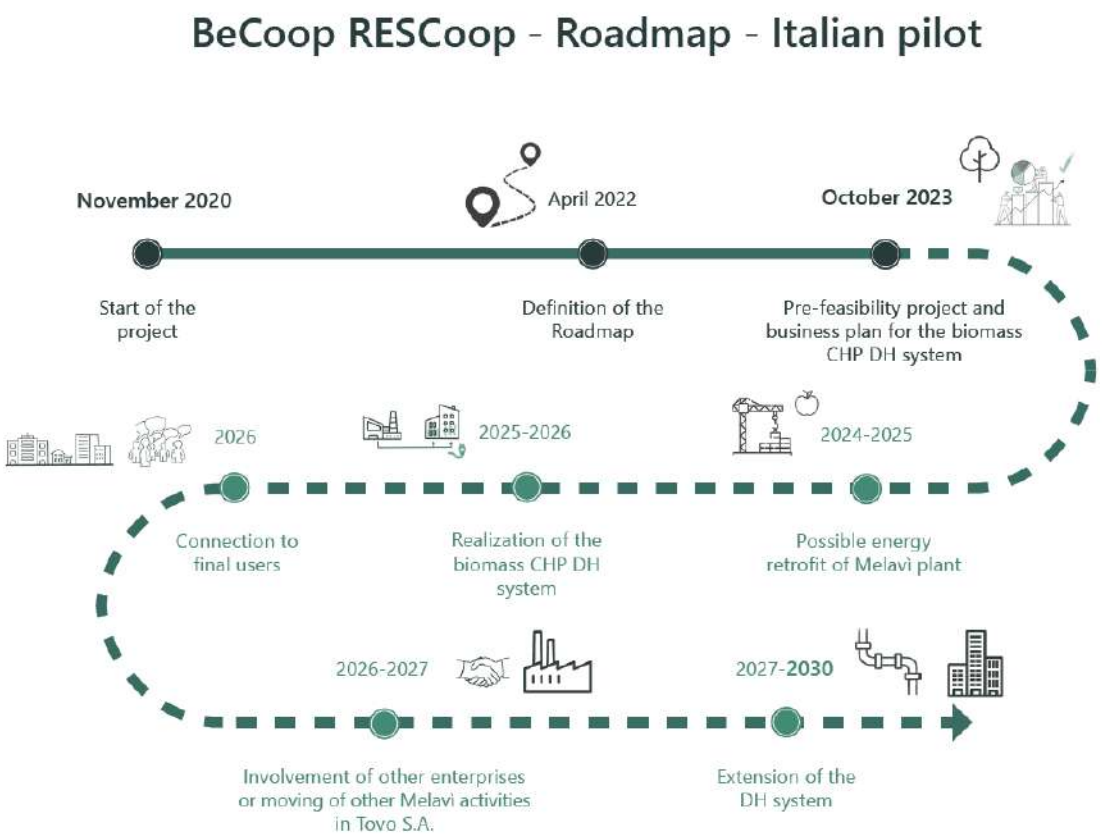
A few of the most important risk factors and mitigation measures are presented in the table below.

High Risk factors	Description	Probability *(high, medium, low)*	Impact *(high, medium, low)*	Mitigation measure
R1: High fluctuations of energy prices	The current situation with the high fluctuations of energy prices is giving an unclear landscape on the feasibility analysis and the reflection of profitability for such business cases.	High	High	In our analyses we are considering recent and proven data, provided by the vast experience of our consortium and/or scientifically proven online information. At the same time, we are also conducting risk assessments by applying safety factors and taking into account future projections in order to eliminate potential deviations.
R2: Insufficient raw material quantities	There is a slight uncertainty about the available quantities of the local residues to provide a sufficient substrate to produce the required thermal energy.	Low	Medium	There is a wide variety of the forest residues that can provide the necessary raw material which will take place in cooperation with the local forest agency.
R3: Maintenance & Failures	There is a slight probability for any failure during maintenance processes.	Low	High	The help of internal or external experts (ESCO) through subcontracting will be considered for this case to avoid and handle every possible situation.

Next steps

The vision towards 2030 implies the different stages of the design activities, the development of the overall project, the implementation of the biomass DH CHP system and the network involving the three municipalities next to the plant. These actions at the current report represent only the activities of Tovo St. Agata but the vision also includes the energy retrofit of Melavì plant as well as other future activities of FIPER. An important element of the vision is the co-creation of a local BECoop RESCoop which is taking place nowadays within the framework of BECoop and it will be able to involve citizens as associated (e.g. some of them can sell wood to the plant and obtain heat for their uses). According to this vision, the area will be as a community/consortium as most as possible fossil free and self-sufficient.

The scheme of the roadmap is drawn in the figure below.


BeCoop RESCoop - Roadmap - Italian pilot
November 2020
April 2022
October 2023
Start of the project
Definition of the Roadmap
Pre-feasibility project and business plan for the biomass CHP DH system
2026
2025-2026
2024-2025
Connection to final users
Realization of the biomass CHP DH system
Possible energy retrofit of Melavì plant
2026-2027
2027-2030
Involvement of other enterprises or moving of other Melavì activities in Tovo S.A.
Extension of the DH system

Annex IV: Spanish RESCoop Business Plan

Executive Summary

The Spanish partners (Goiener) selected Aberasturi as the most suitable area for the implementation of the BECoop RESCoop. It is a small hamlet located in the municipality of Vitoria, in the province of Alava, in the Basque country.

Aberasturi is a small village of 133 inhabitants distributed in 56 houses dependent on the city council of Vitoria/Gasteiz. They enjoy some degree of autonomy because of historical regulations governing smaller rural local authorities, and this is the reason why they manage the aspects that fall within their competence through a local administrative board made up of two members and a president that work voluntarily and elected by the local inhabitants. They also hold administrative meetings with the rest of the neighbours from time to time.

In such area, after preliminary analysis of the heating systems, residential uses are mainly covered by fossil fuels such as oil, propane (51%) and butane gas (12%).

Aberasturi will be taken as an experiment in order to develop the BECoop RESCoop vision that locally covers the entire value chain. In the region, some scattered experiences of pellet and wood chips exploitation for thermal purposes are present, but no one has a RESCoop structure behind. Assigned wood allotments from common land to residents are available which could affect the feasibility of the project. In addition, straw resources are available during the summer season that could be used as an input in the solid biofuels mixture.

Main barriers identified in the area in developing a bioenergy community are mainly the high initial investment costs, the lack of infrastructures (for resource collection, treatment and distribution) and the challenging replacement of diesel boilers with biomass boilers. On the other hand, most of the population in Aberasturi complain about the high bills for heating, due to increasing costs of oil. Moreover, energy autonomy, circular economy, contrast to climate change and local benefits such as job opportunities have been identified as main drivers.

The following uncertainties have been identified through our project actions:

- How to involve the final users and to forecast the number of new real customers?
- How to convince users to move toward a biomass solution for satisfying heating and DHW demand?
- Which would be the best option for the last part of the BECoop RESCoop chain, e.g. DH or individual solutions?
- Which can be the technical details about the new collection facility to be implemented (size etc.)?
- What should be the governance, organisation and management of the resource collection company/entity?
- Which are the main actors locally involved in the bioenergy market and how could they interact to lower the resource cost?
- How can be found the best match between heating demand and available biomass?
- How to ensure a sustainable exploitation of forest resources over the lifetime of the proposed thermal solution?

