



D2.2 Self-assessment tool for evaluating current regional status and future potential – Final

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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

CHP	Combined heat and power
DH	District Heating
ESCO	Energy Service Company
EU	European Union
GHG	Greenhouse gas emissions
KEP	Knowledge Exchange Platform
RED	Renewable Energy Directive
REPower EU	A plan to rapidly reduce dependence on Russian fossil fuels and fast forward the green transition in the European Union
RESCoop	Renewable Energy Cooperatives

Executive summary

The present document constitutes the updated Self-Assessment Tool deliverable (D2.2) of the BECoop project, funded by the European Union's Horizon 2020 Research and Innovation programme.

In particular, this updated version of the BECoop Self-Assessment Tool, in comparison to the initial one (D2.1), includes the following enhancements:

1. Most of the **figures have been updated**. In this revised deliverable, screenshots from the final version of the online self-assessment tool are included.
2. **Minor modifications** of the “**Introduction**” (chapter 1) mainly associated with the new REPower EU plan and of the “**Tool brief overview**” (chapter 2) with the goal of providing more detailed information about the tool.
3. Chapter 3 “**The self-assessment methodology**” **has been enhanced**: “**new resources**” (section 3.1.1) and “**activities**” (section 3.1.2) have now been updated and the rating scheme (section 3.1.5) has been enhanced. Moreover, 2 new sections have been introduced: “**status visualisation**” (section 3.1.6) and “**Show History**” (section 3.2).
4. **Minor updates in chapter 4 (assessment examples)** due to the new updated questions and recommendations in the resources and activity are introduced (this applies also to the Annex I).
5. “**Online tool – user guideline**” (Chapter 5), **minor updates** have been included in the section 5.1-5.2. Minor changes can also be found in sections 5.3 and 5.4, mainly due to a better way of presenting the information.
6. A **new chapter** has been added **about the metrics collected** (Chapter 6) from the self-assessment tool.
7. **Minor revision of the conclusions** section, according to the new updates.

The aim of this deliverable is to demonstrate and further explain how the BECoop self-assessment tool can be used, as well as the type of information the targeted users can obtain, and how this information can help them to assess the status and be in a better position to establish the path towards a successful implementation of a community bioenergy heating project.

In order to achieve this goal, the deliverable is organised as follows:

- Firstly, an introduction chapter is presented, justifying the usefulness of the BECoop self-assessment tool.
- Secondly, the tool is briefly described, seeking to summarize the input data required, the nature of output delivered, how tool outputs can be exploited by users etc. The main goal is to provide a clear picture of the information that the user may obtain and how this can be further used to achieve a successful implementation of a bioenergy heating initiative.
- Thirdly, the methodology applied to develop the tool is being described.
- The following chapter displays an example of using the tool regarding the assessment of installing and operating a district heating unit which is fed with agriculture biomass. This example aims to

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help potential tool-users better understand the type of information and nature of results that the tool delivers.

- Then, the BECoop self-assessment tool guideline is briefly presented, addressing potential users and indicating all the steps to be carried out, as well as the different options to choose from while using the tool.
- A chapter about metrics collected from the self-assessment tool is reported, in which the number of visitors is indicated as well as the satisfaction degree reported by them.
- The deliverable ends with a conclusion chapter including a summary of the main aspects of the tool and the next steps, regarding the tool development and enhancement, to be followed within the upcoming months.

Additionally, an annex has been incorporated in the document including all information (questions, possible answers, recommendations, links and ratings) for a certain activity (District Heating-DH) and a certain type of resource (agricultural biomass).

The detailed self-assessment methodology, that is all questions together with possible answers and recommendations, is presented in a dedicated document (Supplementary Data) which accompanies D2.2. This document is confidential and is available only for the BECoop partners and the European Commission.

1. Introduction

Energy communities are expected to have a huge potential in Europe. As stated in article 22 of the RED II¹, EU considers the energy communities as key actor to achieve the main goals established seeking to drive the transition from fossil based energy to renewable energies (ensuring that 32 % of Europe's energy supply come from RES by 2030). Further to this, on 18 May 2022, the Commission published the REPowerEU plan (Figure 1), which sets out a series of measures to rapidly reduce EU's dependence on Russian fossil fuels well before 2030 by accelerating the clean energy transition. The REPowerEU plan is based on three pillars: (i) saving energy, (ii) producing clean energy and (iii) diversifying the EU's energy supplies. As part of its scaling up of renewable energy in power generation, industry, buildings and transport, the Commission proposes to increase the target in the directive to 45% by 2030².

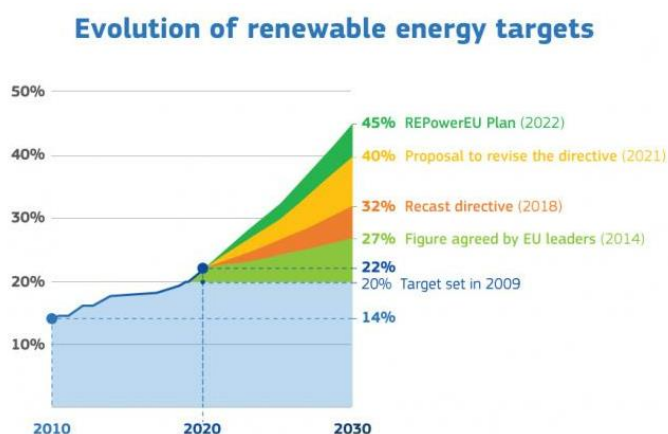


Figure 1. Evolution of renewable energy targets. Source: European Commission.

Additionally, the EU climate goals set for a carbon-neutral Europe by 2050 reinforce the importance of promoting the use of renewable resources as for instance the biomass.

Currently, energy communities are very focused on the production and/or distribution of electricity based on renewable energy sources, such as solar or wind energy. Nevertheless, *bioenergy* communities are not equally popular or widespread, although the bioenergy concept is strongly linked to the energy community philosophy, since biomass should be consumed in the nearby areas contributing to the local development (creation of employment, solution to agricultural disposal waste problems, empowering of the local economy, exploitation of local energy potentials, etc.).

Current bioenergy initiatives are mainly focused on heating and cooling applications. In 2020 (data extracted in January 2022), renewable energy accounts for 22.1 % of total energy use for heating and cooling in the EU-27³, which means that 77.9 % comes from fossil fuels resources. For this reason, the promotion of new renewable sources, such as biomass and the wider uptake of the bioenergy community concept can greatly contribute to achieve the goals of the EU and facilitate the penetration of bioenergy in the residential, industrial and transportation sector.

¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32018L2001&from=fr>

² https://energy.ec.europa.eu/topics/renewable-energy/renewable-energy-directive-targets-and-rules/renewable-energy-targets_en

³ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics#Over_one_fifth_of_energy_used_for_heating_and_cooling_from_renewable_sources

As indicated, the development of suitable bioenergy initiatives implies that they are manufactured and consumed in the local area. This fact is closely linked with the energy community concept, however the lack of knowledge about *how to implement bioenergy initiatives* is a barrier in some cases. On this basis, **the self-assessment tool for bioenergy communities has been developed aiming to allow to carry out a preliminary diagnosis of the initiative that the stakeholder wants to promote and provide hints on the future steps required.**

In order to cover the maximum of possibilities, five groups of resources have been addressed (agricultural, forestry, agro-industrial, biomass from urban parks and gardens and wet biomass) as well as 12 different activities that the energy community can promote. These activities have been grouped in five different categories taking into account that the focus is mostly on the domestic sector and small heating applications and considering that the most relevant aspects when promoting energy communities include the generation of energy, distribution, consumption and sharing. As such, activities considered are clustered in the following groups: logistic supply; biomass processing; electricity and heat production; distribution; and consumption.

The deliverable presents a description of the BECoop self-assessment tool, the employed methodology for its implementation, a guideline for potential users, as well as an example of a self-assessment exercise, so as to adequately explain the nature of outputs that the tool delivers.

2. Tool brief overview

The BECoop self-assessment tool is designed for non-specialised, inexperienced users seeking to assess the current state of a cooperative/community bioenergy project. **The tool consists of self-evaluation forms that allow to assess an initiative’s status and identify the process, technical solution and business model that needs to be followed for initiating and taking part to a community bioenergy heating project.** The questions asked act as roadmap, helping the user to check if the most relevant aspects or considerations have been taken into account. The different answers provided will suggest the steps needed to achieve a successful implementation of a new business model, as well as links (when applicable) to current tools and reports that may be useful to get beyond that stage. Such outputs offer **a clear picture of a user’s project status, highlighting the strengths and weaknesses and providing a series of recommendations for further developing the initiative.** Questions are grouped into different question-categories, each of which are associated with a rating indicator. Internally, a BECoop experts’ panel has been assigned to the development of each set of questions - respective answers further assigning a corresponding rating scheme. Outcomes are also depicted in a graphic/visual way by means of a spider-net. Tool’s outputs can also be downloaded.

Firstly, and after reading the description of the self-assessment tool, the user can start by selecting **the biomass resource type**. Five biomass resources have been identified and addressed: (i) Agricultural resources; (ii) Forestry resources; (iii) Agro-industrial resources; (iv) Biomass from urban parks and gardens and (v) Wet biomass (Figure 2). After clicking in the resource type, a set of 5 questions (with multiple-option styled answers), relevant to the chosen resource type, will appear. Each time, the user will need to select the answer that best applies to her/his case. Recommended actions will then appear, according to the selected answer, and a score will be assigned, depending on the option chosen.



Figure 2. Biomass resources considered in the self-assessment tool.

Secondly, the user should select the **activity to be implemented**. 12 different activity options are reflected in the self-assessment tool, as showcased in Figure 3.

Note: Initially 14 activities were defined because a distinction was made between thermal and electrical energy consumption and distribution. It was later decided that these are merged since the idea was to support users that are interested in the distribution and consumption of renewable energy (thermal and/or electricity) through a community/cooperative energy business model.



Figure 3. Activities that are considered in the self-assessment tool.

After clicking on each activity, a brief description/explanation of each chosen option will be displayed.

4 different types of aspects are then examined for each activity, namely: key partners, key technical aspects, key business and financial aspect, and key social and environmental aspects (Figure 4). In this context, each type of examined aspect entails a series of 3-5 multiple-choice type questions. Once again, based on chosen answers, a numeric score is being formed accompanied by a series of recommended actions.



Figure 4. Different types of indicators examined.

Tool Indicators: based on the sequence of all questions posed, a **set of indicators** is defined, for each questions-category, as follows.

- **Knowledge regarding the resource** → based on the questions related to the resource type.
- **User engagement** → based on the key partner questions.
- **Technical solution maturity** → related to the key technical activity’s questions.
- **Business solution maturity** → based on the key business and financial questions.
- **Social and environmental impact** → according to the answers provided to the key social and environmental activities questions.

According to the answers chosen, project-generated recommendations are displayed and, when applicable, links to either the BECoop toolkit or BECoop e-market or BECoop Knowledge exchange platform or factsheets or catalogues or external links are provided that could be helpful for potential users to carry out the development of their initiative, Figure 5.

Question: Do you know the main characteristics of the agricultural biomass that you are interested in?

Additional comment:
 Fuel characteristics include moisture content, low heating value, Cl, N and S content, ash content, ash composition, etc. These characteristics will considerably affect the following operations to be carried out. -

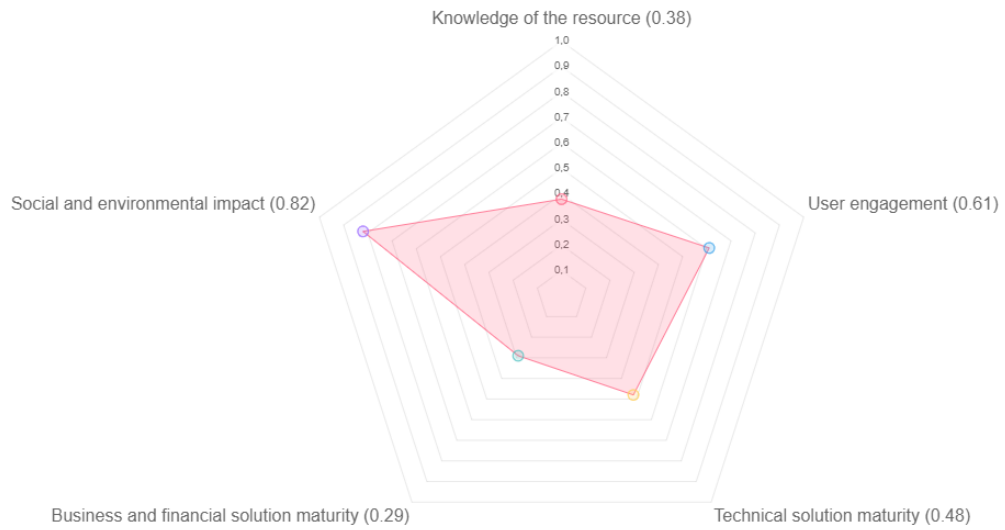
Answer: C: No, I don't know	Advice: The information gathered regarding the biofuel characteristics will contribute to select the most appropriate valorisation pathway. Be aware that not all the agricultural crops have the same fuel characteristic, for instance the herbaceous biomass normally has higher values of Cl (that could cause higher corrosion in boilers) than woody agricultural biomass. Link: Factsheet of solid biomass for small-scale heating applications
------------------------------------	--

Figure 5. Example of recommendation provided by the tool for a question.

By considering the average rate scored - depending on user-specific answers - per indicator, the tool’s outputs are visualized by means of a spider net, and a detailed analysis of user-specific ratings, scored in all major question categories (see Figure 6).

ACTIVITY "LOGISTIC SUPPLY OF AGRICULTURAL RESOURCES"

Survey 2022-10-04 07:51:09.347, activity 'Logistic supply of agricultural resources', resource 'Agricultural resources'



The score obtained in this self-assessment is 0.52:
 Good knowledge of what have to be done, please proceed with caution, you should review if there some categories weaker than others, and put more efforts in these categories, the recommendations provided could help you.



Figure 6: User-specific self-assessment outputs visualised as a spider-net diagram

3. The self-assessment methodology

This section provides all details of the self-assessment exercise. Carrying out and assessing the current status of a bioenergy community initiative, without interacting with each responsible stakeholder, is a huge challenge that is addressed by the tool. Providing such a tool to stakeholders, allows them to perform an assessment themselves, therefore reducing their dependence to consultancy services but also save time and resources (it is expected that the tool can help to save 20 % of the time required by non-specialised users in the decision-making process). Although the assessment will not be detailed, it provides clear guidance on the steps that need to be accomplished to achieve a successful implementation. This tool is, therefore, conceived as a diagnostic means which allows the stakeholders of a new bioenergy cooperative/community to assess the current position/status of their initiative.

The tool is divided into two different sections, one dedicated to the realisation of self-assessments (main function and described in the section 3.1) and the other one to visualize/compare/repeat those self-assessments already done (described in section 3.2).

3.1 Core structure of the self-assessment

Note: BECoop is a project oriented towards the market uptake of bioenergy communities in mainly the residential sector and small heating applications, so the bioenergy cases addressed in the self-assessment tool were selected taking into account this consideration.

At the initial stage, a template for an internal, consortium brainstorming (*Annex II*) was circulated and BECoop partners identified potential users and cases where the self-assessment tool could be relevant. Some theoretical examples were pointed out together with discussions over the main concept of the service to promote. This internal analysis together with the experience of all the partners helped to then identify the most relevant types of resources and activities to be considered and relevant investigative questions to be formed. For each question a set of potential answers and a corresponding rating score were developed and assigned.

Thus, the employed methodology intends to carry out the self-assessment through **a series of multiple choice questions. Users are called to select the options that best fit to their current situation and state of their potential bioenergy community initiative.** Since the target audience of the tool is non-specialised users, the questions and answers have been written in an understandable language. Furthermore, when needed, additional comments are incorporated to facilitate the understanding of each question. To complement the self-assessment process, the user will also receive recommendations and links (if applicable) that are included in each given answer. Moreover, the tool outputs include a spider net visualisation where an initiative's status is assessed based on the rating score that corresponds to the user-chosen answers.

The tool has been implemented in a “beta version” for one year, and after the feedback from users, project partners and advisory board members, the final version has been completed.

The tool's core elements, including a thorough presentation of core question-categories and methodological details of the self-assessment exercise are presented in detail below.

3.1.1 Selections of resources to use

Note: This questions-category is associated to the “Knowledge regarding the resource” tool indicator

Users should first have at least some basic knowledge around the resources to be used. Focusing on biomass, this aspect is quite relevant due to the heterogeneity of the different available resources. Biomass resources, used as an energy source, can be broadly grouped into different groups, in the case of BECoop, the resources selected are classified in five main groups (Figure 2). Questions here address aspects such as i) availability, ii) when raw materials are released to the market, iii) current use and iv) possible needs and challenges that must be tackled.

