Model Assessment of Potential and Barriers to the Development of Renewable Energy Communities at the National Level

Model Assessment Manual

Date: 31 October 2022 (Version 2)

Authors: Lars Holstenkamp, Christian Kriel (ECOLOG Institute for Social-Ecological Research and Education)

Contents

1 Model Assessment of Potential and Barriers to the Development of Renewable Energy Communities

1.1 The Mandate

The European Union has given its member states the mandate to take out assessments of **barriers for and potential of renewable energy communities**:

> *"Member States shall carry out an assessment of the existing barriers and potential of development of renewable energy communities in their territories." (RED II, Article 22 Paragraph 3)*

However, it has not specified this provision in the recast Renewable Energy Directive (RED II). Which means: The content and the form of these assessments has not been clarified (yet). It is only clear from the legal text that these assessment should be the basis of the "enabling framework" mentioned in the following paragraph.

You will find the full legal text here. Article 2 Number 16 includes the definition of a renewable energy community. Article 22 contains all provisions on renewable energy communities.

1.1 The Model Assessment Template

In the following, we present a proposal of how to do such an assessment. We call this our "model assessment template." On these websites, you will find

a) "Texts" on the websites with short descriptions of the process that we propose and brief explanations of each of the four elements that our template contains
b) "Background papers," in which we describe the scientific background behind those elements and which you can download. You will find more information on the aspects, which we discuss in the background papers, in the references cite therein.
c) "Further Material", i.e. links to external websites, which we find useful in this context, and partly some templates that you can use, e.g. a draft questionnaire for assessing barriers and drivers

1.2 Proposed Elements or "Modules"

We propose an assessment with four elements or "modules", which we describe briefly on separate webpages. You will find more background information in the downloadable "Background Papers".

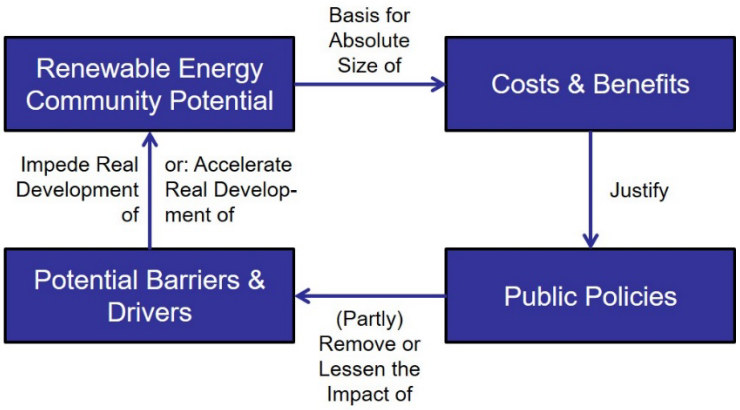

Figure 1: The Four Elements of the Assessment

The four modules are:

1 Assessment of barriers & drivers: Barriers impede the development of energy communities in a country or region. Drivers accelerate their development. With the measures taken to create an "enabling framework", European Union member states should address the barriers and make use of the drivers, so that energy communities can unfold their potential and play their role in the energy transition. An assessment of the barriers and drivers is therefore an important first step in the assessment cycle.
2 Assessment of the potential: How much is it actually worth to follow the European Union's mandate and strengthen energy communities? An answer to this question depends on the potential of energy communities in the geography under investigation. Numbers produced by an assessment of the potential build the basis for the absolute size of (costs and) benefits. In this second module, we compare different methodologies that have been developed and applied to assess the potential of energy communities.

3 Evaluation of costs & benefits: Benefits, considering potential costs, are used to justify measures taken by member states or other public entities as part of the "enabling framework." Moreover, member states should evaluate the impacts of their measures. Overall, empirical evidence of those benefits and costs is scarce. We briefly describe what researchers have found out about costs and benefits of energy communities, based on the work of Berka and Creamer (2018) with some updates.

4 Policy Database: Many member states have already taken steps to support energy communities at home. Much is still in progress while we are writing these lines. Not only member states on a national level are active in this respect, but also other public entities, for example city governments or state development banks or agencies. Hence, an exhaustive list is difficult to set up and would be immediately out-of-date. In our fourth module, we therefore develop some proposals to collect public policies and their impacts.