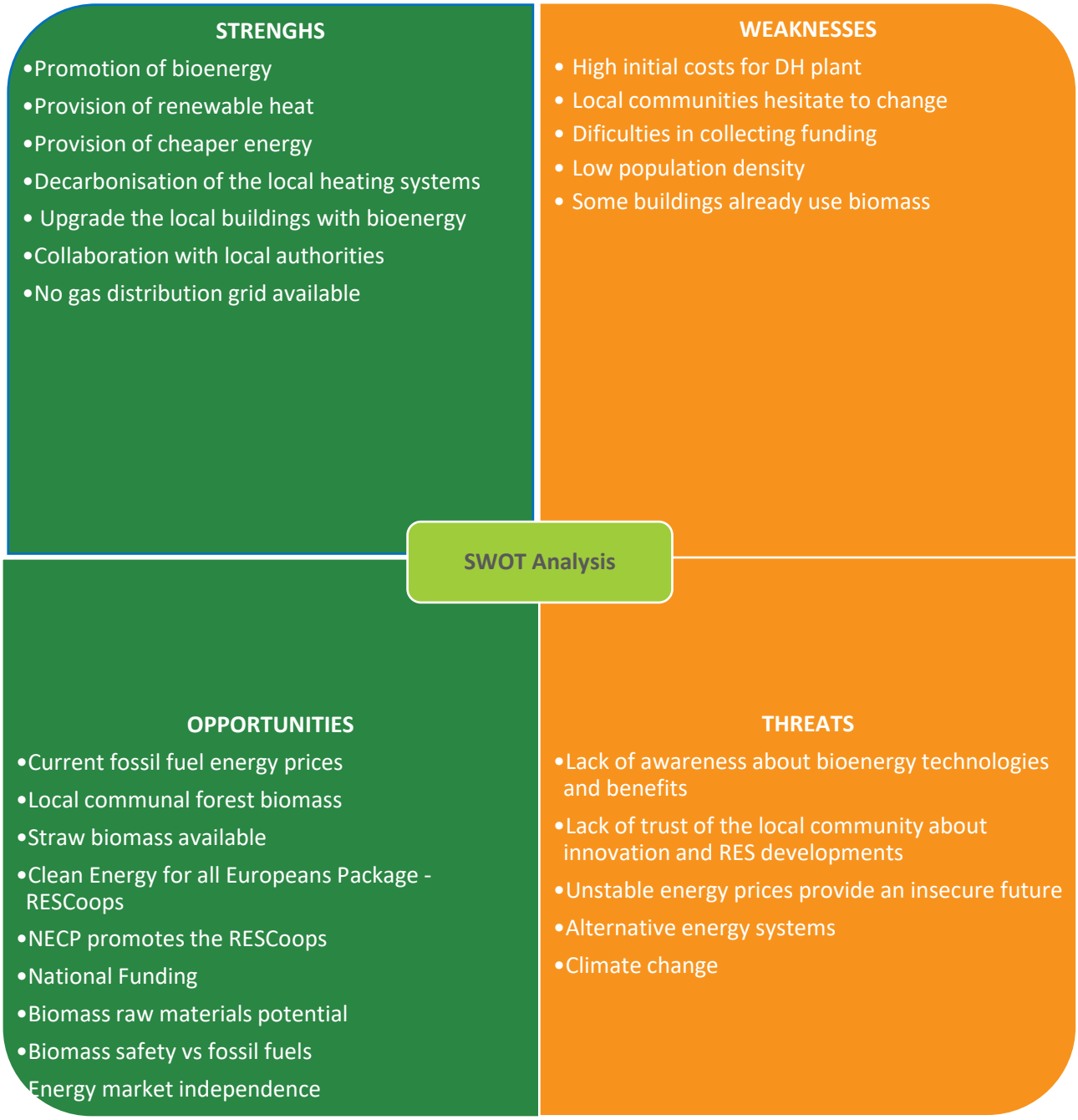
The current business plan aims to tackle all these uncertainties and to assist the area to develop its project.

Aberasturi Concept and vision

PROBLEM STATEMENT	• Forest residues are dangerous for wildfires in the nearby area. • Residue from cereals production is produced in the village but is taken out from it to another region. • Significant increase of fossil fuels might have had an impact on energy poverty in the region. • Forrest wood allotments are available to all residents, but the effort to harvest, transport and transform this resource on an individual basis is considered impractical by most villagers and therefore goes unused. • There is a lack of local awareness about the potential of biomass for clean energy and the efficiency gains of doing this collectively. • Because of the continental climate (warm summers, cold winters) and the type/age of the homes, energy consumption is higher than average for Spain.
SOLUTION	• Collectively harvest the local forest biomass to produce thermal energy • Collect the agricultural residue (straw) from the local farmers • Construct a District Heating system for the town of Aberasturi. • Distribute the heat energy at the local community. • Offer sustainable management of the forest area. • Decarbonise the heating network with biomass. • Increased social awareness of the community about their role in the energy system, based on the use of local resources and democratic control.
RESCOOP CHARACTERISTICS	• Legal status: Non-profit cooperative organisation with the collaboration of the municipality. • Products and services: thermal energy through pipelines. • RESCoop is currently under development.
OBJECTIVES:	• Production and supply of bioenergy to the citizens. • Awareness of the local community to sustainability matters. • Mobilisation of the citizens for social innovation within community bioenergy. • Increase of its membership rate. • Exploration of potential opportunities and funding.
PROJECT DEFINITION	A new District Heating plant is to be installed in the area of Aberasturi which will exploit the biomass of the area (wood chips from forest management and straw from agricultural residue) in order to produce thermal energy. The produced energy will be distributed to the citizens of Aberasturi in order to decarbonise their heating system. The heat demand has been estimated and will require the installation of 1 MW DH plant and network. A new RESCoop is to be created under the supervision and guidance of GOI which will include the citizens of the local area as well as the local authorities who will seek funding for this initiative.
SHORT- AND LONG-TERM GOALS	Short term goals: • Organise the collection and treatment of forest biomass streams. • Organise the collection and transport of the straw • Construction of 1 MW DH plant and network, plus biomass drying and storage facilities • Encouragement of people in using bioenergy instead of fossil fuels. • Creation and establishment of the RESCoop • Further promotion of the RESCoop to engage more members. Long term goals: The future development of various projects related to:

	• energy poverty • energy efficiency • home renovation • electrical self-consumption • Hybridisation with solar energy (solar thermal and solar PV) • Etc.

SWOT Analysis



As we can see from the above analysis the weaknesses of the internal environment are mostly related with the high capital expenses and the difficulties for collecting the proper funding due to low population density. The same stands also for the threats of the external environment which are mainly related with the framework conditions and the future of local bioenergy. Although the current opportunities of the energy

prices, regulations and the benefits of biomass overcome by far the existing concerns and can boost the development of the community bioenergy in the local area.

Market Analysis

Target Market – Customers Profile

TARGET MARKET AND MEMBERS – CUSTOMERS PROFILE	
Membership Segments	**Description**
Local community	People from Aberasturi are members, mainly concerns the following groups: • Citizens • Local organisations
Local authorities	Local authorities are: • Municipal authorities • Agencies
Local companies	• Forest management companies

Competition Analysis

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
Fossil Fuel providers	• Current solution – no need to change. • (Temporarily) reduced VAT rate for Butane. • Existing knowhow. • Current infrastructure.	• Increasing energy prices. • Insecure energy future due to recent geopolitical reasons. • European regulations are against fossil fuels. • GHG emissions and environmental degradation. • No gas grid in the village
Heat pumps owners	• More innovative technology. • Higher thermal efficiency. • Provision of cooling energy as well.	• Much higher installation costs. • Requires electricity which is expensive and not locally generated. • Might need new radiators. • More complicated system design, integration and configuration.
Other biomass sellers	• Other alternative biomass options (woodchip, firewood, etc.). • Individual biomass boilers	• Needs to buy the solid biofuel and boiler • Requires continuous refill • Requires installation and maintenance of boilers

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
Other RES (mainly solar and geothermal)	• Solar heaters are easier to be installed and maintained. • Geothermal if exist is always available.	• Geothermal potential is unknown and should be investigated. • Solar energy requires space. • Difficult to cover thermal demands, especially in winter. • Geothermal restriction areas • Solar unavailability hours

COMPETITION ANALYSIS				
Customer need / problem	**Relevance *(1-10)***	**Coverage by RESCoop** *(0-100%)*	**Coverage by competitors** *(0-100%)*	**Unique Selling Point**
Thermal comfort	10	100%	100%	• Provision of heat energy equal to the local demands.
Affordable energy	10	100%	70%	• The RESCoop in collaboration with the local authorities does not intend to make profit for the provision of thermal energy to the citizens of Aberasturi.
Renewable Energy Sources	10	100%	70%	• Replacement of fossil fuels to face the energy crisis. • Reliable biomass value chain. • Decarbonisation of local heating systems. • Tackle energy poverty. • Decentralised energy.

There are some competitors in the local market that can potentially challenge the business performance of Aberasturi RESCoop. The various alternative heating concepts can compete with bioenergy in specific occasions and periods. However, as we can see from our analysis, the weaknesses overcome the strengths of all our possible competitors. Therefore, our heating solution covers the majority of our target customers' needs with a highly competitive advantage with our unique selling point. Overall, the RESCoop target market along with the competition analysis offers a fruitful ground to align its business development with profitability.

Sustainable Business Model

PROBLEMS & BARRIERS

- Fossil fuel dominance of heating
- High energy prices
- Unexploited forest and agricultural residues
- Lack of awareness of biomass benefits
- Regulatory & Institutional barriers

SOLUTIONS

- Affordable RH to the local community
- Residential decarbonization of heat energy
- Bioenergy from forest residues
- Biomass District Heating Plant

KEY PARTNERS

Local governance

- Municipality of Aberasturi
- Local authorities, agencies,..

Biomass tech providers

- ESCO
- Installation, O&M of DH
- Forest Management firms

Local communities

- Citizens
- Existing RESCoops (GOI, etc.)