Agricultural resources

As agricultural resources, it is considered the biomass produced after carrying out the pruning and plantation removal operation to maintain the productivity of the agricultural crops. In most cases, such agricultural residues (e.g. pruning) remain unexploited and are either burned in open fires or mulched on soil. Five main subgroups can be differentiated here:

- **Vineyard pruning:** each year pruning operations should be performed to maintain the productivity of the vineyards.
- **Olive pruning:** once annually or biennially pruning operations should be carried out to maintain the productivity of the olive trees.
- **Fruit pruning:** each year pruning operations should be done to maintain the productivity of the fruit trees, also graft pruning are frequently being done in a certain period of time.
- **Plantation removal** of the above-mentioned agricultural crops should be performed when the tree productivity decreases.
- **Herbaceous material** as wheat straw or corn stalk, this type of biomass is in general harvested each year and before starting preparation operations for the new crop cycle straw or corn stover needs to be removed from the field.

Forestry resources

Forestry resources include the biomass that is coming from the forest considering a sustainable management, which contributes to prevent fire hazards or to maintain/increase the productivity of the forest in the future. It is the most frequently used biomass in the domestic sector from which two main subgroups can be differentiated here:

- **Shaft biomass:** generally used for woody applications, even though if sustainable practices and cascading use principles allow it, it can also be used for energy purposes.
- **Branch and stem biomass (forestry residues):** generally, this is the main part that is destined for biomass in order to respect the sustainable cascading use.



Figure 7. Shaft biomass (centre picture) and branch and stem biomass (right picture).

Agro-industrial resources

Agro-industrial resources involve the biomass generated after processing the main agricultural crops in an agro-industry and cooperatives. Currently, stakeholders involved in such missions use this resource for power or heat generation demanded in their process and/or sell it to final consumer or distribution operators. There are different types of agro-industrial resources, including:

- **Olive pits and exhausted olive cakes:** both are produced in olive agro-industry/cooperative (olive mills or pomace mills). For the residential sector the mainly used agro-industrial biomass is olive pits.
- **Almond shell:** are produced in fruit agro-industry/cooperative. It is a very popular fuel, since the ratio quality/price is very competitive.
- **Sunflower husk:** is obtained in the sunflower oil industry and is a low-quality fuel destined for industrial applications. Generally, it has a very competitive price compared to other solid biofuels, therefore it is consumed by medium-large size installations.

Biomass from urban parks and gardens

Biomass collected from urban parks and gardens in the municipality includes the biomass that is obtained after cleaning/maintenance operations of parks, roads, highways, etc. The biomass obtained from the trees cleaning operation in the municipality can be classified mainly as forestry biomass, but since the fuel characteristics and the harvesting operations are significantly different, an additional section has been added to address this resource.

Wet biomass

Wet biomass includes biomass with a high moisture content generated as a by-product of certain industries, animal farms, sewage treatment plants, etc. The use of these biomasses is on the rise, and it is expected to be growing in the following years, mainly for biogas/biomethane production. In BECoop the wet biomass considered are:

- **Slurries of the livestock:** as for instance cow manure, pig slurries, poultry manure, etc. This biomass should be properly utilised in order to avoid contamination of the soil.
- **Organic fraction of sewage sludge from wastewater treatment plants:** it is a subproduct un the wastewater plant, it can be valorised though combustion and biogas technology.
- **Organic fraction of municipal solid waste:** the valorisation of this type of biomass should be considered before its accumulation in landfills.

3.1.2 Selection of activities to implement

After choosing resources, the user will have to select an activity from a total of 12 options to implement (Figure 3). In line with what has been indicated in the case of the resources category, there is a large variety of activities that can be carried out to promote community initiatives in the bioenergy sector. Taking into account that the focus is on the residential sector and small heating applications; and considering that the most relevant aspect when promoting energy communities is the generation of energy, distribution, consumption and sharing, the following distribution activities have been proposed in the tool.

At this point it is important to highlight that at the end of each activity's questions, the user will be able to (i) select another activity in which he/she is interested or (ii) complete the self-assessment process. This option has been recently implemented based on the users' feedback, since frequently they had to carry out different activities within the same initiative (such as for instance logistic supply and pellet/woodchips production).

Logistic supply

Logistic operation is a critical activity. When the valorisation of the biomass is targeted, it can represent more than the 50 % of the price of the final product. Furthermore, it can also affect the quality of the biomass. For instance, the existence of exogenous material (sand, rock, metal, etc.) should be avoided when these operations are carried out.

The user who is interested in this activity will be in charge of the harvesting of biomass from different types of crops, the biomass haulage and the selling to an intermediate manufacturer or final consumer. Additionally, the user could also oversee intermediate operations such as storage or even some pre-treatments as sieving or size distribution process.

In general, the core activities in this case involve four activities, each of them associated with a specific resource harvested/collected, since these operations will differ according to the type of biomass collected. Even within the same group of resources there are different options for the harvesting. However, the selection of the most efficient and suitable alternative will depend on a case-by-case analysis.

The breakdown of logistic operations for agro-industrial resources are not included in the tool, as in this case the logistic will mainly involve the distribution and not how the biomass is collected, due to the fact that the biomass is produced in the agro-industry/cooperative.

As a result, the four activities that can be found in this group of activities in the self-assessment tool are:

- Logistic supply of agricultural resource
- Logistic supply of forestry resource
- Logistic supply of biomass from parks and garden
- Logistic supply of wet biomass

Some examples of potential initiatives that would relate to these activities (linked with the two activities already implemented in the tool) are:

- Municipalities (or industries) willing to exploit the local biomass from agricultural resources or public/ private forests towards bioenergy production, while creating employment in the area and avoiding open fires, in the case of agricultural biomass, or sustainably maintaining the forest, in case of forestry biomass.
- Biomass trade centres (biomass yards) to sell agricultural residues or forestry residues directly (in chip/shredded/ bale form) to end-users for covering their energy demands.
- Agro-industrial industries/cooperatives wanting to use their by-products to facilitate the future operations of their associates and diversify their business line.
- Wood process industries processing the forest resources into wood products (e.g. particleboards, MDF).

Biomass processing

The size distribution and the moisture content (together with other fuel characteristics) are very relevant parameters that should be taken into account when promoting a biomass valorisation initiative. In the domestic sector, the clients usually purchase pellets/briquettes, whereas shredded material (and woodchips) is mostly used in small heating applications (> 50 kW).

This activity focuses on users aiming to create a biomass manufacturing centre in order to process the biomass already collected (the self-assessment for the collection of the biomass is addressed in the activity regarding the logistic supply). This activity's aim is to produce a higher quality solid biofuel such as pellet/briquettes/woodchips and sell it to a third person who can be a distribution company or an end user.

Some examples of this kind of initiatives are:

- RESCoop or energy communities willing to create a biomass logistic centre to process biomass and sell it to their associates.
- Agro-industrial cooperatives/agro-industries willing to create and adapt their current installations to a biomass logistic centre to process biomass and sell it to biomass suppliers or final consumers (it could be their associates or others).
- Local industries can join with farmers (for instance) and use the waste/biomass to produce biofuels and sell it to biomass suppliers or final consumers.

- Pellet plants producing pellets (or briquettes) from agricultural/forest residues to cover the energy demands of public buildings and industries.
- Vineyard, fruits, olive, etc. farmers can join the energy cooperative in order to create a biomass logistic centre that would be located in the surrounding area where the biomass can be gathered after pruning and being processed (woodchips, briquettes, pellets, ...) and sold to the biomass suppliers or final consumers.

Electricity and heat production

This group of activities apply to the case in which the user wants to start an industrial installation to produce heat and/or electricity.

The production of heat and electricity from biomass, could be accomplished by means of thermochemical and biological process. By taking into account the BECoop concept, three main activities have been identified as the most relevant for the bioenergy communities and therefore addressed in the self-assessment tool:

- **District heating:** District heating is a system seeking to produce, and afterwards, distribute heat generated in a centralized location, mainly focused on residential sector and therefore avoiding the need of installing individual boilers by the end users. This system is becoming very popular, and the operation through an energy community is expected to increase in the coming years.

Some examples regarding this type of initiative are:

- RESCoop/ energy community that is trying to evaluate the feasibility to establish a district heating production unit to supply some of their associates.
 - Neighbourhood that currently has a district heating unit that works with gas or other fossil fuel, trying to assess the investment required to switch to an equipment working with a renewable source, more specifically biomass.
 - Municipalities (small villages) considering covering their thermal energy demands by means of renewable energy resource through district heating.
 - A group of industrial companies inside the same industrial park (or the surrounding area) willing to create a community in order to produce heat for covering their thermal energy demands, and for sharing the excess heat with nearby buildings.
- **Small co-generation:** Combined Heat and Power (CHP) plants generate two different types of energy, in general electricity and heat. Different technologies are suitable to valorise biomass that can be implemented in CHP plants such as combustion, gasification, anaerobic digestion, etc. This type of installation is very popular for large power plants, even though it is expected to increase in the coming years for intermediate and small power plants.

Some examples of this type of initiatives are:

- RESCoop/energy community, considering the feasibility to establish a heating and power production plant to supply some of their associates.
- RESCoop/energy community, currently producing electricity willing to produce also heat to cover all the energy demands of their associates.

- Municipalities (small villages) considering alternatives to cover their energy demands by means of renewable energy (electricity and heating).
- Cooperatives dealing with forest and/or agricultural residues (vineyard and/or olive pruning, straw, etc.) that invest in a local small CHP (for cogeneration) in order to cover their energy demands.
- **Biogas/biomethane plant:** Biomass resources (dry and wet biomass) are being valorised in some cases through biogas plant. Currently, the feasibility of the upgrading of this gas to produce biomethane is being explored since it can be transported through the natural gas pipelines and commercialized just like the natural gas with renewable origin certificate. Both biogas and biomethane production are being encouraged in the EU as a substitute for natural gas, and the community energy model is a perfect fit to achieve this goal.

Some examples of this type of initiatives are:

- RESCoops, actor considering the feasibility of developing a biomethane plant and selling the biogas for some of their associates.
- Pig farmers face a relevant inconvenience associated with the large amount of slurries they need to dispose. They could join the energy cooperative in order to establish a biogas/biomethane plant (fed by the slurry) seeking to cover heating and electrical demand of the farms in the surrounding area.
- Livestock Cooperatives can consider using the slurry for the production of biogas/biomethane. They have to deal with their residues in an environmentally friendly way (e.g. a dairy production facility or a production unit with livestock). Perhaps such actors can also be relevant potential community members in some cases.
- A group of companies inside of the same industrial park willing to create a community in order to cover their energy demands (heating, sanitary hot water, cold).
- Local industries can join with farmers (for instance) and use the waste/biomass to produce their energy through biogas/biomethane plant.

Distribution

This group of activities apply to the case in which the user intends to carry out the distribution of two main activities: solid biofuels, and electricity and thermal energy.

- **Distribution of solid biofuels:** The user interested in this activity will oversee the purchase of biomass and its selling to their associates/clients. Intermediate operations such as storage or even some pre-treatments as sieving or size distribution could be included in the activities.

An example related to this type of initiative is:

- RESCoop / energy community acting as an intermediate actor in charge of biofuels supply (as pellets, woodchips, briquettes, ...), storage and distribution to their associates.

- **Distribution of electricity and thermal energy:** in this case the potential user will consider purchasing electricity and thermal energy (from the same or different producers) and selling to their associates/clients of the community.

An example related to this type of initiative is:

- RESCoop / energy communities considering the feasibility to distribute the energy demands to their associates but without carry out a huge investment in the production plant of this energy.
- Neighbourhood considering creating a energy community in order to cover their domestic energy demands.

Consumption

In this group of activities, the user consumes one or more from the following: solid biofuels, and thermal energy and/or electricity.

- **Consumption of solid biofuels:** The stakeholder in this case intends to use solid biomass fuels for covering his/her energy demands (mainly heat).

Some examples related to this type of initiative are:

- Neighbourhood/final users considering joining the energy cooperative in order to cover their domestic energy demands.

- **Consumption of electricity and thermal energy:** This type of user it is interested in the consumption of electricity and thermal energy to cover its energy demands coming from RESCoop / energy community.

Some examples related to this type of initiative are:

- Neighbourhood or individual user that want to be part of a RESCoop/energy community and covering his energy demands (electrical and thermal) under such social entities instead of using conventional distribution companies.

Important:

Example on Resources + Activities: An example of a filled template for the resources type “*agricultural resource*” and the activity “*district heating*” can be found in **Annex I**.

3.1.3 Examination of key aspects

Once, an activity is selected, 4 different key aspects will then be displayed for further investigation. Each examined aspect is accompanied by a set of multiple option questions. The under-exploration aspects are introduced below.

Key partners

Note: This questions-category is associated to the “User engagement” tool indicator

The goal of this questions-category is to assess and provide an overview of all the stakeholders that should/could be engaged or contacted in order to implement a community bioenergy heating initiative. The category includes:

- Between 3-5 questions from which:
 - i) 1 question related to the energy community
 - ii) 1 question which focuses on the suppliers' identification
 - iii) 1 question aiming to retrieve information regarding the final consumer of the product

Key technical aspects

Note: This questions-category is associated to the “Technical solution maturity” tool indicator

Key technical aspects that the user should consider while developing a community bioenergy heating initiative. The category includes:

- Between 3-5 questions from which:
 - i) 1 question related to power of the plant/power heat needed/...
 - ii) 1 question related to technology to be implemented
 - iii) 1 question retrieves information regarding the technical experience

Key business aspects

Note: This questions-category is associated to the “Business solution maturity” tool indicator

This questions-category aims to assess and highlight key business and financial aspects that the user should consider while developing an initiative. The category includes:

- Between 3-5 questions from which:
 - i) 1 question related to the energy community
 - ii) 1 question related to the financial resources
 - iii) 1 question retrieves information regarding the knowledge level of the targeted market/s and its potential profitability

Key social and environmental aspects

Note: This questions-category is associated to the “Social and environmental impact” tool indicator

This questions-category highlights social and environmental aspects that the user should consider while developing an initiative. The category includes:

- Between 3-5 questions from which:
 - i) 1 question related to social aspects
 - ii) 1 question related to environmental aspects
 - iii) 1 question related to the energy community

Important: All the questions associated to each resource and activity accordingly have been placed in a separate document as additional material in order to avoid increasing unnecessarily the length of the report, even though an example for one resource and one activity has been included in Annex 1.

3.1.4 Recommendations and links

Project's tailored recommendations that are generated and displayed depending on each chosen answer. These suggestions may help tool users to evaluate the current status of their initiative and include hints on capacity building around each topic.

Moreover, aside from targeted recommendations, when applicable, **links will be provided** that could be helpful for potential users to carry out the development of the initiative (an example was showed in Figure 5). The links will allow the user to increase his/her knowledge regarding specific topics. These links will be based on the results that have been obtained during the project's lifetime, for instance public deliverables, but also the BECoop Toolkit, the BECoop Knowledge Exchange Platform, technical and business catalogues and the project's e-market platform. Additionally, a literature review has been carried out to include, when possible, other public references that can contribute to promote the market uptake of these initiatives.

3.1.5 Rating scheme

The rating process reflects the state of readiness of the initiative to achieve a successful implementation. Rating scores are assigned at two different levels:

A. Questions associated to each category

Within each category, questions are raised and rated, taking into account that the sum of weights assigned to all questions adds up to 1. Each question is rated (weight) according to its importance within the respective category. Key questions obtain a higher rate while questions that are, although relevant, not essential in first instance are linked to a lower score.

B. Answers provided for each question

Rates (weights) are also assigned to the answers provided for each question. The tools' questions have been formulated in a way so that the user can only select one possible answer each time. As such, rates assigned to all possible answers are varied. The minimum score for an answer is 0.25 and the maximum is 1.0. Best suitable answers, corresponding to well-developed initiatives, ready for market uptake, obtain a higher score, while answers corresponding to the initial stage of an initiative in which, for instance, the engagement with actors involved in the value chain has not started yet, should get a bottom level score of 0.25. Other answers regarding intermediate situations are rated between 0.3 and 0.8. Although unusual, it could be possible that different answers provided for the same question have the same rate assigned. See example in Figure 8.