1.3 License

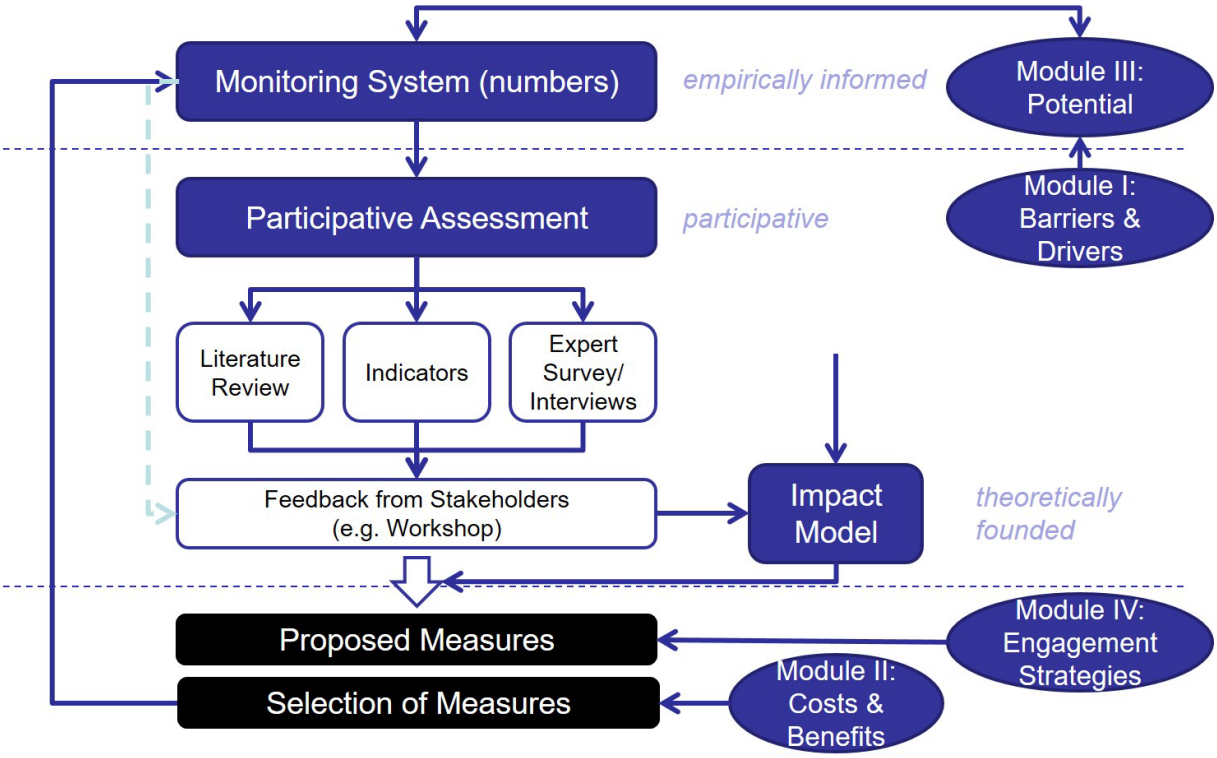

Figure 2: Flow Diagram of the Assessment Process

2 The Assessment Process

2.1 Overview of Our Proposal

We propose an assessment cycle building on a monitoring system that provides numbers for the assessments and evaluates the impacts of the policy measures selected by policy-makers to form the "enabling framework." Barriers and drivers should be assessed using participative methods, that is, give stakeholders a voice in the process, for example in stakeholder workshops. With a clear understanding of how different policy measures work ("impact model"), the evaluators can then propose policies that address the major barriers and make use of the drivers identified. The selection of measures can be informed by a collection of public policies. Costs and benefits of energy communities and estimates of the potential are usually taken as justification for public interventions, in this case in favour of energy communities. Ideally, policy-makers should also evaluate costs and benefits of their measures under consideration, before and after they are implemented. For this, they can resort to the monitoring system.

So, the process that we propose is not linear, but forms a cycle, with several feedbacks or links between the different elements. It runs from monitoring to assessment of barriers and drivers to the selection of policy measures and back to monitoring ("assessment cycle") with input from assessments of potential, of costs and benefits and the collection of public engagement strategies. These three inputs should be generated in parallel to the assessment of barriers and drivers.

2.2 Quality of the Assessment

The assessment of barriers and drivers and the potential of energy communities should fulfill **three criteria**:

1. It should be **empirically informed**: As outlined above, it builds on a monitoring system and surveys and/or interviews of experts. Ideally, the measures building the "enabling framework" are evaluated after their implementation.
2. It should be **participative** to increase the acceptance of assessment results and policy conclusions drawn from this process, but also to include local and expert knowledge that help to generate meaningful findings.
3. It should be **theoretically founded**, so that a clear link between measures taken and their effects can be established. This will be achieved by using an impact model and/or theoretical considerations in the development of the assessment framework.

Standardisation could also help to assure the quality of the assessment and make results from different countries comparable. We propose to review the assessment processes in European Union Member States. As a result, the assessments could be standardised step-by-step – at least those elements of the assessment which do not demand country- or region-specific deviations. However, we acknowledge the need to adapt to country specifics and different resources available. Nevertheless, this kind of standardisation certainly helps to compare findings between countries and may encourage European Union member states and smaller actors with less resources to conduct assessments.

This said, we do not want this plea for standardisation be misunderstood: Some variation beyond the "core" might be useful: Experimentation can help to improve assessments. For these improvements to happen, it might be useful to collect all assessments available in one place.

Core elements to be standardised include:

- the general structure of the monitoring systems, so that these national systems produce comparable numbers;
- the typology of barriers and drivers used for the assessments of these and the questionnaire for surveys;
- the codebook for the analysis of the literature on barriers and drivers;
- the core questions for the interview guidelines;
- the impact model;
- the typology of costs and benefits;
- an agreed methodology for assessing costs and benefits (or at least some guidelines);
- a common list of public engagement strategies.

2.3 Monitoring Systems as Basis for the Assessment

A proper monitoring system illustrates past and present developments of the energy community sector in a country. Ideally, the operator of the monitoring system breaks down numbers according to sub-sectors:

- technologies such as wind energy vs. solar photovoltaics (PV) vs. biomass,
- size classes such as small-scale PV vs. medium-scale rooftop PV vs. large-, utility-scale solar farms and

- types of energy communities such as different legal and organisational structures, for example citizen-led vs. municipality-led vs. energy communities led by small and medium-sized enterprises (SMEs).

Examples of data collections that can build a basis for a monitoring system are:

- the "Community Energy State of the Sector" report for the United Kingdom;
- the Dutch "Local Energy Monitor";
- the annual survey of the German Cooperative and Raiffeisen Confederation (DGRV) – for example, the last one conducted in 2022 here;
- the database developed in the Horizon 2020 project COMETS (all European Union member states; not yet publicly available).