KEY ACTIVITIES

- ✓ Bioenergy production (DH)
- ✓ Provision of bioheat
- ✓ Local forest management
- ✓ Local residential energy upgrade
- ✓ Local awareness on bioenergy

KEY RESOURCES

Physical
- Residues
- Transport
- Equipment
- Experts

Financial
- Municipal funds
- Member's equity
- Bank Loan

Intellectual
- Partnership
- Knowhow

VALUE PROPOSITIONS

- NECP → local bioenergy
- Competitive biomass price
- Tackle energy poverty
- Unexploited forest residues
- Local forest management
- Decarbonization of the local heating system
- Reliable access to RH
- Business opp. for biomass
- Local forest upgrade (fire prevention)

CUSTOMER RELATIONS

- Local Households → bioheat
- Municipal buildings → bioheat
- Forest management → residues
- Local companies → bioheat

SUSTAINABLE CHANNELS

Forest residues → Collection & Distribution → DH plant → bioheat → DH network → households & municipal buildings

CUSTOMER SEGMENTS

- Aberasturi citizens
- Local authorities
- Forest Management firms
- Local companies

END OF LIFE

The local exploitation of biomass offers a reliable residue management system aligned with the circularity principles and the bioeconomy.

COST STRUCTURE & ADDITIONAL COSTS

CAPEX breakdown
- DH generation plant
- Pipelines
- Installation units
- Transportation, connection, configuration
- R&D, Permits, Taxes, etc.

CAPEX est. 900,000€ (50% grant)

Lifetime 25 years

OPEX est.= 77,000€
- Plant operation
- Maintenance
- Biomass logistics
- Labor costs
- Annual fees/other

SUBSIDISATION

Financing sources
- Shares - Equity
- Self-financing (new fees)
- Bank loan
- Accumulation of inv. capital
- Crowdfunding

EU & National Funding programs

LOCAL FUND

CE IMPLEMENTA

EU Regional Dev. Fund

Cohesion Fund

Just transition fund

Recover & Resilience.

REVENUE STREAMS

Renewable Energy Savings
- 1 GWhth annual production
- local thermal demands covered
- Reduced Energy bills

Other potential revenues
- Local/state/EU incentives
- Avoidance of carbon tax

Energy Savings*: 140,000 €/year
ROI: 9.5% **Pay Back:** 11 years

ENVIRONMENTAL RISKS

- Air Pollution from materials manufacturing
- Exhaust emissions in transportation processes
- Unproper combustion may emit pollutants

SOCIAL RISKS

- Short term loss of fossil fuel-based jobs
- Competition of local beneficiaries on the produced energy

ENVIRONMENTAL BENEFITS

- ~ 6,800 tn CO2 saved → 1500 cars
- Decarbonization of the thermal grid
- Clean energy to the local area
- Circularity within local forest management
- Raised Environmental awareness

SOCIAL BENEFITS

- Creation of new jobs (biomass)
- Support of the local economy
- Improved conditions/clean air
- Residential bioenergy
- Local forest upgrade
- Improved thermal comfort

Financial Support

The most relevant financial resources that Aberasturi can utilize can be seen in the table below. These resources have been divided in 3 main categories according to their origin:

- Financing mechanisms that are mostly related with private sources of funding.
- EU and National Funding opportunities which is mainly funding from available programs.
- Financial incentives are also considered in this report.

	Financing & Funding schemes	Description	Characteristics	Challenges & Risks
Financing Mechanisms	Self – financing	The members of the community of Aberasturi will finance the DH plant and network offering to its citizens thermal energy without making profit	• Members equity • Crowdfunding	• Limited resources • Negative willingness • Money allocation
	Bank loans	Aberasturi can apply for a loan at the local bank to minimise the capital investment and repay it through the provision of thermal energy	• Simple loan • Banks with willingness to support community energy initiatives	• Interest rates • Repayment terms • Mortgage terms
	Joint Ventures	Aberasturi can co-create either a public partnership with the local authorities or with a private entity relevant with the installation and maintenance of the boilers to jointly contribute at the initial costs.	• Municipal funds • DH manufacturers • ESCO's	• Capital distribution • Revenues allocation • Contractual obligations
	Leasing	Aberasturi can obtain the use of the DH plant for which it must pay a series of contractual, periodic, tax-deductible payments. At the end of the contract term, Aberasturi will become owner of the boilers by paying a fixed quota settled before the signature of the contract to the manufacturer.	• Renting the equipment • Obtain ownership	• Ownership time • Rental price • Ownership rights
EU Funding opportunities	ERDF	A European fund that can be exploited at regional level for the development of community energy initiatives.	• Regional and national initiative	• Difficult to be applied for this case

National Funding opportunities	Local program "Plan Foral"	A regional program that is already opened and will be resolved by the end of 2023, Institutions only can apply for this program and it could cover over 80% of the CAPEX.	• By 2023 • Institutional based • 80% of CAPEX	
	Local program "EVE"	A regional institution for energy and environment has programs for promoting renewable energies for example for the substations for each citizen.	• Regional based • RES projects	
	Local program "CE implementa"	A national program with EU Next generation funds, promote energy communities up to 70 % of the CAPEX	• National based • Biomass and other RES • Energy Communities • 70% CAPEX	
Financial Incentives	Tax incentives	Possibly near future reduction of energy taxes both for the purchase of biomass boilers and in the pellets trade market or the pricing of thermal energy.	• Tax reduction in boilers purchasing • Tax reduction in energy pricing	
	Feed in tariffs	Provision of fixed price for thermal kWh within a long-term contract to the energy producers.	• Fixed energy price for the energy producers	
	Carbon tax	The implementation of carbon tax is about to take place in the near future, where industries, authorities and companies will have to measure their environmental impact and comply with the EU standards.	• Avoidance of taxes and fees	

Aberasturi RESCoop will be created in a joint collaboration with the local municipality. Together as one entity will lead the construction of the DH plant and will financially contribute on that. The most popular financing option is a mix of various mechanisms from the above table in order to collect the necessary capital needed. One possible scenario upon which the current analysis has be done is the combination of:

- National fund which could potentially provide at least the 50% of the investment.
- Municipal funds.
- Self-financing from Aberasturi citizens either with the form of massive crowdfunding or shares from individual members.
- Bank loan in case the collected funds are not enough for the development of the project.

Investment Planning

This analysis was based on the Aberasturi initial concept through the Goiener roadmap and was made in order to calculate its feasibility. The concept is to construct a biomass DH plant and network in the local area with a total capacity of 1 MWth. To this end, we received the necessary inputs from the technical partners and we made the analysis. The breakdown of the capital and operational expenses as well as the revenues can be seen below. In particular, in this analysis we don't display revenues but energy savings, because the profitability of this concept will be upon the money saved from the citizens of Aberasturi in making use of the heat from the DH plant instead of the current options. For the evaluation of the investment, we made the table below where we calculated the crucial financial indicators in order to demonstrate the viability of our case.

Before diving into the cost benefit analysis and the cumulative cash flow table, we need to state the assumptions and the formulas upon which we based the feasibility study. These assumptions were received after careful considerations among the technical and pilot partners in order to reflect the most appropriate conditions for our analysis and align the viability with the reality. The most important ones are:

- n = 25 years lifetime of the biomass DH plant
- The technical specifications of the boilers have received from the technical partner CIRCE
- r = fixed inflation rate from 2026 onwards based on IMF data equal with 2%
- Fixed OPEX and revenues
- Cash Flow = CAPEX + OPEX – Revenues
- $Present\ Value\ (PV) = \frac{Cash\ Flow}{(1+r)^n}$
- $Net\ Present\ Value\ (PV) = \sum_0^n \frac{Cash\ Flow}{(1+r)^n}$
- $Return\ on\ Investment\ (ROI) = \frac{Revenues - OPEX}{CAPEX}$
- $Payback\ period = \frac{CAPEX}{Revenues - OPEX}$
- $Internal\ Rate\ of\ Return\ (IRR) = \frac{Cash\ Flow}{(1+r)^n} - CAPEX$

The breakdown of each cost is given below and the results of our analysis can be seen in the following cumulative cash flow table.