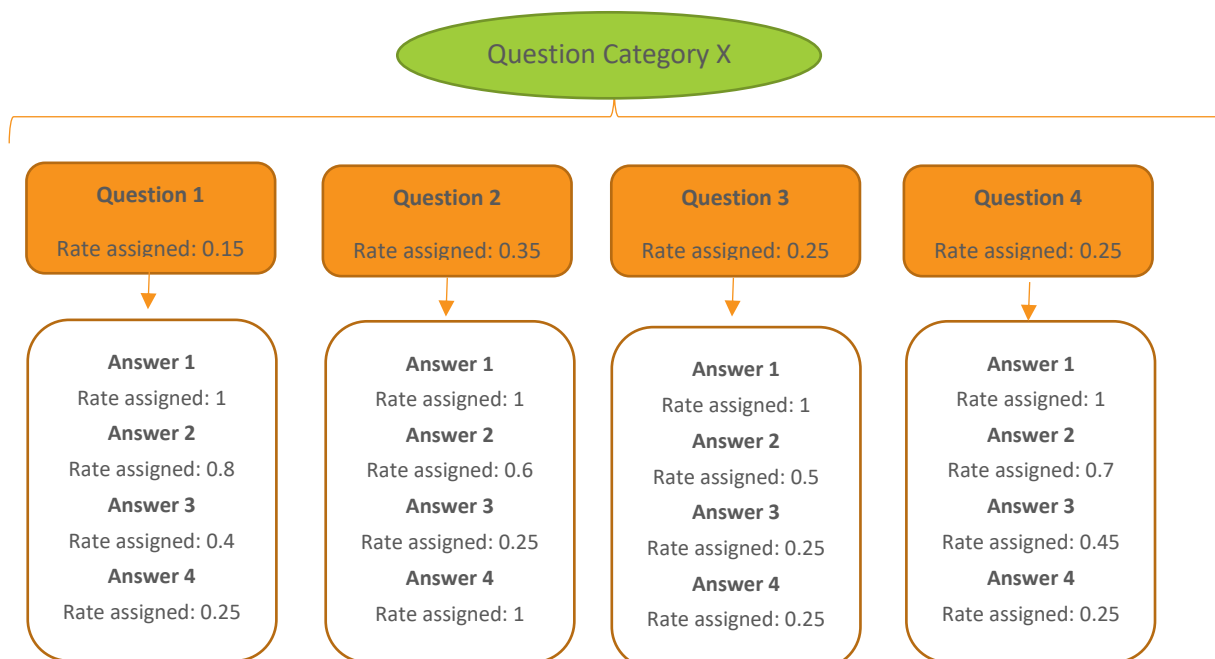


Figure 8. Rating scheme example of each category

Regarding the scoring, it is important to mention that if the user's answers are "he doesn't know" in most cases, the score obtained will be low. This does not always mean that the initiative cannot be implemented successfully; however, it implies that it is necessary to compile more information and work on the initiative business model planning, etc. and then carry out again the self-assessment, once this information has been gathered and compare how the final score reached has improved.

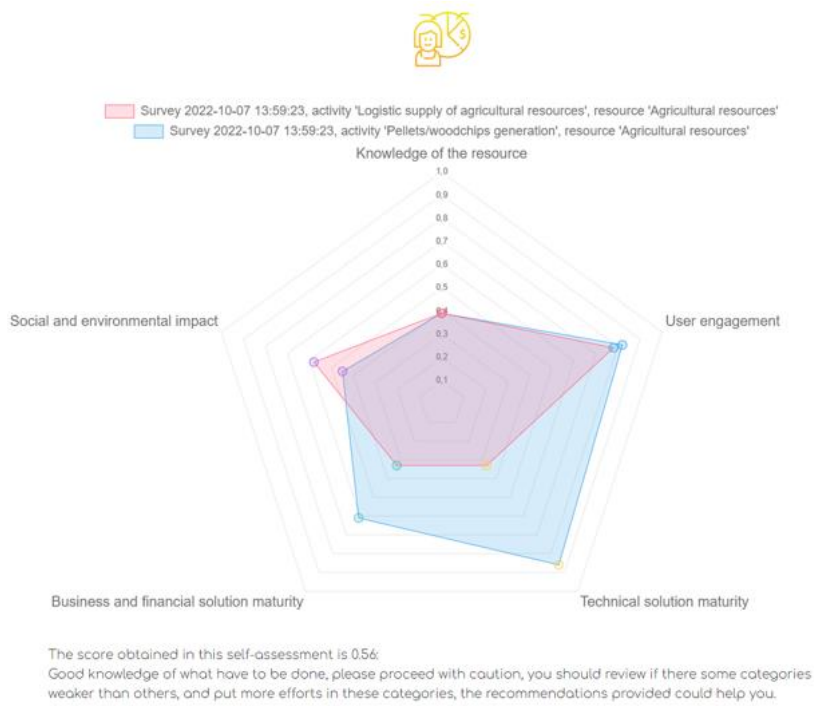
C. Questions associated to each resource/activity

As mentioned in chapter 2, each self-assessment is based on 5 tool indicators (see Figure 4). All the indicators have been considered equally important for the development of an initiative. For instance, it is equally important to (i) have knowledge about resources that you are interested in, (ii) to identify your key partners, (iii) to know about the technical, business solutions, and the social and environmental aspects associated to the community.

For this reason, the score for each of the indicators is 0.2, making a total of 1 for the sum of all indicators. If several activities are selected in one self-assessment, the score associated with each of the indicators for each activity will be calculated on a proportional basis.

3.1.6 Status visualization

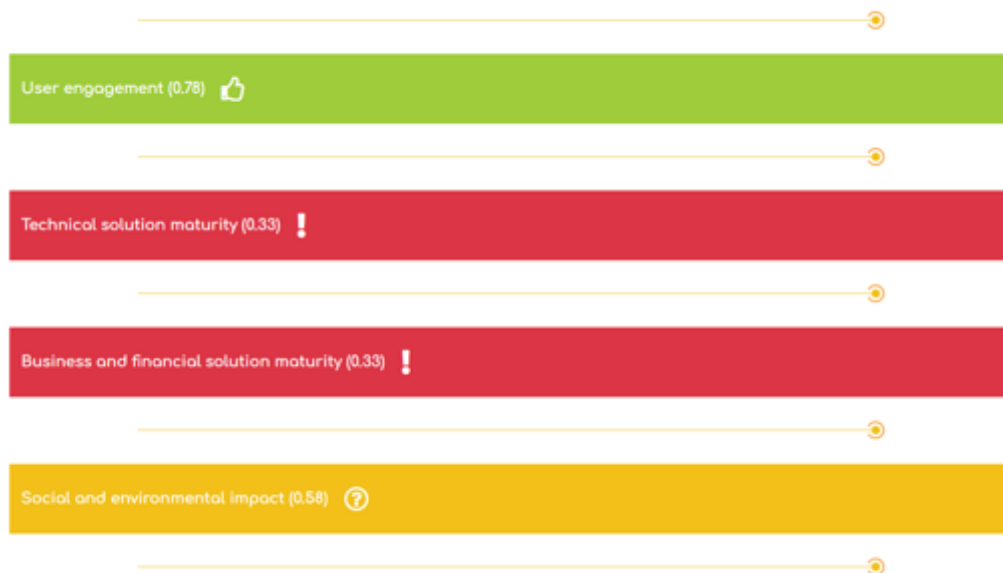
When all tool questions are answered, total scoring results will be presented in the form of a spider-net, taking into account the average rate obtained for each tool-indicator (*Knowledge regarding the resource; User engagement; Technical solution maturity; Business solution maturity; Social and environmental impact*) as was showed in Figure 6. Also, if several activities have been selected in the same self-assessment the spider-net shows independently the results obtained in the indicators of each activity, and the final score obtained in the self-assessment, as can be seen in Figure 10.



Resource "Agricultural resources" +
 Activity "Logistic supply of agricultural resources" +
 Activity "Pellets/woodchips generation" +

Figure 9. Scoring results in the form of a spider-net

Resource "Agricultural resources" +
 Activity "Logistic supply of agricultural resources" -



Activity "Pellets/woodchips generation" +

Figure 10. User-specific self-assessment outputs (which includes several activities in the same self-assessment) visualised as a spider-net diagram

After the spider-net, the global punctuation of the self-assessment is showed together with further explanation. Each indicator has a rate associated with a brief explanation . In order to facilitate the visualisation by users, a similar colour code has been introduced for each of the 5 indicators (see Figure 6), in which:

- **Red colour:** appears when the rate obtained in the indicator is lower than 0.4 and means that “Many things have to be taken into consideration before advancing with the biomass initiative, please follow the recommendations and reconsider if you should continue with the initiative.”
- **Orange colour:** appears when the rate obtained is between 0.4 and 0.7 and means “Good knowledge of what has to be done, please proceed with caution, follow the recommendations indicated, try to improve your weakness and take advantage of your strengths.”
- **Green colour:** appears when the rate is higher than 0.7 and means “Excellent knowledge of what has to be done, everything at place, please go ahead with the initiative.”

Finally, an option to download the results of the self-assessment (a pdf is generated with all the questions, answers selected, and outputs provided by the tool) and to send feedback has been added.

Note: Within a self-assessment process, buttons have been created in all the pages to scroll to the previous or next section or to review and modify an answer before submitting (or saving at any time) the self-assessment.

3.2 Tool’s history button

Firstly, it should be noted that this option will only be available to users who register in the tool. This section has been incorporated because the functionality of the self-assessment tool is not only to make a self-assessment as such, but also to monitor the progress you are making as you work on your initiative (taking into account the recommendations given by the tool, as well as the information you acquire on your own).

For this reason, a table has been created with all the self-assessments carried out, indicating the resource and the activity selected, as well as the day and time the self-assessment took place (Figure 11).

Show entries Search:

Date	Activity	Resource		
2022-10-04 13:59:43.097	Logistic supply of agricultural resources	Agricultural resources	Compare	Repeat
2022-10-04 07:51:09.347	Logistic supply of agricultural resources	Agricultural resources	Compare	Repeat
2022-07-26 06:56:12.099	Logistic supply of agricultural resources	Agricultural resources	Compare	Repeat
2022-06-29 07:43:38.965	District heating	Agricultural resources	Compare	Repeat
2022-06-08 13:22:26.722	District heating	Agricultural resources	Compare	Repeat
2022-06-08 13:19:56.914	Pellets/woodchips generation	Agricultural resources	Compare	Repeat
2022-06-08 13:16:49.252	Logistic supply of agricultural resources	Agricultural resources	Compare	Repeat
2022-06-08 13:12:09.154	Logistic supply of agricultural resources	Agricultural resources	Compare	Repeat
2022-06-08 13:12:09.042	Logistic supply of agricultural resources	Agricultural resources	Compare	Repeat
2022-06-08 13:08:54.706	Logistic supply of agricultural resources	Agricultural resources	Compare	Repeat

Showing 1 to 10 of 24 entries Previous 2 3 Next

Figure 11. Table that shows the self-assessment carried out by the user.

In the same table, it has been made possible to filter by activity, resource or even date, in order to quickly identify the self-assessment, you are looking for. Additionally, a function has been enabled to compare different self-assessments that have been completed (see Figure 12) or even repeat some of them (this function is very useful to monitor the progress of an initiative).

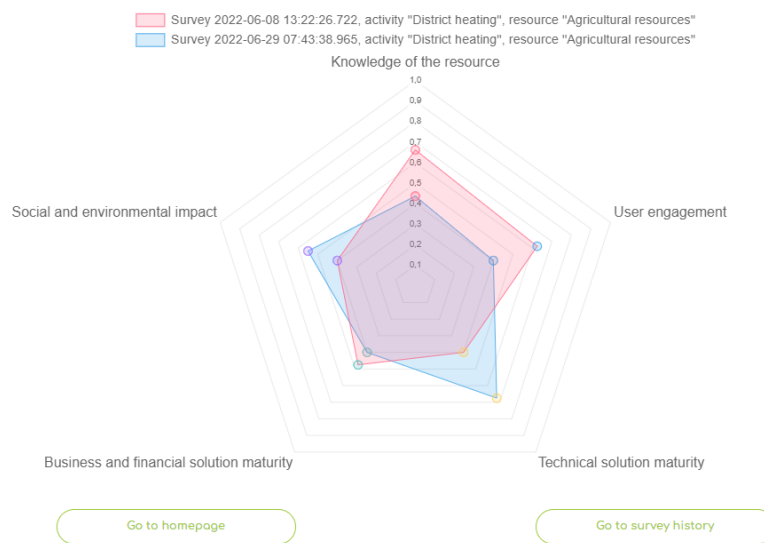


Figure 12. Comparison between different self-assessments carried out.

Finally, it should be said that an option has been added where the registered user can save his self-assessment at any time and place it in the history section. In order not to confuse the user within the data history, the uncompleted self-assessments are displayed in different tables than the fully completed ones, so that they are not mixed up in the same table (see Figure 13).



Figure 13. Completed (left) and unfinished (right) self-evaluations.

It is important to highlight that **the tool provides different recommendations and scores according to the answers selected by the user.** This aspect allows, for instance, to assess the initiative progress throughout a timeline by carrying out different assessments, once the recommendations that were pointed out have been addressed.

4. Tool's output analysis – assessment examples

Explanations are provided in this chapter to help the user better understand the results, the recommendations and links provided by the BECoop self-assessment tool. Towards this aim, an example of the answers selected by a user and the corresponding results reached will be thoroughly discussed herein.

In the examples presented below, a user with an average knowledge of the resource and activity to be undertaken is considered.

In Annex I, an example of a complete case is depicted including the resource (*agricultural biomass*) and one activity (*produce heat in a district heating*) sections, including all the questions, answers, recommendations, additional explanations, and links associated to the case presented.

4.1 Resources assessment

Table 1 shows an example of a self-assessment and the output provided by the tool regarding the resources category. This section depicts the answers that correspond to what a potential tool user chose when posed a series of relevant questions. All questions/answers can be found in the Annex I.

Table 1. Self-assessment exercise example - biomass resources

Resource: Agricultural crops	
1º question	<i>Do you know the main characteristics of the agricultural biomass that you are interested in?</i>
Additional comment	Fuel characteristics include moisture content, low heating value, Cl, N and S content, ash content, ash composition, etc. These characteristics will considerably affect the following operations to be carried out.
Answers selected	Recommendation and link proposed
<i>B: Yes, I have a preliminary idea</i>	The information gathered regarding the biofuel characteristics will contribute to select the most appropriate valorisation pathway. Be aware that not all the agricultural crops have the same fuel characteristic, for instance the herbaceous biomass normally has higher values of Cl (that could cause higher corrosion occurrence in boilers) than woody agricultural biomass.
	Link: Factsheet of solid biomass for small-scale heating applications
2º question	<i>In general bases, agricultural resource are seasonal, which means that in a short period of time (1-3 months) they should be collected and stored.</i>

	<i>Do you know in which period the pruning operations take place for the agricultural crops that you are interested?</i>
Additional comment	
Answers selected	Recommendation and link proposed
<i>B: I don't know</i>	<p>It is important to know when the pruning operation of each agricultural crops are carried out, especially if you want to oversee the logistic operations, since the biomass needs to be collected in a short period of time, but also this information will allow to position yourself in a good place for the acquisition of these biomass.</p> <p>The average period where each biomass from agricultural crops is collected will depend on several aspects such as the weather conditions, that can slightly change each year. Generally (although sometimes this operation is performed several times during the year), for instance vineyard pruning are collected between December and February, olive pruning between February and April, fruit pruning and plantation removal are performed between October and January, wheat straw between July and August and corn stalk between October and November.</p>
	Link: N/A
3^o question	<i>Do you know the availability of the agricultural resource in your area?</i>
Additional comment	In order to know the resource availability, not only the potential of the biomass in the surrounding area (preferably radius lower than 30 km) should be considered but also how much biomass can be collected by reaching agreements with the farmers/cooperatives, considering difficulties associated to the slope of the field, type of land (irrigated or not), productivity of biomass per ha, etc...
Answers selected	Recommendation and link proposed
<i>B: I know the potential surface, but I don't know the availability of biomass.</i>	<p>If you know the potential surface in your area dedicated to the targeted biomass but you don't know its availability, in order carry out a preliminary estimation, you can use the tool Bioraise which can be found in the toolkit of BECoop. Additionally, it is highly recommended to get in contact with some owner of the biomass (farmers, cooperatives) and logistic operators in order to assess their current practice. Also, you can check the catalogue of BECoop about fuel characteristic of biomass in which you can see a first estimation of the average productivity that you can obtain per ha for different types of biomass. Also, you can check the Up_running observatory where several field measurements of the pruning yields were performed in different regions of Europe.</p>
	Link: BIORAISE in BECoop toolkit . Factsheet of solid biomass for small-scale heating applications , uP_running Observatory

4º question	<i>Are you aware of the current use of the targeted resource?</i>
Additional comment	In most cases, the owners of the agricultural biomass are the farmers or the cooperatives. In general, they use this resource as organic matter to improve soil conditions, as biomass for energy purposes either for self-consumption or to be sold to consumers or this biomass is seen as a residue in which case they are normally burnt in the field.
Answers selected	Recommendation and link proposed
<i>B: The owners of the biomass are not using this resource</i>	If the owners of the biomass are not using this resource, probably this resource is a problem for them and normally they will have to invest time and money in order to get rid of it (as for instance burning on the field). In this case, they will probably welcome this initiative, but with the consideration of collecting the biomass as soon as the pruning operations are carried out. Link: N/A
5º question	<i>Do you know the possible needs and challenges that you will have to face when working with this product vs other biomass and/or according to the type of stakeholder that you are going to be inside the value chain?</i>
Additional comment	Properties of the biomass and therefore their behaviour when valorised for different purposes will differ, according to the type of biomass, the land where it is cultivated, logistic operations carried out, pre-treatment process, etc. Thus, before developing an initiative based on this type of biomass it is important to anticipate the possible needs and challenges that you will most likely have to face.
Answers selected	Recommendation and link proposed
<i>B: No, I don't know</i>	The fuels characteristics and the size distribution of agricultural crops are different from forestry biomass (the most frequently used biomass), because of that some people think that it is not a valid biofuel for energy purposes. However, it is a suitable fuel, even though it requires to install the properly combustion technology in order to achieve an efficient operation. Also, you can consult the deliverable 1.4 of BECoop in which some proposed action to tackle the critical needs and challenges are mentioned by each stakeholder. Link: Deliverable 1.4 BECoop
Final score of the indicator (from 0 to 1)	Knowledge of the biomass → 0.56 (Good knowledge of what has to be done, please proceed with caution, follow the recommendations)

	indicated, try to improve your weakness and take advantage of your strengths.)
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This category intends to assess user-knowledge regarding the chosen resource type, as the broader the knowledge of the resource the higher the guarantee of success. According to the answers provided in this example, the final score obtained is 0.56 (from 0 to 1), which means that the user has an intermediate/good knowledge regarding the resource. This could be increased by different actions that are recommended by the tool. The above-mentioned answers are analysed:

- First question is based on the knowledge of the fuel characteristics of the resource. This can considerably affect the future activities to be carried out. In this case, the user has indicated that he/she has a preliminary idea of the fuel characteristic, but he/she is not sure about that. In this case and taking into account that there is a huge range of possible agricultural resources with different properties each, it is desirable before proceeding with the initiative implementation to achieve better knowledge concerning the resource. In this sense, a link is provided to the factsheet related to fuel characteristic developed in BECoop aiming to clarify some characteristics aspects.
- Second question is based on the seasonality of the agricultural resource since this biomass should be collected in a short period of time. In this case the user does not know the period in which the biomass is collected, therefore the recommendation provided indicates a range of months when these operations are usually carried out, even though, this range of time can vary according to the weather and crop. Thus, the collection period can change within the same country and from one country to another in the EU.
- Third question is based on the availability of biomass. This aspect is critical in order to successfully carry out a bioenergy initiative. In this case, the user has indicated that he/she doesn't know the biomass availability in the region or area, but he/she has a preliminary idea of the surface covered by these agricultural resources. For this reason, the tool recommended to take a look at the factsheet of fuel characteristic where productivity of biomass per ha is indicated or to check the "uP_running observatory"⁴ where productivity for different agricultural biomass is included. Also, the user can check the potential of biomass through the "Bioraise"⁵ tool (SIG tool). In any case, it was also indicated that further conversation with the owners of the biomass (farmers and cooperatives) should take place seeking to assess its willingness to give this biomass to others.
- Fourth question is based on the current use of the biomass. This aspect is important since it will facilitate the negotiation with the biomass owners. In this case, the user has indicated that the biomass owner is not using this resource, in fact sometimes it might intend of getting rid of them, therefore this initiative will be very welcomed.
- Fifth question is based on possible needs and challenges that the user will have to face. In this case the user has indicated that he/she doesn't know. In this case, the recommendations provided depict some examples of needs and challenges but also a report produced by BECoop project is proposed.

⁴ <https://www.up-running-observatory.eu/en/>

⁵ <http://bioraise.ciemat.es/Bioraise>

4.2 Key partners assessment

Table 2 shows a user-specific tool output generated regarding the key partners category for the District Heating activity.

Table 2. Self-assessment exercise example - biomass resources – key partners category

Category: Key partners		Activity: District Heating	
1^o question	<i>Are there any biomass suppliers in your region?</i>		
Additional comment	<p>Biomass distributors may be able to supply forestry, agricultural and waste biomass from the surrounding area.</p> <p>The biomass provider can be a farmer as well as a biomass logistic company.</p>		
Answers selected	Recommendation and link proposed		
<i>A. Yes, I know.</i>	<p>You can contact a biomass distributor to find out detailed information (e.g. how much biomass is available (tonnes per year)?, what kind of biomass is it (forestry, agricultural or waste)? In which format is the biomass supplied (raw biomass, pellets, wood chips, briquettes, logs)? What are the physicochemical properties of the material?. The main objective is to determine if the company is able to supply the amount and quality of biomass you need.</p>		
	Link: N/A		
2^o question	<i>Do you know if there is a heat demand close to your DH?</i>		
Additional comment	<p>You need to keep in mind that heat cannot be distributed long distances. The potential consumers must be located close to the DH. In order for a heat infrastructure investment to be profitable a certain number of consumers needs to be reached.</p>		
Answers selected	Recommendation and link proposed		
<i>C. There isn't / I don't know.</i>	<p>Look for potential consumers (public building, residential buildings, industrial companies using heat in their processing, etc). Consult the municipality office about the future investment plans close to your DH (new houses, housing estate, swimming pool, etc). You must perform market research.</p>		
	<p>Link: BECoop toolkit of the tool Hotmaps; Technical catalogue of biomass district heating</p>		
3^o question	<i>Do you know if there is already a heat network operating in your neighborhood?</i>		

Additional comment	Heat network could enable transferring the heat to the final consumers. It can facilitate your activity and lower the investment costs. On the other hand, it means that there is also another player active on the market (your competitor). So, you must be competitive to induce customers to change their heat supplying company or to implement the heat network in a different area than the current heating network.
Answers selected	Recommendation and link proposed
<i>B. No, there isn't. / I don't know.</i>	In this case the district heating should be done from scratch (generation plant and heating network). Find out if there is an interest to use the heat of the district heating. If yes, you need to perform a feasibility assessment, you can check the BECoop technical catalogue of biomass district heating, in which the steps to be taken for the implementation of a district heating are indicated.
	Link: Technical catalogue of biomass district heating
4^o question	<i>Would you say there is an interest in RES cooperatives creation in your region?</i>
Additional comment	The RES cooperatives are still not well known. Thus, local communities may not be aware of such possibilities regarding the heat production and delivery to the consumers. The lack of information regarding how it works and what is the role of the consumers and members of the RESCoop.
Answers selected	Recommendation and link proposed
<i>A. Yes, there is a high interest.</i>	It is a very good opportunity to start communication with the local community and preparations for RESCoop creation. You need to prepare a business plan, determine the heat demand, the role of each stakeholder inside of the community, and look for a DH location as well as elaborate a strategy step by step to establish a RESCoop.
	Link: N/A
Final score of the indicator (from 0 to 1)	User engagement → 0.63 (Good knowledge of what has to be done, please proceed with caution, follow the recommendations indicated, try to improve your weakness and take advantage of your strengths).

This category aims to assess the current status regarding the engagement of the different stakeholder that should be part of the initiative. According to the answers provided in this example, the final score obtained is 0.625 (from 0 to 1), which means that the user has an intermediate/good vision of possible stakeholders that can contribute to the success of the initiative. This could be increased by implementing different actions such as the ones provided as recommendations by the tool. In the above example, two answers were related with “no there isn't / I don't know”, so after getting more knowledge about that, these answers can change, and therefore the final score of this category can be shifted (given that the tool is re-used). The above-mentioned answers are analysed:

- The first question is related to the necessity of having a supplier of the biomass (in some cases the suppliers could be the same that manage the DH). In this example, the user has answered that he/she knows some suppliers, so the tool recommends to obtain more detailed information such as the amount of biomass that the supplier can supply, the fuel characteristic, size distribution, etc. This information is critical and should be examined before signing a contract.
- The second question is linked to the potential consumers, in order to determine if there is an existing demand of the heat generated by the DH. The user has indicated that “There isn’t / I don’t know”, so in this case the recommendation (mainly related with the answer I don’t know) mentions the importance to discuss with potential clients in order to assess the current demand and their opinion about the initiative. Also, in order to have a preliminary idea, the “Hotmaps”⁶ tool was indicated as a potential tool that can help to assess the heating and cooling demand, as same as the District Heating catalogue developed in BECoop in which this aspect is assessed.
- The third question is related to the possible competitors in the nearby area. The user has indicated that “No, there isn’t / I don’t know”, so the tool recommends to assess society’s interest and to guarantee the profitability of the DH if the demand to be achieved is feasible. The BECoop District Heating catalogue is linked since in this document the steps to implement a DH are indicated.
- The fourth question is linked to the interest of the society to be involved in a RESCoop or energy community. The user has indicated that there is high interest, so the recommendations address the final engagement of the potential stakeholders and the development of the feasibility and business plan of the DH.

4.3 Key technical aspects assessment

Table 3 shows a user-specific tool output generated regarding the key technical aspects category for the District Heating activity.

Table 3. Self-assessment exercise example – technical aspects category

Category: Key technical aspects		Activity: District Heating
1º question	<i>Have you considered the heat production capacity of your DH plant?</i>	
Additional comment	Production capacity can be defined as the maximum amount of heat required to supply the clients of the heating network (your community).	
Answers selected	Recommendation and link proposed	
B. No.	You should determine the production capacity of your DH plant taking into consideration the heat demand of the potential clients of the district heating, as well as the resources availability in the surrounding area. Find out, if the district heating could be feasible. You can check the BECoop technical catalogue of biomass district heating, in which the steps to be taken for the implementation of a district heating are indicated.	

⁶ <https://www.hotmaps.eu/map>

	Link: Technical catalogue of biomass district heating
2º question	<i>Have you considered the technology to be implemented in the District Heating plant?</i>
Additional comment	<p>The main elements to consider in a DH are:</p> <p><u>Generation plant</u>: heat production in these systems is carried out centrally to meet the demand of the several consumers. This way, individual equipment that should be placed otherwise at the points of consumption (houses or buildings) can be avoided, while it is possible to have more energy-efficient technologies installed at the generation plant (more efficient equipment and operation & maintenance are carried out by professional staff in order to avoid operational problems).</p> <p><u>Distribution piping network</u>: the piping network allows the distribution of fluids (normally water) through insulated pipes to minimize thermal losses. By means of a thermal fluid, the energy is transported to the users, where the heat is transferred to the consumption points by cooling the fluid. The network also has a return circuit to the plant. The pipes are usually distributed in subway trenches that follow the layout of streets in urban areas.</p> <p><u>Substations</u>: the heat transfer between the distribution network and the consumers (buildings or houses) is carried out through a substation consisting of a heat exchanger and the elements that regulate, measure and control the correct operation of the installation.</p> <p><u>Control and management of district heating networks.</u></p>
Answers selected	Recommendation and link proposed
<i>B. No, I don't know</i>	<p>It is very important to select the appropriate technology for each district heating, according the biomass to be used, the power of the plant, number building to supply, distance of the heating network, etc.</p> <p>For instance, focusing on the "heart" of the thermal generation plant, the boiler, there are different technologies, but for small-medium heating capacities, the most frequently used are: underfeed biomass boiler, biomass boiler with fixed grate, and with mobile grate.</p> <p>The heat transport line consists of two pipelines (with their corresponding collectors), one for the supply and one for the return. In the case of centralized heating and cooling networks, the line consists of four pipes. The selection of the type of insulation is quite relevant since it has an influence on the overall efficiency of the system. It should be taken into account that in the distribution networks is where the greatest performance losses occur in this type of installations, which can range between 5 and 10 % (taking the latter as a very conservative value).</p>

	<p>In each building there is a heat transfer substation, consisting of a heat exchange system, without fluid or pressure exchange, through which heat is transferred to the terminal elements for heating, cooling and domestic hot water service.</p> <p>Finally, the control and management of the DH is usually managed through a “supervisory control and data acquisition” (SCADA), this supervision will allow the optimization of the operation of the network and will increase the safety of its operation. The control and monitoring of the installations include the elements of the power plant and, in some cases, the regulation and measurement substations of the consumption points.</p> <p>You can check the BECoop technical catalogue of biomass district heating, in which more information about that can be obtained.</p> <p>Link: Technical catalogue of biomass district heating</p>
3º question	<i>Do you or your community have experience in the management and/or operation of a DH plant based on biomass energy?</i>
Additional comment	Experience in the management in this field is important as it provides information about the understanding of this specific technology, environmental awareness and relations existing in this whole logistic chain (biomass supplier – heating unit – consumer)
Answers selected	Recommendation and link proposed
<i>D. No, we don't have experience in the generation of renewable energies or other industrial plants.</i>	<p>Expertise in the management and operation of a DH plant is key in order to achieve an efficient and successful operation of the plant. It might be appropriate to consider hiring a person with this expertise. Keep in mind that bio-based plants require biomass acquisition from local suppliers and the fuel characteristics may vary significantly. Be aware DH plants are planned/built for 25-30 years operation, therefore, it is a long time investment. Also, you can see the catalogue developed in BECoop regarding DH plants.</p> <p>Link: Technical catalogue of biomass district heating</p>
4º question	<i>Have you considered the type of biomass and form of biomass to be supplied to the DH plant?</i>
Additional comment	A careful selection of the biomass type-to be used in the DH plant- has to be made in order to secure the supply and stable operation of your plant.
Answers selected	Recommendation and link proposed
A.Yes, I have a preliminary idea	The final form/ type of the harvested biomass will significantly affect the logistic operations (transport of the harvested material or even how to store it in the plant), pre-treatment steps and technology that will be

	applied. To know the type and characteristics of your biomass fuel is important for the right planning and operation of the DH plant.
	Link: Factsheet of solid biomass for small-scale heating applications
Final score of the indicator (from 0 to 1)	Technical solution maturity → 0.41 (Intermediate knowledge of what has to be done, please proceed with caution, follow the recommendations indicated, try to improve your weakness and take advantage of your strengths).

This category aims to assess the basic technical considerations that should be taken into account before starting the initiative implementation. According to the answers of the example, the final score obtained is 0.41 (from 0 to 1), which means that the user has an intermediate knowledge regarding the basic technical aspect to be considered, which could be increased by different action such as the one provided as recommendations by the tool. The above-mentioned answers are analysed:

- The first question is based on the capacity of the DH plant. The size of the DH is a key information since it will determine the investment required. The user has indicated that he/she doesn't know the capacity of the plant, so the recommendation proposed deals with the assessment of heat capacity based on two main factors: energy demand of the potential consumers and availability of biomass to feed the installation a link to BECoop District Heating catalogue is indicated, in which more information can be found.
- Second question is based on the technology to be implemented in the District Heating. The user has indicated that he/she doesn't know, so the recommended action is based on a brief description of the four main elements (generation plant, distribution piping network, substations and management of the DH), additionally a link of BECoop District Heating catalogue is indicated, in which more information can be found.
- Third question is based on securing a good operation and maintenance of the plant in order to avoid future complaint and bad experiences associated with the use of DH feeding with biomass. The user has indicated that in the area or region there aren't experiences with this type of installations or scheme (energy community), therefore the recommendations highlight the importance of accounting with a staff with sufficient expertise, in order to avoid bad experiences and extending the life of the plant. A link to BECoop Districk heating catalogue is indicated, since there is a chapter about this topic.
- Fourth question is based on the type and characteristics of the biomass to be consumed. This is a relevant issue since some of the future problems that could happen could be related with the biomass to be used (if the installation is not suitable for the biomass selected). The user has indicated that he/she has a preliminary idea, so the tool recommends reinforcing the knowledge about that since it is important for the right planning and operation of the DH plant. A factsheet about characteristics of the biomass is linked.

4.4 Key business and financial aspects assessment

Table 4 shows a user-specific tool output generated regarding the key business and financial aspects category for the District Heating activity.

