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

## Assessment of Barriers and Drivers for Energy Communities: Literature Review (Background Paper #2)

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**Abbreviations**

| | | | |
|---|---|---|---|
| DSO | distribution system operator | MLP | Multi-Level Perspective |
| EU | European Union | MS | Member State |
| FiP | feed-in premium | REC | renewable energy community |
| FiT | feed-in tariff | RED II | recast Renewable Energy Directive |
| MA | model assessment | SNM | Strategic Niche Management |

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# 1 Context

In the recast Renewable Energy Directive (RED II), the European Union (EU) urges Member States (MS) to assess potential of and barriers for renewable energy communities. The Oxford Learner's Dictionary defines a **barrier** as "a problem, rule or situation that prevents somebody from doing something, or that makes something impossible" (Oxford University Press, 2022a). Synonyms and related words are (Merriam-Webster, Inc., 2022b): ***constraint, hindrance, holdback, hurdle, impediment, inhibition, obstacle, obstruction, restraint, stumbling block***; also: ***burden, disadvantage*** or ***handicap***; with a more constructive tone: ***challenge***. Many of these terms are used in the literature to describe what we will explore in this deliverable. Some of these barriers are already mentioned in RED II, Art. 22(4):

> *"That framework shall ensure, inter alia, that:*
>
> *(a) unjustified regulatory and administrative barriers to renewable energy communities are removed;*
> *(b) renewable energy communities that supply energy or provide aggregation or other commercial energy services are subject to the provisions relevant for such activities;*
> *(c) the relevant distribution system operator cooperates with renewable energy communities to facilitate energy transfers within renewable energy communities;*
> *(d) renewable energy communities are subject to fair, proportionate and transparent procedures, including registration and licensing procedures, and cost-reflective network charges, as well as relevant charges, levies and taxes, ensuring that they contribute, in an adequate, fair and balanced way, to the overall cost sharing of the system in line with a transparent cost-benefit analysis of distributed energy sources developed by the national competent authorities;*
> *(e) renewable energy communities are not subject to discriminatory treatment with regard to their activities, rights and obligations as final customers, producers, suppliers, distribution system operators, or as other market participants;*
> *(f) the participation in the renewable energy communities is accessible to all consumers, including those in low-income or vulnerable households;*
> *(g) tools to facilitate access to finance and information are available;*
> *(h) regulatory and capacity-building support is provided to public authorities in enabling and setting up renewable energy communities, and in helping authorities to participate directly;*
> *(i) rules to secure the equal and non-discriminatory treatment of consumers that participate in the renewable energy community are in place."*

The main idea behind this provision is to create a "level playing field" for energy communities in the energy markets. Going beyond this, renewable energy communities (RECs) shall be promoted at national level. Therefore, lit. (a) to (i) mainly address regulatory barriers. In addition, the relation between energy communities and Distribution System Operators (DSOs), access to finance and to information, and assistance for local authorities to participate in energy communities are mentioned. Moreover, the list includes the issue of energy poverty.

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. In the literature, the drivers which promote the establishment of energy communities are often examined together with benefits stemming from energy communities (Busch et al., 2019; Ruggiero et al., 2019; Standal et al., 2022). We will distinguish both terms here, since qualifying or quantifying benefits is the object of a separate step in the assessment process – and hence gets a separate treatment in an own Background Paper #4. Merriam-Webster defines a driver as "one that provides impulse or motivation" (Merriam-Webster, Inc., 2022a). In the Oxford Learner's Dictionary it is defined as "one of the main things that influence something or cause it to make progress" (Oxford University Press, 2022b). We will use the term in this latter sense. Often, drivers and barriers describe the same factor – just with the opposite sign or direction of effect: Intermediaries may drive the development of energy communities. A lack of intermediaries is a major barrier to it.

For a typology of barriers and drivers, we build on a review of the literature, previous projects and an ongoing meta-analysis of bottom-up models in all EU MS. The final list goes far beyond regulatory factors, i.e. factors that can be influenced by the state. Nevertheless, a member state could try to identify measures to assist even in those cases where it does not have direct influence.

The Model Assessment (MA) template includes

(a) A list of typical barriers and drivers and

(b) A note on how to assess the magnitude or severity in a specific country context.

In the second step of the MA project, we applied a selected method for the two countries chosen, Germany and Poland, to demonstrate the application of it and revise the MA template as needed. The draft list of barriers was also tested with an international audience.

# 2 Typology of Barriers – A Literature Review

## 2.1 Theoretical Basis vs. Eclectical Approaches

Several authors have reviewed barriers and drivers for **energy communities** or – as it is often called in the English-speaking world and international literature – **community energy**. We briefly review this literature here, especially the typologies developed. In their assessments, EU MS could principally use any of these typologies of barriers and drivers. Most of them are eclectic in nature and do not follow a specific line of theory. Rather, they combine findings from different empirical investigations into a kind of "framework". The scientific status of these frameworks usually stays vague.

"Barriers" and "drivers" could be organised using different theoretical frameworks, e.g. transition theories or socio-ecological systems frameworks and related "design principles". Various frameworks to describe and explain sustainability transitions have been developed. Community energy scholars have applied some of them such as Strategic Niche Management (SNM) (Seyfang et al., 2014) or the Multi-Level Perspective (MLP) (Prados et al., 2022; Wainstein & Bumpus, 2016). The frameworks highlight certain structures and processes and their relations that could help to build a better understanding of strategies to overcome the barriers and install or strengthen drivers. Institutional analysts have worked out "principles" under which community solutions work. Ostrom has labeled them "design principles" (Cox et al., 2010; Ostrom, 1990, 2005). Several authors have applied these frameworks to the energy sector (Acosta et al., 2018; Bauwens, 2017; Bauwens et al., 2016; Gollwitzer et al., 2018).

These perspectives could be used to inform a typology of barriers and drivers for energy communities. As the literature that we review in this paper is more exploratory and none of the articles and reports uses any of the theories mentioned, we would propose to start with an eclectic approach until more theoretically founded typologies have been developed.

## 2.2 Overview

In the following, we will summarise barriers and drivers to energy communities (or community energy) that are studied and listed in selected papers:

- Walker (2008) is an example of the "early" work on community energy in the UK.
- Friends of the Earth Europe (2021) is a recent policy paper that deals with the question.
- Journal articles from Brummer (2018), the Co2mmunity research consortium (Busch et al., 2021; Ruggiero et al., 2021) and the COME RES project (Standal et al., 2022) present recent literature reviews on the issue of barriers and drivers.
- Bauwens et al. (2016) extent these lists from an institutional perspective.

In addition, the literature deals with some barriers on the individual level (see Subsection 2.4). Lastly, we summarise findings from another research project in which we investigate barriers that municipalities face when investing into renewable energies, as energy communities could also include municipality-led projects, not only citizen-led ones (see Subsection 2.5).

## 2.3 Selected Works

### *2.3.1 Walker (2008)*

Walker (2008) identifies different incentives and barriers for the development of community renewable energy projects in the UK. Main barriers from his analysis are summarised in Table 1. He begins with resources, i.e. personal capacities (knowledge and expertise) and public financial support. In addition to this, he stresses the need for key committed persons and support from local institutions, problems with market and grid access and local controversies around renewable energy projects.

*Table 1: Barriers for Community Renewable Energy Projects according to Walker (2008)*

| Barrier | Explanations |
|---|---|
| Lack of knowledge/expertise | Capacities for project development and long-term maintenance of the projects<br>Lack of intermediaries that could mitigate this problem |
| Lack of funding | Availability of subsidies/concessional funding<br>Instability, need to combine money from different sources, high competition for funding |
| Lack of local support | Absence of key committed individuals/entrepreneurs<br>No supportive local institutions |
| Market entry | Unwillingness of network operators to grant grid access, costs of trading, difficult access to green power certificates. |
| Network connection | No incentives for grid operators to connect small installations |
| Local controversies | Depending on level of participation |

### *2.3.2 Friends of the Earth Europe (2021)*

Friends of the Earth Europe (2021) focus on the negative side, i.e. on factors that prevent the energy community sector from flourishing. They distinguish between "barriers" that hinder communities to develop RECs and "threats" that endanger existing RECs and the development of new projects by them (see Table 2). Even if we do not take it up here, this distinction could be used in expert interviews and surveys.