CUMULATIVE CASH FLOWS									
Years	CAPEX €	OPEX €	Inflation Rate	Revenues €	Carbon Tax €	Cash flow €	Cumulative €	PV €	NPV €
0	909.425		2,00%		4.118	-905.307	-905.307	-905.307	-905.307
1		76.926	2,00%	141.231	5.284	69.590	-835.717	68.226	-837.082
2		76.926	2,00%	141.231	6.451	70.757	-764.960	68.009	-769.072
3		76.926	2,00%	141.231	7.618	71.923	-693.037	67.775	-701.297
4		76.926	2,00%	141.231	8.784	73.090	-619.947	67.524	-633.773
5		76.926	2,00%	141.231	9.951	74.257	-545.690	67.257	-566.517
6		76.926	2,00%	141.231	11.118	75.423	-470.266	66.974	-499.543
7		76.926	2,00%	141.231	12.284	76.590	-393.676	66.676	-432.866
8		76.926	2,00%	141.231	13.451	77.757	-315.919	66.365	-366.502
9		76.926	2,00%	141.231	14.618	78.923	-236.996	66.040	-300.462
10		76.926	2,00%	141.231	15.784	80.090	-156.906	65.702	-234.760
11		76.926	2,00%	141.231	16.951	81.257	-75.649	65.352	-169.408
12		76.926	2,00%	141.231	18.118	82.423	6.774	64.990	-104.418
13		76.926	2,00%	141.231	19.284	83.590	90.364	64.618	-39.800

CUMULATIVE CASH FLOWS									
Years	CAPEX €	OPEX €	Inflation Rate	Revenues €	Carbon Tax €	Cash flow €	Cumulative €	PV €	NPV €
14		76.926	2,00%	141.231	20.451	84.757	175.121	64.235	24.435
15		76.926	2,00%	141.231	21.618	85.923	261.045	63.842	88.277
16		76.926	2,00%	141.231	22.784	87.090	348.135	63.440	151.718
17		76.926	2,00%	141.231	23.951	88.257	436.392	63.030	214.747
18		76.926	2,00%	141.231	25.118	89.423	525.815	62.611	277.358
19		76.926	2,00%	141.231	26.284	90.590	616.405	62.184	339.542
20		76.926	2,00%	141.231	27.451	91.757	708.162	61.750	401.291
21		76.926	2,00%	141.231	28.618	92.923	801.085	61.309	462.600
22		76.926	2,00%	141.231	29.784	94.090	895.175	60.861	523.461
23		76.926	2,00%	141.231	30.951	95.257	990.432	60.408	583.869
24		76.926	2,00%	141.231	32.118	96.423	1.086.856	59.949	643.817
25		76.926	2,00%	141.231	32.118	96.423	1.183.279	58.773	**702.590**

Cash flows breakdown

CAPEX breakdown:

- 1 MW biomass DH plant, network and residential installation units
- Transportation, connection and configuration
- R&D, permits and taxes
- Use of the available national grant (50%)

OPEX breakdown:

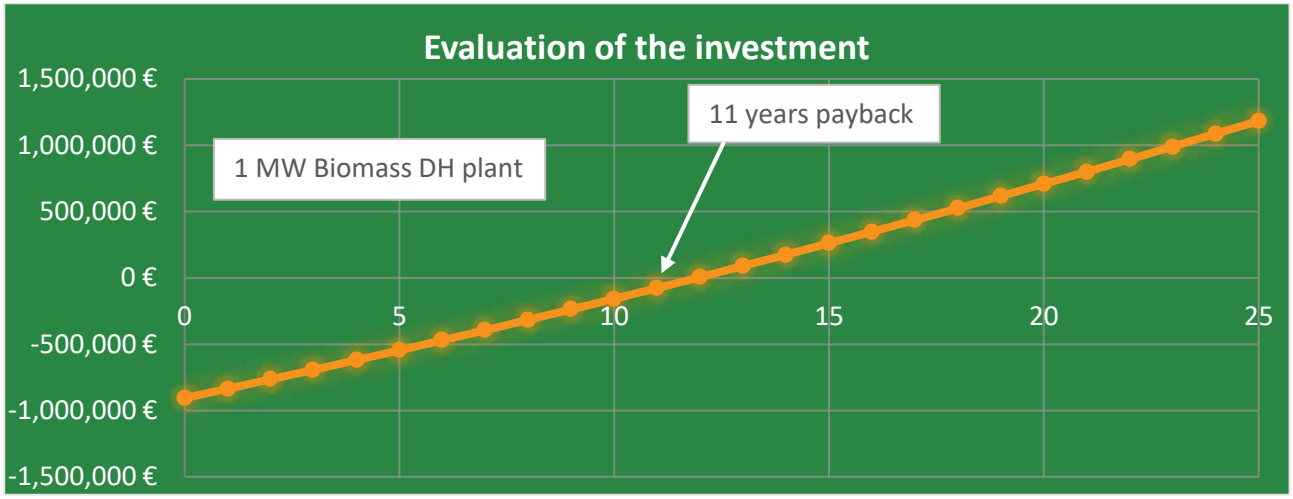
- Plant operation
- Maintenance
- Biomass logistics
- Labour costs
- Annual fees/other

Revenues breakdown:

- Energy savings for the households based on their current status.
- Avoidance of carbon tax based on current status in Spain and with a future conservative projection.

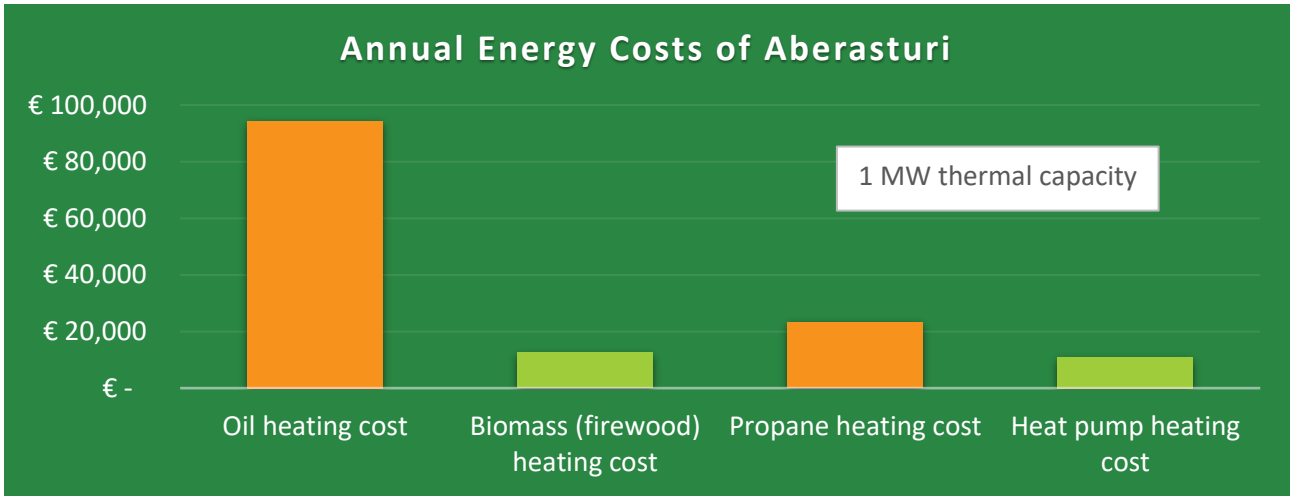
Investment evaluation & profitability

As you can see from the graph and the results of our investment planning, it appears that under the assumptions made, our concept is viable and offers a payback period of 11 years. To the best of our results we integrated safety factors and conservative scenarios due to the current energy crisis and the huge fluctuations of energy prices. The projection of our concepts viability is highly related to the energy savings based on the current prices and demands of Aberasturi.



Net Present Value	€ 702.590
Return On Investment	9,12%
Pay-pack period	10,96
Internal Rate of Return	5,16%

We also applied a sensitivity analysis with the implementation of carbon tax in order to demonstrate better the benefits of using bioenergy instead of fossil fuels. Carbon tax is already being implemented and will be established in all the EU countries to meet the EU goals. The consequence of this tax implementation will be the additional increase of the fossil fuel prices.



Energy consumed from oil boilers	57%
Energy consumed from biomass (firewood)	32%
Energy consumed from propane	10%
Energy consumed from heat pumps	1%

On the other hand as we can see from the graph above, the current energy costs are highly dependent on the consumption of the fossil fuels. There is a contribution of biomass and it has a massive potential in the area. Constructing the DH plant will offer a significant relief to the citizens by reducing their energy bills to

the minimun. The creation of the Aberasturi energy community will be initiated by the local municipality and co assisted by GOI for the sound establishment.

Along these lines we realise that the biomass DH plant will offer a lot of benefits to the local community across economic, environmental and social dimensions. Therefore it should be considered as a viable project both for the current period and the short-term future which offers a cheap and at the same time a sustaiable solution.

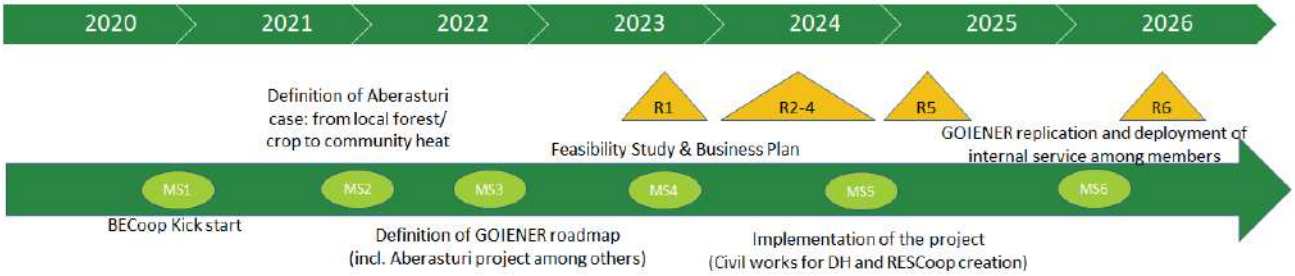
Project Plan

Schedule & Milestones

For the successful implementation of this project, we foresee that from March to December 2023 the local municipality will work for a funding scheme that could make the project feasible. At the same time Aberasturi citizens will formalize the RESCoop with the assistance of Goiener and by the end of 2023 the funding scheme should be finalized:

- National funding opportunities
- Bank loans or investors.