Table 4. Self-assessment exercise example – business aspects category

Category: Key business and financial aspects		Activity: District Heating	
1 ^o question	<i>What is the investment needed to build and operate a DH plant, along with its operational and maintenance costs?</i>		
Additional comment	Financial aspects are crucial in this subject as a DH plant implementation requires significant investments and costs in the long time.		
Answers selected	Recommendation and link proposed		
B. No, I don't know.	The investment of a CHP plant should be taken into account from the first moment, since it is significant. Obviously, it will depend on the amount of the power and heat to be produced (capacity of the plant) as well as the technology provided, and the characterization of the burned biofuel.		
	All these aspects should be clarified since if a decision is made it is difficult to stop/resign without serious financial losses.		
	Further information on the investment of a biomass district heating, along with its operational and maintenance costs, can be found in the BECoop Catalogue "District Heating".		
	Link: Technical catalogue of biomass district heating		
2 ^o question	<i>Is there a biomass heat market in the region?</i>		
Additional comment	Considering the EU strategy for the coming years, the heat market from RES is expected to grow especially in the areas where the bituminous coal for heat purposes is in use.		
Answers selected	Recommendation and link proposed		
B. There is a market of heat but not from RES.	If there is a market of heat in your area based on fossil fuels, you should implement the environmental benefits of the biomass vs fossil fuels, and therefore to introduce RES from local resources, which can be used to cover the energy demands. The education of local society is a key point to succeed.		
	Link: N/A		
3 ^o question	<i>Are you able to describe the barriers that may have a direct or indirect consequence for the financing of DH plant in your region?</i>		
Additional comment			

Answers selected	Recommendation and link proposed
<i>B. I don't know any barriers.</i>	Brainstorm this topic or talk to the local community. Compile information regarding the decommissioned biomass power plants. What was the cause? Obtain information about legal aspects and future perspectives of bio-based DH plants in your area. Keep in mind that this kind of investment has an exploitation period of 25-30 years.
	Link: N/A
4^o question	<i>Do you think that your investment into biomass heating can diminish energy poverty in your region?</i>
Additional comment	Adequate heat, cooling, lighting and the energy to power appliances are essential services needed to guarantee a decent standard of living and citizens' health. Energy poverty occurs when a household suffers from a lack of adequate energy services at home (source: https://www.energypoverty.eu/). From a financial point of view if you pay more than 10% of your incomes for heating (on an annual basis) you are suffering to energy poverty.
Answers selected	Recommendation and link proposed
<i>A. I am sure that local biomass should be a solution to solve the problem of energy poverty.</i>	Please consider investments in district heating using biomass. If you are a policy maker please see the link below and get familiar with EU policy.
	Consider promoting RESCoop or subsidizing as other activities to raise the living standard of your society. Link: Energy Poverty Advisory Hub
5^o question	<i>Existing supporting strategic partnerships between industries/primary sector and local government in the region or among neighbouring regions</i>
Additional comment	Adequate heat, cooling, lighting and the energy to power appliances are essential services needed to guarantee a decent standard of living and citizens' health. Energy poverty occurs when a household suffers from a lack of adequate energy services at home (source: https://www.energypoverty.eu/). From a financial point of view if you pay more than 10% of your incomes for heating (on an annual basis) you are suffering to energy poverty.
Answers selected	Recommendation and link proposed
D. Don't know	Efforts should be allocated to determine if there are strategic partnerships in the region that could be useful for the implementation of the initiative.
	Link: N/A

<p>Final score of the indicator (from 0 to 1)</p>	<p>Business solution maturity → 0.40 (Intermediate knowledge of what has to be done, please proceed with caution, follow the recommendations indicated, try to improve your weakness and take advantage of your strengths).</p>
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This category aims to assess the business and financial aspects that should be considered before starting the implementation of an initiative. According to the answers of the example, the final score obtained is 0.40 (from 0 to 1), which means that the user has an intermediate knowledge regarding the business and financial aspects. The above-mentioned answers are analysed:

- The first question is based on the investment needed to develop and operate a DH plant. This aspect is critical in order to assess the feasibility of the initiative. The user has indicated that they don't know the CAPEX and OPEX of the plant, so the recommendation deals with the main parameters that should be provided to an ESCO or engineering company to obtain an average budget. For instance, the thermal demand per year and biofuel to be consumed. The invested time to carry out this analysis is a very important parameter since once the installation is built and performing, a slightly change with respect to the initial design could imply a huge challenge. The BECoop District Heating catalogue is linked since more information can be found there.
- The second question is based on the identification of the potential consumers and therefore clients of the DH network. The user has indicated that there is a heat market, but currently it is based on fossil fuels, so in this case the tool recommends to transfer to the possible consumers the information regarding the current policy and goals of the RED II, Green Deal, and how a DH fed with biomass could be a suitable solution for reaching this goal. For this reason, it is mentioned that the education of local community is a key point to achieve success.
- The third question is based on the previous knowledge of the financial barriers that the user could face when thinking on the implementation of a DH. The user has indicated that doesn't know any barrier, so the recommendation deals with the collection of this information through brainstorming with the local community, other experiences, legal and policy regulations, etc.; always taking into consideration that a DH has a minimum exploitation period of 25-30 years.
- The fourth question is based on the energy poverty and how the stability of biomass prices versus other fossil fuel resources can be positive. The user has indicated that he/she is sure that local biomass is a solution to energy poverty, so in this case the recommendation is to reinforce this idea and a report which indicates how a RESCoop can contribute to this goal is suggested.
- The fifth question is based on regional supporting partnerships between the stakeholders (as for instance industries, primary sector, local government, etc). The user has indicated that he/she doesn't know, for this reason the recommendations was focused on the importance of obtaining this information since it could be useful for the implementation of the initiative.

4.5 Social and environmental aspects assessment

Table 5 shows a user-specific tool output generated regarding the key social and environmental aspects category for the District Heating activity.

Table 5. Self-assessment exercise example – social and environmental aspects category

Category: Key social and environmental aspects		Activity: District Heating
1º question	<i>Are there any actions organised in your area in order to promote the use of biomass in district heating?</i>	
Additional comment	In many countries/regions the people are very often used to heat their households by an energy source being very popular/traditional since many generations (there are habits among society).	
Answers selected	Recommendation and link proposed	
B. The region is not active in this topic.	Initiatives like using biomass for energy purposes are new in the region. Communication and dissemination in this regard could contribute to the social acceptance. Consider promotion actions and raising awareness in the area of RES utilisation/application, especially biomass.	
	Link: N/A	
2º question	<i>Do you know the GHG savings that you can achieve compared with the use of this energy by fossil fuels?</i>	
Additional comment	A greenhouse gas (or GHG for short) is any gas in the atmosphere which absorbs and re-emits heat, and thereby keeps the planet's atmosphere warmer than it otherwise would be.	
Answers selected	Recommendation and link proposed	
B. No, I don't know.	The GHG benefits achieved with this type of initiatives should be communicated to the general public to raise awareness. In order to do a first estimation, you can use the online tool Biograce II. These recommended workshops should help to change this situation.	
	Link: Biograce II tool in BECoop toolkit	
3º question	<i>Have you quantified the impact of DH plant based on biomass on energy poverty of local society?</i>	
Additional comment	Energy poverty can be defined as a household which doesn't have enough energy to meet its basic daily needs: heating / cooling, cooking, lighting, etc.	
Answers selected	Recommendation and link proposed	

<p>A. Yes, I do.</p>	<p>You can consider implementing RESCoop to support diminishing energy poverty. You can play the role of policy maker/activist in the area of biomass promotion for heating purposes.</p>
	<p>Link: Energy Poverty Advisory Hub</p>
<p>4^o question</p>	<p><i>What is the feeling of the local society regarding using RES such as biomass for household heating?</i></p>
<p>Additional comment</p>	<p>Knowing how the community feels and attitudes to heat sources is important to understand the reasons for the current situation and to take appropriate measures to change this view.</p>
<p>Answers selected</p>	<p>Recommendation and link proposed</p>
<p>A. Renewable energy initiatives are very welcomed in the region.</p>	<p>In principle it seems that the initiative will have social backup. As a result, the proposition of RESCoop creation should involve interest and be accepted by local society.</p>
	<p>Link: N/A</p>
<p>5^o question</p>	<p><i>Are there any other energy communities in your area?</i></p>
<p>Additional comment</p>	<p>Knowing how the community feels and attitudes to heat sources is important to understand the reasons for the current situation and to take appropriate measures to change this view.</p>
<p>Answers selected</p>	<p>Recommendation and link proposed</p>
<p>B: No</p>	<p>Previous experience with energy communities plays a key role for the acceptance of your initiative by the general public. Good success examples of the past could act as a driver for the acceptance of the project as people are already familiar with the concept and trust has been already established. People are also aware of the positive impact that energy communities may have in their area (e.g. creation of new jobs, reduced energy bills etc.). From the other hand, bad previous examples could act as a barrier for the initiative as citizens will be hesitant and skeptical to join or accept the new project. In case there is no previous experience it is important to start by establishing a good communication path with the community and involve the citizens throughout the organisation and implementation phase of the project. Procedure's transparency will create trust and will strengthen community's acceptance.</p>
	<p>Link: N/A</p>
<p>Final score of the indicator (from 0 to 1)</p>	<p>Social and environmental impact → 0.58 (Good knowledge of what has to be done, please proceed with caution, follow the recommendations)</p>

	indicated, try to improve your weakness and take advantage of your strengths).
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This category aims to assess the social and environmental aspects that should be taken into account before starting the initiative implementation. According to the answers of the example, the final score obtained is 0.58 (from 0 to 1), which means that the user has a feeling that there is an intermediate social and environmental knowledge regarding this type of initiative, which could be increased by implementing different actions such as the one provided as recommendation by the tool. The above-mentioned answers are analysed:

- The first question is based on the social promotion of the biomass as green energy source in the area, since this aspect can facilitate the introduction of biomass. The user has indicated that the region is not active in this topic, so the proposed recommendation deals with promotion and education actions in the area in order to broadcast all the advantages of using biomass versus other fossil fuels.
- The second question is based on the environmental aspect, which in many cases corresponds to the reduction of greenhouse gases. The user has indicated that he/she doesn't know the percentage of GHG reductions. The tool highlights the importance of this information, as it can be used to raise awareness in the region about the environmental advantages of biomass, while can be also considered when applying to obtain a financial support. A link that can be utilised for this aim (GHG calculations) is provided by the self-assessment tool, this tool (Biograce)⁷ can be also found in the BECoop toolkit.
- The third question is based on how the exploitation of local energy resources (as biomass), together with the exploitation of business model of an energy community, can deal with the energy poverty of local society. The user has indicated that he/she knows the importance of this aspect, so the recommendation points out the importance to continue promoting the energy community, while also suggests that the user can be a biomass activist in the area. More information resources around energy poverty are provided to increase user's knowledge about this topic.
- The fourth question is based on the social perceptions around the use of biomass for heating. The support of the maximum number of citizens (and in this case also the support of the potential consumers of the DH network) is very important for the success of the initiative. The user has indicated that renewable energy initiatives are very welcomed in the region, so the tool indicates that the initiative will have social backup and therefore should take into consideration the interests of the local community in order to reach public acceptance
- The fifth question intends to assess if other energy communities have already been implemented in the area in the past. Previous positive or negative experiences can be very critical for the success of other energy communities. The user has indicated that there is no other energy community in the area, so in order to strengthen the community's acceptance, the suggestion is to start promoting the concept of "energy community".

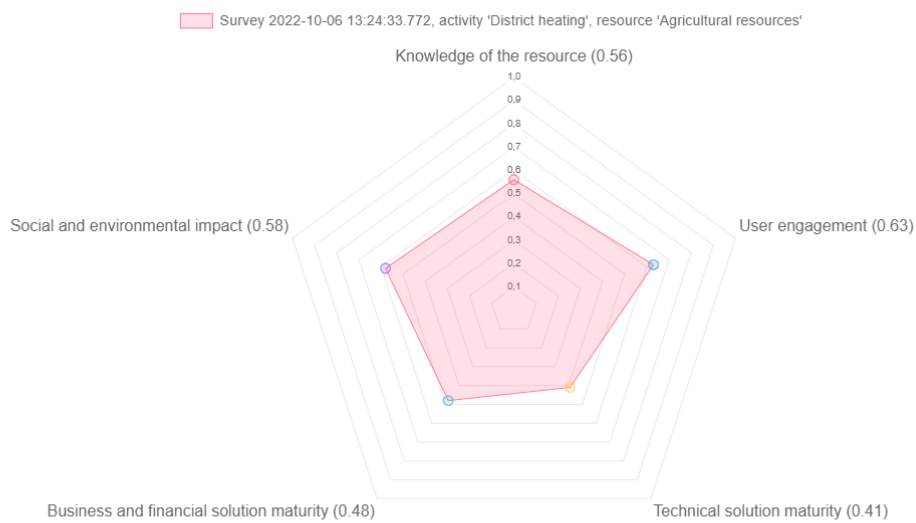
⁷ <https://www.biograce.net/biograce2/>

4.6 Initiative’s overall status assessment

After carrying out the self-evaluation process the user will have an overview of the scores obtained for each category through a spider-net (see Figure 14). In this way, the user can explore and identify the categories in which he/she should put more effort, in order to develop the initiative.

Moreover, an automatic report will be generated with the possibility of being downloaded, which will include all the questions, answers selected by the user, the recommendations, links suggested, and the final scores obtained in each category.

ACTIVITY "DISTRICT HEATING"



The score obtained in this self-assessment is 0.54:

Good knowledge of what have to be done, please proceed with caution, you should review if there some categories weaker than others, and put more efforts in these categories, the recommendations provided could help you.



Figure 14. Overview of all the scoring for each category of the case selected.

5. Online tool - user guideline

This chapter will mainly focus on giving clear instructions that complement the previous information to the tool users in order to support them through the different steps of the online self-assessment tool, making sure that the guideline is clear, and all the steps are explained in an understandable and concise way.

5.1. Where can the user find the self-assessment tool?

The self-assessment tool can be found in BECoop webpage (Figure 15), more specifically in the following link: <https://becoop.fcirce.es/self-assessment/>.

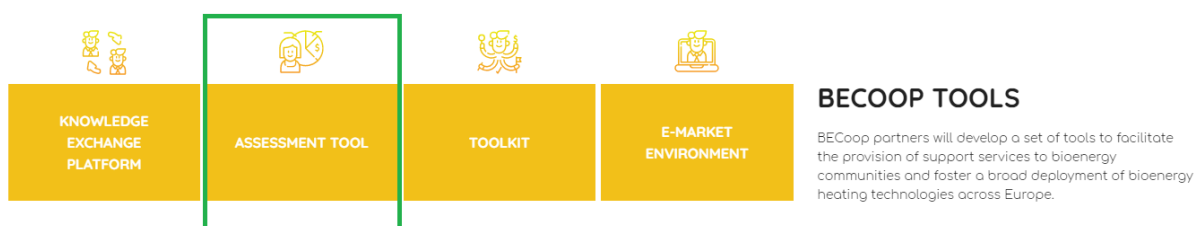


Figure 15. Site of the self-assessment tool

The tool can also be accessed via the [BECoop Knowledge Exchange Platform \(KEP\)](#)

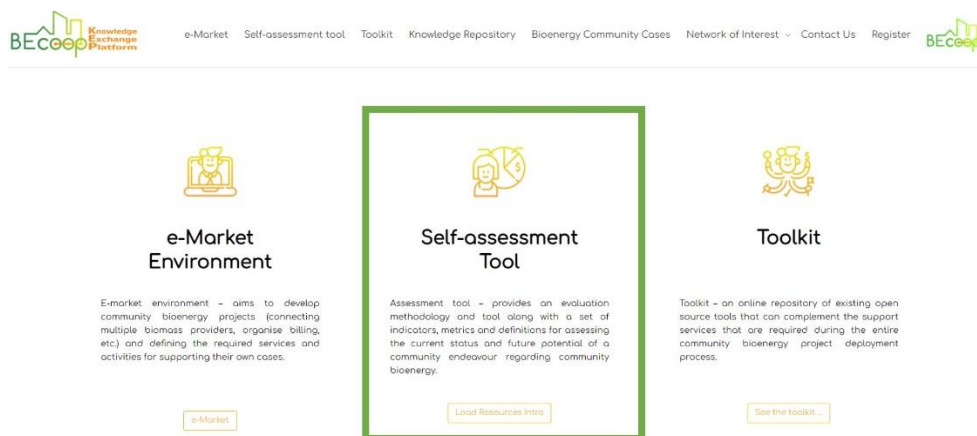


Figure 16. KEP - Presentation of BECoop tools

5.2. Initial steps of the tool

Once, the user accesses the tool, the first screen that the user will see includes a brief tool description the possibility of accessing to the tool without registration or through registration (if the user registers, he/she has access to all the functionalities of the tool free of charge), Figure 17.

SELF-ASSESSMENT TOOL

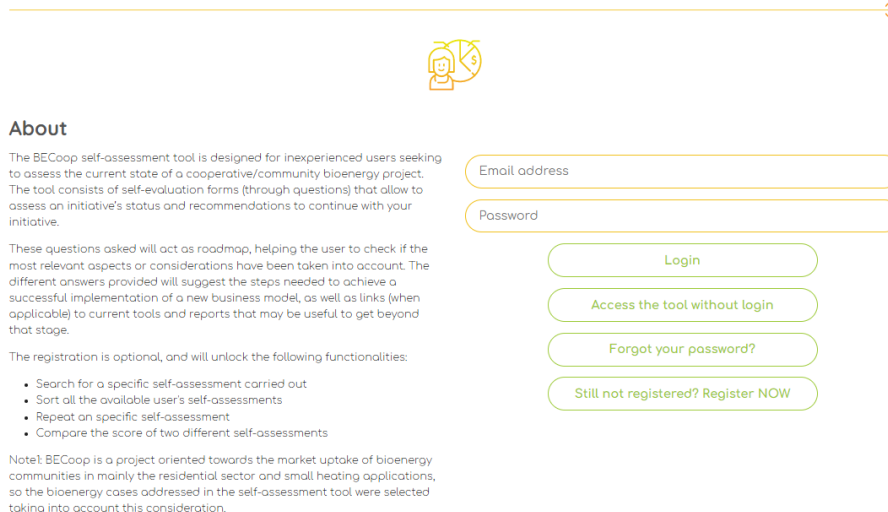


Figure 17. Initial screen where optional registration for the self-assessment tool is indicated.

In order to facilitate the registration process, the username and password are common to the BECoop e-market platform. This way you only need to register once to access both platforms.

After accessing the tool (with or without registration), the user will see the steps that need to be followed in order carry out a self-assessment exercise. If the user is already registered, she/he will also have access to previous assessments through the “Show history” button (described in section 5.4).



Figure 18. Second screen of the tool. Brief description of the self-assessment and history options.