Findings based on past development of numbers can be used in the assessment in the following ways:

1. The increase or decrease in numbers can be used as an indicator of potential barriers or drivers at work. Therefore, a study of the numbers can provide possible reasons for low or strong growth of energy communities in general or individual segments. As such it informs stakeholder interviews to assess barriers and drivers.
2. Statistical evidence could be used to contrast them with qualitative data and survey results. Researchers call this approach "triangulation." The idea is to apply different methods and through this produce more reliable and valid results.
3. The "sector-development approach" in the assessment of the potential of energy communities, which we describe here, demands data on past developments and present state of energy communities.
4. A full version of the monitoring system could include indicators of costs and benefits that energy communities produce. In this way, the monitoring system would improve the evidence base that is still scarce.
5. The monitoring system can be utilised to measure the effects of policies implemented as part of the "enabling framework". The results of this monitoring could be fed into the collection of public engagement strategies.

2.4 Impact Model for the Evaluation of Policy Measures

European Union member states should select policy measures that help to overcome barriers and strengthen drivers. The link between these – barriers/drivers and policy measures – are described by an "impact model" or a "theory of change". Put in other words: it describes how and why an initiative works. Such an understanding of how and why the measures introduced help to overcome barriers or reinforce the drivers can be implicit or explicit, but it is always present.

Theoretical models are still under investigation by researchers. There is no readily available toolbox for this purpose. Therefore, we recommend to take the following steps:

1. **Make sure of the goals** to be achieved by the implementation of the measures: You could consider a growth in the number of energy communities or the installed capacity of community renewable energy a goal in itself. Usually, this is called "energy democracy." However, this is probably not the only goal, in some countries or circumstances maybe not the highest held one. Members states might want to secure social acceptance of renewable energy projects, accelerate the energy transition in their country or initiate regional development processes, to name a few other potential goals. These are discussed in the third module as potential benefits of energy communities.
2. **Build a framework on empirical findings**: Research on investments by private households, small and medium-sized enterprises (SMEs) and local governments in general and on community energy investments specifically produces insights on how these groups react to changes in their environment, especially to public incentives. Moreover, there is a growing body of literature on costs and benefits of energy communities, including factors that affect the direction and size of these impacts.
3. **Use expert statements** on such kind of links between policy measures and barriers/drivers: We propose to conduct expert interviews as part of the assessment of barriers and drivers. These interviews may include some questions on the link between barriers and drivers and potential policy measures.

After implementation of the policy measures, evidence should be reviewed using the monitoring system. If measures fail to achieve the goals, the impact model or theory of change needs to be revised or complemented if a factor missing in the original framework used led to the failure.

2.5 Background Paper

We explain our proposed assessment process in more details in Background Paper #1.

3 The Assessment of Barriers & Drivers

3.1 Overview

In the recast Renewable Energy Directive (RED II), the European Union urges member states to "carry out an assessment of the existing barriers" (RED II, Article 22 Paragraph 3). Potential **barriers** for energy communities have been intensively studied in the academic and policy literature. The same can be said about **drivers** for energy community development – even if the understanding of the term differs between authors. Often, drivers and barriers describe the same factor, just with the opposite sign or direction of effect: Intermediaries, for instance, may drive the development of energy communities. A lack of intermediaries is a major barrier to it.

This template includes two elements related to the assessment of barriers and drivers:

1. a list of typical barriers and drivers that can be used for the assessment and
2. a note on how to assess the magnitude or severity in a specific country context.

Related to the second point, we make a proposal for the assessment process itself. The magnitude or severity of barriers and drivers in a member state or region can be assessed using existing literature, indicators, indirect measurements based on market observations or ratings or rankings based on expert opinion and/or stakeholder feedback through surveys, interviews or workshops. We distinguish two types of assessment processes here:

1 An **ideal case** where a full monitoring system or database exists and resources are available to conduct a participative assessment of barriers and drivers over several steps;

2 A "**shortcut**" version of the assessment if data are not available and resources are limited, for instance, if a smaller non-governmental organisation (NGO) carriers out the assessment.

A mixed approach is, of course, possible. We highly recommend to include stakeholders in the assessment. A multi-stage assessment (Delphi method) including a rating by stakeholders and a participative format to discuss and evaluate results seems to be, on the one hand, the most resource-intensive option for doing the assessment of barriers and drivers. On the other hand, it is certainly the most insightful method and the one that is likely to generate the highest level of acceptance among stakeholders concerned.

3.2 Participatory Assessment as Recommended Version

In the ideal case, the process starts with the monitoring of different energy community segments in the country under investigation and different regions of this country (see figure). If a full monitoring system does not exist in the member state, the evaluators could still use those numbers that are available for the participative assessment, that is: leave out or shorten the first step.

The assessment itself would then begin with a review of the literature on barriers and drivers in this country to inform the development of an indicator set, which draws from data of the monitoring system, and a standardised survey and/or expert interviews. Literature review, indicators (where possible), survey and expert interviews complement and inform each other.

Results are presented to stakeholders together in a joint workshop and/or separate workshops for different types of stakeholders ("focus groups"). A differentiation by region makes sense where the monitoring system indicates great variance between geographical areas.

In fact, this assessment can be designed in multiple steps, not only two with those three elements (literature review, survey, expert interviews) in parallel. As such a process is resource-intensive, we propose to carry it out once and develop other feedback mechanisms together with stakeholders for further "cycles" after measures have been implemented.

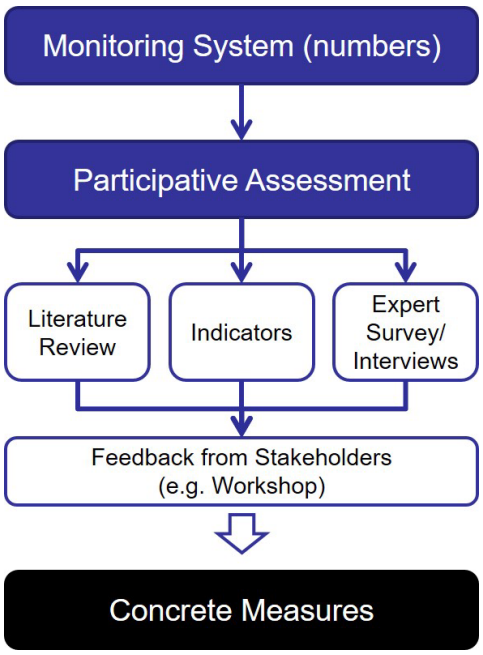

Figure 3: Assessment of Barriers & Drivers – Flow Chart of Process for the Ideal Case

3.3 Assessment Process if Resources are Lacking

If member states are reluctant to carry out the assessment and/or smaller organisations, for instance, national umbrella organisations or dedicated non-governmental organisations (NGOs), want to do the assessment, there could be a need for a less resource-intense version of the assessment. We call this version a "rapid assessment."

The first step of this rapid assessment is a review of existing numbers, that is, a short description of the status quo based on existing literature and market surveys – instead of a fully-fledged monitoring system and analysis of past and present developments.

The second step would only include two parts: a literature review and an expert survey. Member states or NGOs could use our template for this. Survey results give a first indication of what the most pressing issues are, at least if responses are high enough. (It is hard to predefine what "high enough" means in absolute numbers, especially since not even the overall population is known from which the interviewees are drawn.) Ideally, the standardised survey is complemented by qualitative interviews, which cover more specific aspects of the situation in the country studied.

If resources are really scarce, the evaluator may stop here and derive some policy measures from the results of literature and expert survey without feedback from stakeholders via workshops. If time and resources allow, the assessor may collect feedback through responses to an assessment paper via e-mails or a webform.

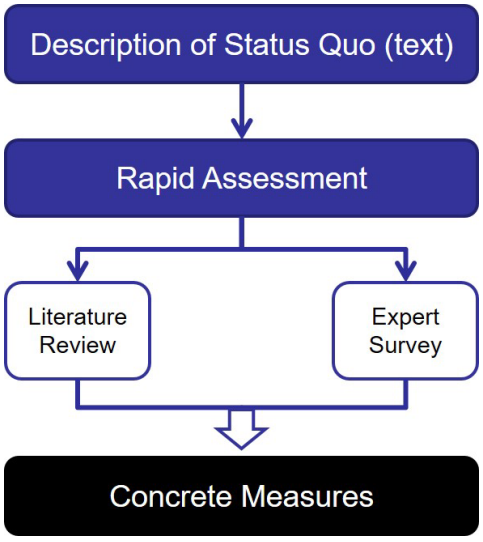

Figure 4: Assessment of Barriers & Drivers – Flow Chart of Process If Resources Are Lacking

3.4 Survey Template

For the use in the underlying project, we developed and tested a questionnaire sent out to some experts in different countries. We think that this short(!) survey could be useful to compare barriers and drivers in different countries and work as a starting point for further discussions. We are convinced that it will be especially useful if data from different regions within a country and/or from different member states are available. This said, we know that it is certainly only a starting point for a discussion with country experts.

You can download the questionnaire in three different languages here: English [EN] | German [DE] | Polish [PL]. The questionnaire is available in different formats: pdf, docx, odt, xml and lss for use with the software LimeSurvey.

We welcome any comments and invite potential evaluators to further develop the survey template.

3.5 Typology of Barriers and Drivers

Researchers and practitioners have developed several typologies of barriers and drivers. We reviewed these different typologies and tried to set up a list of barriers and drivers that hopefully works for all European Union member states. Some of these barriers and drivers will be more relevant than others for selected countries. Nevertheless, we would recommend to keep them in here: A use of the same typology across countries would enable us to compare results between member states and, as a result, be better able to see what we can learn from other countries and where results are probably not that easy to transfer between member states.

As you can see in the table below, we distinguish between four groups of barriers and drivers:

1. those related to business case and (general) legal frameworks;
2. barriers and drivers to market access;
3. informal institutions and conflicts and
4. those related to the availability or non-availability of different resources.

No	Factor	Barrier	Driver
I	**Business Case & Legal Framework**		
1	Natural resource endowments	Unfavourable wind conditions and/or solar irradiation set low incentives for the implementation of wind and/or solar energy projects.	Strong winds and/or high solar irradiation make wind and/or solar energy projects profitable for energy communities.
2	Support schemes	Support schemes for renewable energies do not have the right form, are too complex, change too often, do not provide enough support or are of limited volume for energy communities.	Appropriate support schemes make a difference ('loud'), are sustained for a duration that reflects the financing horizons ('long') and are clear and legally established and stable ('legal').
3	Planning rules	Planning policies, environmental laws and/or heritage conservation rules lead to long and uncertain processes for projects developed by energy communities.	Planning processes for energy community projects are well established and proceed reliably over a reasonable length of time.
4	Taxes, surcharges & fees	Rules for taxes, surcharges and/or fees put energy community projects at a disadvantage compared to other types of projects.	Rules for taxes, surcharges and/or fees provide monetary incentives to implement energy community projects.
5	Breakdown of targets	There are no clear national, regional or local targets for climate protection.	Clear national, regional and local targets encourage governments at different levels to act.
6	Energy prices	Low fossil-fuel and nuclear energy prices provide little incentive for policy makers to act and disadvantage renewable energy projects by energy communities.	High and/or volatile energy prices create incentives for policy makers to act and make renewable energy projects of energy communities competitive with fossil fuel projects.
7	Risk attitudes	Energy communities and their members are too risk averse, so that only few low-risk projects can be implemented for them.	Energy communities develop more expertise and understanding to be able to develop also more complex and risky projects.
II	**Market Access**		
8	Grid access rules	Energy communities face challenges to get access to the grid because of unclear and/or instable grid access rules.	There are clear and stable rules for grid access of decentral renewable energy projects.
9	Legal market entry barriers	There are high requirements, unclear or constantly changing rules for market access. Some markets (e.g. for ancillary services) are restricted to large players.	Energy communities are allowed to enter energy markets also with smaller volumes. Local flexibility markets are created, opening up further business opportunities for energy communities.
10	Licensing procedures	Licensing procedures are cumbersome and/or take long times with uncertain result or energy communities even are not allowed to get a license.	Licensing procedures are clear and short or energy communities are exempt from licensing requirements.
11	Definition of RECs	Definitions of RECs are unclear or change frequently. The country lags behind with transposition of directives.	New and clear definitions of RECs incentivise the creation of energy communities.
12	Availability of legal forms	There is no appropriate legal form for energy communities. Creating a company for doing business as an energy community takes long times and is very costly.	There are well-known legal forms available to energy communities. Founding a company can be done quickly and at low costs.
13	Competitive situation	A lack of economies of scale prevent energy communities from entering energy markets. They cannot compete with incumbents.	Energy communities have identified niches and/or strategies to develop economies of scale, so that they can compete with incumbents.

No	Factor	Barrier	Driver
14	Incumbent behaviour	Incumbents, which dominate the markets, try to keep energy communities out of business or make processes to enter markets and access grids cumbersome, time consuming and/or costly.	Incumbents cooperate with energy communities and regard them as appropriate partners, e.g. to increase social acceptance and/or develop new services for customers.
III	**Informal Institutions & Conflicts**		
15	Historical legacy & energy activism	Collective entities, including cooperatives, are seen critical by the local population due to experiences with these models in the past. Coal and/or natural gas have been playing a major role in the region/country. People are highly satisfied with the status quo of the energy system. There is a low perceived urgency of change.	There is a long tradition of energy activism which energy communities can link with. People are unsatisfied with the status quo of the energy system. There is a high perceived urgency of change.
16	Social capital/trust	General trust is low. The civil society is weak.	General trust is high. There is a vibrant civil society.
17	Narratives/vision	The dominant narrative of and vision for the energy system builds on central energy supply technologies and large, financially strong actors.	A strong (counter-)narrative building on decentral energy technologies and local ownership exists. There is a role envisioned for energy communities.
18	Local conflicts & social acceptance	Local conflicts and low social acceptance of renewable energy projects inhibit energy community projects.	Social acceptance of renewable energy projects is high. Local ownership is seen as an instrument to increase or maintain social acceptance.
IV	**Resources**		
19	Equity capital from members	Low availability of capital from members limit activities that energy communities could develop.	Sufficient equity capital from members is available to develop energy community projects.
20	(Mezzanine and) debt finance from banks and other financial institutions	Banks and other financial institutions do not lend to energy communities or only at unfavourable conditions and/or not enough.	Specialised banks or local banks well experienced with energy community projects support the communities and promote the energy community sector.
21	Public funding and technical assistance	Public funding and technical assistance is not available, instable, only with low amounts and/or through complex awarding processes.	Strong public funding programmes and technical assistance is provided for energy community projects, e.g. through a dedicated fund.
22	Knowledge/expertise	Members lack knowledge and expertise to develop more complex community energy projects.	Members are well equipped with knowledge and expertise in the right fields to develop more complex projects. Role models or “local champions” exist that are copied elsewhere.
23	Time	Members, especially those with managing role, do not have enough time that they can dedicate to develop new projects and manage existing ones.	Energy communities are able to employ people that can dedicate enough time to develop new projects and manage existing ones.
24	Committed key persons	There are not enough committed key persons for energy communities.	There are many highly committed key persons on local level engaged in energy communities.
25	Intermediaries & local support	There are no intermediaries helping energy communities to develop their businesses. Local support for energy communities is absent.	Intermediaries and/or local authorities support energy communities to (further) develop their businesses.

3.6 Background Paper & Further Material

You will find a more detailed explanation of the assessment of barriers and drivers in Background Paper #2. Please consult references cited therein for further information.

If you want to use the questionnaire developed in the underlying research project, please see here.

4 The Assessment of the Potential

4.1 Overview

Developing policy measure for energy communities makes only sense, of course, if there is a relevant potential. We are convinced there is – but how much? Realistically? There are various studies that has tried to answer these questions. These studies focus on different shareholders – private households, small and medium-sized enterprises (SMEs) and/or local governments. Moreover, they cover different technologies. But in the end, they can be assigned to three principle methodological approaches:

- With recourse to historical and current data from the energy community sector, for example, building on a monitoring system. We call extrapolations or scenario-based methodologies of this kind "sector-development approaches."
- Based on potential future installations and willingness-to-invest of communities. We call this "bottom-up modelling approaches."
- Often, both general approaches are used to different degrees at the same time. We call this a "mixed approach." A mixed approach only uses – as the name tells us – different elements from each of the other two approaches. Therefore, we will concentrate on the other two methodologies here.

We do not recommend a specific modelling approach. Rather, we think that the selection of the approach highly depends on data availability and purpose. Ideally, assessments of potential using different approaches can be compared and a range of likely values for implementable and hypothetical potentials be given. In the following, we briefly explain the principles of both approaches. You can find more details in the related background paper and the references cited therein.

4.2 Sector-Development Approaches

Sector-development approaches start with data from the energy community sector and extrapolate those data or use expert judgements ("scenarios") to project likely development trajectories.

The 2014 study by Capener on the potential of community energy in the UK is a good example of a sector-development approach. You can find it here. Based on data on Industrial and Provident Societies (IPSs) in the energy sector, Capener calculates community investments and investments in installations by communities including debt and other financial sources. Using specific investment costs for different technologies and size classes, Capener "translates" these investments into installed capacities ("community capacity"). Divided by the total (future) investments of all actors, this results in the community shares.

4.3 Bottom-Up Modelling Approaches

Bottom-up modelling approaches use similar quantities and final calculations, but typically build these not on (past) sector data, but on

- technological or economic potential taken from model scenarios, policy targets or own calculations ("technology data"),
- ability- or willingness-to-invest ("investment data") – often taken from surveys or experimental studies – and,
- depending on the concrete modelling approach, assumptions regarding financial structures ("financing data").

Private households, small and medium-sized enterprises (SMEs) and local authorities usually combine equity that they invest into these projects with other forms of financing and sometimes co-invest with other actors. Therefore, further assumptions regarding financing conditions and ownership structures are needed. These function as a multiplier for community equity investments derived from investment data. The product is the projected community investment. Community shares result from dividing community investments by total investments. The latter are derived from technology data, which are translated into monetary units by multiplying capacities with cost projections.

4.4 Background Paper & Further Material

You will find a more detailed explanation of the assessment of energy community potential in Background Paper #3.

You can download or find the examples displayed in the background paper here:

- Capener, P. (2014). *Community Renewable Electricity Generation: Potential Sector Growth to 2020—Methodology, Detailed Assumptions and Summary of Results, FINAL REPORT*.

- CE DELFT. (2016). *The potential of energy citizens in the European Union*.
- Edgar, J., Ahern, J., & Williams, M. (2020). *The future of community energy—A WPI Economics report for SP Energy Networks*. WPI Economics.
- Fina, B., Auer, H., & Friedl, W. (2020). Cost-optimal economic potential of shared rooftop PV in energy communities: Evidence from Austria. *Renewable Energy*, *152*, 217–228. https://doi.org/10.1016/j.renene.2020.01.031
- Fina, B., Monsberger, C., & Auer, H. (2022). A framework to estimate the large-scale impacts of energy community roll-out. *Heliyon*, *8*(7), e09905. https://doi.org/10.1016/j.heliyon.2022.e09905
- Harnmeijer, J., Parsons, M., & Julian, C. (2013). *The Community Renewables Economy – Starting up, scaling up and spinning out*. ResPublica.
- Laes, E., Anfinson, K., Krug, M., Gatta, V., Meynaerts, E., De Luca, E., Cotroneo, R., Caliano, M., Klāvs, G., Kudrenickis, I., Aakre, S., Håkon, S., Standal, K., Nowakowski, P., Wnuk, R., Azevedo, I., & Maleki, P. (2021). *Deliverable 2.2—Assessment report of potentials for RES community energy in the target regions*. COME RES.
- Pons-Seres de Brauwer, C., & Cohen, J. J. (2020). Analysing the potential of citizen-financed community renewable energy to drive Europe's low-carbon energy transition. *Renewable and Sustainable Energy Reviews*, *133*, 110300. https://doi.org/10.1016/j.rser.2020.110300

5 The Evaluation of Costs & Benefits

5.1 Overview

An analysis of potential costs and benefits is needed to justify any policy intervention. Moreover, such an assessment of costs and benefits may help to evaluate the choice of different policy instruments. Normally, policy-makers get involved when they know that what they are supporting will have a positive impact.

As outlined in the background paper, the evidence base is still quite small regarding many of the potential benefits and costs associated with energy communities. Moreover, they usually depend on the type of energy community and how this energy community is implemented. It could also depend on external factors and differ between countries and regions. Therefore, further research is needed to establish "known effects".

Principally, the evaluation of costs and benefits can build on a review of the literature or an own evaluation. We propose to use a common typology of costs and benefits based on the literature review. If the strength of effects is known from the literature or past evaluations, the evaluator can use these "factors" for the quantification of effects. For some benefits, especially "regional value added", tools have been developed that quantify effects based on literature values and specifications by evaluators for selected parameters. Own evaluations are relatively resource intensive, no matter which type of evaluation is used. Hence, the evaluation of costs and benefits may include only literature-based analyses and/or focus on selected (costs and) benefits.

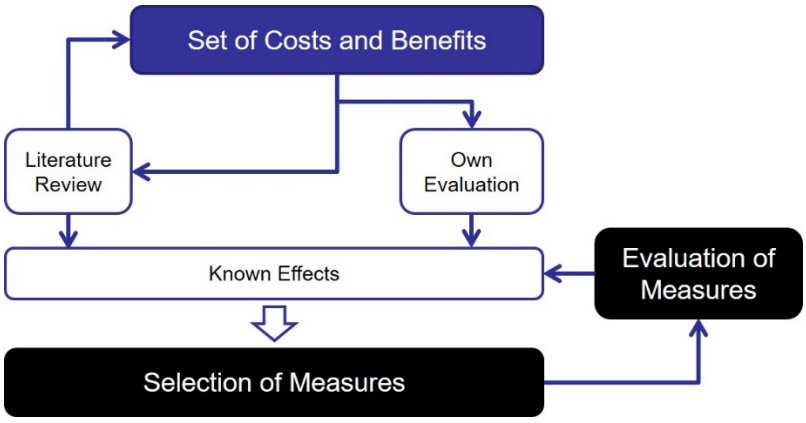

Figure 5: Process for Evaluating the Impacts

After the selection of policy measures, European Union member states should evaluate the implementation and its results. For this, they need to establish a monitoring system that ideally includes metrics of costs and benefits that could be attributed to those policies. Findings from this programme evaluation feed back into "known effects" and selection of measures.

5.2 Typology of Costs and Benefits

There are several papers reviewing the literature on impacts of energy communities (see Further Material). Typologies differ in detail, but have major elements in common. We organize our typology according to three rationales commonly ascribed to political participation: improved effectiveness, emancipation and higher legitimacy. We assign all (potential) impacts of energy communities to one of these three rationales.