During 2024 Aberasturi Biomass district heating should be constructed starting operation at the end of the year.



PROJECT SCHEDULE, MILESTONS & RISKS				
Critical Milestone	**Description**	**Due to date**	**Project phase**	**Stakeholders involved**
MS1: BECoop kick start	The beginning of BECoop project.	Oct'20	BECoop research	BECoop consortium
MS2: Definition of Aberasturi case	The forest potential of the area and the willingness for community heat energy project.	Dec'21	BECoop research	GOI
MS3: Definition of GOI roadmap	Our consortium partner roadmap within the BECoop project and afterwards for its development on assisting the creation of new energy communities like the one in Aberasturi	Apr'22	BECoop research	BECoop consortium
MS4: Feasibility Study & Business Plan	Elaboration of the techno-economic assessment and business planning of the Aberasturi concept.	May'23	BECoop research	BECoop consortium

PROJECT SCHEDULE, MILESTONS & RISKS				
Critical Milestone	**Description**	**Due to date**	**Project phase**	**Stakeholders involved**
MS5: Implementation of the Aberasturi concept	Creation of the Aberasturi RESCoop and starting of the civil works for the construction of the DH plant and network.	Dec'24	Post project implementation	GOI & Aberasturi
MS6: GOI replication	Deployment of internal service for newly created energy communities like Aberasturi.	2025 →	Post project monitoring and assistance	GOI & Aberasturi

Risk Assessment

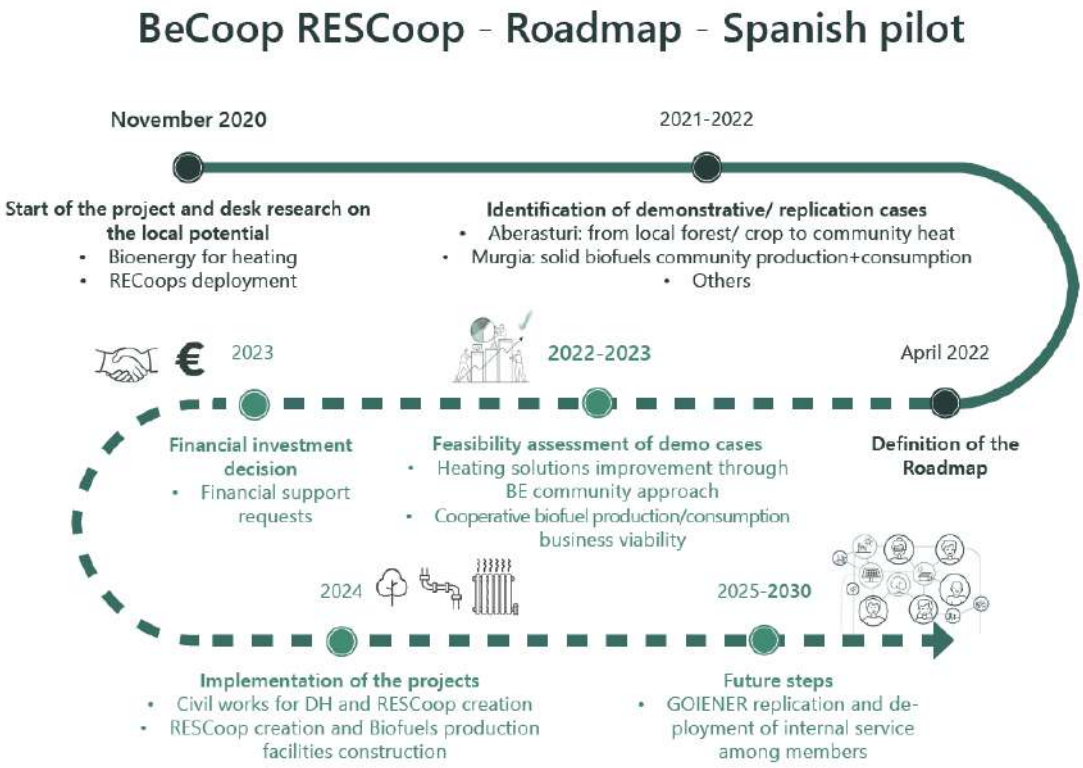
High Risk factors	**Description**	**Probability** *(high, medium, low)*	**Impact** *(high, medium, low)*	**Mitigation measure**
R1: High fluctuations of energy prices	The current situation with the high fluctuations of energy prices is giving an unclear landscape on the feasibility analysis and the reflection of profitability for such business cases.	High	High	In our analyses we are considering recent and proven data, provided by the vast experience of our consortium and/or scientifically proven online information. At the same time, we are also conducting risk assessments by applying safety factors and taking into account future projections in order to eliminate potential deviations.
R2: Participation	Not enough local residents signed up for the DH.	High	High	Through BECoop business and technical deployment actions and the continuous support of GOI, the local residents of Aberasturi will be further convinced in participating in the DH heating project.
R3: Voluntary work	The energy community is not formed or no-one is willing to do the voluntary work to start operations.	High	Medium	Through BECoop business and technical deployment actions and the continuous support of GOI along with the local authorities, the local residents of Aberasturi will be further convinced in participating in the DH heating project and to lead the initiative as well as to take care of the necessary voluntary work required.
R4: Funding	There are a lot of potential funding opportunities for such projects however no one can guarantee their security.	Medium	High	A sound formation of the energy community and a strong collaboration with the local authorities and GOI along with their networks will minimise the risks into obtaining the proper funding.
R5: Forest Management	The externalised forestry work becomes too expensive or no local companies want to do this kind of forest management.	High	Medium	The kick starting of the project activities and the formation of the energy community will convince the forest management companies to get onboard.

High Risk factors	Description	Probability *(high, medium, low)*	Impact *(high, medium, low)*	Mitigation measure
R6: Maintenance & Failures	There is a slight probability for any failure during maintenance processes.	Low	High	The help of internal or external experts (ESCO) through subcontracting will be considered for this case to avoid and handle every possible situation.

Next steps

Aberasturi will be a great example of new bioenergy community cases that will be established in Spain within the guidance of GOI. The ultimate goal of supporting these cases is to gain knowledge and experience on bioenergy community heating in order to deploy a renewable thermal assessment service among its members, and to assist other RESCoops in Spain and Europe to replicate. Therefore, renewable electricity retail activities will be complemented with consultancy in renewable thermal systems.

In the figure below we see the vision of Goiener and its future plans towards 2030.



Annex V: Polish RESCoop Business Plan

Executive Summary

The commune of Oborniki Śląskie is a typical rural area with relatively large forestry and agricultural resources in the north-eastern part of Lower Silesia, Poland. At the same time, more than 50% of the households are directly or indirectly heated by coal which influences the high pollutants emission in the region. This situation is caused mainly by low environmental awareness and low incomes. As a result, a significant part of the residents suffers the energy poverty. However, the anti-smog regulation in the region and remarkable increase of fossil fuels prices forced local stakeholders to change old and insufficient boilers into a new one as well as to look for a cheaper source of heat, i.e., biomass.

Therefore, for the BECoop polish case the connection of biomass suppliers with a manufacturing business in charge of turning the biomass into high-quality fuel and then selling it to end users could be a solution to help the development of an energy cooperative. Due to the possible access to the local raw biomass resources characterized by relatively low cost and improved technology of biomass valorisation, such a short local logistic chain should help to reduce energy poverty. Existing sawmills in the area that want to increase their operations can be the production companies leading to the development of the region and social integration.