5.3 Self-assessment of an initiative

In order to carry out a self-assessment exercise, the user should follow 5 main steps, which are summarised in Figure 19

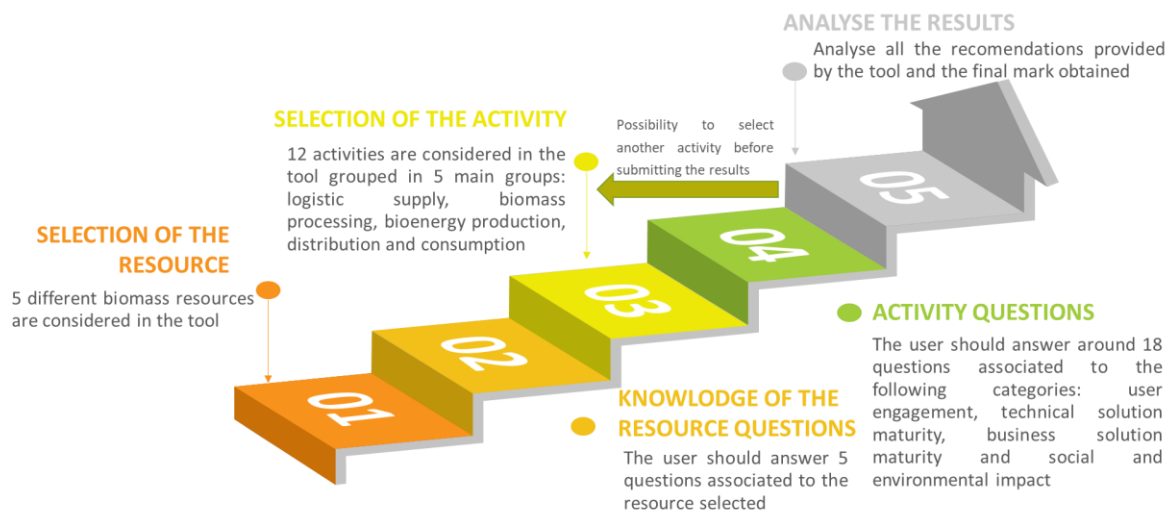
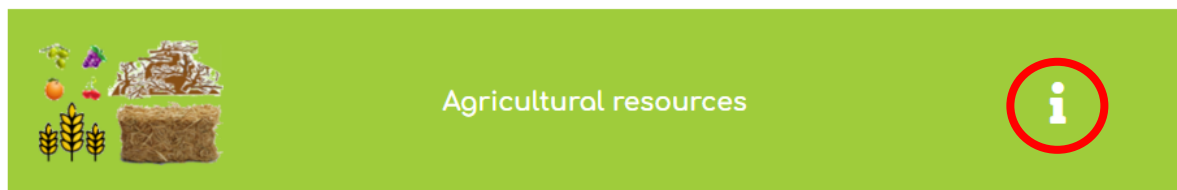


Figure 19. Main steps to be followed by the user in order to carry out a self-assessment.

Initially, the user should select the biomass resource of his/her interest, among the five biomass resources that have been identified for the tool (previously described in 3.1.1). Before clicking in each resource, the user will have the chance to read a brief description of the biomass resource just by clicking with the mouse in the info button. An example is shown in Figure 20 for agricultural resources.



As agricultural resources, we consider the biomass produced after carrying out the pruning and plantation removal operation to maintain the productivity of the agricultural crops. In most cases, such agricultural residues (e.g. pruning) remain unexploited and are either burned in open fires or mulched on soil. Five main subgroups can be differentiated here:

- **Vineyard pruning:** each year pruning operations should be performed to maintain the productivity of the vineyards.
- **Olive pruning:** once annually or biennially pruning operations should be carried out to maintain the productivity of the olive trees.
- **Fruit pruning:** each year pruning operations should be done to maintain the productivity of the fruit trees, also graft pruning are frequently being done in a certain period of time.
- **Plantation removal** of the above-mentioned agricultural crops should be performed when the tree productivity decreases.
- **Herbaceous material** as wheat straw or corn stalk, these type of biomass is in general harvested each year and before starting preparation operations for the new crop cycle straw or corn stover needs to be removed from the field.


Figure 20. Tool screenshot - selection of biomass resources.

After clicking the resource, the tool will display five questions to assess the knowledge of the user about the resource to be used.

Hereafter, the user will have the option to continue with the selection of the activity they want to implement (previously described in 3.1.2). By clicking the info button, the user can obtain more

information about each activity together with some examples (Figure 21). In this case, it will be around 18 questions to be answered by the user grouped in 4 different categories (user engagement, technical, business and financial, and social and environmental).

District heating



District heating is a system seeking to produce, and afterwards, distribute heat generated in a centralized location, mainly focused on residential sector and therefore avoiding the need of installing individual boilers by the end users. This system is becoming very popular, and the operation through an energy community is expected to increase in the coming years.

Some examples regarding this type of initiative are:

- RESCoop/ energy community that is trying to evaluate the feasibility to establish a district heating production unit to supply some of their associates.
- Neighbourhood that currently has a district heating unit that works with gas or other fossil fuel, trying to assess the investment required to switch to an equipment working with a renewable source, more specifically biomass.
- Municipalities (small villages) considering covering their thermal energy demands by means of renewable energy resource through district heating.

Figure 21. Tool screenshot - selection of the bioenergy activity to implement.

Once all the questions associated to an activity are completed, the user has the option to finalise the self-assessment by submitting his/her results or come back to the selection of additional activity to assess.

Once all the questions from each activity have been answered, the user can submit the results in order to visualise the final output provided by the tool. Nonetheless, at the end of the questions associated with each category, the user has the option of visualising the recommendations provided by the tool and the rate associated to each category.

The final results are scored through each questions-categories and based on the user-specific answers (methodology followed explained in chapter 3.1.5). The results are further visualised in the form of a spider net (as previously described in point 3.1.6). In case the user selects several activities, then each selected combination can be visualised within the spider-net plot. Figure 22 shows an example of several activities carried out in the same self-assessment.

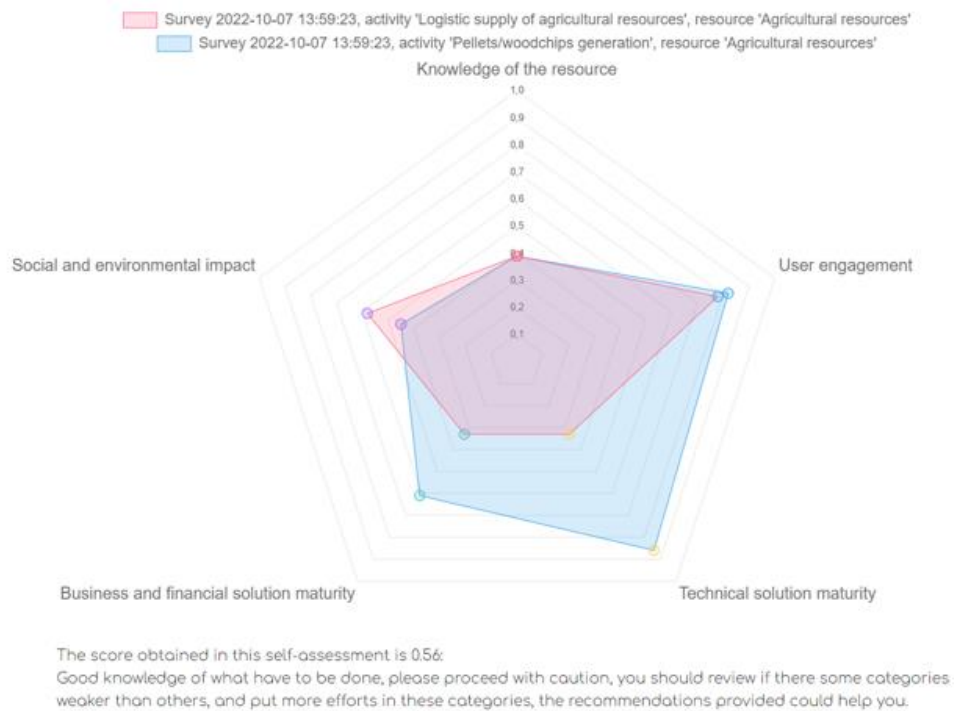


Figure 22. Final output of several combinations carried out in the self-assessment.

Additionally, the user can download the results of the self-assessment in a pdf and he/she can provide feedback about their satisfaction degree of the tool or even suggestions of improvement.

Finally, it should be noted that at any time the user has buttons to move forward, backward, save (if registered), submit the self-assessment, etc.

5.4 Show history

As mentioned above, this functionality will only be available to users who have registered in the tool. The structure of this function is explained in chapter 3.2 and summarised in Figure 23. The aim of the “history” function is:

- **To consult the self-assessment carried out:** Once a self-assessment is finalised and submitted, it is automatically saved and allocated in the “Show History” section. The registered user can see it whenever there is need to.
- **To repeat a completed self-assessment:** You have the option of seeing the answers selected in a self-assessment previously carried out and change it whenever there has been further progress. This “new self-assessment” will be saved as an independent assessment.
- **To compare different self-assessments:** It can give you information on which initiative is best positioned at any given moment, and what are the strengths and weaknesses of each of them.
- **To continue with an unfinished self-assessment:** At any time while taking a self-assessment the user has the option to save the answers that have been entered, in order to resume the assessment

at a later time. This is stored in a separate table from the completed self-assessments in the “Show History” section.



Figure 23. Main functionalities that can be realised by accessing the history button.

6. Tool metrics: online traffic and analytics

The self-assessment tool can be accessed online either through the **project's website** or through the **BECoop Knowledge Exchange Platform (KEP)**, as indicated in chapter 5.1. A series of online tool metrics (traffic and impression analytics) is briefly presented below:

- The tool has already been **used 4,168 times** from **199 independent users** (data reported on the 19th of September 2022). Users on average have used the tool 20 times, assessing, therefore, multiple scenarios while also taking advantage of the “history” function .
- The tool was developed in such a way so that registration is optional, in case the user wants to take advantage of the “history” function. From the 199 independent users, **24** users have registered in the self-assessment tool and there are additional **86** users registered in the BECoop e-market platform, who also have access to all the functionalities of the self-assessment, as the username and password are common (**110 registered users by Sept 2022**).
- **The satisfaction degree of the users using the tool was monitored, as well as the perceived risk reduction**, through an optional questionnaire “send what you think” that appears when the self-assessment exercise is completed.
 - The satisfaction survey is optionally completed by the users in order to collect their degree of satisfaction and to provide feedback for improving the tool. In this regard, a Likert-scale progress bar is presented in order for the users to indicate a) their user experience satisfaction rate from using the tool, b) the potential rate of perceived investment risk reduction towards establishing a project, stemming from the guidance, directions and recommendations provided by the tool (Figure 24Figure 24).
 - The current results from the users indicate shares of (a) 88% satisfaction and (b) 48% perceived risk reduction.
- Furthermore, the satisfaction survey includes a question whether the user would recommend the tool to others. Up until now, the users have indicated that all of them (100%) would recommend this tool.
- Lastly, the satisfaction survey asks for the users’ feedback regarding their suggestions for improving the tool.


Satisfaction survey ×

How satisfied are you with the BECoop assessment tool?

★★★★★

How much has the BECoop assessment tool help you to reduce the risk for an investment decision?

5



Would you recommend this tool to other entrepreneurs?

Yes

No (please specify)

If you have any suggestions to improve the tool, please specify

Figure 24. Satisfactory survey implemented in the tool.

- Further dissemination of the tool will be done in the following months in other BECoop activities (webinars, BECoop RESCoops, replication cases, etc) so it is expected that the visits and registered users will increase. All these metrics will be monitored and reported at the end of the project.

7. Conclusions

The information included in this report allows to understand how the bioenergy community self-assessment tool, developed under BECoop project, works, as well as the bioenergy resources and activities that can be found and the outputs that can be obtained. An example is presented within the report that explains the outcomes of the tool and clarifies the recommendations provided and how they should be interpreted. A supplementary data document (confidential) has been further elaborated in which all the information that are included in the online tool are reported (questions, answers, recommendations, and links from all the resources and activities).

The development of this tool aims to contribute to the promotion of bioenergy communities in Europe by overcoming the lack of knowledge about the implementation of such initiatives. The tool does not only provide recommendations and valuable resources, but further directs the user to BECoop reports and links to the wider array of project- developed assets (toolkit, e-market environment and knowledge exchange platform).

This tool is also used to endorse the supporting actions developed under WP4, provided to the new initiatives in the framework of BECoop project (BECoop RESCoops). This self-assessment exercise can also be employed to support the follower cases that will be identified under T5.2 and further supported by the project's partners. It can also be used by other stakeholders (outside of BECoop consortium) that want to assess their current situation regarding bioenergy community initiatives.

Aiming to increase the tool's visibility, targeted dissemination will be employed through the project's activities such as training workshops, webinars and events, while it will be also included in the BECoop's Replication Handbook that will serve as a guide to support the establishment of new bioenergy communities all around Europe.

Despite the fact that the task has been completed, the ***tool will continue to be available online and with open access*** to be used by all users who wish to do so.

Annexes

Annex I: Example of one case of resource and bioenergy activity

In this annex can be found an example of a filled template for the resource “agricultural resource” and the activity “district heating”. This process has been done with 5 resources and 12 activities.

Resource: Agricultural resources		
Rate 1 ^o question: 0.25		
1^o question	<i>Do you know the main characteristics of the agricultural biomass that you are interested in?</i>	
Additional comment to understand the question (if needed)	Fuel characteristics include moisture content, low heating value, Cl, N and S content, ash content, ash composition, etc. These characteristics will considerably affect the following operations to be carried out.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A: Yes, I know	The information gathered regarding the biofuel characteristics will contribute to select the most appropriate valorisation pathway. You should consider the fuel characteristic in order to identify your market audience, linked to the appropriate combustion and feeding technology.	1
	N/A	
B: Yes, I have a preliminary idea	The information gathered regarding the biofuel characteristics will contribute to select the most appropriate valorisation pathway. Be aware that not all the agricultural crops have the same fuel characteristic, for instance the herbaceous biomass normally has higher values of Cl (that could cause higher corrosion occurrence in boilers) than woody agricultural biomass.	0.6
	Link: Factsheet of solid biomass for small-scale heating applications	
C: No, I don't know	The information gathered regarding the biofuel characteristics will contribute to select the most appropriate valorisation pathway. Be aware that not all the agricultural crops have the same fuel characteristic, for instance the herbaceous biomass normally has higher values of Cl (that could cause higher corrosion in boilers) than woody agricultural biomass.	0.25

	Link: Factsheet of solid biomass for small-scale heating applications	
Rate 2º question:	0.10	
2º question	<i>In general bases, agricultural resource are seasonal, which means that in a short period of time (1-3 months) they should be collected and stored. Do you know in which period the pruning operations take place for the agricultural crops that you are interested?</i>	
Additional comment to understand the question (if needed)		
Answers	Elaborated recommendations for each answer	Answers
A: Yes, I know	<p>Taking into account the period in which the agricultural biomass is collected is important. Once the biomass is placed in the market, this information will allow you to plan the logistic operations (storage area needed, flow of trucks weekly, etc.) or to position yourself in a good place for the acquisition of these biomass.</p> <p>Link: N/A</p>	A: Yes, I know
B: I don't know	<p>It is important to know when the pruning operation of each agricultural crops are carried out, especially if you want to oversee the logistic operations, since the biomass needs to be collected in a short period of time, but also this information will allow to position yourself in a good place for the acquisition of these biomass.</p> <p>The average period where each biomass from agricultural crops is collected will depend on several aspects such as the weather conditions, that can slightly change each year. Generally (although sometimes this operation is performed several times during the year), for instance vineyard pruning are collected between December and February, olive pruning between February and April, fruit pruning and plantation removal are performed between October and January, wheat straw between July and August and corn stalk between October and November.</p> <p>Link: N/A</p>	B: I don't know
Rate 3º question:	0.25	
3º question	<i>Do you know the availability of the agricultural resource in your area?</i>	
Additional comment to understand the question (if needed)	<p>In order to know the resource availability, not only the potential of the biomass in the surrounding area (preferably radius lower than 30 km) should be considered but also how much biomass can be collected by reaching agreements with the farmers/cooperatives, considering difficulties associated to the slope of the field, type of land (irrigated or not), productivity of biomass per ha, etc...</p>	

Answers	Elaborated recommendations for each answer	Answers
A: Yes, I know	<p>Knowing the availability of the biomass in the area is key to determine if the existing and available resource are enough to successfully implement the business model of the initiative planned. You should also know if there are others agricultural service companies that could be a competence.</p> <p>Link: N/A</p>	A: Yes, I know
B: I know the potential surface, but I don't know the availability of biomass.	<p>If you know the potential surface in your area dedicated to the targeted biomass but you don't know its availability, in order carry out a preliminary estimation, you can use the tool Bioraise which can be found in the toolkit of BECoop. Additionally, it is highly recommended to get in contact with some owner of the biomass (farmers, cooperatives) and logistic operators in order to assess their current practice. Also, you can check the catalogue of BECoop about fuel characteristic of biomass in which you can see a first estimation of the average productivity that you can obtain per ha for different types of biomass. Also, you can check the Up_running observatory where several field measurements of the pruning yields were performed in different regions of Europe.</p> <p>Link: BIORAISE in BECoop toolik. Factsheet of solid biomass for small-scale heating applications, uP_running Observatory</p>	B: I know the potential surface, but I don't know the availability of biomass.
C: I don't know	<p>Knowing the availability of the biomass in the area is key to determine if the existing and available resource are enough to successfully implement the business model of the initiative planned, since independently of your role as logistic operator, manufacturer or consumer, if the potential does not exist or it is limited, this fact can compromise the viability of the initiative. In order carry out a preliminary estimation, you can use the tool Bioraise which can be found in the toolkit of BECoop, or you can check the Up_running observatory where several field measurements of the pruning yields were performed in different regions of Europe. Additionally, it is highly recommended to get in contact with some owner of the biomass (farmers, cooperatives) and logistic operators in order to assess their current practice (burning, soil incorporation, energy valorisation or other).</p> <p>Link: BIORAISE in BECoop toolik. uP_running Observatory</p>	C: I don't know
Rate 4 ^o question:	0.2	
4^o question	<i>Are you aware of the current use of the targeted resource?</i>	

<p>Additional comment to understand the question (if needed)</p>	<p>In most cases, the owners of the agricultural biomass are the farmers or the cooperatives. In general, they use this resource as organic matter to improve soil conditions, as biomass for energy purposes either for self-consumption or to be sold to consumers or this biomass is seen as a residue in which case they are normally burnt in the field.</p>	
<p>Answers</p>	<p>Elaborated recommendations for each answer</p>	<p>Answers</p>
<p>A: The owners of the biomass are currently using this resource</p>	<p>If the owners of the biomass are currently using the biomass for instance, as organic matter for their own field or they are currently selling this biomass to others, it will be more complicated to convince them. Anyway, in some cases leaving the organic matter on the field can lead to plant infections.</p> <p>Link: N/A</p>	<p>0.35</p>
<p>B: The owners of the biomass are not using this resource</p>	<p>If the owners of the biomass are not using this resource, probably this resource is a problem for them and normally they will have to invest time and money in order to get rid of it (as for instance burning on the field). In this case, they will probably welcome this initiative, but with the consideration of collecting the biomass as soon as the pruning operations are carried out.</p> <p>Link: N/A</p>	<p>1</p>
<p>C: Both situations</p>	<p>If both situations are taking place, firstly you should consider if the potential related with the biomass that is currently not used will be enough to operate the business, if this fact happens you should focus on speaking with these owners. In case it does not, you should consider also speaking with the owners that are currently using this biomass in order to know if they are open to negotiate.</p> <p>Link: N/A</p>	<p>0.5</p>
<p>D: I don't know</p>	<p>It is important to know the current practice in the area in order to assess if this resource is currently available or not.</p> <p>If the owners of the biomass are currently using the biomass for instance, as organic matter for their own field or they are currently selling this biomass to others, it will be more complicated to convince them. Anyway, in some cases leaving the organic matter on the field can lead to plant infections.</p> <p>If the owners of the biomass are not using this resource, probably this resource is a problem for them and normally they will have to invest time and money in order to get rid of it (as for instance burning on the field). In this case, they will probably welcome this initiative, but with the consideration of collecting the biomass as soon as the pruning operations are carried out.</p> <p>For this reason, you should figure out the current use of the targeted biomass.</p>	<p>0.25</p>

	Link: N/A	
Rate 5 ^o question:	0.2	
5^o question	<i>Do you know the possible needs and challenges that you will have to face when working with this product vs other biomass and/or according to the type of stakeholder that you are going to be inside the value chain?</i>	
Additional comment to understand the question (if needed)	Properties of the biomass and therefore their behaviour when valorised for different purposes will differ, according to the type of biomass, the land where it is cultivated, logistic operations carried out, pre-treatment process, etc. Thus, before developing an initiative based on this type of biomass it is important to anticipate the possible needs and challenges that you will most likely have to face.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A: Yes, I know	<p>It is very relevant to identify the particularities that the biomass targeted has comparing to other types of biomass in order to properly carry out the future activities to commercialize/valorise this product.</p> <p>Also, it might be useful to consult the deliverable 1.4 of BECoop in which some action to tackle the critical needs and challenges that have been identified by each stakeholder are proposed.</p> <p>Link: Deliverable 1.4 BECoop</p>	1
B: No, I don't know	<p>The fuels characteristics and the size distribution of agricultural crops are different from forestry biomass (the most frequently used biomass), because of that some people think that it is not a valid biofuel for energy purposes. However, it is a suitable fuel, even though it requires to install the properly combustion technology in order to achieve an efficient operation.</p> <p>Also, you can consult the deliverable 1.4 of BECoop in which some proposed action to tackle the critical needs and challenges are mentioned by each stakeholder.</p> <p>Link: Deliverable 1.4 BECoop</p>	0.25

Category: Key partners	Activity: District Heating
Rate 1 ^o question: 0.3	
1^o question	Is there any biomass suppliers in your region?
Additional comment to understand the question (if needed)	<p>Biomass distributors may be able to supply forestry, agricultural and waste biomass from the surrounding area.</p> <p>The biomass provider can be a farmer as well as a biomass logistic company.</p>

Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, I know.	You can contact a biomass distributor to find out detailed information (e.g. how much biomass is available (tonnes per year)?, what kind of biomass is it (forestry, agricultural or waste)? In which format is the biomass supplied (raw biomass, pellets, wood chips, briquettes, logs)? What are the physicochemical properties of the material?. The main objective is to determine if the company is able to supply the amount and quality of biomass you need.	1
	Link. N/A	
B. No, I don't know.	Retrieving information about potential and the quality of biomass provider/supplier is key. You can ask the local municipality office for instance. Try to find farmers specialised in agricultural crops or contact with forestry management institutions. Look for the biomass logistic operators. You can consult the BECoop platform in order to identify relevant stakeholders around you. Also, you can check the BECoop factsheet of solid biomass to have an overview of the characteristic of each type of biomass.	0.25
	Link: e-market platform ; Factsheet of solid biomass for small-scale heating applications	
Rate 2 ^o question:	0.3	
2^o question	Do you know if there is heat demand close to your DH?	
Additional comment to understand the question (if needed)	You need to keep in mind that heat cannot be distributed long distances. The potential consumers must be located close to the DH. In order for a heat infrastructure investment to be profitable a certain number of consumers needs to be reached.	
Answers	Elaborated recommendations for each answer	Answers
A. Yes, the demand is high.	Find out if the consumers are interested in connecting to your heat network. Check the heat demand of potential users. Try to estimate the number of customers that could be interested to insure profitability of your business.	1
	Link: N/A	
B. Yes, the demand is low.	Look for the possible consumers of the produced heat (industrial companies using heat in their processing). Consult the municipality office about the future investment plans close to your DH (new houses, housing estate).	0.6
	Link: BECoop toolkit of the tool Hotmaps ; Technical catalogue of biomass district heating	
C. There is no demand / I don't know.	Look for potential consumers (public building, residential buildings, industrial companies using heat in their processing, etc). Consult the municipality office about the	0.25

	future investment plans close to your DH (new houses, housing estate, swimming pool, etc). You must perform market research.	
	Link: BECoop toolkit of the tool Hotmaps ; Technical catalogue of biomass district heating	
Rate 3 ^o question:	0.2	
3^o question	Do you know if there is already a heat network operating in your neighborhood?	
Additional comment to understand the question (if needed)	Heat network could enable transferring the heat to the final consumers. It can facilitate your activity and lower the investment costs. On the other hand, it means that there is also another player active on the market (your competitor). So, you must be competitive to induce customers to change their heat supplying company or to implement the heat network in a different area than the current heating network.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, there is.	Contact the owner of the heat network in order to determine if it would be possible to use it for heat distribution. You should attract a significant number of clients and to estimate the heat demand. A good promotion strategy pointing out the advantages of a community heating network should be carried out.	1
	Link: N/A	
B. No, there isn't./ I don't know.	In this case the district heating should be done from scratch (generation plant and heating network). Find out if there is an interest to use the heat of the district heating. If yes, you need to perform a feasibility assessment, you can check the BECoop technical catalogue of biomass district heating, in which the steps to be taken for the implementation of a district heating are indicated.	0.25
	Link: Technical catalogue of biomass district heating	
Rate 4 ^o question:	0.2	
4^o question	Would you say there is an interest in RES cooperatives creation in your region?	
Additional comment to understand the question (if needed)	The RES cooperatives are still not well known. Thus, local communities may not be aware of such possibilities regarding the heat production and delivery to the consumers. The lack of information regarding how it works and what is the role of the consumers and members of the RESCoop.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A Yes, there is a high interest.	It is a very good opportunity to start communication with the local community and preparations for RESCoop creation. You need to prepare a business plan, determine	1

	the heat demand, the role of each stakeholder inside of the community, and look for a DH location as well as elaborate a strategy step by step to establish a RESCoop.	
	Link: N/A	
B Yes, but the interest is low.	You need to perform the analysis related to reasons of low interest of the people. Meetings with the local community should be carefully planned. Try to build a positive image of RESCoop.	0.6
	Link: RESCoop	
C No, there is no interest/ I don't know	In this case you might need to start working from scratch. Most likely, the local community needs basic information and education regarding the RES, RESCoop and their characteristics.	0.25
	Link: BECoop D 1.1 report ; RESCoop	

Category: Key technical aspects		Activity: District Heating
Rate 1 ^o question:	0.3	
1 ^o question	Have you considered the heat production capacity of your DH plant?	
Additional comment to understand the question (if needed)	Production capacity can be defined as the maximum amount of heat required to supply the clients of the heating network (your community).	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, I have a preliminary idea.	<p>If you have a preliminary dimension/capacity of your plant, you can start to contact with the companies that will be in charge of the implementation, you can consult the e-market in order to find out. Additionally, it is desirable to perform the financial analysis of your business. To confirm the final number of potential heat consumers at the beginning and the potential clients in the future. Check the options of the location of the generation plant. Secure the biomass delivery for your business, etc.</p> <p>Link: e-market platform; Technical catalogue of biomass district heating</p>	1
B. No.	You should determine the production capacity of your DH plant taking into consideration the heat demand of the potential clients of the district heating, as well as the resources availability in the surrounding area. Find out, if the district heating could be feasible. You can check the BECoop technical catalogue of biomass district heating, in	0.25

	which the steps to be taken for the implementation of a district heating are indicated.	
	Link: Technical catalogue of biomass district heating	
Rate 2º question:	0.3	
2º question	Have you considered the technology to be implemented in the District Heating plant?	
Additional comment to understand the question (if needed)	<p>The main elements to consider in a DH are:</p> <p><u>Generation plant</u>: heat production in these systems is carried out centrally to meet the demand of the several consumers. This way, individual equipment that should be placed otherwise at the points of consumption (houses or buildings) can be avoided, while it is possible to have more energy-efficient technologies installed at the generation plant (more efficient equipment and operation & maintenance are carried out by professional staff in order to avoid operational problems).</p> <p><u>Distribution piping network</u>: the piping network allows the distribution of fluids (normally water) through insulated pipes to minimize thermal losses. By means of a thermal fluid, the energy is transported to the users, where the heat is transferred to the consumption points by cooling the fluid. The network also has a return circuit to the plant. The pipes are usually distributed in subway trenches that follow the layout of streets in urban areas.</p> <p><u>Substations</u>: the heat transfer between the distribution network and the consumers (buildings or houses) is carried out through a substation consisting of a heat exchanger and the elements that regulate, measure and control the correct operation of the installation.</p> <p><u>Control and management of district heating networks.</u></p>	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, I have a preliminary idea of the technology to be implemented in the DH plant	<p>If you know the technology to be implemented in your DH, you can start contacting with DH plant manufacturers in order to obtain an estimated budget.</p> <p>Link: e-market platform</p>	1
No, I don't know.	<p>It is very important to select the appropriate technology for each district heating, according the biomass to be used, the power of the plant, number building to supply, distance of the heating network, etc.</p> <p>For instance, focusing on the "heart" of the thermal generation plant, the boiler, there are different technologies, but for small-medium heating capacities, the most frequently used are: underfeed biomass boiler, biomass boiler with fixed grate, and with mobile grate.</p>	0.25

	<p>The heat transport line consists of two pipelines (with their corresponding collectors), one for the supply and one for the return. In the case of centralized heating and cooling networks, the line consists of four pipes. The selection of the type of insulation is quite relevant since it has an influence on the overall efficiency of the system. It should be taken into account that in the distribution networks is where the greatest performance losses occur in this type of installations, which can range between 5 and 10 % (taking the latter as a very conservative value).</p> <p>In each building there is a heat transfer substation, consisting of a heat exchange system, without fluid or pressure exchange, through which heat is transferred to the terminal elements for heating, cooling and domestic hot water service.</p> <p>Finally, the control and management of the DH is usually managed through a “supervisory control and data acquisition” (SCADA), this supervision will allow the optimization of the operation of the network and will increase the safety of its operation. The control and monitoring of the installations include the elements of the power plant and, in some cases, the regulation and measurement substations of the consumption points.</p> <p>You can check the BECoop technical catalogue of biomass district heating, in which more information about that can be obtained.</p>	
	<p>Link: Technical catalogue of biomass district heating</p>	
<p>Rate 3^o question:</p>	<p>0.2</p>	
<p>3^o question</p>	<p>Do you or your community have experience in the management and/or operation of a DH plant based on biomass energy?</p>	
<p>Additional comment to understand the question (if needed)</p>	<p>Experience in the management is quite important as it provides information about the understanding of this specific technology, environmental awareness and relations existing along the whole logistic chain (biomass supplier – heating unit – consumer).</p>	
<p>Answers</p>	<p>Elaborated recommendations for each answer</p>	<p>Rate of each answer</p>
<p>A. Yes, we have experience in management/operation of DH plants based on biomass energy.</p>	<p>Your experience in the management and operation of DH plant based on biomass will greatly help you in the implementation of this business. Consider local market research in terms of the bio-based heating systems application/development.</p>	<p>1</p>
	<p>Link. N/A</p>	

<p>B. Yes, we have experience in DH plants based on other renewable energy sources.</p>	<p>Your experience in managing/operating a DH plants based on other RES will help you to develop this project, but in any case, you should consider to specialise in the management and operation of DH plants based on biomass. You should cooperate with experts who have experience in this field. Also, you can see the catalogue developed in BECoop regarding DH plants.</p>	<p>0.8</p>
<p>C. No, we don't have experience in operation/management of DH plants based on renewable sources of energy, but we have experience with other plants based on fossil fuels.</p>	<p>Your experience in other projects will help you to develop this project, but in any case, you must consider to specialise in the management and operation of DH plants based on biomass. You should cooperate with experts who have experience in this field. Keep in mind that bio-based plants require biomass acquisition from local suppliers and the fuel characteristics may vary significantly. Also, you can see the catalogue developed in BECoop regarding DH plants.</p>	<p>0.5</p>
<p>D. No, we don't have experience in the generation of renewable energies or other industrial plants.</p>	<p>Expertise in the management and operation of a DH plant is key in order to achieve an efficient and successful operation of the plant. It might be appropriate to consider hiring a person with this expertise. Keep in mind that bio-based plants require biomass acquisition from local suppliers and the fuel characteristics may vary significantly. Be aware DH plants are planned/built for 25-30 years operation, therefore, it is a long time investment. Also, you can see the catalogue developed in BECoop regarding DH plants.</p>	<p>0.25</p>
<p>Rate 4^o question:</p>	<p>0.2</p>	
<p>4^o question</p>	<p>Have you considered the type of biomass and form of biomass to be supplied to the DH plant?</p>	
<p>Additional comment to understand the question (if needed)</p>	<p>A careful selection of the biomass type-to be used in the DH plant- has to be made in order to secure the supply and stable operation of your plant.</p>	
<p>Answers</p>	<p>Elaborated recommendations for each answer</p>	<p>Rate of each answer</p>
<p>A.Yes, I have a preliminary idea</p>	<p>The final form/ type of the harvested biomass will significantly affect the logistic operations (transport of the harvested material or even how to store it in the plant), pre-treatment steps and technology that will be applied. To know the type and characteristics of your biomass fuel</p>	<p>1</p>

	is important for the right planning and operation of the DH plant.	
	Link: Factsheet of solid biomass for small-scale heating applications	
B. No, I don't know	The determination of the type of biomass to be used in the DH plant is crucial for the success of your activity. Firstly, you should determine if there is enough amount of the desired biomass in the nearby area or if there is a logistic operator that can supply you with the required amount of biomass annually. Furthermore, the form of the supplied biomass should be defined. Not only it can affect the technology to be implemented in the DH plant, but also it impacts the storage of the biomass, its logistics, and even the need for a pre-treatment step for handling the biomass prior to its feeding to the plant (e.g. drying, further size reduction etc.). Finally, it is good to know the fuel characteristics of the biomass to be used (e.g. moisture content, calorific value etc.) in order to better specify the operation and efficiency of the plant.	0.25
	Link: Factsheet of solid biomass for small-scale heating applications, Technical catalogue of biomass district heating	

Category: Key business and financial aspects		Activity: District Heating
Rate 1 ^o question:	0.3	
1^o question	What is the investment needed to build and operate a DH plant, along with its operational and maintenance costs??	
Additional comment to understand the question (if needed)	Financial aspects are crucial in this subject as a DH plant implementation requires significant investments and costs in the long time.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, I have a preliminary idea.	Knowing the investment is a first step. Now you should consider how are you going to finance this investment, through the community? Will you need an investor/bank? Crowdfunding between your associates? Supporting programs? EU funds?	1
	Link: Technical catalogue of biomass district heating	
B. No, I don't know.	The investment of a CHP plant should be taken into account from the first moment, since it is significant. Obviously, it will depend on the amount of the power and	0.25

	<p>heat to be produced (capacity of the plant) as well as the technology provided, and the characterization of the burned biofuel.</p> <p>All these aspects should be clarified since if a decision is made it is difficult to stop/resign without serious financial losses.</p> <p>Further information on the investment of a biomass district heating, along with its operational and maintenance costs, can be found in the BECoop Catalogue “District Heating”.</p>	
	Link: Technical catalogue of biomass district heating	
Rate 2º question:	0.3	
2º question	Is there a biomass heat market in the region?	
Additional comment to understand the question (if needed)	Considering the UE strategy for the coming years, the heat market from RES is expected to grow especially in the areas where the bituminous coal for heat purposes is in use.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, there is such a market.	A well-developed market will provide the adequate framework for new products, but it also implies higher competence. The existence of a bio-based market means that there are potential consumers/final users in the region. The potential client is conscious of the existence and potential of this kind of fuel which facilitates to carry out the first contact and discussions in this regard.	1
	Link: N/A	
B. There is a market of heat but not from RES.	If there is a market of heat in your area based on fossil fuels, you should implement the environmental benefits of the biomass vs fossil fuels, and therefore to introduce RES from local resources, which can be used to cover the energy demands. The education of local society is a key point to succeed.	0.5
	Link: N/A	
C. No.	If currently there are no markets of biomass heat in your area, the first step would be to analyze the reasons and identify the energy sources that are currently used for covering the thermal demand. It would be important to determine if the local population is close minded about changes. Do you know the people that in some cases there are incentives for the use of renewable energies? All these questions can help you in order to assess if the market could be put in place in your area. The implementation of	0.25

	the education strategy among local society is strongly recommended.	
	Link: N/A	
D. I don't know.	It is key to perform a market analysis and define the new heat source potential.	0.25
	Link: N/A	
Rate 3 ^o question: 0.2		
3^o question	Are you able to describe the barriers that may have a direct or indirect consequence for the financing of DH plant in your region?	
Additional comment to understand the question (if needed)		
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, I know these barriers.	Try to identify which of them are key and may significantly threaten the development of your investment.	1
	Link: N/A	
B. I don't know any barriers.	Brainstorm this topic or talk to the local community. Compile information regarding the decommissioned biomass power plants. What was the cause? Obtain information about legal aspects and future perspectives of bio-based DH plants in your area. Keep in mind that this kind of investment has an exploitation period of 25-30 years.	0.25
	Link: N/A	
Rate 4 ^o question: 0.1		
4^o question	Do you think that your investment on biomass heating can contribute to diminish energy poverty in the region?	
Additional comment to understand the question (if needed)	Adequate heat, cooling, lighting and the energy to power appliances are essential services needed to guarantee a fair standard of living and citizens' health. Energy poverty occurs when a household suffers from a lack of adequate energy services at home (source: https://www.energypoverty.eu/). From a financial point of view if you pay more than 10 % of your incomes for heating (on an annual basis) you are suffering of energy poverty.	
Answers	Elaborated recommendations for each answer	Rate of each answer

<p>A. I am sure that local biomass should be a solution to solve the problem of energy poverty.</p>	<p>Please consider investments in district heating using biomass. If you are a policy maker please see the link below and get familiar with EU policy. Consider promoting RESCoop or subsidizing as other activities to raise the living standard of your society.</p>	<p>1</p>
<p>Link: Energy Poverty Advisory Hub</p>		
<p>B. I don't suffer from energy poverty and biomass heating is not a solution for me.</p>	<p>Please consider that biomass ecological heating can solve not only financial problems. It can bring a positive impact into the environmental and social areas of local communities.</p>	<p>0.25</p>
<p>Link: Energy Poverty Advisory Hub</p>		
<p>Rate 5º question: 0.10</p>		
<p>5º question</p>	<p>Existing supporting strategic partnerships between industries/primary sector and local government in the region or among neighbouring regions</p>	
<p>Additional comment to understand the question (if needed)</p>		
<p>Answers (minimum 2 and maximum 4-5)</p>	<p>Elaborated recommendations for each answer</p>	<p>Rate of each answer</p>
<p>A. Yes, many</p>	<p>Strategic partnerships between the primary sector and local government seem to be a usual structure. The initiative should explore to determine whether it is a good option for the project considered</p>	<p>1</p>
	<p>Link: N/A</p>	
<p>B. Yes, a few</p>	<p>Strategic partnerships seem to be a not very common structure. Nevertheless, the initiative should explore to determine whether it is a good option for the project considered</p>	<p>0.60</p>
	<p>Link: N/A</p>	
<p>C. No</p>	<p>Strategic partnerships between the primary sector and local government doesn't seem to be a very common structure in the region. In case of necessary, the effort to implement such partnership could be significant considering there are no previous experiences.</p>	<p>0.25</p>
	<p>Link: N/A</p>	
<p>D. Don't know</p>	<p>Efforts should be allocated to determine if there are strategic partnerships in the region that could be useful for the implementation of the initiative.</p>	<p>0.25</p>
	<p>Link: N/A</p>	

Category: Key social and environmental aspects		Activity: District Heating
Rate 1 ^o question:	0.20	
1^o question	Are there any actions organised in your area in order to promote the use of biomass in district heating?	
Additional comment to understand the question (if needed)	In many countries/regions the people are very often used to heat their households by an energy source being very popular/traditional since many generations (there are habits among society).	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. The region is very active in this topic.	Regional framework seems quite appropriate for the use of biomass for energy purposes. Consider start promoting RESCoop creation in this area.	1
	Link: N/A	
B. The region is not active in this topic.	Initiatives like using biomass for energy purposes are new in the region. Communication and dissemination in this regard could contribute to the social acceptance. Consider promotion actions and raising awareness in the area of RES utilisation/application, especially biomass.	0.25
	Link: N/A	
C. I don't know.	Raising awareness regarding using biomass for energy purposes could contribute to the social acceptance of initiatives seeking to fulfil such objectives. Consider promotion actions and education in the area of RES utilisation/application, especially biomass. Think about conducting a survey related to biomass and other renewables applications for this purpose.	0.25
	Link: N/A	
Rate 2 ^o question:	0.2	
2^o question	Do you know the GHG savings that could be achieved compared with the use of fossil fuels?	
Additional comment to understand the question (if needed)	A greenhouse gas (or GHG for short) is any gas in the atmosphere which absorbs and re-emits heat, and thereby keeps the planet's atmosphere warmer than it otherwise would be.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, I know.	Public awareness regarding the contribution to decrease GHG emissions with this type of initiative establishes an adequate framework for its implementation. You should disseminate these Figures.	1
	Link: N/A	

B. No, I don't know.	The GHG benefits achieved with this type of initiatives should be communicated to the general public to raise awareness. In order to do a first estimation, you can use the online tool Biograce II. These recommended workshops should help to change this situation.	0.25
	Link: Biograce II tool in BECoop toolkit	
Rate 3 ^o question:		
Rate 3 ^o question:	0.2	
3^o question	Have you quantified the impact of DH plant based on biomass on energy poverty of local society?	
Additional comment to understand the question (if needed)	Energy poverty can be defined as a household which doesn't have enough energy to meet its basic daily needs: heating / cooling, cooking, lighting, etc.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Yes, I do.	You can consider implementing RESCoop to support diminishing energy poverty. You can play the role of policy maker/activist in the area of biomass promotion for heating purposes.	1
	Link: Energy Poverty Advisory Hub	
B. No, I don't.	You should know that the use of local biomass for heating purposes increases job creation, has a positive impact on local development, health and state of environment. Finally, it can lead to the RESCoop creation.	0.25
	Link: Energy Poverty Advisory Hub	
Rate 4 ^o question:		
Rate 4 ^o question:	0.2	
4^o question	What is the feeling of the local society regarding using RES such as biomass for household heating?	
Additional comment to understand the question (if needed)	Knowing how the community feels and its attitudes regarding heat sources is important to understand the reasons for the current situation and to take appropriate measures to change its point of view.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A. Renewable energy initiatives are very welcomed in the region.	In principle it seems that the initiative will have social backup. As a result, the proposition of RESCoop creation should involve local interest and be accepted by local society.	1
	Link: N/A	
	Benefits achieved with this type of initiatives should be communicated to the general public to raise awareness. Consider the improvement of the communication form in	0.5

B. Neither support nor opposition can be expected.	the field of use of biomass for heating purposes and benefits for local society. Link: N/A	
C. Social opposition can be expected.	Efforts should be allocated to present the environmental and social benefits associated to this type of initiatives and answer criticisms (e.g. rise of energy safety, influence on environment and health). This information can contribute to change the way of thinking about biomass as a heat source. Link: N/A	0.25
D. I don't know.	It is not a key to evaluate the acceptance of general society, but it will be good to determine if this could be an alliance or a barrier for implementing your initiative. Education seems to be necessary to provide local citizens with knowledge about the role of biomass for heat production in the local area. Link: N/A	0.25
Rate 5º question: 0.2		
5º question	Are there any other energy communities in your area?	
Additional comment to understand the question (if needed)	Knowing how the community feels and attitudes towards heat sources, it is important to understand the reasons for the current situation and to take appropriate measures to change this point of view.	
Answers	Elaborated recommendations for each answer	Rate of each answer
A: Yes	Previous experience with energy communities plays a key role for the acceptance of your initiative by the general public. Good success examples of the past could act as a driver for the acceptance of the project as people are already familiar with the concept and trust has been already established. People are also aware of the positive impact that energy communities may have in their area (e.g. creation of new jobs, reduced energy bills etc.). From the other hand, bad unsuccessful experiences could act as a barrier for the initiative as citizens will be hesitant and skeptical to join or accept the new project. In this case action should be taken in order to restore citizen's trust by identifying the previous problems and proposing solutions or offering new information through an open and transparent process. Link: N/A	1.0
B: No	Previous experience with energy communities plays a key role for the acceptance of your initiative by the general public. Good success examples of the past could act as a driver for the acceptance of the project as people are already familiar with the concept and trust has been	0.4

	<p>already established. People are also aware of the positive impact that energy communities may have in their area (e.g. creation of new jobs, reduced energy bills etc.). On the other hand, unsuccessful experiences could act as a barrier for the initiative as citizens will be hesitant and skeptical to join or accept the new project. In case there is no previous experience it is important to start by establishing a good communication path with the community and involve the citizens throughout the organisation and implementation phase of the project. Procedure's transparency will create trust and will strengthen community's acceptance.</p>	
	<p>Link: N/A</p>	
<p>C: I don't know</p>	<p>Previous experience with energy communities plays a key role for the acceptance of your initiative by the general public. Good success examples of the past could act as a driver for the acceptance of the project as people are already familiar with the concept and trust has been already established. People are also aware of the positive impact that energy communities may have in their area (e.g. creation of new jobs, reduced energy bills etc.). On the other hand, unsuccessful experiences could act as a barrier for the initiative as citizens will be hesitant and skeptical to join or accept the new project. Before starting your initiative, you should first examine the experience of the local community with energy community projects.</p>	<p>0.25</p>
	<p>Link: N/A</p>	

Annex II: Initial brainstorming about users and cases where the self-assessment tool could be relevant

The main goal of this “initial brainstorming” was to define the users of the self-assessment tool in order to develop a useful tool for the targeted audience and, at the same time, assessing and identifying the bioenergy activities and resources to be considered in the tool.

1. User A: Current or new RESCoops

Current or new RESCoop that are interested in assessing the feasibility of developing bioenergy heating solutions.

Examples	Technologies involved
RESCoop actor willing to create a biomass logistic centre to process biomass and sell it to their associates.	Developing a pellet, briquettes or woodchips/hog fuel plant
RESCoop actor acting as intermediate in charge of biofuels supply (as pellets, woodchips, briquettes, ...), storage and distribution to their associates.	No technologies involved, maybe they just need a warehouse to storage the biofuels
RESCoops, actor considering the feasibility of developing a biomethane plant and selling the biogas for some of their associates.	Biomethane plant
RESCoops, that are considering the feasibility of commercialize biomethane for their associates.	No technologies involved
RESCoop, actor considering the feasibility to establish a heating and cold energy production to supply some of their associates.	District Heating Co-generation Biomass boiler
RESCoop, actor currently producing electricity willing to produce also heating energy to cover all the energy demands of their associates.	PV, solar thermal, thermal storage, wind,... Cogeneration District Heating
RESCoops that are considering to install biomass boilers to associates’ homes, or to public buildings, swimming pools, sports centres, etc.	Biomass boiler

2. User B: Neighbourhood, municipality, farmers, ...

User B apply to a group of small entrepreneurs (such as neighbours, municipality, farmers ...) considering the feasibility of creating a heating supply community.

Examples	Technologies involved
Neighbourhood considering joining the energy cooperative in order to cover their domestic energy demands.	District heating Co-generation Biomass boiler
Neighbourhood considering to purchase bioenergy to cover the energy demands (for instance through a ESCO)	No technologies involved for the community they just paid for kWh consumed
Neighbourhood that currently has a district heating/co-generation plant working with gas or other fossil fuel, seeking to assess the investment required to switch to a renewable source and work with biomass.	District heating Co-generation Biomass boiler
Municipalities (small villages) considering covering their energy demand by means of renewable energy resources (electricity and heating)	District heating Co-generation Wind, PV, solar thermal
Municipalities willing to use the biomass from garden cleaning parks, public forest or urban solid waste to cover their energy demands or the energy demand of public buildings For instance, the municipality could invest and install individual biomass boilers in public buildings, sports centres etc. and use the biomass from garden cleaning parks, public forest etc.	District heating Co-generation Biomass Boiler
Vineyard, fruits, olive, ... farmers can join the energy cooperative in order to create a biomass logistic centre that would be located in the surrounding area where the biomass can be gathered after pruning and processed (woodchips, briquettes, pellets, ...) and sold to the final consumers.	Developing a pellet, briquettes or woodchips/hog fuel plant
Farmers can build a value chain that exploits agricultural residues (prunings, plantation removal etc.) and invest in biomass boilers in public buildings or use them as fuel in District heating units (or even CHP unit).	District heating Co-generation Biomass boilers
Pig farmers face a relevant inconvenience associated with the large amount of slurries they need to dispose. They could join the energy cooperative in order to establish a biomethane plant (fed by the slurry) seeking to cover heating and electrical demand of the farms in the surrounding area.	Biomethane plant

3. User C: Other Cooperatives

Other cooperatives outside of the energy concept as for instance Agro-industrial Cooperatives that would like to create a new business line based on biofuel products.

Examples	Technologies involved
Cooperatives of animal food and feed sector, normally account with a pelletization plant, so they can be also a cooperative of biofuels pellet (for energy purposes) from herbaceous material (since this is the kind of material they are used to).	Developing a pellet, briquettes or woodchips/hog fuel plant
Cooperatives of olive oil sector can consider using the olive pruning for biofuels production.	Developing a pellet, briquettes or woodchips/hog fuel plant
Cooperative of fruit can consider using the fruit pruning and biomass obtained from the plantation removal for the biofuels production.	Developing a pellet, briquettes or woodchips/hog fuel plant
Vineyard cooperatives or distilleries can consider using the vineyard pruning for biofuels production	Developing a pellet, briquettes or woodchips/hog fuel plant
For the cooperatives with the prunings (vine, fruit, olives etc.) could be also that they invest in a local small CHP (for cogeneration) or on a District heating unit or install several individual boilers for heating in public buildings	District Heating Cogeneration Biomass boilers
Livestock Cooperatives can consider using the slurry for the production of biomethane. They have to deal with their residues in an environmentally friendly way (e.g. a dairy production facility or a production unit with livestock). Perhaps such actors can also be relevant potential community members in some cases.	Biomethane

4. User D: Industrial companies

Industrial companies looking for save cost and become more sustainable through a community business case.

Examples	Technologies involved
A group of companies inside of the same industrial park willing to create a community in order to cover their heating demands (heating, sanitary hot water, cold).	District heating Co-generation Biomethane
A group of industrial companies inside of the same industrial park (or the surrounding area) willing to create a community in order to produce steam seeking to cover the thermal energy demands needed for their processes.	District heating Co-generation Biomethane
Perhaps a group of companies that start using biomass to cover their thermal energy demands and send the excess of heat to DH network?	District heating
Local industries can join with famers (for instance) and use the waste/biomass to produce biofuels or community bioenergy services	Developing a pellet, briquettes or woodchips/hog fuel plan District heating Co-generation Biomethane Biomass boiler