Energy communities may improve **effectiveness** in various ways:

- Energy communities mobilise money and space/land. On the negative side, support programmes for energy communities cost money that could otherwise be used alternatively.
- Projects implemented by energy communities can have beneficial (or detrimental) environmental effects, especially on greenhouse gas emissions.
- A major technological aspect are effects on grids. Distributed energy technologies from RECs (as well as other market actors) can relieve the existing grid or possibly also place an additional burden on it. Furthermore, they may have an impact on the (future) grid expansion.
- Participation in an energy community may influence the behaviour of members, especially on electricity consumption.
- The literature describes various learning effects: Through their involvement in the energy community, members learn a lot about the energy sector and how to develop and operate projects. This engagement raises their awareness.

- Energy communities may contribute to technological and social innovation.
- Not often discussed, but sometimes mentioned: Energy communities add another type of actor in the energy markets and strengthen competition.
- Even less studied: A higher diversity of actors may strengthen the resilience of the energy system.

Energy communities may help members and communities to **emancipate**:

- Politically – usually discussed under the terms "energy democracy" or "energy citizenship".
- Socially – strengthened social cohesion as an effect of community engagement in the energy sector.
- Economically – higher regional or local value added and/or local development processes triggered by the activities of energy communities.
- Distributionally – if a REC can deliver electricity or heat at a lower price, especially to vulnerable households, it may contribute to combat energy poverty.

Energy communities may contribute to **legitimacy** of the energy transition and/or activities of specific businesses:

- Project-related social acceptance is said to be higher in case of community ownership (all else being equal).
- RECs may contribute to higher political acceptance and general acceptance of renewable energy technologies.
- Engaging in an energy community might help to form a positive image of a company ("license to operate").

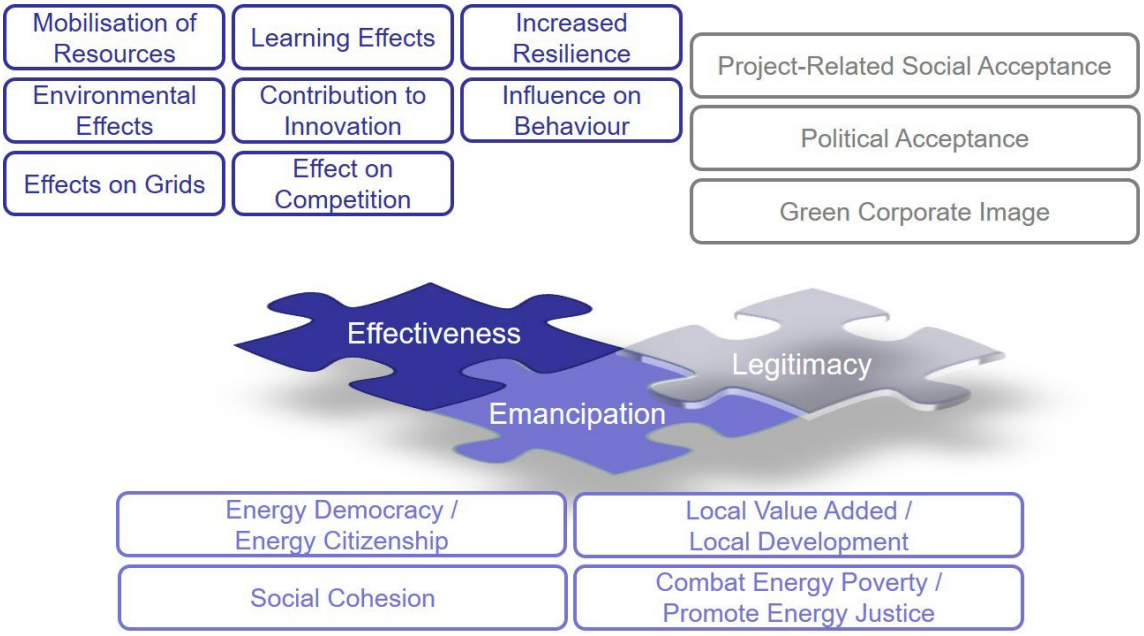

Figure 6: Typology of Costs and Benefits of Energy Communities

5.3 Background Paper & Further Material

You will find a more detailed explanation of the evaluation of costs and benefits in Background Paper #4.

You can download the list of references for your reference management software in different formats: text documents (docx, odt) or MS Excel including tags and different formats for reference management softwares (bib, rdf, ris, xml). You are free to add further references or modify these files as to your needs. We would be glad to receive updated and extended versions of the collection for use by other researchers and practitioners, which we will publish here with reference to all contributors. If you upload them yourself, please add a reference to the following doi in the repository of your choice: 10.5281/zenodo.7304891.

In our own review of the scientific literature, we identified five different literature reviews (in chronological order):

1. Hauser et al. (2015) – study for the German community energy association (in German)
2. Berka and Creamer (2018) – academic paper used as a basis for our own collection of findings
3. Busch et al. (2019) – working paper from the European research project CO2mmunity
4. Hoffmann et al. (2021) – deliverable from the European research project SocialRES
5. Standal et al. (2022) – deliverable from the European research project COME RES

(Reading the studies, you will see that not only typologies of costs and barriers vary, but so do the definitions of these two terms.)

6 The Policy Database

6.1 Overview

Based on the assessments, member states shall select policy measures to "enable" energy communities to play a role in the energy sector. Usually, measures to be chosen are developed in national policy discourses. Sometimes policy-makers take up instruments developed elsewhere and adapt them to their national contexts. Against this background, the goal of a "policy database" is to provide a list for stakeholders, especially public administrations and political decision-makers, but probably also civil-society actors lobbying for energy communities. The stakeholders can use this list of policies or strategies as a basis for their proposal of measures, which are then assessed to make the final selection.

We do not provide a full list of existing measures in different European Union member states. Rather, we recommend to build a repository of public policies and make some suggestions how to develop and structure such a repository. We propose to organise the collection around the barriers addressed by the instrument. The repository should contain summary information on the instrument. You will find an example in the following table:

Table 1: Profile of a Selected Measure

Name of Measure	Bürgerenergiefonds [Community Energy Fund] Schleswig-Holstein
Status	In force
Time of Implementation	2018
Geographical scope	Sub-national/regional: Schleswig-Holstein
Technological scope	All (GHG emission reduction)
Type of instrument	Advisory services (TA) Financing (debt, convertible to grant)
Barrier(s) addressed	Risk attitudes, Competitive situation, Equity capital from members, Debt finance from banks, Public funding & TA, Knowledge/expertise
Type of financing (if applicable)	Preferential loan (grace period: 2 years, interest rate: 2 %-points above base rate and annual increase of 0.5 %-points, amount: € 10-200T), non-refundable in case of failure Financing of preparatory measures for energy community projects (early phase)
Source of funding (if applicable)	Special fund (Bürgerenergie.SH)
Implementing agency	IB.SH/Energieagentur (state energy agency within state public bank)
Evaluations	None known
More information	https://www.ib-sh.de/produkt/buergerenergiefonds/ (German only) FA Wind (2021)

Source: FA Wind. (2021). *Bürgerenergiefonds—Bürgerenergie für mehr Akzeptanz vor Ort*. https://www.fachagentur-windenergie.de/fileadmin/files/Veroeffentlichungen/Handlungsempfehlungen/FA_Wind_Handlungsempfehlung_6_Buergerenergiefonds_09-2021.pdf

6.2 Background Paper & Further Material

You will find a more detailed explanation of the policy database in Background Paper #5.

7 Material at a Single Glance

7.1 Background Papers

- Background Paper #1: Model Assessment Structure Proposal
- Background Paper #2: Assessment of Barriers and Drivers – Review of the literature and typology of barriers and drivers for the development of energy communities
- Background Paper #3: Assessing the Potential of Energy Communities – A Comparison of Methodologies
- Background Paper #4: Assessing the Impacts of Energy Communities – An Overview of (Potential) Costs and Benefits
- Background Paper #5: Overview of Public Policies

7.2 Further Material

On the Assessment process:

- Legal basis: Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources (recast)

On the Assessment of barriers & drivers:

- Standardised survey templates in three languages – English (EN), German (DE) and Polish (PL) – in the following formats: pdf, docx, odt, xml, lss

On the Evaluation of costs & benefits:

- References with tags to be used in reference management software in different formats
- Our collection is based, with some updates, on the following journal article: Berka, A. L., & Creamer, E. (2018). Taking stock of the local impacts of community owned renewable energy: A review and research agenda. Renewable and Sustainable Energy Reviews, 82, 3400-3419. https://doi.org/10.1016/j.rser.2017.10.050. Unfortunately, the paper is not freely available online.

On the Assessment of the potential:

- Capener, P. (2014). *Community Renewable Electricity Generation: Potential Sector Growth to 2020—Methodology, Detailed Assumptions and Summary of Results, FINAL REPORT*.
- CE DELFT. (2016). *The potential of energy citizens in the European Union*.
- Edgar, J., Ahern, J., & Williams, M. (2020). *The future of community energy—A WPI Economics report for SP Energy Networks*. WPI Economics.
- Fina, B., Auer, H., & Friedl, W. (2020). Cost-optimal economic potential of shared rooftop PV in energy communities: Evidence from Austria. *Renewable Energy*, *152*, 217–228. https://doi.org/10.1016/j.renene.2020.01.031
- Fina, B., Monsberger, C., & Auer, H. (2022). A framework to estimate the large-scale impacts of energy community roll-out. *Heliyon*, *8*(7), e09905. https://doi.org/10.1016/j.heliyon.2022.e09905
- Harnmeijer, J., Parsons, M., & Julian, C. (2013). *The Community Renewables Economy – Starting up, scaling up and spinning out*. ResPublica.
- Laes, E., Anfinson, K., Krug, M., Gatta, V., Meynaerts, E., De Luca, E., Cotroneo, R., Caliano, M., Klāvs, G., Kudrenickis, I., Aakre, S., Håkon, S., Standal, K., Nowakowski, P., Wnuk, R., Azevedo, I., & Maleki, P. (2021). *Deliverable 2.2—Assessment report of potentials for RES community energy in the target regions*. COME RES.
- Pons-Seres de Brauwer, C., & Cohen, J. J. (2020). Analysing the potential of citizen-financed community renewable energy to drive Europe's low-carbon energy transition. *Renewable and Sustainable Energy Reviews*, *133*, 110300. https://doi.org/10.1016/j.rser.2020.110300

8 Acknowledgements and Feedback

Acknowledgements

This study was conducted by ECOLOG Institute on behalf of REScoop.eu and funded by the European Climate Foundation.

We thank Josh Roberts, Stavroula Pappa and Sara Tachelet from REScoop.eu for helpful comments and suggestions to a first draft. We take all responsibility for remaining mistakes.

Corresponding Author & Contact Details

Dr. Lars Holstenkamp

ECOLOG Institute for Social-Ecological Research and Education

Wichernstraße 34, Entrance B

21335 Lüneburg

Germany

lars.holstenkamp@ecolog-institut.de

https://www.ecolog-institut.de/

Persistent Identifier

doi:10.5281/zenodo.7474277