OBS Concept and vision

PROBLEM STATEMENT	• Significant increase of fossil fuels costs has created energy poverty in the region. • There is a lack of local awareness about the potential of biomass for clean energy. • There is low environmental awareness amongst residents of rural areas. • Lack of good examples of energy communities in Poland acting as lighthouse cases. • There are regulatory and institutional barriers that hinder the establishment and operation of energy cooperatives. • The availability of local biomass depends on many external factors (e.g. contradictory legal regulations, changes in fertilizers prices, unstable energy prices etc.). • There is still a strong subsidizing scheme for coal purchase (coal allowance). • Forest residue accumulation is dangerous for fires in the nearby area. • The cooperative initiative is characterized by a very low trust. • There is no heating network in the OBS commune.
SOLUTION	• Creation of a pellet-production plant. • Collection of the local biomass to produce pellets in the OBS plant. • Distribution of solid biofuels to the local community. • Installation of biomass boilers in residential and municipal buildings. • Offer a waste management solution for the city and the forest area. • Decarbonise the heating network with biomass. • Increase environmental activity to reduce pollution in the region.
RESCOOP CHARACTERISTICS	• Legal status: Profit cooperative organisation • Products and services: Solid biofuels (pellets) • Objectives:

	- Production and supply of solid biofuels to the citizens - Aware the local community of sustainability matters - Explore potential opportunities and funding - Social integration of the local stakeholders
PROJECT DEFINITION	The project is the development of a supply chain and the creation of a biomass pellet production plant. Along with that, more than 4k boilers are expected to be installed in residential and public buildings. Forest (chunk wood, waste wood in the form of trees, branches from pruning, bark waste) and agricultural (straw and other crop residues) residues will be the main materials for the pellet production. Half of the pellet production will be sold to the members of the RESCoop and the remainder will be provided free or cheaper to municipal buildings. This project aims to tackle energy poverty in the region and assist the local community in gradually switching from using coal to renewable and clean energy.
SHORT- AND LONG-TERM GOALS	Short-term goals: • Education of the local community and promotion of bioenergy • Interest of a group of positive activists in engaging in energy community development. • Construction of a biomass pellet production plant • Installation of more than 4k biomass boilers in residential and public buildings • Exploitation of local agroforestry residues • Attraction of more people to using pellets instead of fossil fuels Long-term goals: • Development of an energy community in the region and establishment of a real energy cooperative.

SWOT Analysis

As we can see from the analysis below, the weaknesses of the internal environment are mostly related to the lack of awareness of the local community and their unwillingness to change habits and participate in such initiatives due to the lack of successful examples. These can be easily tackled with the strong commitment of the commune to create a RESCoop and collaborations both on the provision of heat energy and the awareness of the local community. The same stands also for the threats of the external environment which are mainly related with the biomass legislative conditions in Poland and the future of local bioenergy. However, the current opportunities of the energy prices, regulations and the benefits of biomass overcome by far the existing concerns and can boost the development of community bioenergy in the local area, which can act as lighthouse cases for the development of more similar communities in Poland.

Market Analysis

Target Market – Customers Profile

OBS has divided the customer profiles into two stakeholder groups. Residents of the commune, farmers, entrepreneurs, local activists, investors, and representatives of scientific institutions comprised the first group, while local authorities comprised the second. The stakeholders are described in the table below.

TARGET MARKET AND MEMBERS – CUSTOMERS PROFILE	
Membership Segments	**Description**
Agricultural Industries	A group pf people and/or industries working mainly in the agricultural sector. • Farmers • Agricultural biomass producers/ managers • Wood production companies
Local community	People from Oborniki Śląskie Commune and nearby areas, mainly concerns the following groups: • Citizens • Research centres • Local organisations • Local companies • Transport & logistic companies
Local authorities	Local authorities at commune level are interested in participating in the initiative: • Municipal authorities • Agencies responsible for collection of agrobiomass. • Oborniki Slaskie Forest District
Local industries	There are some local industries that have a special interest in bioenergy initiatives. Which are mainly involve: • Local pellet manufacturer • Local briquette manufacturer • Representatives of the horticultural industry • Entrepreneurs in the wood industry (sawmills & carpentry shops)

Competition Analysis

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
Fossil Fuel network	• Current solution – no need to change. • NG heating system is fully automatic. • Existing knowhow. • Current infrastructure. • Residents of rural areas burn coal since generations.	• Increasing energy prices. • Insecure energy future due to recent geopolitical reasons. • European regulations are against fossil fuels. • GHG emissions and environmental degradation. • Need some activity of the user
Heat pumps owners	• More innovative technology. • Higher thermal efficiency. • Provision of cooling energy as well. • Fully automatic heating systems. • No fire risk. • Clean technical room. • No pollutants emission.	• Much higher installation costs. • Requires electricity which is mainly from fossil fuels (ca. 90%) in Poland. • Might need new radiators.

CURRENT AND POTENTIAL COMPETITORS		
Competitors	**Strengths**	**Weaknesses**
		• More complicated system design, integration, and configuration.
Other biomass sellers	• Other alternative biomass options (woodchip, firewood, etc.). • Might have competitive prices. • Familiar with the biomass market	• Unknown biomass control check. • Unknown biofuel quality. • Uncertain know-how on biomass and such boilers. • Do not develop the local region

COMPETITION ANALYSIS				
Customer need/problem	**Relevance *(1-10)***	**Coverage by RESCoop** *(0-100%)*	**Coverage by competitors** *(0-100%)*	**Unique Selling Point (USP)**
Solid Biofuel	10	100%	60%	• High-quality pellet. • Tested biomass content. • Tested energy performance and LHV. • Monitored combustion & emissions.
Cheap energy	8	70%	70%	• 570 €/tn incl. installation & maintenance. • 400 €/tn in the near future. • Cheapest solution in the local market.
Alternative RES	10	100%	80%	• Replacement of fossil fuels to face the energy crisis. • Guaranteed biomass value chain. • Decarbonisation of local heating systems. • Tackle energy poverty.
Installation & Maintenance of the boilers	7	100%	30%	• Boilers installation, integration, and configuration • Yearly maintenance twice • Repair damages and failures • Monitor the operation

There are some competitors in the local market that can potentially challenge the business performance of OBS. The various alternative heating concepts can compete with pellets in specific occasions and periods.

However, as we can see from our analysis, the weaknesses overcome the strengths of all our possible competitors. Therefore, our heating solution covers the majority of our target customers' needs with a highly competitive advantage with our unique selling point. Overall, OBS's target market along with the competition analysis offers a fruitful ground to align its business development with profitability.

Sustainable Business Model

The business model for the OBS case was developed based on the pilot leader answers on the questionnaire and the follow up calls with them and is present below.

PROBLEMS & BARRIERS

- Unexploited forest residues
- Availability of local biomass restricted by external factors (e.g. regulations, unstable energy prices etc.)
- Lack of financial support programs dedicated to energy cooperatives.
- Strong and continuous subsidisation of coal use by the government
- Significant local energy poverty
- Restrictions and strict legal requirements for
- the establishment/operation of bioenergy cooperatives
- Fossil fuel dominance in heating
- Lack of awareness of biomass benefits
- Regulatory & Institutional barriers

SOLUTIONS

- Affordable RH to the local community –low investment and operational costs
- Production of solid biofuels (pellets – agroforestry residues) for heating purposes
- Decarbonization of heat energy for households
- Long-term stability of access to heating fuel
- Easy adaptation and use to automatic coal-fired boilers

KEY PARTNERS

- Local governance
- OBS Forest District
- Local Authorities (OBS commune)
- Biomass Tech Providers
- Installation
- O & M
- Residues management
- Academia (WUELS)
- Scientific support
- Local community
- Citizens
- Farmers
- Horticultural representatives
- Local entrepreneurs (sawmills & carpentry shops)

KEY ACTIVITIES

- ✓ Biofuel production (pellets)
- ✓ Agroforestry residues management
- ✓ Provision of bioheat
- ✓ Local awareness-raising campaigns

KEY RESOURCES

Physical
- Residues
- Transport
- Equipment
- Experts

Financial
- Partially financed by OBS
- Partially financed by ESCO
- Bank Loan

Intellectual
- Partnership
- Knowhow

VALUE PROPOSITIONS

- NECP → local bioenergy
- Competitive biomass price
- Tackle energy poverty
- Unexploited residues for RE
- Local forest management
- Decarbonization of the local heating system
- Reliable access to RH
- Business opp. for biomass
- Biofuel to citizens

CUSTOMER RELATIONS

- Local Households → pellets/bioheat
- Agro-forestry management → residues

CUSTOMER SEGMENTS

- OBS household residents (End-users)
- Municipality of OBS (public buildings)

SUSTAINABLE CHANNELS

Agroforestry residues → pellets → biomass boilers → heat → citizens

END OF LIFE

The local exploitation of biomass offers a reliable waste management system aligned with the circularity principles and the bioeconomy.

COST STRUCTURE & ADDITIONAL COSTS

Capital Expenditures

- Pellet production plant 3,170 tn/year
- Equipment 830 biomass boilers (8-24kW)
- Transportation, connection, configuration

CAPEX est. 2.80 m€

Lifetime 25years

OPEX est.= 870,000€
- Plant operation
- Maintenance
- Biomass logistics
- Labor costs
- Annual fees/other

SUBSIDISATION

Financing sources
- Regional funds
- Municipal funds
- Local development programs
- Private funds (investors/loans)

EU & National Funding programs

Clean Air programme

Stop Smog

EU Regional Dev. Fund

Cohesion Fund

Just transition fund

Recover & Resilience.

REVENUE STREAMS

Renewable Energy Savings
- 18,000 MWh annual thermal production
- Local thermal demands covered
- Reduced Energy bills
- Pellets trade market

Other potential revenues
- Boilers maintenance
- Local/state/ EU incentives
- Installation in other buildings

Revenues: 1.25 m€/year (pellet market)
ROI: 13.5% **Pay Back:** 7.6 years

ENVIRONMENTAL RISKS

- Air Pollution from materials manufacturing
- Exhaust emissions in transportation processes
- Unproper combustion may emit pollutants.
- Risk of negative impact on local biodiversity (e.g. through monoculture crops, deforestation).