Compared with Walker (2008), their understanding of "access to financial capital" extends beyond public support to more general barriers in getting external capital, especially in the face of lack of equity from REC members. Moreover, the paper includes more legal barriers (prohibitive rules, definition of RECs) and bureaucracy as barrier.

*Table 2: Barriers and Threats according to Friends of the Earth Europe (2021)*

| Barriers | Threats |
|---|---|
| Inadequate grid access | Switch from feed-in tariffs/support schemes to auctions |
| Difficulty accessing financial capital | Poor definition of energy communities |
| Problematic legal framework | Nimbyism and local backlash against renewable energy |
| Burdensome bureaucracy and permitting | |

### *2.3.3 Co2mmunity Project Outputs*

In the following, we briefly summarise two papers from the Co2mmunity project funded by the EU under the INTERREG-Baltic Sea Region programme: Busch et al. (2021) and Ruggiero et al. (2021).

Busch et al. (2021) identify ***feed-in tariffs*** (FiTs) as the main policy tool that can be used to promote community energy policies and assign a particular role to ***intermediaries*** in terms of policy learning and coordination. Furthermore, they investigate policy barriers or "challenges", as they call them, and summarize these under the following headings: directionality (i.e. breakdown of global targets), demand articulation (i.e. type of support that enables economic viability), (space for) experimentation and policy learning & coordination challenge. We briefly describe these barriers in Table 3.

*Table 3: Challenges according to Busch et al. (2021)*

| Category | Explanations |
|---|---|
| Directionality | Global and national sustainability visions and targets to be broken down to the regional/local level ⇒ increases ambition of local people and companies to organize and become active in RECs. |
| Demand articulation | Forms of FiTs and subsidies designed to support RECs and ensure long-term economic operation of plants |
| Experimentation | Local RECs need opportunity to experiment institutionally and economically to develop business model that is best suited for them.<br>Intermediaries play particularly important role here, as they can provide support in this process and create spillover effects |
| Policy learning and coordination challenge | Policymakers & RECs benefit from intensive exchange and closely coordinated demand-benefit analysis. But: time-delayed feedback and adjustments at both political and market levels to be taken into consideration. |

Ruggiero et al. (2021) distinguish six "contextual factors" that they use to compare the development of community energy in the Baltic Sea region:

1. Visions;
2. Formal institutions;
3. Informal institutions;
4. Natural resource endowments;
5. Technological specialisations; and
6. Socio-economic conditions.

*Table 4: Contextual Factors according to Ruggiero et al. (2021)*

| Contextual Factor | Synonym/Related Concept | Comments |
|---|---|---|
| Vision | Narrative | Dominant vision for energy sector development<br>Does a vision for energy communities and their role in the energy sector exist?<br>Often contested visions |
| Formal institutions | Mainly: support scheme | Favourable = driver: FiT/FiP, grants/loans, tax incentives<br>Detrimental = barrier: auctions |
| Informal institutions | Traditions, customs, cultures of civic engagement, trust/social capital, community cohesion | The development of energy systems is influenced by geographically determined cultural differences<br>Informal institutions also include cultures of civic engagement |
| Natural resource endowments | Incentives and necessity | Regional availability of renewable energy sources<br>Creation of energy security in the absence of natural fossil resources |
| Technological specialisations | Knowledge spill-overs | Political support for local industrial specialisations<br>Knowledge spill-overs to civil society |
| Socio-economic conditions | Disposable income, education, knowledge of renewables, insight into energy issues | Level of disposable income a key factor for the development of energy communities |
| Local champions | Individuals with a prominent motivational role | Local champions promote the development of energy communities<br>The extent of their impact is unclear |
| Intermediaries | Promotion of information exchange via networking | Organisations or individuals that promote the exchange of best practices and information<br>They cooperate with local authorities and have access to wide-ranging networks |

FiP = feed-in premium, FiT = feed-in tariff

In addition, they highlight the role of agency, especially the role played by "local champions", i.e. individuals with a prominent role in the promotion of community energy, and "intermediaries". We summarise these factors in Table 4.

### *2.3.4 Brummer (2018)*

In his literature-based assessment of barriers, Brummer (2018) uses a typology developed by Weber (1997) who distinguishes between institutional, market, organisational and behavioural barriers. Brummer groups factors that he identifies in the literature and assigns them to these four categories, thereby reworking this typology slightly. He ends up with the following list:

1) Organisational issues/legal framework/planning requirement [= organisational & institutional]: dependency on volunteers, high transaction costs, small firms do not generate enough surplus, financial regulations, regulations make setting up community energy extremely difficult
2) Discrimination in favour of big companies, incumbents [= market]: market structure, legal framework, grant schemes favour big companies, grid connection costs
3) Lack of institutional and political support [= institutional]: community energy is not on political agenda, risk of loosing community support by growing too big, policy is complex and changes often, CRI dissolved, FiT limitations, financial authority doubts cooperativeness of community energy
4) Skepticism about community energy/Not-In-My-Backyard (NIMBY) opposition [= behavioural]: renewable energy reliability skepticism, wait and see attitude, lack of interest, nature conservation opposition to renewable energy, collective action problem/benefit distribution, perception of renewable energy community democratic governance as ineffective or negative, demographic development (elderly have no interest), free-riding behaviour lessens motivation
5) Lack of resources/expertise/resilience [= various]: lack of long-term funding, initial financing problems, high institutional costs of cooperatives, uncertain FiT levels, no government-backed bank funding, low resilience (legal changes, business risks), professionals cost money, communication and networking is resource-intensive
6) Saturation effect [= unclear/no relation]: people are already engaged, no new projects realisable

As can be seen from the list, the categorisations are not without overlaps. Therefore, we group them somewhat differently here (see Table 5).

*Table 5: Regrouped Barriers according to Brummer (2018)*

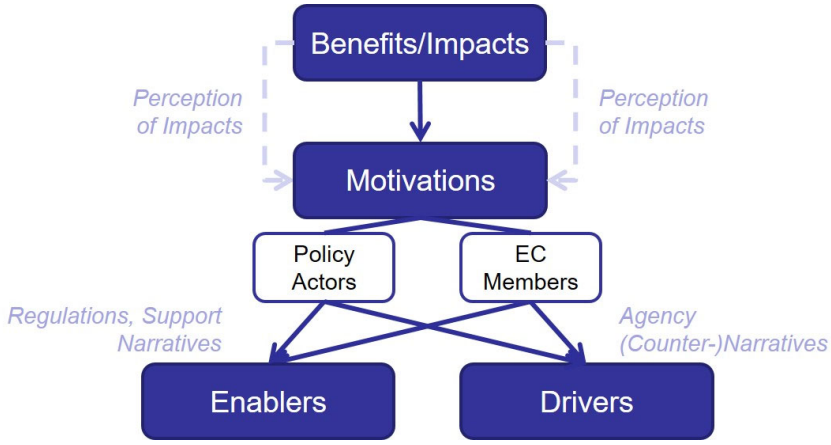
| **Category (Weber, 1997)** | **Barrier (Grouped)** | **Comments/Explanations** |
|---|---|---|
| Institutional | Organisational issues/legal framework/planning requirement<br>Lack of institutional and political support<br>Lack of resources/expertise/resilience | Lack of resources in the form of expertise, practical experience, and financial support can represent significant barriers and prevent professional support. |
| Market | Discrimination in favour of big companies, incumbents | Large and already established companies in the market often benefit from grant schemes. Partly, incumbents do not have incentives to connect small producers or even actively hinder new entrants. |
| Organisational | Organisational issues/legal framework/planning requirement<br>Lack of resources/expertise/resilience | Complex planning and application procedures as well as complex legal parameters pose challenges that are difficult to overcome, especially for smaller renewable energy cooperatives. |
| Behavioural | Skepticism about community energy/Not-In-My-Backyard (NIMBY) opposition<br>Lack of resources/expertise/resilience<br>Saturation effect | Behavioral factors of individuals, but also of groups could slow down and prevent the development of renewable energies and energy communities. The lack of expert knowledge, but also saturation effects, can be a decisive factor. |

### *2.3.5 The COME RES Typology*

*As part of the COME RES project, Standal et al. (2022) analyse barriers and drivers for renewable energy communities. However, they seem to have a somewhat different understanding of the term "driver", as they (partly) equate it with benefits from – or generally: impacts of – energy communities and with motivational factors. As we dedicate a separate background paper to benefits/impacts, we would exclude them here. Moreover, we acknowledge that*

*environmental motivations may drive people to engage in community energy initiatives and that this kind of agency is important. Therefore, we summarise motivational factors below in 2.4. Taking the context of this analysis into account, however, we differentiate between individual level "drivers" or motivations and more structural, meso- or macro-level factors. At one point in their deliverable, Standal et al. make a difference between "drivers" and "enablers", which might also be helpful in some contexts. We can understand "enablers" as factors that make the foundation of energy communities possible, whereas drivers help to scale up the sector. We depict the relation between those concepts in EC: Energy Community*

Figure 1.




*EC: Energy Community*

*Figure 1: Relation between Benefits, Motivations and Drivers/Enablers*

*In the following, we will therefore concentrate on those factors – drivers/enablers and barriers – that can be located on this meso-/macro-level below in EC: Energy Community*

Figure 1. Hence, we partly take out factors and regroup some listed in Standal et al. (2022).

*Table 6: Reorganised Barriers and Drivers Included in Standal et al. (2022)*

| Category | Factor | Barrier | Driver |
|---|---|---|---|
| Economic & market aspects | Access to credit/finance | Bad/no access, high costs | Good access, low interest rates<br>Finance from external partners |
| | Support schemes/financial incentives | Lack of business models | |
| | Market aspects | Volatile prices<br>Grid tariffs | Emergence of (local) flexibility markets |
| | Competitive position | Competitive disadvantages vis-à-vis larger players | |
| Social & cultural aspects | Acceptance of RECs | Conservatism<br>Lack of experience (historical roots): sharing, common ownership<br>Lack of trust in models<br>Socialist heritage | Awareness of community energy as concept<br>Information campagins, training, capacity building |
| | Acceptance of RES | Resistance to RES technologies, esp. wind power | |
| | Leadership skills | | Competent local leader(s) |
| | Existing energy system | No "urgency" of change | |
| | National & local discourses (RES & RECs) | Centralised energy supply narrative<br>Unclear role for RECs<br>Lack of political focus | Energy poverty discourse: RECs perceived as solution |
| Legal aspects & regulatory framework | Legal definition of RECs | Unclear definitions<br>Implementation gaps | |
| | Licensing, planning, environmental laws | Cumbersome regulatory requirements<br>No energy sharing possible | |
| | Regulation of power system | Lack of stability<br>Reluctance to change legislation<br>No level of experimentation | |

| | | | |
|---|---|---|---|
| Networking & organisation | Cooperation | Lack of trust in actors/processes | Experienced partners<br>Social networks |
| | Knowledge/competences | Lack of competences/assets/capabilities | Local authorities & service providers<br>Intermediaries<br>Examples/"local champions"<br>Pilot projects & dissemination |
| | Decision-making | Long procedures/high quorum<br>Internal conflicts (heterogeneity) | |
| | Available time | Lack of time | |
| | Agency | | |

### *2.3.6 Bauwens et al. (2016)*

Bauwens et al. (2016) examine the changing role of energy communities in the wind sector in Denmark, Germany, Belgium, and the UK by considering the energy system as a social-ecological system. The study reveals that energy communities are facing pressures due to changes in regulations, which pose new challenges for the energy sector as a whole. Accordingly, energy communities are facing an increasingly hostile environment in which they are at a disadvantage compared to conventional actors. Additionally, they see themselves forced to perform strategic adjustments in order to ensure their long-term existence on the energy market. Among the countries considered, the identified factors differ in their effects and characteristics, but can be summarised as done in Table 7. A distinction between barriers and drivers is not always distinctly possible at this point, as positive factors can also turn out to be facilitating factors (drivers) and vice versa (barriers). This is expressed via the "effect" column.

*Table 7: Barriers according to Bauwens et al. (2016)*

| **Factor** | **Effect** | **Explanations** |
|---|---|---|
| Support mechanisms | Barrier | Renewable energy communities often do not have access to the same technologies as large energy suppliers and are therefore not competitive. This disadvantage should be compensated by feed-in tariffs and special support measures, for example. |
| Planning policies | Barrier | Extensive planning regulations make it difficult, especially for small renewable energy communities, to realize their project. In addition, there is the high planning risk for each individual member. Opening up participation to other citizens and the resulting capital accumulation can minimize this risk. |
| Attitudes toward the cooperative model | Barrier/ Driver | Demand for and the success of renewable energy communities depends largely on the relationship of the population to this form of community-based organization. In other words, negative relationships and past experiences can be critical to the success or failure of the project. |
| Local energy activism | Barrier/ Driver | The emergence of local environmental movements, such as the anti-nuclear movement, promote acceptance and motivation to form renewable energy communities. It may represent a manifestation of the previously by protests expressed dissatisfaction. |

## 2.4 Individual-Level Factors

Some of the previous lists of barriers and drivers already mention factors that prevent or motivate individual households from/to participating in community energy. As mentioned at the beginning, the RED II also refers to energy poverty and a lack of monetary resources for some households. Koirala et al. (2018) ask respondents about the perceived barriers to participate: Lack of time (37%), lack of financial resources (18%) and satisfaction with the current energy system (16%) rank highest among the answers. According to Balcombe et al. the age of individuals is particularly important in the context of barriers and motivation analysis, as needs and circumstances vary depending on the individuals' life stage (Balcombe et al., 2013). In their work, Bomberg and McEwen conclude that for long-term and consistent sustainable energy communities, structural factors (e.g. administrative support and financial incentives) are not the only factors which have to be provided by the government. Rather, symbolic resources and direct support of local motivations are also needed (Bomberg & McEwen, 2012). However, this requires a comprehensive understanding of individual motivations and addressing them directly.

On the latter topic, various studies using different methods exist: qualitative interviews, often in the context of case studies, direct elicitation through surveys or choice experiments (Bauwens, 2016; Dóci & Vasileiadou, 2015; Ebers Broughel & Hampl, 2018; Hicks & Ison, 2018; Hoffman & High-Pippert, 2010; Holstenkamp & Kahla, 2016; Sloot et al., 2019). In most cases, studies find that ecological, social/political/normative and financial motives are present at the same time, though to a different degree or with different emphasis. When presented with different motives, investors tend to indicate that ecological and, partly, social/political considerations dominate financial motives. There are also some cases, where private investors from the region are motivated mainly financially (return or cheap energy supply) (Fleiß et al., 2017; Hatzl et al., 2016) and ecological or other motives are added as additional "side conditions" or classified as mere subordinate "drivers" (Ruggiero et al., 2019). Moreover, the literature discusses differences between type of members, women vs men, size of the initiative/company or legal structures (Holstenkamp & Kahla, 2016). Similarly, the motivation for small and medium-sized enterprises (SMEs) to participate in energy communities varies – from financial over public image to social and political engagement (Standal et al., 2022).

Motivations to participate in energy communities are important for the discussion of drivers and barriers not only because they influence "agency" as a major driver and the development of (counter-)narratives, as depicted in Figure 1. There is also a link to the magnitude of barriers and drivers – to give an example: the more profit- or economically oriented the members, the more important are regulations that determine returns on investment.

### 2.5 Barriers and Drivers for Municipalities

In the context of various interviews and surveys with municipal decision-makers, the ECOLOG Institute identifies a large number of municipal barriers regarding the participation of municipalities in local renewable energy projects in Germany. We add and briefly discuss some further factors based on other research projects:

- Perceived lack of economic efficiency – often without knowledge of the actual economic efficiency
- Missing pressure from superior institutions due to missing goals and legal as well as sublegal obligations (region, state, federal government, EU)
- Missing self-interest or intrinsic motivation (sustainability, environmental/climate protection, technical fascination)
- Time-consuming application for funding (especially due to lack of personnel and lack of qualification – which is a barrier in itself), lack of funding or advice
- Fear of change or rejection of new things (risk aversion) in local politics and/or local administration
- No awareness of the problem of climate change/climate protection and security of supply at the decision-making level
- Social resistance (almost exclusively in the case of large-scale wind and increasingly ground-mounted solar PV plants), also due to inadequate communication
- Protection of historical monuments and listed area statutes
- Thinking in terms of fossil fuels, especially in communities or regions economically influenced by fossil fuels
- Nature conservation/species protection (almost exclusively in wind energy projects)

As such, these factors somewhat resemble barriers described for energy communities. While the focus in the underlying research project is on Germany, most results are applicable in all EU MSs. In some countries legal forms available for municipalities to participate in economic life are also a barrier. Even if this was not mentioned in German interviews, this points at an issue that may lead to controversies between municipalities and their supervisory bodies: when and how are municipalities allowed to take part in economic life, potentially competing with private companies.

Besides barriers, the ECOLOG Institute has also compiled a variety of drivers for municipalities through literature review and interviews with experts and selected municipalities. In the "Benefits"[1] project, we distinguish between factors that positively influence municipalities' willingness to engage financially in renewable energy projects ("positive factors") and factors that would further drive municipalities' financial engagement ("promoting factors") (see Table 8).

[1] Official title of the project: "Beschleunigung der Energiewende durch die Erweiterung der finanziellen Teilhabe kommunaler und privater Stakeholder"; grant number 03EI5203A-E, duration: 01.01.2020 to 30.11.2022.

*Table 8: Factors Driving Municipal Financial Engagement in Renewable Energies (Source: Benefits Project)*

| Level | Positive Factor | Promoting Factor |
|---|---|---|
| Personal | Committed, prominent individual actors | |
| | Existing expertise on the part of the decision-makers (local politics, administration) | Promotion of knowledge, courage and openness on the part of decision-makers and other actors |
| | Personal or personally conveyed positive experiences with comparable projects | |
| Organisational | Existence of a strategic energy concept | Dissemination of positive examples of financial commitment and inter-municipal cooperation |
| | Early involvement of influential actors | Inter-municipal support, e.g. support in heat planning by experienced municipalities |
| | Participation of local/regional SMEs | Financing technical advice for RE on own properties |
| | Personnel and financial resources | |
| | (Free) expert advice | Support with applications for subsidies, funding of appropriate advice |
| | | Creation/dissemination of action guidelines for municipalities and municipal utilities |
| Economic | Subsidies | Improved financial resources |
| | Local/regional value added effects | Change in the EEG: return to the former subsidy via the electricity price, instead of complicated crediting procedures related to own consumption |
| | Municipal revenues | No crediting of profitable investments to the possible credit limit of the municipalities by the municipal supervision |
| | $CO_2$ pricing | |
| Societal | Active citizens in favour of energy transition | |
| | Positive public opinion/public pressure | Enabling especially voluntary municipal actors to communicate energy transition goals and projects to the local population |
| | Favourable or at least neutral press coverage | Positive change in public opinion, press coverage |

# 3 Proposed List of Barriers and Drivers for the Assessment – a Synthesis

## 3.1 Typology

We group the above mentioned barriers and drivers into four categories:

1. Business case and legal framework: factors that directly influence the profitability of projects
2. Market access & structure: factors that technically or economically enable or constrain the access to markets to do business
3. Informal institutions and conflicts: "social" or "cultural" and "behavioural" factors listed in the literature
4. Resources: internal, production factors and those relevant for the organisation of the production process

In the figures that follow, we indicate by repeating individual factors from other groups that these four groups do not represent self-contained categories, which can be clearly delineated at all times and in all cases. There are various links between the groups and some overlaps.

The first groups summarise all legal and economic aspects. Hence, a different typology would probably differentiate barriers and drivers along these two disciplines. Due to the highly regulated character of energy markets, legal issues play the central role in the profitability of business ideas – they directly translate into economic viability or financial returns. We put factors that define the structure of and access to markets as well as the behaviour of players within these structures into a second group – also for practical reasons as a combined group would be too large to handle in the assessment. Laws and changes in legal settings are decided in political processes that link these formal institutions with informal institutions, in which they are embedded. This may describe the link between Groups #1/#2 and Group #3.

Embeddedness is probably also the right way to describe the relation between Group #3 and #4. Trust, for instance, is a necessary ingredient in any (successful) cooperation. Low levels of trust therefore have a negative effect on the cooperation capacities of energy communities (Group #4) – beyond its direct effect on the emergence of energy communities (Group #3).

## 3.2 Description of the Four Groups of Barriers and Drivers

### *3.2.1 Business Case and Legal Framework*

Several factors directly affect the risk-return profile of the investment by energy communities, most importantly natural resource endowments and legal framework. Overall, energy communities are described as relatively risk averse in the literature: As a reaction to risk aversion of their members they tend to focus on relatively secure projects. Moreover, they usually have less possibilities to diversify risks with smaller and fewer projects and usually a more narrow geographical focus than commercial private developers. Hence, the risk-return profile of the projects must fit risk preferences of the energy communities in order for it to make a business case. Legal aspects that we include here are (for grid-related and licensing see next section):

- Support schemes for renewable energies (FiTs/FiPs, quota systems, net metering, auctions), its form, complexity, stability, support level and size/volume;
- Planning policies, environmental laws and heritage conservation, with the length and uncertainty of procedures as two relevant dimensions;
- Taxes, surcharges and fees that apply to specific types of projects and constellations.

All three areas together determine the extent to which there is room for experimentation. Moreover, we add:

- Breakdown of targets, which are usually formalised in the objectives provisions of laws.

Targets are an indication of policy support, which we posit as a “linking element” between formal (Group #1) and informal institutions (Group #3). Policy support and change in policies may further be induced by energy prices, most prominently still oil and natural gas prices, and by catastrophic events.

Factors and relations are illustrated in Figure 2.

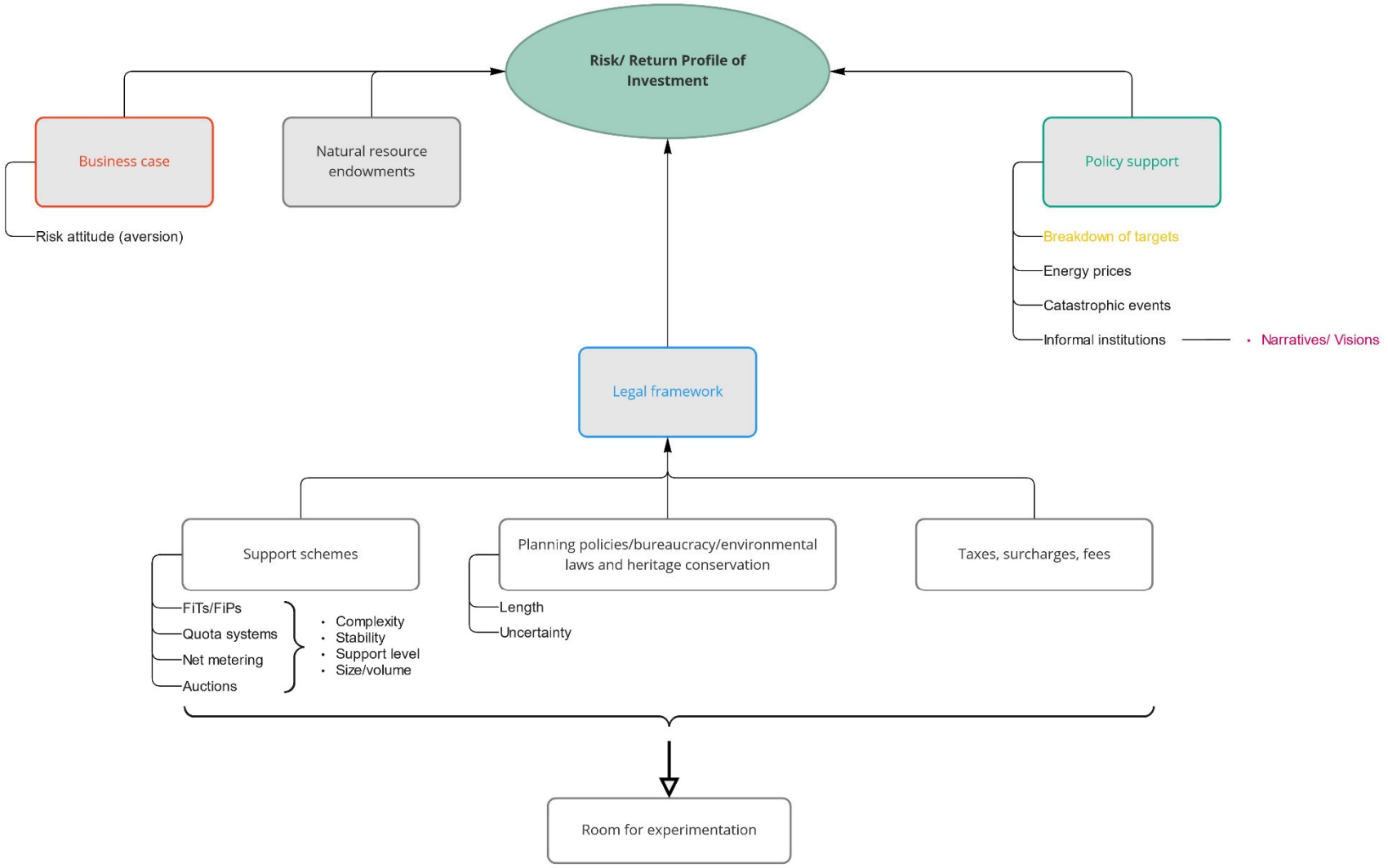



*Figure 2: Barriers & Drivers for Energy Communities, Group #1 – Business Case & Legal Framework*

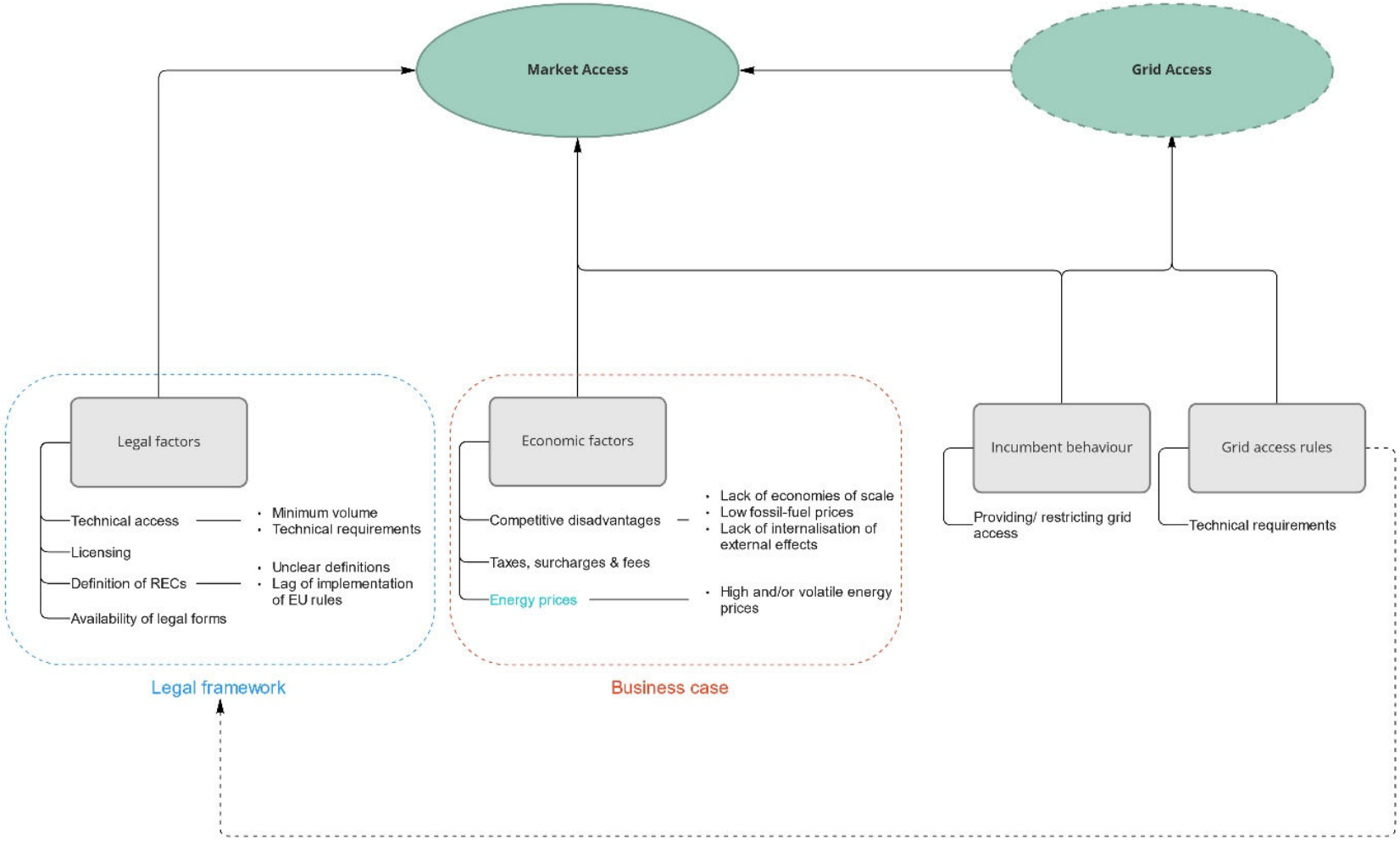



*Figure 3: Barriers & Drivers for Energy Communities, Group #2 – Market Access*

### *3.2.2 Market Access*

In the second group, we summarise all factors that facilitate or impede entry into the energy markets for energy communities. As this is highlighted in the literature reviewed above, we pay special attention to grid access. Factors can be of legal nature, lie in the economic structure of the business or be due to incumbent behaviour:

- Legal factors, including technical access rules (e.g. minimum volume, technical requirements for grid connection), licensing, definition of RECs (barriers being unclear definitions or lag in implementation of EU rules) and availability of legal forms;
- Economic factors, mainly competitive disadvantages due to a lack of economies of scale or disadvantages vis-à-vis other energy technologies as a result of low fossil-fuel prices and lack of internalisation of external effects (e.g. low carbon prices/taxes);
- Behavioural factors, especially incumbent behaviour within energy markets or providing/restricting grid access.

Legal factors can be considered part of the legal framwework (see Group #1). The economic factors are obviously related to the business case of energy communities. Energy prices and their developments influence not only the competitive position (Group #2), but also policies (Group #3) and may induce change in narratives or policy visions (Group #3).

Factors and relations are illustrated in Figure 3.

### *3.2.3 Informal Institutions & Conflicts*

Our third group of factors that impede (barriers) or facilitate (drivers) the development of energy communities is a heterogenous collection of three sub-groups: informal institutions and cultural aspects, political narratives and visions and local conflicts. Under the first term, we summarise the following factors:

- Historical legacy, most importantly experiences in the past with collective organisations or the cooperative model in former socialist countries and fossil-fuel economies that keep a region or nation “locked in” (Unruh, 2000, 2002);
- Culture of local energy activism, which is somewhat related to the previous factor and fuelled by perceived urgency of change vs. satisfaction with the current energy system
- Social capital and trust, building on common values, which is important for forming a culture of local energy activism and for cooperation (see Group #4) and which is certainly linked to historical experiences.

Political narratives and visions form the second sub-group. The literature distinguishes general national and local energy discourses from the role attached to RECs.

Lastly, local conflicts about renewable energy projects and a lack of social acceptance of renewable energy technologies are added as a third sub-group. For a brief review of the literature on social acceptance see also the Background Paper #4 – energy communities are said to increase social acceptance locally. There are several factors influencing social acceptance, including saturation effects and the perceived urgency of change.

Factors and relations are illustrated in Figure 4. There are various strands of the academic literature that discuss parts or a combination of these factors and relations, e.g. the literature on social innovation.

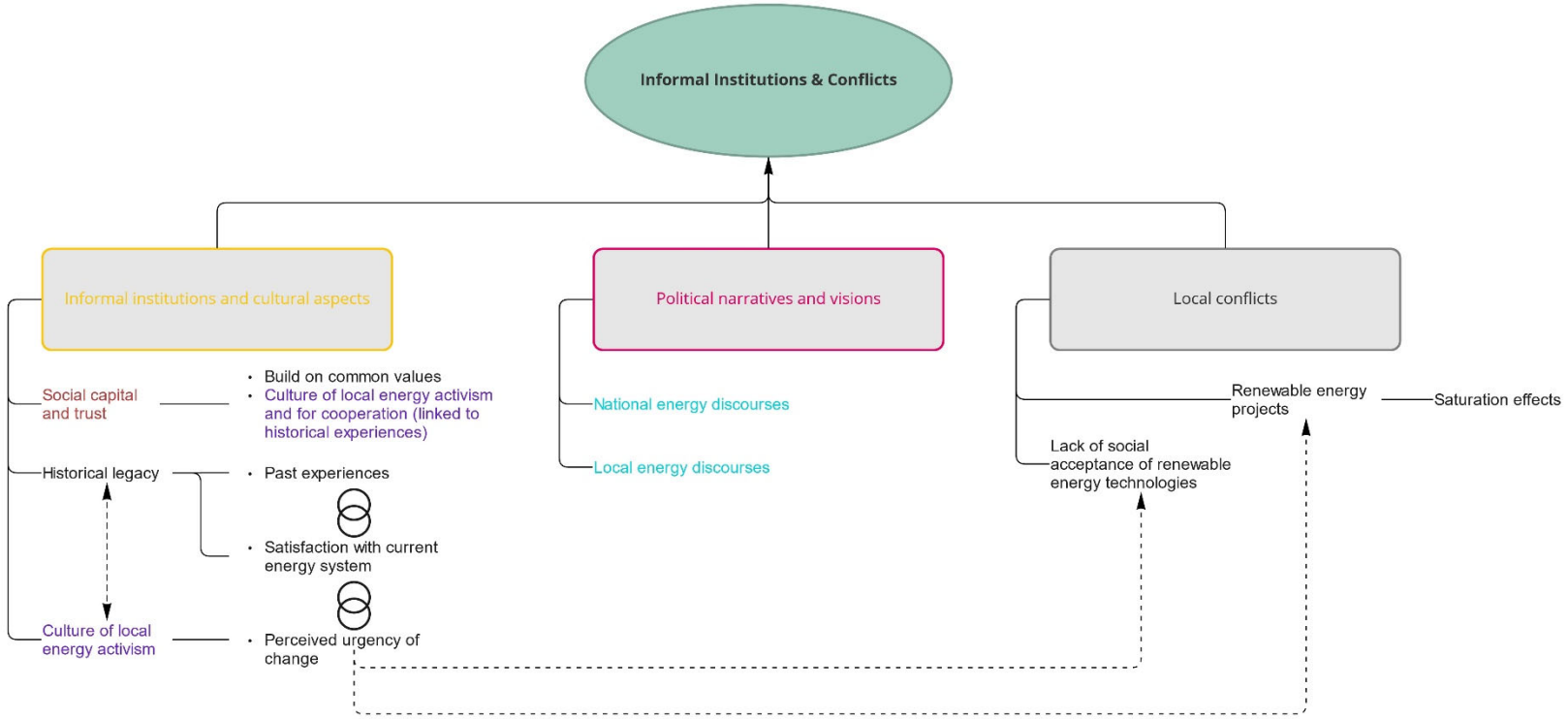



*Figure 4: Barriers & Drivers for Energy Communities, Group #3 – Informal Institutions & Conflicts*

### *3.2.4 Resources*

Within Group #4, we summarise factors that are used as input in the production process ("resources"):

- Financial resources, including equity financing from members, public funding and private external financing, especially loans from banks;
- Human resources, i.e. knowledgeable staff, committed individuals and time that can be dedicated to the activities of the energy communities;
- Cooperation and public technical assistance as a strategy to overcome bottlenecks in financial and human resources.

The availability of equity capital from members depends on socio-economic conditions (i.e. their ability to invest), but also the culture of local energy activism. Dimensions of public funding are availability, (in-)stability, amount and competition. Access for energy communities to public funds partly depends on knowledge or expertise of members in this area, especially if there is high competition within these programmes. Depending on the type of financial system and its stage of development, different financial institutions may or may not provide external capital to finance energy communities' projects. The financial intermediaries can have more or less experience with RECs, easing the access to funds or making it difficult to collect external capital.

Most energy communities in Europe rely heavily on voluntary work. Professionalisation could be a strategy to "buy in" knowledge and expertise from outside or pay for (more) time that committed members can dedicate to their work within the energy community. So-called "mission drift" is a potential danger of this strategy if energy communities become "normal" energy companies and somewhat lose their roots in the communities and their social targets (Horstink et al., 2020). Standal et al., among others, mention pilot projects and well documented cases, i.e. "role models" or "local champions", to overcome some of the knowledge-based challenges of energy communities.

Cooperation with others is another potential strategy to overcome resource bottlenecks. Partners could be intermediaries, local authorities or other local players. "Intermediary" means any entity, e.g. non-governmental organisation, non-profit organisation or private company that facilitates in developing and implementing the businesses of energy communities. Trust between partners and a common goal or vision are two necessary conditions for cooperation to work. On the other hand, experienced partners may increase the trust of people in the abilities of energy communities. Cooperation and networking are becoming increasingly important to survive in the energy markets against competitors. In some cases, energy communities are embedded in "business ecosystems" (Moore, 1993; Vernay & Sebi, 2020), i.e. networks which jointly develop new products and provide services for customers together.

Lastly, public technical assistance is a third way how national or regional governments or agencies can support energy communities besides support schemes (see Group #1) and financial assistance (see above).

Factors and relations are illustrated in Figure 5.

## 3.3 Summary of Factors for Survey

Depending on the methodology used to assess barriers and drivers (see next chapter), there might be the need to summarise and shorten the list of factors included in the assessment. This is particularly necessary for a standardised survey of experts. Therefore, we propose the following list of 25 factors – expressed as barriers and as drivers (see Table 9).

A standardised set of barriers and drivers makes comparisons between countries and benchmarking possible. Based on first assessments the list proposed here should be looked at again and revised if necessary. It is quite likely that some of the 25 factors will be identified as irrelevant in all EU member states. In that case, they can be deleted. On the other hand, some factors may need reformulation or further specification.

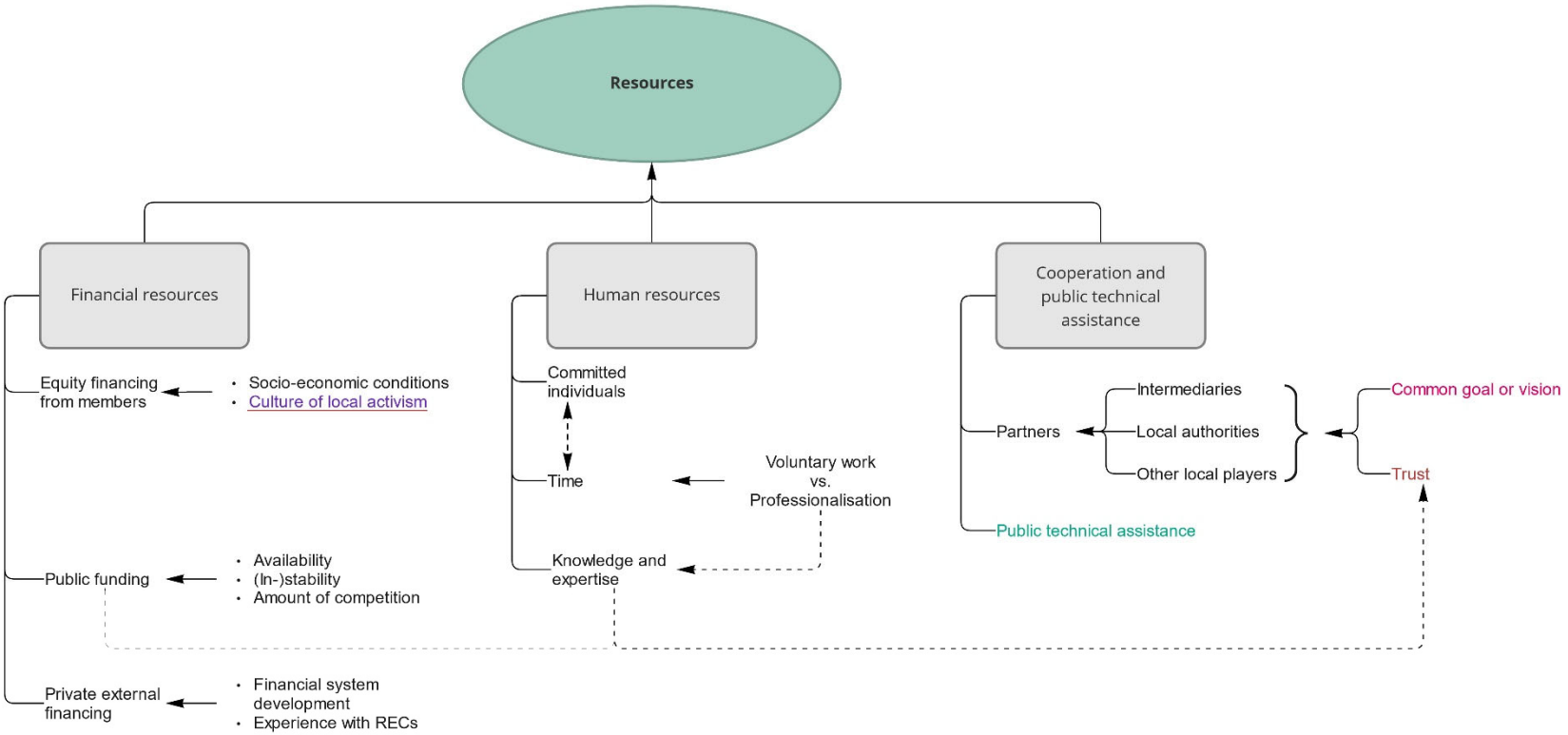



*Figure 5: Barriers & Drivers for Energy Communities, Group #4 – Resources*

*Table 9: Summarised List of Barriers and Drivers for Energy Communities*

| 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. |

| No | Factor | Barrier | Driver |
|---|---|---|---|
| 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. |
| 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 critial 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. |

# 4 Assessing the Magnitude of Barriers and Drivers in a Member-State Context

## 4.1 Overview

Principally, EU MS can use four different methods to assess the magnitude of barriers and drivers:

1. An analysis of the existing literature (literature-based assessment);
2. A direct measurement using indicators (indicator-based assessment);
3. An indirect measurement based on market observations (assessment by revelation),
4. Ratings or rankings based on expert opinion and/or stakeholder feedback through surveys, interviews or workshops (expert/participative assessment).

We will explore options #1 and #4 in some more details here. Indicator-based assessments and those building on market observations would generally be valuable complements or substitutes as they objectify what is assessed through subjective expert judgement in options #1 and #4. Depending on the type of barrier or driver at least some indicators have been established in related fields such as competition policy and measurement of market entry barriers. However, these methods are relatively demanding on the data side. Implementation seems difficult in most if not all EU MS due to missing monitoring systems. Overall, options #2 and #3 still need further development. Ideally, the assessment of barriers and drivers would be based on a national or even regional monitoring systems measuring the development of different types of energy communities in those geographies.

## 4.2 Literature-Based Assessment

In the literature, a variety of different methodological approaches for conducting a literature review exists, including integrative or narrative reviews (Baumeister & Leary, 1997; Torraco, 2005) and meta-analyses or systematic reviews (Davis et al., 2014; Liberati, 2009; Wong et al., 2013). The procedure or the evaluation of the results, respectively, follows various procedures such as the simple counting of previously determined keywords or the qualitative result determination based on specific adjectives.

If only scarce resources are available for the assessment of barriers and drivers and if the assessment is due within a short timeframe, we would recommend doing a literature review, possibly supplemented by an assessment of few selected experts. We would recommend this especially to energy community supporters who would like to push their government to act. EU MS, on the other side, should generally invest proper resources into the assessment, in order to get the most efficient results for decision-making.

## 4.3 Expert Opinion and Participative Assessment

Besides existing literature or models, governments can also build an assessment of barriers and drivers on expert opinion. Depending on the method used, this task can be challenging as the energy sectors in all EU MS are in a transition process, so the assessment addresses a “constantly moving target”. Evaluators should keep this in mind when designing the questionnaire or interview guidelines.

There are various ways how to assess the severity of barriers and size of drivers qualitatively or quantitatively via experts, ranging from qualitative interviews and group discussions to standardised ratings and rankings of barriers and drivers. The latter allows to gain insights into the most pressing issues quickly. A standardised list of barriers and drivers to be evaluated has the advantage of being comparable between countries. Stakeholders and governments can use this to set up a benchmarking system. The former is probably most insightful, but at the same time more resource-intensive. It could involve different stakeholders and be used to participatively assess barriers and drivers.

A multi-stage assessment (Delphi method) (Linstone & Turoff, 1975; Niederberger & Renn, 2019) 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**.

## References


Acosta, C., Ortega, M., Bunsen, T., Koirala, B., & Ghorbani, A. (2018). Facilitating Energy Transition through Energy Commons: An Application of Socio-Ecological Systems Framework for Integrated Community Energy Systems. *Sustainability*, *10*(2), 366. https://doi.org/10.3390/su10020366

Balcombe, P., Rigby, D., & Azapagic, A. (2013). Motivations and barriers associated with adopting microgeneration energy technologies in the UK. *Renewable and Sustainable Energy Reviews*, *22*, 655–666. https://doi.org/10.1016/j.rser.2013.02.012

Baumeister, R. F., & Leary, M. R. (1997). Writing Narrative Literature Reviews. *Review of General Psychology*, *1*(3), 311–320. https://doi.org/10.1037/1089-2680.1.3.311

Bauwens, T. (2016). Explaining the diversity of motivations behind community renewable energy. *Energy Policy*, *93*, 278–290. https://doi.org/10.1016/j.enpol.2016.03.017

Bauwens, T. (2017). Polycentric Governance Approaches for a Low-Carbon Transition: The Roles of Community-Based Energy Initiatives in Enhancing the Resilience of Future Energy Systems. In N. Labanca (Ed.), *Complex Systems and Social Practices in Energy Transitions* (pp. 119–145). Springer International Publishing. https://doi.org/10.1007/978-3-319-33753-1_6

Bauwens, T., Gotchev, B., & Holstenkamp, L. (2016). What drives the development of community energy in Europe? The case of wind power cooperatives. *Energy Research & Social Science*, *13*, 136–147. https://doi.org/10.1016/j.erss.2015.12.016

Bomberg, E., & McEwen, N. (2012). Mobilizing community energy. *Energy Policy*, *51*, 435–444. https://doi.org/10.1016/j.enpol.2012.08.045

Brummer, V. (2018). Community energy – benefits and barriers: A comparative literature review of Community Energy in the UK, Germany and the USA, the benefits it provides for society and the barriers it faces. *Renewable and Sustainable Energy Reviews*, *94*, 187–196. https://doi.org/10.1016/j.rser.2018.06.013

Busch, H., Ruggiero, S., Isakovic, A., Faller, F., & Hansen, T. (2019). *Scientific Review Paper on CE Drivers and Barriers* (Co2mmunity WORKING PAPER No. 2.1). http://co2mmunity.eu/wp-content/uploads/2019/01/co2mmunity-working-paper-No.-2.1-v04.pdf

Busch, H., Ruggiero, S., Isakovic, A., & Hansen, T. (2021). Policy challenges to community energy in the EU: A systematic review of the scientific literature. *Renewable and Sustainable Energy Reviews*, *151*, 111535. https://doi.org/10.1016/j.rser.2021.111535

Cox, M., Arnold, G., & Tomás, S. V. (2010). A Review of Design Principles for Community-based Natural Resource Management. *Ecology and Society*, *15*(4). https://www.jstor.org/stable/26268233

Davis, J., Mengersen, K., Bennett, S., & Mazerolle, L. (2014). Viewing systematic reviews and meta-analysis in social research through different lenses. *SpringerPlus*, *3*(1), 511. https://doi.org/10.1186/2193-1801-3-511

Dóci, G., & Vasileiadou, E. (2015). "Let's do it ourselves" Individual motivations for investing in renewables at community level. *Renewable and Sustainable Energy Reviews*, *49*, 41–50. https://doi.org/10.1016/j.rser.2015.04.051

Ebers Broughel, A., & Hampl, N. (2018). Community financing of renewable energy projects in Austria and Switzerland: Profiles of potential investors. *Energy Policy*, *123*, 722–736. https://doi.org/10.1016/j.enpol.2018.08.054

Fleiß, E., Hatzl, S., Seebauer, S., & Posch, A. (2017). Money, not morale: The impact of desires and beliefs on private investment in photovoltaic citizen participation initiatives. *Journal of Cleaner Production*, *141*, 920–927. https://doi.org/10.1016/j.jclepro.2016.09.123

Friends of the Earth Europe. (2021). *Barriers and Threats to the People-Owned Energy Revolution*. https://friendsoftheearth.eu/wp-content/uploads/2021/05/FOEE_barriers_and_threats.pdf

Gollwitzer, L., Ockwell, D., Muok, B., Ely, A., & Ahlborg, H. (2018). Rethinking the sustainability and institutional governance of electricity access and mini-grids: Electricity as a common pool resource. *Energy Research & Social Science*, *39*, 152–161. https://doi.org/10.1016/j.erss.2017.10.033

Hatzl, S., Seebauer, S., Fleiß, E., & Posch, A. (2016). Market-based vs. grassroots citizen participation initiatives in photovoltaics: A qualitative comparison of niche development. *Futures*, *78–79*, 57–70. https://doi.org/10.1016/j.futures.2016.03.022

Hicks, J., & Ison, N. (2018). An exploration of the boundaries of 'community' in community renewable energy projects: Navigating between motivations and context. *Energy Policy*, *113*, 523–534. https://doi.org/10.1016/j.enpol.2017.10.031

Hoffman, S. M., & High-Pippert, A. (2010). From private lives to collective action: Recruitment and participation incentives for a community energy program. *Energy Policy*, *38*(12), 7567–7574. https://doi.org/10.1016/j.enpol.2009.06.054

Holstenkamp, L., & Kahla, F. (2016). What are community energy companies trying to accomplish? An empirical investigation of investment motives in the German case. *Energy Policy*, *97*, 112–122. https://doi.org/10.1016/j.enpol.2016.07.010

Horstink, L., Wittmayer, J. M., Ng, K., Luz, G. P., Marín-González, E., Gährs, S., Campos, I., Holstenkamp, L., Oxenaar, S., & Brown, D. (2020). Collective Renewable Energy Prosumers and the Promises of the Energy Union: Taking Stock. *Energies*, *13*(2), 421. https://doi.org/10.3390/en13020421

Koirala, B. P., Araghi, Y., Kroesen, M., Ghorbani, A., Hakvoort, R. A., & Herder, P. M. (2018). Trust, awareness, and independence: Insights from a socio-psychological factor analysis of citizen knowledge and participation in community energy systems. *Energy Research & Social Science*, *38*, 33–40. https://doi.org/10.1016/j.erss.2018.01.009

Liberati, A. (2009). The PRISMA Statement for Reporting Systematic Reviews and Meta-Analyses of Studies That Evaluate Health Care Interventions: Explanation and Elaboration. *Annals of Internal Medicine*, *151*(4), W. https://doi.org/10.7326/0003-4819-151-4-200908180-00136

Linstone, H. A., & Turoff, M. (Eds.). (1975). *The Delphi method: Techniques and applications*. Addison-Wesley Pub. Co., Advanced Book Program.

Merriam-Webster, Inc. (2022a). *Driver (noun)*. https://www.merriam-webster.com/dictionary/driver

Merriam-Webster, Inc. (2022b). *Merriam-Webster's Unabridged Dictionary*. https://www.merriam-webster.com/

Moore, J. F. (1993). Predators and prey: A new ecology of competition. *Harvard Business Review*, *71*(3), 75–86.

Niederberger, M., & Renn, O. (Eds.). (2019). *Delphi-Verfahren in den Sozial- und Gesundheitswissenschaften: Konzept, Varianten und Anwendungsbeispiele*. Springer VS.

Ostrom, E. (1990). *Governing the commons: The evolution of institutions for collective action*. Cambridge University Press.

Ostrom, E. (2005). Understanding institutional diversity. In *Princeton paperbacks* (p. 355). Princeton University Press.

Oxford University Press. (2022a). *Barrier*. https://www.oxfordlearnersdictionaries.com/definition/english/barrier?q=barrier

Oxford University Press. (2022b). *Driver (noun)*. Oxford Learner's Dictionaries. https://www.oxfordlearnersdictionaries.com/definition/english/driver?q=driver

Prados, M.-J., Iglesias-Pascual, R., & Barral, Á. (2022). Energy transition and community participation in Portugal, Greece and Israel: Regional differences from a multi-level perspective. *Energy Research & Social Science*, *87*, 102467. https://doi.org/10.1016/j.erss.2021.102467

Ruggiero, S., Busch, H., Hansen, T., & Isakovic, A. (2021). Context and agency in urban community energy initiatives: An analysis of six case studies from the Baltic Sea Region. *Energy Policy*, *148*, 111956. https://doi.org/10.1016/j.enpol.2020.111956

Ruggiero, S., Isakovic, A., Busch, H., Auvinen, K., & Faller, F. (2019). *Co2mmunity WORKING PAPER No. 2.3 Developing a Joint Perspective on Cummunity Energy: Best Practices and Challenges in the Baltic Sea Region* (2.3). http://co2mmunity.eu/wp-content/uploads/2019/03/Co2mmunity-working-paper-2.3.pdf

Seyfang, G., Hielscher, S., Hargreaves, T., Martiskainen, M., & Smith, A. (2014). A grassroots sustainable energy niche? Reflections on community energy in the UK. *Environmental Innovation and Societal Transitions*, *13*, 21–44. https://doi.org/10.1016/j.eist.2014.04.004

Sloot, D., Jans, L., & Steg, L. (2019). In it for the money, the environment, or the community? Motives for being involved in community energy initiatives. *Global Environmental Change*, *57*, 101936. https://doi.org/10.1016/j.gloenvcha.2019.101936

Standal, K., Aakre, S., Leiren, M. D., Alonso, I., Azevedo, I., Di Nucci, M. R., Krug, M., Kudrenickis, I., Maleki-Dizaji, P., & Wnuk, R. (2022). *Synthesis report of case-studies on drivers and barriers in 5 selected target regions* (No. V2; Deliverable 2.3). COME RES. https://come-res.eu/resource?uid=1300

Torraco, R. J. (2005). Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review*, *4*(3), 356–367. https://doi.org/10.1177/1534484305278283

Unruh, G. C. (2000). Understanding carbon lock-in. *Energy Policy*, *28*(12), 817–830. https://doi.org/10.1016/S0301-4215(00)00070-7

Unruh, G. C. (2002). Escaping carbon lock-in. *Energy Policy*, *30*(4), 317–325. https://doi.org/10.1016/S0301-4215(01)00098-2

Vernay, A.-L., & Sebi, C. (2020). Energy communities and their ecosystems: A comparison of France and the Netherlands. *Technological Forecasting and Social Change*, *158*, 120123. https://doi.org/10.1016/j.techfore.2020.120123

Wainstein, M. E., & Bumpus, A. G. (2016). Business models as drivers of the low carbon power system transition: A multi-level perspective. *Journal of Cleaner Production*, *126*, 572–585. https://doi.org/10.1016/j.jclepro.2016.02.095

Walker, G. (2008). What are the barriers and incentives for community-owned means of energy production and use? *Energy Policy*, *36*(12), 4401–4405. https://doi.org/10.1016/j.enpol.2008.09.032

Weber, L. (1997). Some reflections on barriers to the efficient use of energy. *Energy Policy*, *25*(10), 833–835. https://doi.org/10.1016/S0301-4215(97)00084-0

Wong, G., Greenhalgh, T., Westhorp, G., Buckingham, J., & Pawson, R. (2013). RAMESES publication standards: Meta-narrative reviews. *BMC Medicine*, *11*(1), 20. https://doi.org/10.1186/1741-7015-11-20