SOCIAL RISKS

- Short term loss of fossil fuel-based jobs
- Competition of local beneficiaries on the produced energy

ENVIRONMENTAL BENEFITS

- 5.400 tn CO2 saved /year → 1200 cars
- Decarbonization of the thermal grid
- Clean energy for OBS residents
- Circularity within local agroforestry management/fire prevention

SOCIAL BENEFITS

- Creation of new jobs (biomass)
- Support of the local economy
- Improved conditions/clean air
- Increased energy independence
- Reduced energy poverty
- Raised Environmental awareness

Financial Support

The most relevant financial resources that OBS can utilize can be seen in the table below. These resources have been divided in 3 main categories according to their origin:

- Financing mechanisms that are mostly related with private sources of funding.
- EU and National Funding opportunities which is mainly funding from available programs.
- Financial incentives are also considered in this report.

	Financing & Funding schemes	Description	Characteristics	Challenges & Risks
Financing Mechanisms	Self – financing	OBS will invest in a pellet plant and new biomass boilers and will profit from selling pellets to members.	• OBS own shares	• Limited resources • Negative willingness
	Bank loans	OBS can apply for a loan at the local bank to minimise the capital investment and repay it through selling pellets or other arrangements.	• Simple loan • Banks with a willingness to support community energy initiatives	• Interest rates • Repayment Terms • Mortgage Terms • Negative willingness
	Joint Ventures	OBS can co-create a joint action with the local authorities relevant to the selling, installation, and maintenance of the boilers along with the building of the pellet production plant to contribute to the initial costs jointly. OBS will sell pellets to the local community (members) and provide free pellets to cover the thermal needs of municipal buildings.	• Municipalities • RESCoop key members	• Capital Distribution • Revenues allocation • Contractual obligations
EU Funding opportunities	ERDF	A European fund that can be exploited at the regional level for the development of community energy initiatives.	• Regional and national initiative	• Difficult to be applied for this case
National Funding opportunities	Support Programs (Clean Air programme and Stop Smog)	Support programs for owners and co-owners of single-family houses (replacement subsidies for thermal modernization up to PLN 30,37k and 60k). The members of the community can	• Upgrade the thermal systems • 50-80% subsidy • Residential buildings	• Proper documentation needed

		use these programs for the replacement of boilers for smog pollution issues.		
Financial Incentives	Tax incentives	Possibly near future reduction of energy taxes both for the purchase of biomass boilers and in the pellets trade market or the pricing of thermal energy.	• Tax reduction in boilers purchasing • Tax reduction in energy pricing	
	Feed in tariffs	Provision of fixed price for thermal kWh within a long-term contract to the energy producers.	• Fixed energy price for the energy producers	
	Carbon tax	The implementation of carbon tax is about to take place soon, where industries, authorities and companies will have to measure their environmental impact and comply with the EU standards.	• Avoidance of taxes and fees	

The OBS RESCoop will be formed in partnership with the local municipality. Together, they will lead the construction of the pellet production plant and the installation on the new biomass boilers and contribute financially to it. To collect the necessary capital, the most popular financing option is a combination of various mechanisms from the above table. The current analysis is based on a possible scenario that includes the following elements:

- Municipal and regional funds along with local development programs for the construction of the pellet production plant.
- National funds (subsidies) for the investment of new biomass.
- Bank loan in case the collected funds are not enough for the development of the project

Investment Planning

This analysis was based on the OBS initial concept through their roadmap and was made to calculate its feasibility. The concept is to construct a pellet production plant in the local area and install approximately 830 domestic boilers in the local residential and municipal buildings. The total production capacity of the plan has been estimated as 3,170 tn pellet/year with a total investment of 2.8 million Euros. To that end, we gathered the necessary information from our technical partners and conducted the analysis. The breakdown of the capital and operational expenses as well as the revenues can be seen below. For the investment evaluation, we created the table below, in which we calculated the critical financial indicators to demonstrate the profitability of our case.

Before dive into the cost benefit analysis and the cumulative cash flow table, we need to state the assumptions and the formulas upon which we were based to conduct the feasibility study. These assumptions were received after careful considerations among the technical and pilot partners in order to reflect the most appropriate conditions for our analysis and align the profitability with the reality. The most important ones are:

- n = 25 years lifetime of the biomass boilers
- The technical specifications of the boilers have received from the technical partner
- r = fixed inflation rate from 2026 onwards based on IMF data equal with 2%
- Fixed OPEX and revenues
- Cash Flow = CAPEX + OPEX – Revenues
- $Present\ Value\ (PV) = \frac{Cash\ Flow}{(1+r)^n}$
- $Net\ Present\ Value\ (PV) = \sum_{0}^{n} \frac{Cash\ Flow}{(1+r)^n}$
- $Return\ on\ Investment\ (ROI) = \frac{Revenues - OPEX}{CAPEX}$
- $Payback\ period = \frac{CAPEX}{Revenues - OPEX}$
- $Internal\ Rate\ of\ Return\ (IRR) = \frac{Cash\ Flow}{(1+r)^n} - CAPEX$

The breakdown of each cost is given below and the results of our analysis can be seen in the following cumulative cash flow table.

Cash flows breakdown

CUMULATIVE CASH FLOWS								
Years	CAPEX €	OPEX €	Inflation Rate	Revenues €	Cash flow €	Cumulative €	PV €	NPV €
0	2.878.790	0	2,00%	0	-2.878.790	-2.878.790	-2.878.790	-2.878.790
1		869.461	2,00%	1.248.000	378.539	-2.500.251	371.117	-2.507.673
2		869.461	2,00%	1.248.000	378.539	-2.121.711	363.84	-2.143.833
3		869.461	2,00%	1.248.000	378.539	-1.743.172	356.706	-1.787.127
4		869.461	2,00%	1.248.000	378.539	-1.364.633	349.712	-1.437.415
5		869.461	2,00%	1.248.000	378.539	-986.094	342.855	-1.094.560
6		869.461	2,00%	1.248.000	378.539	-607.554	336.132	-758.428
7		869.461	2,00%	1.248.000	378.539	-229.015	329.541	-428.887
8		869.461	2,00%	1.248.000	378.539	149.524	323.08	-105.807
9		869.461	2,00%	1.248.000	378.539	528.064	316.745	210.937
10		869.461	2,00%	1.248.000	378.539	906.603	310.534	521.471
11		869.461	2,00%	1.248.000	378.539	1.285.142	304.445	825.916
12		869.461	2,00%	1.248.000	378.539	1.663.681	298.476	1.124.392
13		869.461	2,00%	1.248.000	378.539	2.042.221	292.623	1.417.015

CUMULATIVE CASH FLOWS								
Years	CAPEX €	OPEX €	Inflation Rate	Revenues €	Cash flow €	Cumulative €	PV €	NPV €
14		869.461	2,00%	1.248.000	378.539	2.420.760	286.885	1.703.901
15		869.461	2,00%	1.248.000	378.539	2.799.299	281.26	1.985.161
16		869.461	2,00%	1.248.000	378.539	3.177.839	275.745	2.260.906
17		869.461	2,00%	1.248.000	378.539	3.556.378	270.339	2.531.245
18		869.461	2,00%	1.248.000	378.539	3.934.917	265.038	2.796.283
19		869.461	2,00%	1.248.000	378.539	4.313.456	259.841	3.056.124
20		869.461	2,00%	1.248.000	378.539	4.691.996	254.746	3.310.870
21		869.461	2,00%	1.248.000	378.539	5.070.535	249.751	3.560.621
22		869.461	2,00%	1.248.000	378.539	5.449.074	244.854	3.805.475
23		869.461	2,00%	1.248.000	378.539	5.827.614	240.053	4.045.528
24		869.461	2,00%	1.248.000	378.539	6.206.153	235.346	4.280.874
25		869.461	2,00%	1.248.000	378.539	6.584.692	230.731	**4.511.605**

CAPEX breakdown:

- One pellet production plant with a capacity of 3,170 tn/year
- Transportation cars and machinery/equipment
- 830 domestic biomass boilers 8-24 kW
- R&D, permits and taxes

OPEX breakdown for the required pellet for the 830 boilers ~ 3,170 tn.

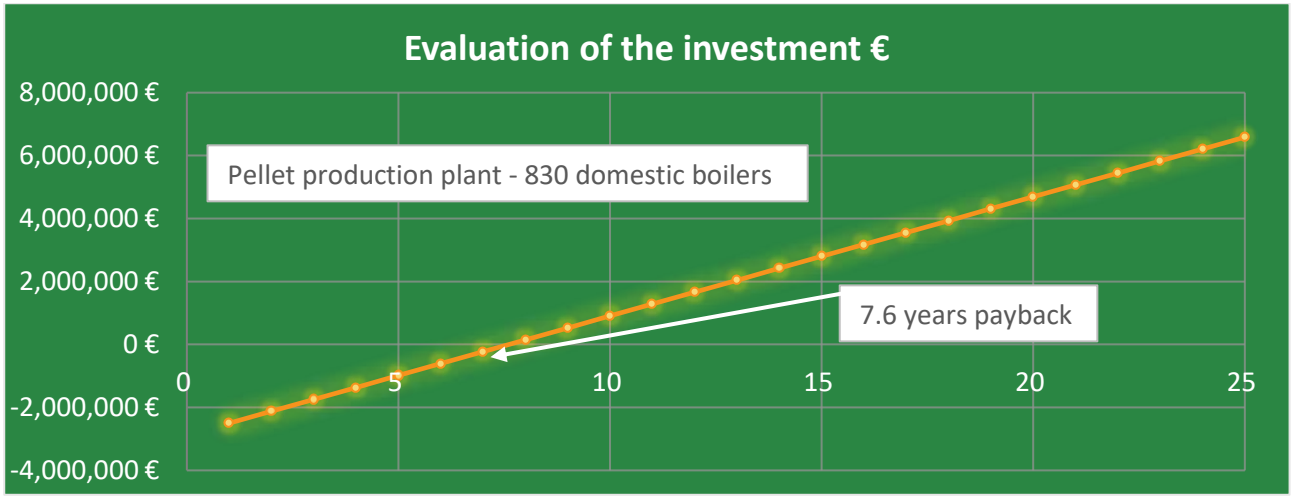
- Pellet production plant operational costs
- Thermal demands
- Electrical demands
- Dryness
- Pelletizing
- Packaging
- Machinery and vehicles maintenance and depreciation
- Biomass logistics (pruning, wood waste, forest residues)
- Collection
- Transportation
- Storage
- Labour costs
- Annual fees
- Other costs

Revenues breakdown:

The revenues have not been calculated with the current price due to the energy crisis but with a lower value (400 Euros/tn) which is more realistic for the near future.

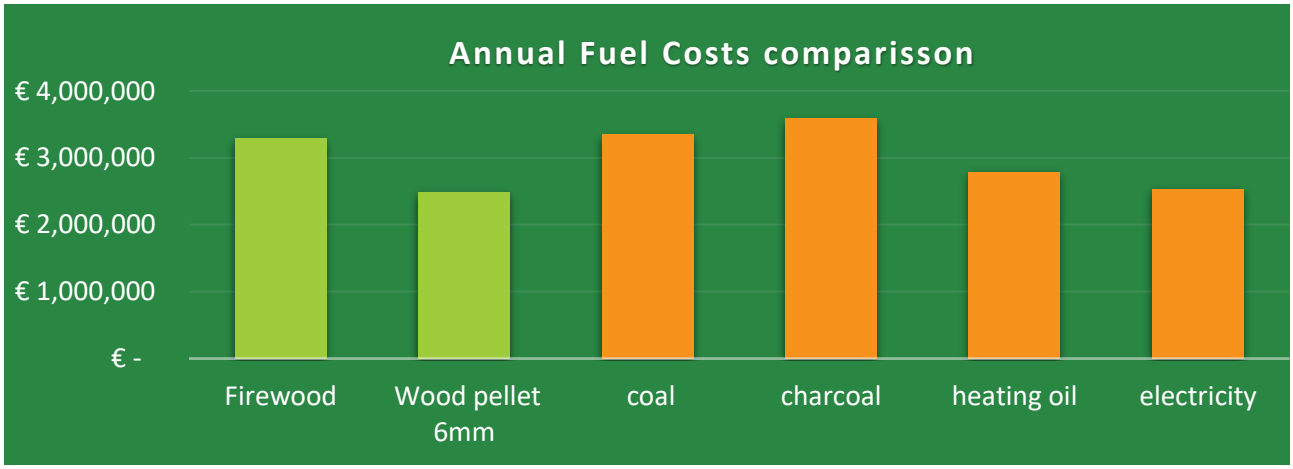
- Sell pellets to public buildings at around 400 €/tn or
- Installation and maintenance costs are included in the prices above.

Investment evaluation & profitability



Net Present Value	4.511.605 €
Return On Investment	13.15%
Pay-pack period	7.60 years
Internal Rate of Return	6.98%

As you can see from the graph and the results of our investment planning, it apperas that our concept is profitable and offers a payback period of 7.6 years. To the best of our results, we integrated safety factors and conservative scenarios due to the current energy crisis and the huge fluctuations in energy prices. The projection of our concept's profitability is highly related to the revenues which have been calculated as 400 €/tn including installation and maintenance costs whereas nowadays this cost meets the price of 570 €/tn. This concept as can be seen from the section below is about to be implemented from 2025 onwards when we expect a decrease in all energy prices.



On the other hand as we can see from the graph above, the current energy costs are highly dependent on the consumption of the fossil fuels. There is also a contribution of biomass with firewoods where it has massive potential in the area. As we can see from the graph pellets seem to be the cheapest energy solution for heating in the local area. The construction of the pellet production plan and the installation of the domestic boilers will offer significant relief to the citizens and will face local energy poverty by reducing their energy bills to the minimum.

Along these lines, we realise that the pellet plant will offer a lot of benefits to the local community across economic, environmental and social dimensions. Therefore should be considered a viable project both for the current period and the short-term future which offers a cheap and at the same time sustainable solution.

Project Plan

Schedule & Milestones

The graph below represents the short-term plan of OBS for the upcoming years.

The installation of the 830 domestic biomass boilers is scheduled for 2024 with the following intermediate critical steps. An analysis of the project milestones as well as a risk assessment with the necessary mitigation measures are also given below.

The below provides a description of the most critical milestones and risks towards the development and establishment of the OBS RESCoop.

PROJECT SCHEDULE, MILESTONES & RISKS				
Critical Milestone	**Description**	**Due to date**	**Project phase**	**Stakeholders involved**
MS1: BECoop kickstart	The beginning of the BECoop project.	Oct'20	BECoop research	BECoop consortium
MS2: Definition of OBS roadmap – Identification of stakeholders & biomass producers	The vision and the short – long-term business concept.	Apr'22	BECoop research	BECoop consortium
MS3: Feasibility Study & Business Plan	Elaboration of the techno-economic assessment and business planning of the concept.	Mar'23	BECoop research	BECoop consortium
MS4: The initial declaration of intent to join a local energy cooperative – or short supply chain	Call to gather candidates to become members of the energy community	Jun '23	OBS roadmap	OBS initiation members & local authorities
MS5: Installation of approx. 830 domestic boilers in residential & public buildings	Construction of the pellet production plant and installation, integration, and system configuration of the biomass domestic boilers	Dec '24	OBS roadmap	OBS members
Development of the energy community in the	Actions towards the development of the RESCoop	2024-2030	OBS roadmap	OBS members and all relevant stakeholders

PROJECT SCHEDULE, MILESTONES & RISKS				
Critical Milestone	**Description**	**Due to date**	**Project phase**	**Stakeholders involved**
region and creation of a real energy cooperative				

Risk Assessment

A few of the most important risk factors and mitigation measures are presented in the table below.

High-Risk factors	**Description**	**Probability** *(high, medium, low)*	**Impact** *(high, medium, low)*	**Mitigation measure**
High fluctuations in energy prices	The current situation with the high fluctuations of energy prices is giving an unclear landscape on the feasibility analysis and the reflection of profitability for such business cases.	High	High	In our analyses, we are considering recent and proven data, provided by the vast experience of our consortium and/or scientifically proven online information. At the same time, we are also conducting risk assessments by applying safety factors and considering future projections to eliminate potential deviations.
Insufficient raw material quantities	There is a slight uncertainty about the available quantities of the local residues to provide a sufficient substrate to produce the required thermal energy.	Low	Medium	There is a wide variety of forest residues that can provide the necessary raw material which will take place in cooperation with the local forest agency.
Installation and Maintenance failures	There is a slight probability of any failure during maintenance processes.	Low	Medium	The help of internal or external experts (ESCO) through subcontracting will be considered for this case to avoid and handle every possible situation.

Next steps

The Polish Energy Policy and the commune's desire to improve the quality of the natural environment and reduce energy poverty are the basic arguments that influence the direction and trend of changes in heating energy in the commune of Oborniki Śląskie. However, due to the attachment to fossil fuels, especially coal, it is necessary to systematically work from scratch to change the way of thinking about fuels that have a negative impact on the environment and encourage the use of local resources of the commune, including

biomass. It is also necessary to stimulate grassroots activity among the local community and increase trust in joint initiatives that will result in specific actions in the context of the development of an energy cooperative. Finally, legislative changes and support programs for creating energy communities are necessary. Hence, the timeframe for the development of the Oborniki Śląskie commune in this area is quite complex and requires a lot of commitment from all stakeholders.

Overall, the scheme of the Polish roadmap is presented below: