ENERGY SYSTEM TRANSITION THROUGH STAKEHOLDER ACTIVATION, EDUCATION AND SKILLS DEVELOPMENT

ENTRUST

# Energy Management Approaches for Sustainable Communities

*Deliverable D5.3*

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# Table of Contents



# List of Figures

## List of Tables

# About the ENTRUST Project

ENTRUST is mapping Europe's energy system (key actors and their intersections, technologies, markets, policies, innovations) and aims to achieve an in-depth understanding of how human behaviour around energy is shaped by both technological systems and socio-demographic factors (especially gender, age and socio-economic status). New understandings of energy-related practices and an intersectional approach to the socio-demographic factors in energy use will be deployed to enhance stakeholder engagement in Europe's energy transition.

The role of gender will be illuminated by intersectional analyses of energy-related behaviour and attitudes towards energy technologies, which will assess how multiple identities and social positions combine to shape practices. These analyses will be integrated within a transitions management framework, which takes account of the complex meshing of human values and identities with technological systems. The third key paradigm informing the research is the concept of energy citizenship, with a key goal of ENTRUST being to enable individuals to overcome barriers of gender, age and socio-economic status to become active participants in their own energy transitions.

Central to the project will be an in-depth engagement with five very different communities across Europe that will be invited to be co-designers of their own energy transition. The consortium brings a diverse array of expertise to bear in assisting and reflexively monitoring these communities as they work to transform their energy behaviours, generating innovative transition pathways and business models capable of being replicated elsewhere in Europe.

For more information see **http://www.entrust-h2020.eu**

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# Executive Summary

A key objective of work package 5 of the ENTRUST project has been to develop a cohesive community research environment utilising participatory action research (PAR) techniques that encourage active participant engagement in the project and the issues informing ENTRUST's intersectional, co-design programme. Establishing the creative spaces whereby stakeholders are able to identify, consider, and then deliberate on, the actions and behaviours that influence their respective participations and positionalities in the energy system and its current transition, has been essential to this approach. In addition, it was important for the research team that this was done by implementing a range of iterative, multi-scalar dialogues with participants within each of the case study communities that, in turn, also informed the team's engagements in each of the other communities when applicable.

The previous two deliverables for this work package reported on how the ENTRUST team went about achieving these goals, from the selection of the communities of practice through to the reflexive feedback and analysis of the community dialogue outcomes. An important part of these activities was to ensure that an essential requirement of the project, achieving gender inclusion in the research actions, was possible. Collecting a majority male (or indeed female) perspective was considered anathema to the project's overall goals and therefore not considered an option. **D5.1 Report on Community Dialogues** demonstrated how the research team went about ensuring that balanced engagement did occur, in terms of gender, and discussed the suite of collaborative methods that were deployed. **D5.2 Report on the Expert Feedback on Community Dialogue Outcomes** dealt more specifically with an innovative research method adopted for the research communities in this project, a deliberative democracy tool known as the citizen jury, in addition to a modified Delphi-panel with experts – this was further augmented with engagements at the community level – to coproduce a set of principles that promote a fair and inclusive energy transition in Europe.

This deliverable, in turn, reports on the research carried out on new policy mixes and innovative cooperation mechanisms that have the potential to support transitions. In addition to the key findings emerging from WP5, the report has also applied a number of the lessons learned from Task 4.1 to develop the cooperation mechanisms that will prove useful to policy makers tasked with driving the energy transition at the various socio-political and infrastructural levels of Europe's energy transition. Policy plays a key role in shaping societal responses to a vast array of influences and circumstances, both in terms of human and non-human interactions. Therefore, the tools and pathways policy makers promote as they seek to drive an agenda towards its final policy goal can have consequences not always foreseen by those self-same policy makers. This report offers a number of examples of innovative cooperation mechanisms that have been applied in real-world contexts, as well as some that could complement existing mechanisms already in place. The insights presented in this report highlight a number of examples, or scenarios, where energy user communities outside of the ENTRUST project can learn from and apply to their local and national contexts.

# 1 Introduction

## 1.1 Background

The objective of Task 5.4 'Community Sustainable Energy Management Approaches' was to consolidate findings from work package 5. Building on these findings and the 'mapping' of the policy & regulation landscape conducted in Task 4.1, the tasks aims to 'recommend new policy mixes and innovative cooperation mechanisms that will support and promote transitions, and which have been evolved at the community level

Cognisant of the importance of the policy context and political structures in delivering the energy transition, this report acknowledges and has strived to reflect political structure variabilities *e.g.,* the degree of local autonomy through our project study countries, which represent a mix of centralised, devolved and federal political arrangements, these variables will be captured by the process'

## 1.2 Energy transitions

The world is currently engaged in an energy transition – although the nature of which may be contested – history shows that previous energy transitions have been have what Taleb (2007) describes as 'black swan events'[1]. The inability to predict outliers in the real world, with all its immeasurable complexity of influence and consequence, makes society ill-prepared to identify the likely consequences from the many synchronicities and vicissitudes of everyday life (be they local, national or international). With black swan events, these conclusions are not immediately apparent until, that is, after they have come to pass. Our ability to see patterns in events after they have occurred has not always served us well when trying to negotiate the increasingly dynamic and complex set of experiences found in late modernity (Bauman, 2000; Giddens, 1991).

If one were to tell a charcoal burner in the Middle Ages that wood would lose its dominance as *the* primary energy source for Western Europeans by the 1830s, no doubt one would have been met with incredulity and disbelief for daring to contradict what had been held to be a truism for millennia, again by way of confirmative experience. The same can be said for the coal barons presiding over the vast coal deposits mined in the late 1800s. When looking at the evidence, through the lens of confirmative experience, that showed previous primary-fuel sources remained dominant for centuries it is no wonder that they failed to interpret the true significance of then recent discoveries of deposits of oil and natural gas, and as a consequence failed to recognise the beginning of another technology shift in energy production and its consumption.

Since it is accepted that we are good at finding systemic patterns after an event has occurred (Taleb, 2007) it is still useful to look at how technological shifts in the past have influenced these changes in energy production and consumption. Such a perspective will have resonance for more recent technological developments in renewable energy sources (RES). However, if we are to apply Taleb's hypothesis, we must also recognise that these patterns can only help us to guess how RES technologies will develop or be adapted

[1] Taleb (2007) describes how, prior to European arrival on the Australian continent, European biologists widely believed that all swans were naturally predisposed to having white plumage. That is until black swans were 'discovered' in Western Australia in 1697, disproving a previously held assumption that had been considered to be fact; a fact based entirely on confirmatory knowledge built over millennia of only ever having experienced white swans.

into the future, but they are not a road map to that future. Like the struggle for dominance in the early 1980s between two forms of video media, VHS and Betamax, the success or failure of a new technology is often dependent on dynamic, sometimes seemingly random, unfolding sets of events. This can also be said of the policy flows of government.

de Oliveira Matias and Devezas (de Oliveira Matias & Devezas, 2007) show how the ever-increasing levels of sophistication found within societal structures, especially since the advent of late modernity, have resulted in five distinct technological transformations, which in turn have coincided with very significant changes in how we organise and use energy resources. This increased sophistication, evident in the closely associated linkages between subsequent primary-energy sources and the technological transformations they have engendered, has been situated into what they call economic structural long waves, or Kondratieff waves[2]. They argue these technology transformations have been linked to adaptations to more efficient primary-energy sources over this timeframe:

- The first of these transformations occurred between 1770 and 1800 when wood and charcoal were superseded for the first time by coal as the primary-energy source for European industries, particularly iron-making;
- They identify the second, and more complete, transformation as having occurred between 1830 and 1850 with the rise in the use of steam power in the textile and transport industries. These first two transformations have been linked together and termed the 'First Industrial Revolution' (de Oliveira Matias & Devezas, 2007);
- The third transformation (1860-1900) centred on technological advances in a number of key industries, including steel and electricity production, chemistry, manufacturing, telecommunications and the internal combustion engine. This "Second Industrial Revolution" also saw the increasing dominance of oil over coal as the primary energy source for these key industries;
- While the fourth transformation, 1930 to 1950, centred on the production of synthetic goods, aviation, broadcasting and electronics, all made possible by our ever-increasing dependence on the unsurpassed versatility of oil over all other energy sources.
- Finally, the fifth transformation they discuss is suggested to have started around 1980 and involved the growing importance of microelectronics, telecommunications and Information Technology (IT) in our day-to-day lives. Manuel Castells (1998) substantiates this assessment in the final volume of his treatise The Information Age: Economy, Society and Culture. However, he intimated that this transformation in fact began some five years earlier, around the mid-1970s. Either way, there is agreement as to the nature of the current technological transformation, if not on its date of inception.

de Oliveira Matias and Devezas go on to describe the importance of the above mentioned primary-fuel sources in driving these technological transformations. Coal began competing with wood as a primary-energy source during the first technological transformation, leading to the economic expansion of the first K-wave.

[2] Kondratieff waves (or K-waves) describe a long-range business cycle where a new technology influences an expansion of economic activity. This activity eventually contracts as newer technologies are rolled out. These cycles last for approximately fifty years or so, and then the next "wave" of activity develops. The theory was first promoted by the Russian economist whose name the theory bears, Nikolai Kondratieff.

It then displaced wood as the primary-fuel source for the first time at the height of the second K-wave. Coal went on to reach peak dependence during the third K-wave, meeting over 60% of the world's commercial-energy requirements (de Oliveira Matias & Devezas, 2007). Meanwhile non-solid fuels, (NSFs) such as oil and natural gas, began to be utilised with greater efficiency and in turn surpassed coal at the peak of the fourth K-wave. NSFs in turn spurred on the third and fourth technological transformations. At present, we are living through what has been described as the fifth K-wave and it is predicted that once we hit Peak Oil (Campbell, 1997, 2003, 2005; Heinberg, 2004; Leggett, 2005) we will have reached the middle of the present K-wave and will again witness a new technological shift, which will in turn stimulate the transformation. This, some have suggested, is what is already happening (de Oliveira Matias & Devezas, 2007; Devezas & Modelski, 2003). They posit we are already witnessing this next technological transformation with renewable energy sources possibly overtaking NSFs as the primary-energy source, in this new technological transformation, sometime over the course of this century. Devezas and Modelski (2003) have argued that the leading technologies driving the current K-wave, namely around Information Technology (IT), are far less energy-intensive than any of the previous technologies that drove earlier transformations, enabling de Oliveira Matias and Devezas to conclude that:

> *even if, in global terms, energy consumption continues to grow, the energy intensity will continue to decrease…at least in commercial-energy terms.*
>
> (de Oliveira Matias & Devezas, 2007)

They also argue that the amount of carbon emitted per energy unit consumed has continued to decrease through the various K-waves described above. Table 1 below shows the differences in the amounts of carbon emitted by the various fossil fuels that have acted as primary-energy sources over the 250 years.

**Table 1: Amount of carbon emitted per unit of energy consumed, per primary energy source (de Oliveira Matias & Devezas, 2007)**

| Primary-energy Source | Carbon Intensity (tC/toe) |
|---|---|
| Wood | 1.25 |
| Coal | 1.08 |
| Oil | 0.84 |
| Natural Gas | 0.64 |

The paradox we are currently experiencing, whereby the positive benefits associated with the ever-decreasing carbon intensity of the fuel sources we use being cancelled out by the relentless growth in energy demand – and consequently its consumption – continues to contribute ever greater complexity and sophistication to the socio-environmental problems we face and will continue to have profound effects on how societies are to be structured into the future. One potential solution to this has been put forward by way of transitioning to renewable energy sources (RES) with its promise of low-carbon, or even carbon-neutral electricity production. In theory, this may allow us to go on consuming ever greater amounts of energy without having to fear of the consequences, especially human-induced climate change. All of these transitions, in turn, were a result of public policy and societies (re)organising the socio-economic structures needed to accommodate the next transition. Understanding the dynamics of current public policy and the governance structures that regulate them are important if we are to maintain resilience in the face of the multiple complexities found within the socio-environmental systems we depend on for survival.

# 2 Understanding policy

Public policy is both a complex and multi-layered process that takes place at each level of government, in the local, national and international contexts. It can be understood as being either, or a combination of the following:

- the stated intention of a government or public body;
- a current or past action or decision that impacts, or has impacted on, a group of people; or
- the organisational practices of a government organisation.

Public policy as such can be seen as the translation of political vision into applicable, real-world outcomes (Wilson, 2006). By its nature, it is inherently political and can be either democratic or dictatorial in approach depending on the structures from which it emerges. This section of the report will take the reader through a number of key concepts associated with the concept and demonstrate why it is important to our overall understanding of the energy transition as it is rolled out across the European Union.

## *2.1 Public Policy, its analysis and interpretation*

*Public policies result from decisions made by governments and … decisions by governments to retain the status quo are just as much policy as are decisions to alter it*

(Howlett & Ramesh, 2003)

It can be taken as given that we live in complex, non-linear and often recursive social structures (Urry, 2000), which in turn influence how we interact with our physical environment; from the energy networks we plug in to, to the socio-cultural spaces we negotiate on a daily basis. It is no longer possible for individual states to meet the energy demands of their citizens without first adopting some form of co-dependent relationship with outside third-party entities such as the multi-national oil and natural gas companies. As a result, the chances for volatility or disruption occurring becomes increasingly likely when one considers the myriad of causes and effects that go into meeting these demands. With this raised complexity of relationships, between the material and the semiotic, comes the increased likelihood for systems breakdown either from events or actions occurring outside the policy process or indeed from within the policy cycle itself.

Policy occupies its own "space" within the socio-political, economic and environmental networks one negotiates both as an individual and more collectively within groups, be they local, national or international. It can also be argued that policy, by its nature, is a fundamentally mobile process constituted by a series of flows and inertias (Leach, Scoones, & Stirling, 2010) that coalesce to bring about the transference of what are essentially abstract ideas or political intentions (the semiotic) into real-world, concrete manifestations of those initial representations (the material). It occupies a multi-tiered, multi-sphered space (Yeates, 2002), and ideas of movement and flow are helpful here if we are to understand how policies are operationalised through the multi- level administrative structures of government; be they supranational, national or local. Taken more widely, the theme of mobility – with its ideological associations for some around liberal assumptions on autonomy, freedom and universalism – have seen it co-opted into neoliberal discourses espousing the need for uninhibited freedom of movement (though invariably in rather qualified forms) of capital and people, while at the same time conveniently ignoring the unequal and differentiated access groups within society have to these mobilities. This is true for mobilities around energy as it is for other socio-spatial activities, leading some to suggest that these ideologically-charged mobility politics and their subsequent policies may not work since they invariably ignore these realities (Adey, 2010). Developments in European Union structural reform over the past number of decades have also made the idea of flow and fluidity useful concepts for studying those changes (Urry, 2000), particularly given its emphasis on propagating collective, socio-technical solutions to many of the challenges it currently faces.

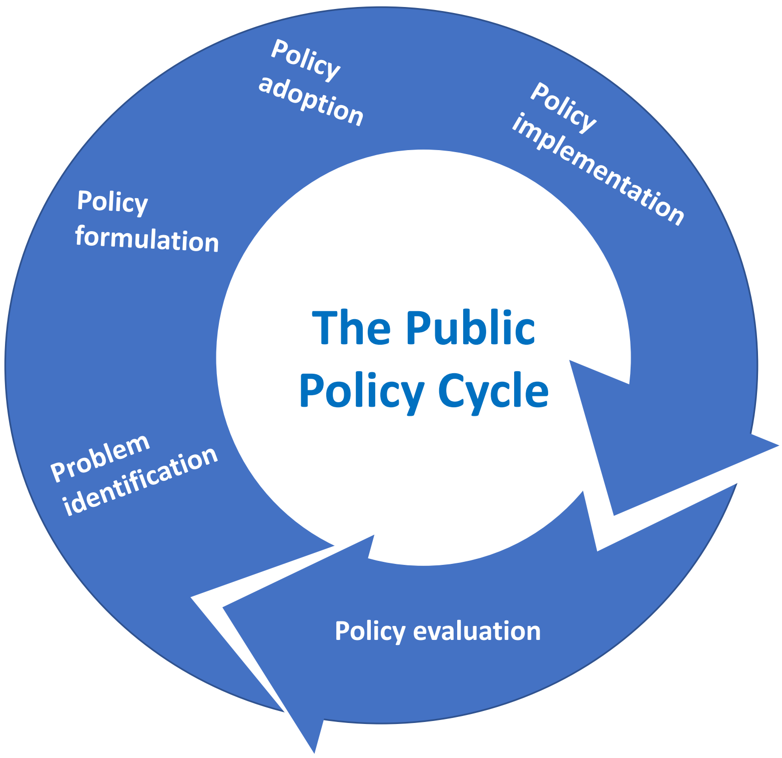



**Figure 1: An illustration of the cyclical and iterative nature of public policy**

So, in order to understand the inherent mobilities found within policy cycles we must first understand its full significance and meaning. Thomas Dye has defined public policy as “anything a government chooses to do or not to do” (Dye, 1972). Such a succinct definition helps us to recognise that ultimately it is government that has sole agency in making public policy decisions. This distinction between the decisions made by individuals or organisations outside of government (such as private businesses, NGOs or special interest groups) is important since, “when we talk about public policies we speak of the actions of governments” (Howlett & Ramesh, 2003) be they national, intergovernmental or supranational. While it is generally accepted that non-state actors can influence the decisions made by governments, the decisions they make are not public policy. As Howlett and Ramesh (2003) suggest this definition does not capture the full complexity, and often contradictory nature of government decision-making, and makes no distinction between the trivial or diversionary decisions and the more significant determinations of government. However, it does highlight the fact that in the end it is government alone that makes the defining choice as to what course of action to take, be it an active response to an issue or alternatively to do nothing. The fact that a government may decide not to do something is in itself a policy decision. For instance, a government decision not to raise income taxes or impose a carbon tax on industry is as much a policy decision as signing up to the Kyoto Protocol or introducing legislation to ban the sale of cigarettes to minors.

Jenkins (1978) expands this understanding of what constitutes public policy, suggesting we should see it as:

> *...a set of interrelated decisions taken by a political actor or group of actors concerning the selection of goals and the means to achieving them within a specified situation where those decisions should, in principle, be within the power of those actors to achieve*
>
> (Jenkins, 1978)

Jenkins' "set of interrelated decisions" highlights that often a government's capacity to implement its decisions may be limited by external and internal constraints. For instance, a government's energy policy relating to the proliferation of renewable energy power systems within a state, such as the development of wind and solar farms, may conflict with environmental or planning polices as set down by different government departments. This may be due to a failure on the part of those departments to take an integrated approach to an issue that affects them equally, albeit in different ways. Other constraints may include a lack of appropriate personnel to deal with the issue, fiscal restraints, obligations to (conflicting) international treaties and the accumulation of resistances to specific local developments can all influence the success or failure of a particular government policy. The obligations that governments must adhere to, in relation to international treaties, continue to grow in increasing regularity particularly for countries located within supranational networks such as the European Union. Understanding the actions of governments within such structures requires a "detailed understanding of the limits and opportunities provided by international agreements, treaties, and conventions" (Howlett & Ramesh, 2003).

The sheer complexity of the phenomenon that is public policy is generally acknowledged (Geyer & Cairney, 2015; Gornitzka, Kyvik, & Stensaker, 2002; Jenkins, 1978; Pender, 2004; Weiss, 1982). With numerous contributing governmental actors, along with a varying array of factors influencing decision-making, it is hardly surprising that there are many research issues for policy analysts to explore. An important aim of any policy researcher should be, in recognising such complexity, to present its analysis along more manageable constituent parts. By focusing on a limited range of relevant causal factors, and at the same time underlining the general need to take a more holistic approach, the researcher must take into account an appropriate range of influencing variables (Howlett & Ramesh, 2003). Howlett and Ramesh identify four different approaches within the literature that theorists have taken in order to deal with this complexity.

- One common course is to affiliate particular types of policy or "policy outcomes" to the constituent nature of the political system in operation and how it engages with wider society (Howlett & Ramesh, 2003). They argue that this can only be considered a starting point for any serious analyst, since this approach merely outlines a basic set of indicators to what decisions a government may take, which is itself largely dependent on its political orientation. However, it does not tell us much with regards to how such predilections influence individual policy decisions.
- Another approach public policy analysts have taken is to carry out empirically-orientated quantitative research in order to look for causal factors in the policy- making process, often referred to as policy

determinants (Easterly & Wetzel, 1989; Hancock, 1983; Munns, 1975). These determinants can come from macro-level socio-economic factors, where the characteristics of domestic societies and the international political system are analysed; or from the micro-level behaviour of individual public policy-makers. Such approaches tend to provide overly macro-level-orientated explanations and are less able to formulate reasons as to "how these structural characteristics affect the specific sectoral and temporal contexts in which policies develop" (Howlett & Ramesh, 2003).

- The analysis of policy content is yet another approach found within the literature, emphasising how very often it is the nature of a specific policy problem and the solutions created to solve it that determine how it will be processed by the political system. It is the very specificity of the policy problem itself that influences responses to it, whereby policies can and often do determine the political systems that produce them (Hirschman & Berman, 2014; Kjellberg, 1977; Lowi, 1972). This emphasis on the nature of a given policy problem having a reciprocal influence on what can be done to solve it is a useful approach to take but it, too, has its limitations. The *problem* itself can often be difficult to define or agree upon, which can make an appropriate policy response difficult to devise, and in turn analyse, without trying to factor in the "larger social and political constraints and contexts" (Howlett & Ramesh, 2003). A particular emphasis on the evolving government to governance paradigm (Frahm & Martin, 2009), particularly within the European Union context, has emerged and is noted extensively in the literature as governments steadily transformed how they operated during the 1990s and 2000s (Andrew, C. and Goldsmith, 1998; Borrás, 2003; Kooiman, 1993; Rosenau, 1992; Shapiro, 2001; Stoker, 1998) especially in response to the growing pressures of globalisation, political/institutional change, and environmental governance and its regulation. Many of these policy responses towards tackling the effects of human-induced climate change have tended to fall under the ecological modernisation epitome of modifying existing structures, albeit along single-issue actions such as improved water quality (Memon, Kirk, & Selsky, 2011) or waste management (Bulkeley, Watson, & Hudson, 2007; Watson & Bulkeley, 2005) and fall far short of the kinds of responses that are really needed.
- A fourth approach that Howlett and Ramesh refer to in the literature focuses on the policy impacts or outcomes where the direct and indirect effects of specific policies are analysed using statistical inference, ignoring the exact nature of the tools at a government's disposal, and the causal factors involved in policy development. This approach has often been favoured by economists and involves concentrating on easily quantifiable outcomes such as the linkages between corporate investment activity and government expenditure, but again this rarely takes into account the processes through which policy is developed and implemented.

More recently, comparative public policy analysis has been put forward by a number of scholars including Brans and Pattyn (2017), Schmitt (2017), Gupta (2012), and Howlett and Ramesh (2003) with comparative policy researchers exploring why and under what circumstances policy-makers agree upon adopting specific policies. This contextual and situational approach to understanding the processes and determinants of public policy making is useful on a number of fronts.

Research from a policy science perspective comprises a broad range of activities, from analyses of institutions, actors policy instruments, programs, and decision-making processes, to evaluating implementation and actual outcomes versus expected outcomes (Howlett & Ramesh, 2003; Schmitt, 2017).

These activities have resulted in the analytical focus of much of the literature on comparative policy analysis being directed towards the policy decisions themselves and the causal factors that explain them. Schmitt (Schmitt, 2017) breaks down research on comparative policy-making into three groups, differentiating them in terms of their analytical focus. The first group covers the entire policy change literature, which she acknowledges is rather fragmented given the number of approaches that aim towards comparing *public policies* [*sic*], while sub-disciplines may focus on the *patterns* [*sic*] of policy-making and the decision-making processes, again taking a comparative perspective. Schmitt groups the second cohort in terms of how policy diffusion, policy convergence, policy termination or policy dismantling are analysed according to the respective patterns they are understood to adopt. There is considerable divergence in terms of perspective in this second grouping. For instance, scholars engaged in the policy diffusion perspective tend to emphasise patterns of diffusion, along with the mechanics of policy change; whereas the policy convergence literature tends to focus on the degree of commonality policy decisions may achieve over time rather than focusing on the individual policy-making behaviours of governments. While researchers engaging in policy termination and policy dismantling literature, in turn, emphasise comparisons found between decisions to cancel or modified pre-existing policies. Schmitt's third grouping suggests a process-oriented body of literature engaged in comparative policy research that tends towards focusing on specific explanatory or causal factors that impact on the decision-making processes of government(s). This third approach is interesting in that its lesson-based delineations draw from analyses that explore how policy actors perceive and understand the policy-making process, most notably how they use lessons from experiences gained elsewhere to inform their own policy-making decisions. Also, the processes by which policies move from one place/jurisdiction to another is another contributing perspective. This type of institutional analysis has proved helpful towards understanding the role institutional constraints, including economic variables, veto players, historical affinities *etc*. (Immergut, 2008; Jeong & Peksen, 2017) can play on specific policy decisions. Schmitt (Schmitt, 2017) notes, however, that there has been some divergence in respect to the methodological choices and causal explanations from scholars engaging in the topic given its comparatively broad focus, which have led to "contradictory results and a variety of identified factors and constellations that determine policy-making, its direction, extent and implications" (Schmitt, 2017).

These varying approaches within the literature have evolved into two definable distinctions, policy study and policy analysis, depending on the degree of neutrality or self-interest that the policy researcher may have respectively (Brooks & Gagnon, 1990; Hoppe & Jeliazkov, 2006). Policy study refers "to the study 'of' policy" and policy analysis to "the study 'for' policy" (Howlett & Ramesh, 2003). In an effort to simplify these composite approaches and traditions considerable work has been carried out on building universal models or "frameworks of analysis" (Dunn, 2007; Dunn & Kelly, 1992) which combine the assorted literatures into coherent structural approaches. The Policy Cycle Framework of Analysis has become an increasingly popular model whereby the public policy-making process is broken down into "a series of discrete stages and sub-stages" (Howlett & Ramesh, 2003).

**Table 2: How applied problem solving links to the stages in the policy cycle** (Howlett & Ramesh, 2003)

| Five stages of the policy cycle and their relationship to applied problem-solving | |
|---|---|
| **Applied Problem-Solving** | **Stages in Policy Cycle** |
| 1. Agenda-setting | 1. Agenda-setting |
| 2. Proposal of solution | 2. Policy formulation |
| 3. Choice of solution | 3. Decision-making |
| 4. Putting solutions into effect | 4. Policy implementation |
| 5. Monitoring results | 5. Policy evaluation |

Table 2, above, shows one such framework highlighting the various stages of the policy cycle that public policy-makers must take in relation to the applied problem-solving methodologies they use. The table, while contributing greatly towards simplifying the policy-making process, is criticised by Howlett and Ramesh for not allowing for all the subtle nuances that occur in real-time, and gives the misguided impression that policy-makers operate in a very methodical and linear fashion. This is obviously not the case with policy-makers often functioning in reactive or ad hoc ways to specific strategic challenges, sometimes giving precedence to their own interests or following predetermined ideological tendencies (Feick, 1992; Howlett & Ramesh, 2003; Kathlene & Martin, 1991; Stone, 1988). Maor (2012) updates this further, suggesting the distinction between policy success and policy failure has only really taken shape in its current interpretation over the past two decades. He also notes that the literature capturing this phenomenon does not capture patterns of policy he refers to as being "too successful". Describing a common tendency to consider public policy as occupying three rather distinct realms (processes, programmes and politics) that can solely, or in combination, impact on the potential successes and/or failures along what McConnell (McConnell, 2010) describes as a spectrum of success. McConnell subdivides this spectrum into four states depending on how the three realms described above impact on a specific policy, resulting in resilient success, conflicted success, precarious success or failure (McConnell, 2010). Maor (2012) suggests the need to widen the spectrum of policy outcomes to capture policies that "may be too successful (*e.g.,* successful or spectacularly successful policies whose outcomes hurt the policy initiators as much as the policy target)". Using the concept of "policy overreaction" to describe policies that cause real and/or perceived social costs without necessarily producing any offsetting real and/or perceived social benefits. Such a scenario can invariably happen when policy-makers think they are more talented and competent than they actually are, or that they have more control over an event than they actually do, or valorise certain forms of information over others leading them to believe that their information is more accurate than may actually be the case (Kahneman, 2011). Such failures have led to policy makers over-investing in bad, poorly-realised policy for longer than was prudent, in turn leading to unintended negative consequences for both the recipients of such policy and those who devised it in the first place.

The collective fictions of autonomous personal choice and individual responsibility have permeated thinking in public policy for some time, with political institutions and numerous policy makers adhering to political theory informed by the concept that citizens give their consent to be governed. That this consent is based on rational decision making that is clearly thought out. Judicial systems are also built upon this assumption that people make independent, rational choices and therefore must bear full responsibility for their decisions (Greenfield, 2011). These assumptions inform the efforts of current public policy practitioners wishing to shift consumer culture, including energy, towards more "responsible" decision-making without necessarily changing the very system that pushes people to make the "wrong choices" in the first place. As Klein puts it:

> *The myth of responsibility, for example, holds that the wrongdoer could have refrained from the wrong and hence is "at fault," "to blame," or "guilty." That is the necessary myth that serves clumsily in place of the subtler reasoning that eludes us on the spot or fails to persuade the jury. A student of the deeper reasons for maintaining a system of individual responsibility, such as Hayek (1960), knows better: "We assign responsibility to a man, not in order to say that as he was he might have acted differently, but in order to make him different.... In this sense, the assigning of responsibility does not involve the assertion of fact. It is rather of the nature of a convention intended to make people observe certain rules"*
>
> (Klein, 1997)

This narrative of personal choice, and by extension responsibility, has been used to explain the shift towards increased consumption patterns since the 1970s (Shove & Spurling, 2013). From this perspective, the notion that we can help people to change their (negative) personal choices through teaching and promoting self-development has become increasingly popular in many policy-making circles. With this misdirected perception of individual agency making a collective difference towards societal change absolves government responsibility in that it shifts blame on to the individual rather than tackle the deep systemic problems that need to be addressed. Indeed, it is this attributing of blame that has been included in the policy discourses around an increasing popular construct, the "energy citizen". With the right education, the consumer/citizen will "change" they ways to "behave" more responsibly. It is the individual, who must navigate the economic system that has more control over her than she has over it, that must change to become "better", more "active" participants in the energy transition. This myth of responsibility has been used to great effect in the past and continues to occupy a specific role in the present.

> *As legal scholar Barbara H. Fried writes, 'enthusiasm for blame is not confined to punishment. Changes in public policy more broadly – the slow dismantling of the social safety net, the push to privatize social security, the deregulation of banking, the health care wars, the refusal to bail out homeowners in the wake of the 2008 housing meltdown – have all been fueled by our collective sense that if things go badly for you, you've got no one to blame but yourself'. The more responsibility that is laid at the feet of individuals, the easier it is to justify the many inequalities in our world.*
>
> (Martinez, 2016)

Energy policy continues to be a fundamental government activity of all states, with the level of complexity with which it is applied only set to increase in our highly developed, post-industrial contexts. Now more than ever it is imperative that policy makers fully appreciate the energy system in its complete context, especially with regards to the dynamic relationships it has with the complex and uncertain natural systems it interacts with and the human commitments and values that dictate how these relationships are ultimately realised (Funtowicz & Ravetz, 2003; Ravetz, 2006). Also, recognising the complexity involved in tackling issues around the energy system and its influence on our response to human-induced climate change does not necessarily have to generate the degree of paralysis seen in many local governments, and indeed some national governments. Unfortunately, policy makers do at times defer to the "greater expertise" of private sector operators or to national arbitrators over the experts within their own corporate structures. This has happened with regards to the rolling out of wind farms in response to supranational guidelines on renewable energy, for instance. This type of deferral to outside interests (or least to those not directly involved in producing policy) is in many ways symptomatic of how governments now operate, be they local authorities in an Irish or French context or a Member State within the European Union. The abdication of responsibility is as much a product of policy as is the taking on of responsibility for tackling a specific societal issue. From this perspective, we can see how the degrees of inequality that we find in the world are very much the outcome of policy (Martinez, 2016).

## *2.2 Lessons learned from the review of the policy landscape in T4.1*

Currently, the European energy system, and the numerous local and national networks that comprise it, must contend with numerous cross-sectional challenges; including issues around energy security, the ongoing effects of climate change, and the resultant impacts on human health and wider ecosystem services. A key response, in terms of energy, has been the drive to transition the energy system from one based predominantly on finite, fossil fuels to one that is more mixed with a greater emphasis on renewable energy sources that are low-carbon or carbon-neutral in their configurations (Creutzig et al., 2014; Verbong & Geels, 2010). Consequently, the term 'energy transition' is most often used to refer to this so-called sustainable energy transition (SET) (Sgouridis & Csala, 2014), which has had very real impacts not only affect the energy system itself, but on society as a whole since energy permeates every aspect of human activity. Therefore, planning, organising and then implementing an energy transition is a long and highly complex task as it involves a myriad of different socio-technical systems, with their competing representations of reality, expectations, and capabilities; and are very much dependent on geo-physical and socio-political arrangements that very from one country to another. Consequently, the political contexts at each point in multi-level governance structures of the European Union and its constituent member states are a significant factor. As Meadowcroft (2011) suggests, "politics is the constant companion of socio-technical transitions, serving alternatively (and often simultaneously) as context, arena, obstacle, enabler, arbiter, and manager of repercussions. Politics (including not just the behaviour of government but also that of other actors) is manifest on each of the three levels of the multi-level perspective". Meadowcroft divides these three levels into landscape, regime and niche perspectives. At the landscape level, we can consider the general economic climate (commonly understood in terms of economic growth/stagnation, free trade/protectionism, *etc*.) including the development of innovative pathways and deployment of technologies through largescale political projects such as defence and strategic infrastructure. The regime level, in turn, comprises the legal structures and regulatory initiatives that support/challenge dominant (energy) regimes. The level of complexity at this level is underscored by the fact that governments very much depend on the revenues generated from existing economic practices, and consequently may be reluctant to shift to newer, unproven economic models. Finally, at the niche level specific government programs can have the potential to either enforce or disrupt innovation at both local and national levels. The decision to embark on a new energy transition is not simply a matter of policy makers agreeing to begin such as task, but instead involves a complex struggle among rival social, political and commercial groups that collide with pre-existing conflicts over regulation, property rights and access to resources. Subsequently, a significant preoccupation of governments at all levels is managing the distributional fall-out, whether it is impacting on pre-existing rights to commonages when rolling out wind turbines or the consequences associated with industrial development and/or its decline (Meadowcroft, 2011). The political dimension to this current energy transition is in many ways unprecedented, given the current role narratives around sustainable development are playing in constructing a particular vision of what the socio-technical future should look like. This "explicitly political" dimension has resulted in public policy having a far greater role to play than earlier, more "organic" transitions (Kuzemko, 2013).

Task 4.1 of the ENTRUST project focused on the policy landscape of energy transitions in the European Union and provides an up-to-date assessment of the current situation concerning the policies and regulations relating to the energy system in a range of European countries. Consortium partners examined key technological, social and market factors in order to better understand the various energy policy frameworks in Ireland, Spain, the United Kingdom, France, Italy, and Germany. This was accompanied by an analysis of public dialogues in each of the member states mentioned and focused on key public discourses currently taking place, along with an assessment of the main barriers to implementing low carbon measures in each country. For a more detailed overview of the situation in each of the member states, and a wider European analysis for greater context in each member state, please see project deliverable 4.1 Report on policy & regulation landscape (Boo et al., 2016).

# 3 Energy Management Approaches

## *3.1 Introduction*

Energy policy has been at the heart of the political agenda of the European Union since the establishment of the European Coal and Steel Community (ECSC) in 1952. Since then, the Community's attitude towards energy has developed in line with its evolution into the supranational political entity that it is today. In addition to this, key developments in EU energy policy have coincided with the rapid growth rates in newer commercially-viable renewable energy technologies in Member States since the mid-1990s (Olesen, Szoleczky, West, Bedi, & Fowler, 2006). Energy policy, more generally, has been driven by the need for greater security of supply and a growing acceptance of the consequences of human induced climate change, motivating policy makers within the EU's institutions to diversify the trading bloc's energy portfolio away from traditional, carbon-based fuel sources. One response to this has seen a shift towards developing viable energy alternatives, most notably from renewable energy sources. In conjunction with this shift, has been a greater emphasis on devising suitable energy management approaches that compliment this suite of innovations.

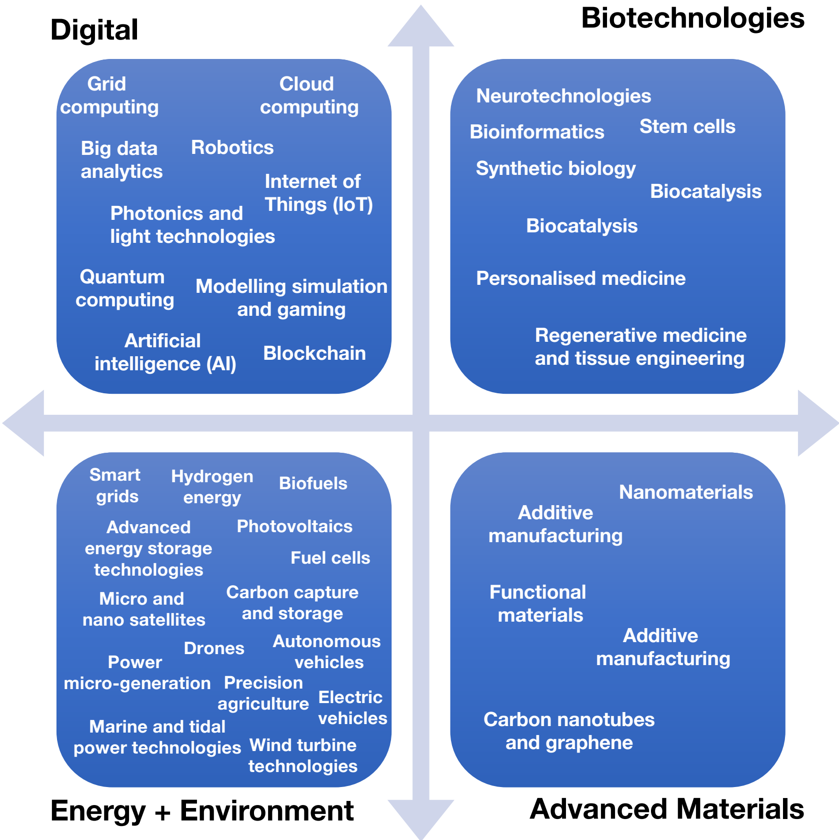



**Figure 2: Sample of key and emerging technologies set to increase in importance over the coming years (OECD, 2016)**

According to the OECD's recent *Science, Technology and Innovation Outlook* (OECD, 2016) they estimate that by 2040 low-carbon energy sources and fossil fuels (oil, gas and coal) will each contribute approximately 50% to the world's energy supply mix. Globally, wind is set to most likely contribute the greatest share to electricity generation from renewables at around 34%, followed by hydroelectric power at 30%, and by solar technologies at 18%. Other key examples of emerging technologies that the OECD estimates will increase in importance can be seen in Figure 2, above. The complex relationship the energy system shares with the growth in new and emergent technologies is only set to deepen over the coming century, and how the supporting infrastructure and networks that will help manage these developments will be of critical importance.

*Mitigating the considerable extent and impacts of climate change will require ambitious targets for the reduction of greenhouse gas emissions and waste recycling to be set and met, implying a major shift towards a low-carbon "circular economy" by mid-century. This shift will affect all parts of the economy and society and will be enabled by technological innovation and adoption in developed and developing economies*

(OECD, 2016)

This shift, while daunting, present many unique opportunities not seen since the last K-wave and will bring about profound changes to the societal and economic structures that we have at present. It particularly challenges our understanding of concepts such as citizenship, consumerism and the what it means to have social and economic agency within one's community.

## *3.2 What are sustainable communities?*

A s*ustainable community*, as a term, is understood in a number of ways depending on the person using it and the context within which it is being applied. In fact, the two words, 'sustainable' (or more accurately, 'sustainability') and 'community' are themselves contested terms. A grassroots activist will usually have a very different understanding of what a sustainable community means compared to how say that of an energy industry executive. Where one may view it in terms of long-term, self-supporting networks of family members, neighbours and friends the other may view it as simply a stable costumer base guaranteeing a continuous revenue stream for a particular product etc. Having said that, the term most often refers to a local neighbourhood that has integrated a number of economic and environmental considerations into their planning that promotes long-term positive outcomes for residents living there. Issues such social equity, access (both to services and infrastructure), and local government are usually central to discourses around this topic. Associated terms such as the "green city", "eco-communities", "resilient neighbourhoods" have seen growing usage from practitioners and policymakers in a number of countries in recent year including Canada, the Netherlands, Ireland, the UK and France.

The term *sustainable community*, emerged from wider sustainable development discourses that took place during the 1970s and 1980s, which were in turn informed by wider understandings of the concept of sustainability that date back much further to the ecology science debates of the seventeen and eighteenth centuries (Blewitt, 2015; Grober, 2007). Sustainability, and more specifically sustainable development, can be considered to be quite an amorphous concept with over two hundred accepted definitions being used to describe it at present. Having said that, one of the more commonly referred to definitions comes from the 1987 Brundlandt Report[3], which presented it as follows:

> *Humanity has the ability to make development sustainable to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs. The concept of sustainable development does imply limits - not absolute limits but limitations imposed by the present state of technology and social organization on environmental resources and by the ability of the biosphere to absorb the effects of human activities.*
>
> (Brundtland, 1987)

The requirement that we do not compromise future generations their ability to meet their needs, through overconsumption and resource mismanagement in the present, is largely consistent across a majority of the definitions. In addition, scholars agree that in order to realistically achieve an acceptable degree of sustainability one must first reach an equilibrium between at least three key determining factors: social, economic and environmental. René Passet coined the phrase the three spheres of sustainability in 1979 and

[3] This United Nations World Commission on Environment and Development (WCED) publication is also known as the *Report of the World Commission on Environment and Development: Our Common Future*.

it has proved a useful framework ever since to conceptualise the type of balance that is required of policy makers if they are to implement genuinely sustainable policies. A representation of the three spheres of sustainability is presented in Figure 3.

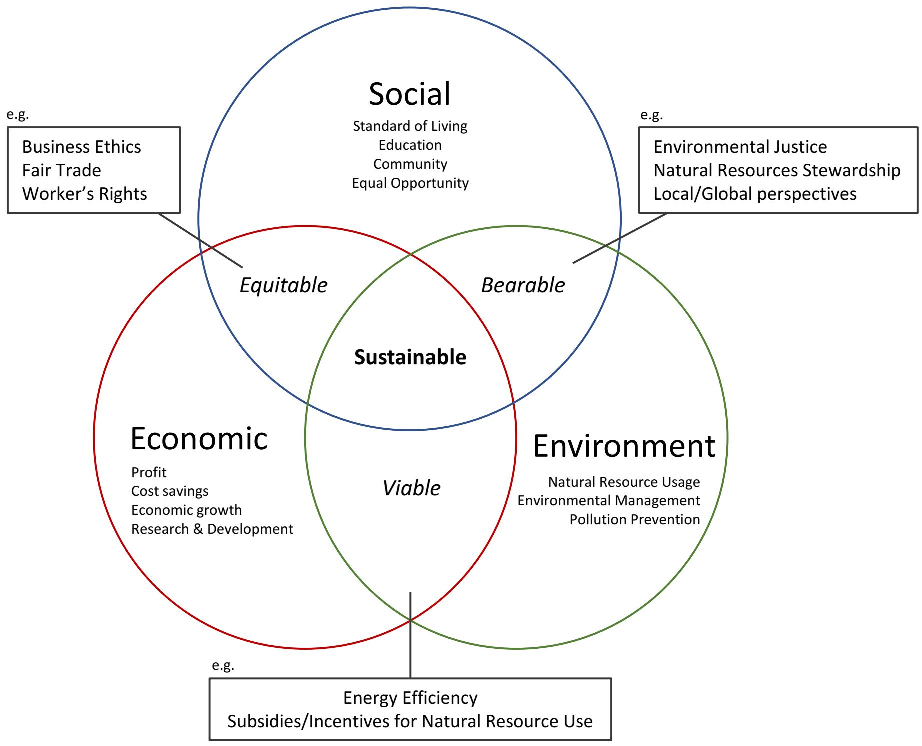



**Figure 3: The three spheres of sustainability** (adapted from Passet, 1996)

A full appreciation of this asymmetrical interdependence has not always been to the fore with some policy practitioners who continue to valorise economic considerations over both the social and environmental consequences of such activities; in effect ignoring the obvious fact that together they underpin all economic activity and without which commerce would cease. However, there has been a movement towards greater recognition of this in recent years. Everything we do as human beings has an effect on the long-term sustainability of humanity and the environment that supports us. Looking at Figure 3 we can see that at the interstitial space between the economic and environmental spheres we have all the viable economic activities that the environment can support, while all economic activities that take into account social considerations can be considered to be (to varying degrees) equitable. The suggested examples for each refer to the kinds of supports to can help foster greater levels of equity, viability and bearability. To be considered sustainable we must have a balance of all three and occupies the space at the interface of all three. When these are not in balance conflicts arise and long-term sustainability are jeopardised. For example, coal mining may be considered a viable economic activity when one take into account current economic infrastructural frameworks. However, the mining and consumption of coal have numerous significant negative, long-term social and environmental consequences, especially in terms of lung disease and overall population health and as a contributor to human-induced climate change and the catastrophic environmental consequences associated to it. The energy transition, if done correctly, can be considered to occupy the sustainability interface if it meets the challenge of balancing all three determining factors equally. How we get to that point very much will depend on how people organise to cope with the associated anxieties that will come from this transition, and those reactions will in turn be shaped by the strong social bonds that coalesce to help people define their understanding of 'their' community. This process is itself a result of the very human desire to:

> *…search for connections and patterns and the composing of stories and rituals, which quite literally put us, put all of us, in our place. What the archaeologists did as they pieced together the Lion Man is what societies have always done: work with fragmentary evidence to build a picture of the world. You could say that it's when a group agrees on how the fragments of the cosmic puzzle fit together that you truly have a community - one that endures, encompassing the living, the dead and the yet unborn.*
>
> (MacGregor, 2017)

For the purposes of this report when we use the word community, we not only refer to communities of place – such as the towns and villages at the heart of the ENRTUST H2020 project – but we also refer *communities of interest*, i.e. those groups of people who may or may not live in the same neighbourhood but who share a common interest, such as say the environment, local food movements, or how to transition to a low-carbon economy etc. Therefore, we can understand community as occupying something beyond just a place-specific context. The forthcoming knowledge and communication platform will facilitate exchange and learning both within the communities of practice engaged in as parts of work packages 3 and 5, but also between the different communities.

> *Community developers have long understood the importance of local participation in the events and processes that shape communities. Effective, democratic, and people-and-place-centered development strategies have the potential to achieve such participation.*
>
> (Majee & Hoyt, 2011)

When we discuss the term sustainable community, we acknowledge it can be very much a contested term. This is hardly surprising given the varied understandings the terms "sustainability" and "community" conjure up for some people, and which contribute to it etymologically. There is no one particular, demonstrable type of neighbourhood, area or region that fully encapsulates what a sustainable community is. The environments that sustain the activities of citizens living in an area can vary considerably both in spatial and temporal terms. Therefore, rather than being static and somewhat fixed, especially with regards to social and civil life, a sustainable community can be considered to be adaptive; dynamically meeting the social and economic challenges that present themselves while at the same time not exhausting the environmental resources that sustain those very same socio-economic activities. Decision-making in a sustainable community usually comprises an active, democratic civic life where members share information freely to make informed choices together rather than the reactive, factional processes that so often occur today. In doing so, a sustainable community uses it resources to meet current requirements while at the same time provisioning those resources so that they meet the needs of future generations too. The potential knock-on benefits of this kind of approve includes an improvement in the overall quality of life of community members that become realised through the revitalisation of local economies. This revitalisation itself comes from a number of activities such as the minimising of waste (usually by monetising certain wastes, *i.e.,* recycling, and by promoting greater efficiencies within existing technical systems), pollution prevention (which sees improvements in overall population health), and the development of local resources, which combined with improved energy efficiencies, often result in a greater proportion of local wealth staying within the local economy.

Applying this understanding, a *sustainable community energy system* then is essentially an integrated approach to supplying a local community with its energy needs from a renewable energy source or a suite of highly-efficient co-generation energy sources. This approach is very much in keeping with the distributed generation concept (Ackermann, Andersson, & Soder, 2001; Pepermans, Driesen, Haeseldonck, Belmans, & D'haeseleer, 2005). The potential for significant employment opportunities with more sustainable patterns of development is strong. Retrofit and redesigning existing infrastructure, knowledge-based services, environmental technologies, the stewardship of local natural resources, in addition to tourism-related activities all offer significant local development opportunities that could combine private sector investment and favourable government policies.

## *3.3 Understanding Energy Management*

With the current profusion of environmental and technological crises that directly correlate to corporate industrial activities and the socio-political systems that have largely failed to challenge or keep them in check, post-industrial modernisation has seen discussions shift towards sustainability and deep ecology narratives to understand and ultimately to try and address these challenges. Emerging from the critical thinking and environmental movements of the 1970s, especially in response to human-induced climate change, both approaches have incrementally informed our collective management approaches to energy, placing a greater emphasis on improving efficiencies from existing energy sources, as well as shifting towards a portfolio of low-carbon alternatives. Shrivastava (1995) and others have argued that traditional management practices, which are seen as being a significant contributing factor in the collective failure to check these crises, should be abandoned in favour of alternative more "ecocentric" approaches. Such approaches seek to reduce the environmental impact of organisational visioning, and the regulation of inputs, throughputs, and outputs (Shrivastava, 1995) and have been taken up, to a greater or lesser extent, in thinking around energy management.

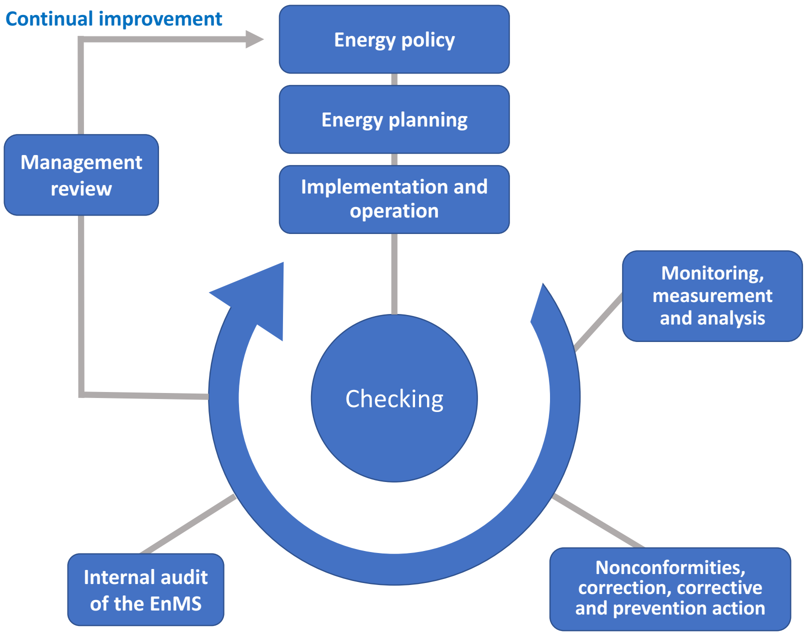



**Figure 4: Visualisation of the energy management process (ISO 50001)**

Practitioners accept that energy management involves detailed planning and operation of energy production, in addition to the subsequent consumption of that produced energy. Objectives include devising measures promoting resource conservation, adhere to climate protection standards, while at the same time contributing to significant savings on overall costs, all the while ensuring that users have access to as much energy as they require. Taken in terms of wider socio-environmental contexts, these aspirations are not always compatible. Shedryk *et al*. (2017) refer to the Verein Deutscher Ingenieure (VDI)[4] definition of energy management as "the proactive, organized and systematic coordination of procurement, conversion, distribution and use of energy to meet the requirements, taking into account environmental and economic objectives" (Verein Deutscher Ingenieure, 2007) and is closely connected other business administration functions including environmental management, production management, and logistics. Consequently, a key outcome of energy management for many advocates is the production of goods and services that have the least environment impact and lowest cost (Krishna, Manickam, Shah, & Davergave, 2017).

## *3.4 Energy Management Approaches – Community Level*

In the United Kingdom, the energy company Good Energy, in their 2016 report Community Energy, outline the pressing need for meeting future energy needs in a secure, affordable and sustainable way. Expanding on these three criteria, Good Energy articulate an 'energy trilemma' of energy affordability, energy security and energy sustainability, linked to decarbonisation (Good Energy, 2016). Table 3 shows an overview of a range of community energy projects as described by Good Energy. A brief description and benefit of each type of energy is provided, together with a description of what aspects of the 'security-affordability-decarbonisation' energy trilemma the different projects have the potential to address. Tension that

[4] English translation: Association of German Engineers

frequently occur between decarbonisation and affordability agendas are clear from Table 3, and discussed in greater details in Bosman, Loorbach, Frantzeskaki, & Pistorius (2014).

**Table 3: Types of community energy project, after (Good Energy, 2016)**

| Project Type | Description | Benefits to local communities | Energy Trilemma target |
|---|---|---|---|
| **Community Energy - Local renewable generation** | Where groups are generating renewable electricity locally. Predominantly made up from small to medium size solar and wind | Generate revenue for investment within the community, reducing carbon emissions and reducing the price of electricity used on site | Security, decarbonisation and affordability |
| **Community Energy - Community heat** | Community hot water, seasonal thermal energy storage and district heating. | Reduce carbon emissions and energy bills | Decarbonisation and affordability |
| **Energy efficiency** | Projects to improve energy efficiency within local housing. In particular the focus has been on those households in fuel poverty | Delivers positive economic, social, health and wellbeing outcomes | Decarbonisation and affordability |
| **Collective purchasing** | Communities coming together to negotiate a better deal on their gas, electricity and other heating fuel supplier | Reduction in the price of fuel, assisting those in fuel poverty | Affordability |
| **Local tariffs and community benefit funds** | Suppliers offering community funds, local tariffs and windfall payments. Often given on a £ per MW basis | Helps existing community energy generators to generate more funds locally for community benefit | Security, decarbonisation and affordability |
| **Other initiatives** | Covers any other initiatives. Examples include, communal washing lines and pilot projects to match supply with demand | Save money on energy bills and also help with knowledge of complex energy system problems | Decarbonisation and affordability |

The transformation from the current energy system to a decentralised renewable energy system requires the transformation of communities into energy neutral or even energy producing communities (van der Schoor & Scholtens, 2015). The concept of 'community energy' describes formal or informal citizen-led initiatives which propose collaborative solutions on a local basis to facilitate the development of sustainable energy technologies and practices (Bauwens, 2016; Seyfang & Longhurst, 2013). Community energy projects provide the opportunity for citizens to actively engage in the community and the local energy system. Rather than participating as mere energy consumers, members of the public are currently able to assume a number of different roles within the energy system, as they are able to influence the ways and the extent to which energy is produced (Kalkbrenner & Roosen, 2016; Stern, 2014). Increasingly, citizens become 'prosumers' and pool their resources to start a local energy initiative (van der Schoor & Scholtens, 2015). In addition, local energy systems such as Integrated Community Energy Systems (ICESs) not only ensure self-provision of energy but also provide essential system services to the larger energy system. In this way, local energy systems can potentially contribute to the overall energy and climate objectives, helping reverse energy consumption and emissions trends worldwide (Koirala, Koliou, Friege, Hakvoort, & Herder, 2016).

In the social movement for local energy transitions, Van Der Schoor & Scholtens (2015) report a wide diversity of interacting and overlapping networks linking together individual prosumers, regional providers and national lobbyists in our case study. The cooperative model is apparent throughout these networks. There are several other different types of legal structures available that community energy organisations can adopt as detailed in Table 4.

**Table 4: Possible legal structures for community energy, after (Vauhan-Morris, 2015)**

| Legal Structures | Description | Corporation Tax Obligation |
|---|---|---|
| Registered Society: Community Benefit Society (BenCom) | A group of more than three members registered under the Financial Conduct Authority (FCA) that operate for non-profit, and trade to benefit the boarder community, governed by charity law. | Y |
| Registered Society: Cooperative | A group of more than three members registered under FCA that operate for non-profit, and run for the mutual benefit of their members that use its services. | Y |
| Community Interest Company (CICs) | A form of limited company that is governed by the Companies Act 2004 and is designed for social enterprises. | Y |
| Private Company Limited by shares (CLSs) if wholly owned by registered charity | Private limited company, where shareholders' liability is limited to the capital originally invested, with shares not listed on a stock exchange. | Y |
| Private Company Limited by guarantee (CLGs) if wholly owned by registered charity | A limited company registered with Companies House and governed by Company Law, with a limited liability status with shareholders guaranteeing to pay GBP£1 - GBP£10 if insolvency occurs. | Y |
| Charitable Trust | An irrevocable trust established for charitable purposes. | N |
| Charitable incorporated organisation (CIO) | An organisation with charitable aims that meets the public benefit test, is incorporated without being a company, and is registered with the Charity Commission. | N |

Community Energy England (2017) produced a report on 222 community energy groups across the UK. They found that there were three prevalent types of legal structure which have been adopted by community energy projects within the UK (Table 5).

**Table 5: Legal Structure of Community Energy Organisations in the UK, after (Community Energy England, 2017)**

| Community Energy Legal Structure | Percentage surveyed |
|---|---|
| Community Benefit Societies (BenComs) | 44% |
| Cooperatives (co-ops) | 22% |
| Community Interest Companies (CICs) | 11% |
| Other charitable entities | 23% |

Community Energy projects in the UK have largely been dominated by solar projects in the south of England, the rest of the country has a more disparate generation capacity (Community Energy England, 2017).

### *3.4.1 Policy Tools Most Appropriate to the Approach*

Within the community energy sector there are two distinct types of finance capital that need to be raised; development funding and project finance costs. The development costs can cover many activities from feasibility studies through to planning or license applications. Project finance covers the capital costs associated with implementing the project such as purchasing the technology and installing it at a site. At the organisational level, in addition to the obvious specificities of community-based energy projects as compared to more traditional companies, (Bauwens, 2016) emphasises substantial differences among these initiatives, which in turn require adapted policy responsiveness.

Many community groups access public funding to enable activities to happen (Dinnie & Holstead, 2017). However, public funding can present something of a dilemma for community based initiatives (CBIs); it provides a useful source of income but it can have other (unforeseen) consequences for how CBIs operate (Dinnie & Holstead, 2017). Aiken (2015) discusses how public funding can generate tensions within groups as members try to negotiate a collective purpose, vision and focus of activities (such as social engagement and awareness raising) within the confines of a funding programme and wider policy context which may emphasise other priorities.

Feed-in Tariffs (FITs) for renewable energy constitute a key policy instrument in the development of community energy schemes. FITs are currently the prevailing instrument to promote renewable energy generation in Europe according to (Haas et al., 2004), followed by rebates, tax incentives, tendering systems, and green tariffs. Gao, Fan, Kai, & Liao (2015) reports that FIT has become the most successful and prevailing approach to promote PV around the globe. However, it has also led to unexpected PV booms and over-development in some FIT countries and FIT schemes have required reform measures over time.

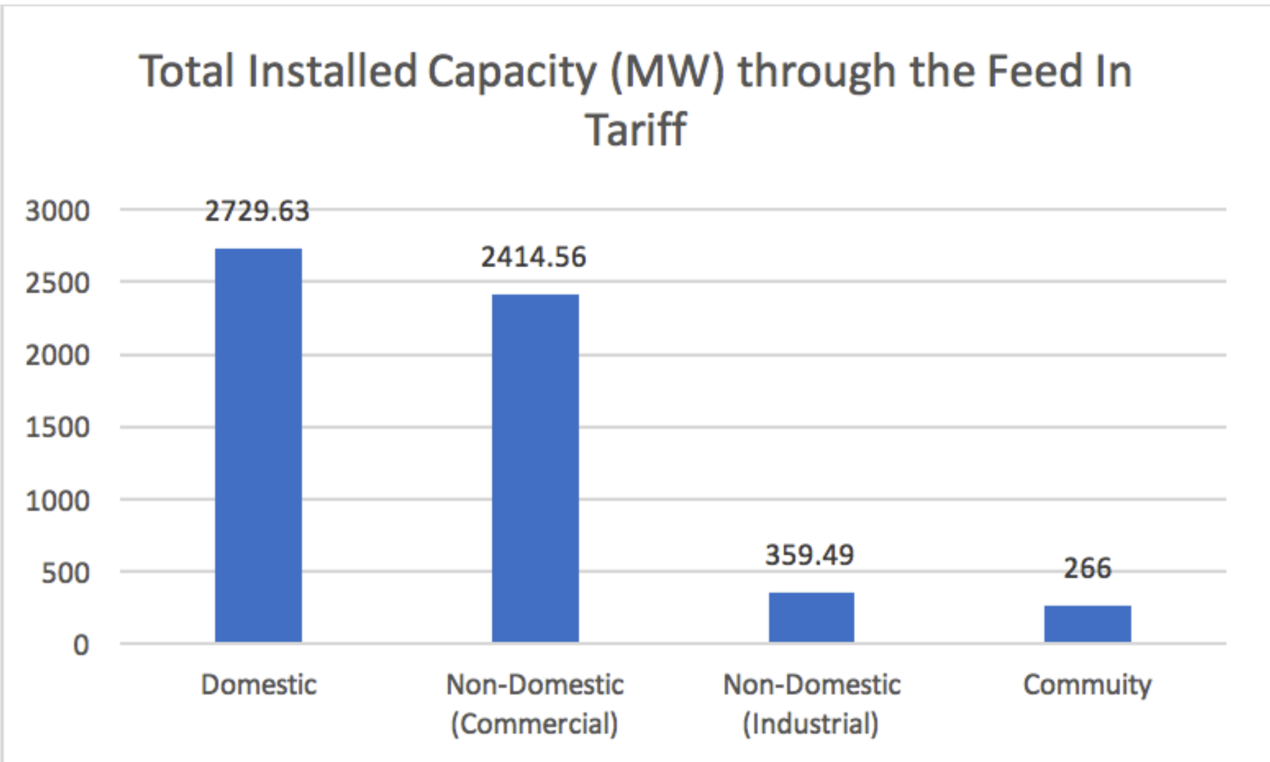



**Figure 5: Total installed capacity of projects that have utilised the FITs as of June 2017, OFGEM (2017b) data**

In the UK, FIT's were supported by two project development grants the Urban Community Energy Fund (UCEF) and the Rural Community Energy Fund (RCEF). When introduced, these grants were flagged as the UK government's community energy strategy set out by Department for Climate Change (DECC). The UCEF was worth GBP£10 million and the RCEF GBP£15 million (UK Department for Business Energy & Industrial Strategy, 2014; UK Department for Energy & Climate Change, 2013). FIT's were announced in 2008 and made available from April 2010. Projects which were registered after the 15th July 2009 were eligible for the full FIT. Early adopters who already had technologies prior to this date were able to claim the FIT at a lower rate. The FIT does not only cover community energy but it is also available for domestic, non- domestic commercial and non-domestic industrial projects too.

FITs are payable for a period of 20 years; however, the FIT is given in relation to the specific technology installed on a specific site. This means that should the technology be relocated then the existing FIT agreement will no longer be paid. Since the FIT's were introduced there here have been significant cuts to the FIT's scheme which a combination of small incremental and large drastic reductions. The central FIT register published by OFGEM (2017b) provides an overview of all FIT registered projects across the UK. From the data, a series of graphs have been produced to identify who has taken advantage of this policy and what types of technology have prevailed.

### *3.4.2 Potential impact for the Energy Transition*

**Table 6: Overview of the Potential Impact for the Energy Transition from Community Energy Schemes**

| Measure | Ownership & Control | Benefit(s)<br>• Social<br>• Economic<br>• Environmental | Carbon-Reduction & Scalability | Major Barrier(s) |
|---|---|---|---|---|
| **Community Energy Schemes** | Community Level Ownership & Control – dependent on the model selected. | **Social** – local community benefit (community benefit schemes)<br><br>**Economic** – Difficulty with achieving economic and financial sustainability, especially when competing with large energy companies. Multiple revenue streams likely required.<br><br>**Environmental** – proliferation of small scale renewable energy generation. | Technologies such as PV and wind energy provide low-no carbon alternatives to fossil fuel energy.<br><br>Scalability from community energy generation questionable – would require massive proliferation across all community demographic types to have meaningful impact. | Changing policy supports;<br><br>Lack of low cost financing;<br><br>Limitations in low skills, knowledge and know-how |

**Legal aspects:**

- Becker, Franke, & Gläsel (2017) explore how applying for and maintaining a legal form of organization exposes community based initiatives (CBIs) to pressures with the potential to shape them. They argue that applying for a legal form is not an easy or straight forward process and selecting and maintaining a legal form is an early obstacle that CBIs must overcome to contribute to a transition. These pressures are described as barriers which push and prevent CBIs in the process of acquiring and maintaining a legal organizational form. CBIs resist and work to overcome the pressures using social capital, internal agreements, citizen financing, and umbrella organizations (Becker et al., 2017).

- CBIs also experience challenges negotiating technical and procedural goals and ways of working, affecting their identity and aspirations (Dinnie & Holstead, 2017). Hillman, Axon, & Morrissey (2016) report for example, the tensions between achieving financial sustainability and realising social goals for social enterprises in the north-west of England.

**Social aspects:**

- Taylor Aiken (2017) argues for greater appreciation of the imbrication of space, community, and energy as mutually co-constitutive when considering community low carbon transitions. In this paper, the argument is forwarded that tensions in community transitions often result from different spatial imaginaries, informing one's approach to, and 'common sense' understanding of, community.
- There is a death of research on citizens' willingness to engage in community-based renewable energy projects, and its determinants. The study by Kalkbrenner & Roosen (2016) reports that while the general attitude toward community energy is positive, willingness to volunteer is higher than willingness to invest money in such schemes. Their analysis demonstrates that social norms, trust, environmental concern and community identity are important determinants of willingness to participate in community energy schemes. Ownership of a renewable energy system and living in a rural, rather than urban community, increase the likelihood of participation in community energy schemes for the study group sampled in Germany.

**Economic Aspects:**

- The autonomous nature of the social-economic model applied by community energy projects, including for example community energy social enterprises can represent a viable means to target social, environmental and economic multiple-bottom lines. Such organisations can develop strong links to their local communities and provide positive externalities in generating financial revenue, while also remaining fully cognisant of, and structured towards social outcomes (Hillman, Axon, & Morrissey, n.d.). In this regard, although centralized energy systems are economically attractive, local energy systems are important for self-sufficiency and sustainability (Koirala et al., 2016).

**Scale and regime transformation:**

- The transitions literature highlights the importance of a protected incubation space so that niches can become developed enough to break through to the regime. Within the context of community energy in the UK the incubation space provided by the government through the FITs has been reduced before originally expected. However, the findings do show that post FIT, organisations are innovating their business models to move away from subsidy based models in favour of becoming financially sustainable in their own right (Hillman et al., n.d.).
- Hillman *et al*. (n.d.) argue that a number of barriers exist which in the medium-long term may limit the potential of social enterprises to deliver regime transformation, or to act as 'transitions engines'. Chief amongst these is a lack of clarity or certainty on the policy and regulatory landscape in which they operate. This is true in particular of the energy and environmental policy landscape, more-so than the

regulatory landscape for social enterprises. *Ad hoc* and reactionary policy change in the UK has acted as a major challenge to energy focused social enterprises. It is clear that social enterprises are already playing an important role in the energy sector.

- Ruggiero, Martiskainen, & Onkila (2018) report that that there are factors preventing the niche from scaling up to the global niche phase, based on a study of community energy in the Finnish context. One of the main limitations is the lack of a shared vision of what community energy should mean, with differing aims for expansion among the types of projects identified, the limited national policy support for community energy, and the continuing discussion among experts on who should support the sector.

# 4 Recommended Policy Mixes and Innovative Cooperation Mechanisms

## 4.1 Introduction

In this section, we demonstrate how one might go about devising an innovative, community-orientated approach that brings together the various stakeholders involved in a project. More often than not, one cannot refer to one single type of agreement that all stakeholders adhere to, but rather the types of agreements – or contracts – each stakeholder enters into will reflect a myriad of social and financial circumstances the individual is negotiating at the time of the project. For example, a community-orientated renewable energy project will invariably involve a combination of written and verbal contracts and/or agreements that have spectrum of legal or moral obligations attached to them. Here we will present a series of seven scenarios that demonstrate the types of initiatives that a community may engage in as they transition to a low-carbon energy system and the types of agreements, cooperations, partnerships and incentives that can combine to drive these initiatives to their logical conclusions.

## 4.2 Devising Incentivised, Innovative Cooperation Mechanisms

### 4.2.1 Partnering, alliancing and the formulating (in)formal contracts

In aligning the objectives of different project stakeholders with the overall objectives of a project, there is a strong need to clarify how key stakeholders may benefit from the successful completion of the project's objectives, but also how they might become disadvantaged from these objectives. In taking this approach, those leading the project could further strengthen their case by adopting a Project Alliancing or Partnering arrangement whereby the interests of the alliance members – i.e., the project owner and all key stakeholders – are coordinated as co-beneficiaries of the project's agreed outcomes. The drivers that will help meet the requirements of such an alliance can used individually or in combination depending on the specific social contexts and environments being negotiated. They can include performance bonuses and profit-sharing, but also the threat of penalties for non-performance[5] etc.

### 4.2.2 The partnering approach to contracting

This potential can, in a number of ways, be fostered through adopting a partnering approach when formulating the contractual arrangements needed to begin a community-oriented renewable project. Laan *et al.* (2011) describe the conditions for developing trust between client and contractor in the construction

[5] This is in contrast with traditional contractual arrangements wherein the parties have individual responsibilities and associated legal liability for non-performance and contract disputes often lead to legal action.

industry, where a project-based approach dominates resulting in often very different entities that are relative strangers to each other having to work together to completion. These projects can be highly complex and are often characterised by uncertainty and risk. The authors focus on the project-alliance model of contract, which aligns the interests of client and contractor organisations by distributing the advantages of effective project implementation. The advantages from this type of contract are strongly linked to the fostering of trust between the client and that contractor through clear pathways of communication that signpost the risks and potential remedies to all partners in the project.

This approach is not just theoretical, but examples can be found demonstrating real-word contexts. A longitudinal study of a rail construction project in the Netherlands found that the alliance form of contract was more effective at fostering trust and managing hard-to-control risks than either traditional or design-build contracts. This was partly due to the fact that all partners were expected to carry the burden of increased risk-sharing, which helped to create a common interest and a less confrontational relationship between principal and contractor. However, in order that the contract realises its potential, the financial resources of the alliance fund must be of sufficient size to promote a common interest for all project partners to work together. Both principal and contractor organisations must be transparent about the levels of risk, and the design and management budgets, during negotiations. By establishing co-operative relationships from the beginning collaboration becomes is subsequently set at a premium. Consequently, the project-alliance model of contract has significant potential to create a virtuous cycle of trust between the partners, culminating in a gradual rise in the quality of interpersonal relationships within the alliance, itself brought about by co-location, transparency, a shared administrative system and tackling shared problems together. This in turn has a positive effect on the project's outcome.

Within the parameters of the alliancing model itself there is a very clear continuum, beginning with where relationships are embodied in a formal alliance contract to the spectrum of looser partnership arrangements that typify a project. The success of any partnering model is very much dependent on the following key factors, according to Rose & Manley (2011) and Laan *et al.* (2011):

- Strong relationships among partners;
- A high level of trust between partners;
- An alliance fund or set of financial incentives sufficiently large to create a shared interest in successfully completing the project;
- Effective and timely communication between partners about risks and potential remedies;
- Flexible incentives which respond to the changing circumstances of a project;
- Multiple goal incentives which increase partners' opportunities to achieve the incentive award;
- A perception of rewards being fairly and equitably distributed among partners.

These factors are also appropriate to alliance contracts. Fundamentally, the partnering approach – in at least to some degree – share the risks and rewards of the project among the partners, ensuring that everyone has an incentive to see it succeed. However, a partnership can be more or less inclusive in terms of both the stakeholders involved and the proportion of a project's life-cycle that it encompasses. In the example of an energy retrofit, a number of potential stakeholders much be considered as central to the project's success, including building owners, owners of any additional infrastructure, the designers and principal contractor, and community members including tenants affected by the project. For tenants, they may be included in the structure of risks and rewards by framing their tenancy contracts to reward them for reducing their energy usage and incentivise them to make effective use of the energy-saving equipment installed.

Government agencies or municipal authorities interested in promoting energy efficiency, reducing carbon emissions or technical innovation in the building stock might choose to partner – through varying degrees of formality – with building owners or an energy service company (ESCos). In terms of a building's life-cycle, a partnership might simply embrace the design and construction phases or even continue through to its occupation, management, refurbishment, and eventual demolition. Throughout these successive phases different partners might come and go. Ideally, an energy efficient buildings (EeB) project embraces the entire life-cycle of a building and all the different stakeholders with an interest in its performance. This could be said to be true for a renewable energy generating project too. However, since this is not always possible the next best alternative is a partnership that focuses on those parts of building's (or energy generating plant's) life-cycle that have most impact on its overall performance (as defined by the project owner in collaboration with key stakeholders). A modular contract approach within a framework structure offers greater flexibility in that it includes different partners as and when they are identified as having significant influence of achieving the project's objective(s).

### *4.2.3 Modular contracting*

At first glance, the concepts of life-cycle integrated management, integrated project delivery and alliancing appear to have quite different perspectives – differing especially in terms of their emphasis – on the understanding that relationships between key project stakeholders must be arranged so that they are structured, organised, and incentivised to work to a common objective. In acknowledging this, it can also be inferred that there are many different variations on how integration is applied. A useful approach is to integrate the aspects of the project that most impact established key performance metrics (i.e., those activities and those actors who have the most potential to contribute, or inhibit, the realisation of a project's objectives.

Again, in the context of a building energy efficiency project, adopting a modular contract approach allows those involved to use a number of contracts depending on the multiple relationships and timescales that may arise. This approach helps the project owner – who has first defined the project's life-cycle – to build a framework agreement which covers the life-cycle of the project. Such project partnerships or alliances are governed by an overall framework contract, under which a variety of subsidiary or daughter contracts are then added as required, and as specific aspects of the project present themselves. As the project progresses, new daughter contracts can be added and new partners can be brought on board and/or old partners allowed to leave. When engaging in this modularised type of contractual arrangements one needs to be aware that the incentives set out in each of these contracts must be aligned to the overall goals of the project. Incentivising actions that promote the successful completion of the project, in accordance with the metrics chosen, can range from cost savings (on material, labour, *etc*.), to energy savings (from up-to-date technology applications and behaviour change), to a reduction in overall carbon emissions.

Consulting with existing guidelines and suites of contract templates, such as those provided by FIDEC[6] (*e.g.,* short form; construction; plant & design-build; design-build-operate; energy performance contract / turnkey) and NEC[7] (e.g., engineering and construction; subcontract, short contract, short sub-contract, professional services; adjudication; term services; framework; supply) are a useful starting point when devising contracting arrangements for a community energy project. The common types of contract provided by these templates allows one to take a 'pick and mix' approach to creating a project-specific contract. In taking this modular contracting approach communities can develop highly-targeted, project-specific contracts – taken from the suites of templates mentioned above – that meet the changing needs of partners over the lifetime of the project. The requirements that will present themselves at the various stages of a project, from proposal to implementation, are best understood once one has implemented a life-cycle analysis of the project:

1. Goal Setting: initially, the project owner (with other stakeholders) must determine those performance metrics most relevant to the project – *e.g.,* cost, energy savings, GHG emissions reduction, other environmental impact, etc.
2. Scoping: a scoping exercise is then performed to ascertain which stages of the project's life-cycle will have most impact on the performance metric(s) chosen;
3. Identification of key actors: for each of these stages, an assessment must be carried out to ascertain the key activities that have most impact on the chosen performance metrics and the stakeholders with most influence on these activities - these are the stakeholders that should be the primary focus of the contractual arrangements;
4. Development of contracts: based on this analysis, the project owner should work with the identified key stakeholders to develop contracts to govern each set of activities (based on the available NEC, FIDIC templates and similar), which would best incentivise them to contribute to the achievement of the performance metrics for the overall project;
5. Contract alignment: the subsidiary contracts are aligned within an overall framework contract.

In summary, the goal is to combine the benefits of an alliancing approach with the integration of the various phases in a project's life-cycle in order to maximise the spread of risks and incentives among stakeholders. This is achieved through the flexibility of a modular framework for contracting and is used to target those points in a project's life-cycle which have the potential to realise the maximum gains in energy efficiency, cost savings and carbon reductions.

### *4.2.4 Enforcement*

Effective management, organisation, and in particular, enforcement that are applied in partnership and alliance contracts are key elements to their success. The self-enforcement provisions found in relational contracts (i.e. those that adjust compensation to performance) impacts incentive provision due to asymmetrical information at play between agent and principal and moral hazard (Levin, 2003). Good faith

[6] International Federation of Consulting Engineers – Fédération Internationale des Ingénieurs-Conseils.

[7] New Engineering Contract, a formalised system of contractual guidelines for construction and infrastructure projects created by the UK based Institution of Civil Engineers.

within the context of on-going relationships is therefore essential to many contracting relationships. Since writing completely effective contracts is difficult, incentives for performance are often informal, such as concern for reputation and the desire to maintain the good will of business or trading partners.

Melumad *et al.* (1995) note the additional incentive problems that arise from delegating authority to agents in a hierarchy, who go on to communicate and contract with agents at lower levels. They argue that additional incentive problems inherent in delegation can be resolved through sufficient monitoring of the agent's contribution to co-production and by following a particular sequence of contracting. They observe that 'intermediate agents who have been given authority over certain decisions may pursue their own self-interest rather than that of the principal' (Melumad et al., 1995).

To overcome this problem, it is essential that the principal can (1) monitor the contribution of the primary contractor to the project; and (2) design the sequence of contracts appropriately. This means the intermediate agent must accept the primary contract before entering into the subcontract with the secondary agent (to minimise information asymmetries between principal and agent), and report their own cost before entering the contract. The result is to screen the agent's private information and align their objectives with that of the principal. Holmstrom & Milgrom (1991) note that in relation to incentivising contracts, for the principal it may be better to have several different tasks for the agent to complete, or that the agent's single task has several different dimensions to it. This strategy offers the principal a more nuanced matrix from which to assess criteria and issue rewards. It also underlines the importance of job design, as it may make sense to separate out different tasks or different phases of tasks, where possible, and individually incentivise them. Obviously, this will have additional knock-on effects when devising optimum contractual arrangements.

### *4.2.5 Incentive based contracts*

A significant potential weakness that is frequently referred to in the literature on compensation and incentive-based contractual arrangements involves their susceptibility – depending on how well thought-out the incentives are – to being 'gamed' by participants. This can lead to incentives sometimes having unintended, dysfunctional consequences that reduce the overall efficiency of a given incentivised contract. For example, a developer may be incentivised to complete a project (say a community-based renewable energy generation plant) in as short a timeframe as possible without the accompanying adherence to industry standards also being locked in to the contract. As a result, the developer's focus may tend towards the looming completion date rather than ensuring best-practice is being adhered to throughout the entirety of the project. Essentially, while very useful as part of a suite of incentives, incentivising the completion date on its own is a perverse incentive. Therefore, performance measurement(s) must accurately reflect an organisation's objectives if we are to expect incentives to operate efficiently and minimise risk.

> *When the marginal product of an agent's actions on the performance measure is highly correlated with the marginal product of these actions on the principal's objective, then the performance measure is a good one and the resulting contract will be efficient*
>
> (Baker, 1992, p. 612).

Since an information asymmetry usually exists between the agent (in this case, the developer) and the principal (in this case the community organisation leading the project) the purpose of performance measurements is to persuade the agent to use their information productively and not to encourage dysfunctional actions. As Baker (1992) suggests, this type of situation may arise when an organisation – such as a non-profit or a government firm – lacks a clearly defined objective, or when contracting may require additional measures of performance. Essentially, the efficiency of contract incentives very much depends on the relationship of the performance measure used and the project owner's objective(s). Rose & Manley (2011) have identified three key types of financial incentives that are typically applied in construction projects and which may prove useful to community organisations wishing to engage with the construction industry to develop a renewable energy project of their own. They are: share of savings incentives; schedule incentives; and technical performance bonuses.

The complex and fragmentary nature of construction industry supply chains makes the case for such incentives – to promote corresponding motivations across interdependent, though often contractually fragmented, project teams – all the more. However, there is very little extant evidence from the literature detailing the relative effectiveness of financial incentives on a project. Rose & Manley (2011) have highlighted four Australian case studies that show how equitable contract conditions and good project relationships are essential for financial incentive effectiveness, with motivation resulting from the following four interrelated factors:

- Goal commitment (linked to attractiveness and the attainability of a goal);
- Distributive justice (the relation of a reward to the risk carried by a stakeholder and to those secured by other members of the project team);
- Procedural justice (the fairness of the procedures by which incentives are distributed);
- Interactional justice (the quality of communications and trust between principal and agent).

Rose & Manley also demonstrate how financial incentives directly motivated a majority of participants in each of the four case studies and effectiveness actually increased when those incentives were incorporated flexibly to meet the changing circumstances of the project. The multiple-goal incentivisation structures also improved participants' chances to meet their targets especially when rewards were perceived as being fairly and equitably distributed between the project partners. This increase in motivation also corresponded with each participants' greater sense of control over their own performance.

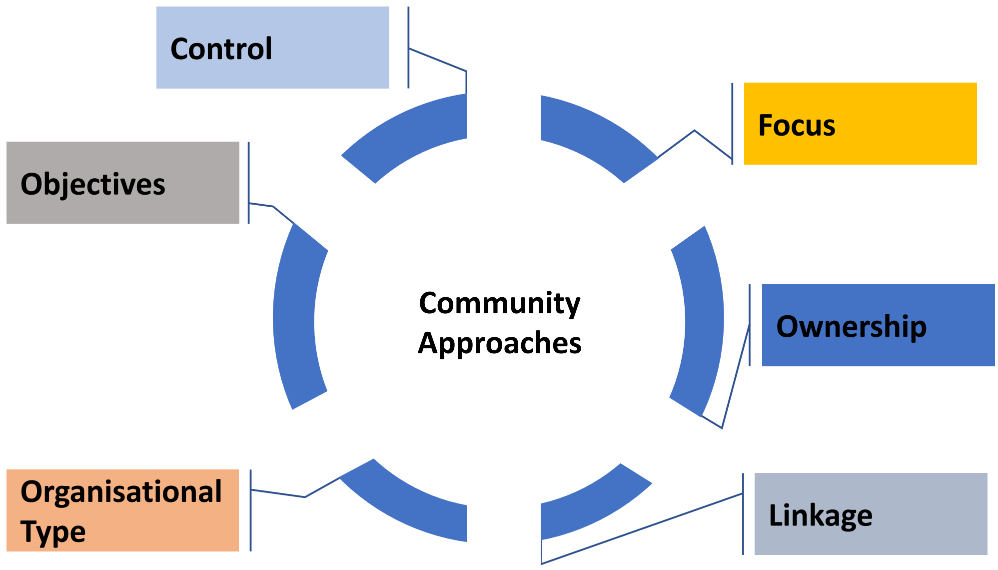
*Across all projects, mutual trust, team relationships and supporting processes played a vital role in promoting motivation toward voluntary goals*

(Rose & Manley, 2011)

Two notable motivational factors linked to relationship management are the potential for future work and establishing formal structures that promote relationship workshops as early as possible in the project. What we can take from the literature on incentive based contracts is that financial incentives on their own do not automatically translate into greater motivation for partners, but rather they are most effective when applied in a respectful contracting environment that supports trust and co-operation. Also, it can be difficult to successfully align financial incentives with the goals of an organisation and ensure they cannot be 'gamed'.

### 4.3 *Operationalising local responses to (inter)national energy transition in a policy context*

The potential for operationalising proactive localised citizenry responses to national and international energy transition trends, that incorporates social justice and is presented within a transparent and open policy context, is still very much achievable despite the somewhat mixed results to date (Dorcey & McDaniels, 2001; Lund, 2009). In this section we present seven scenarios, many of them informed by real-world examples already implemented at the local community setting, that demonstrate how engaged citizens can make a difference when supported by the correct policy and financial incentivisation configurations. Each scenario has a community-led organisation that operates using a combination of six characteristics outlined in Figure 6, and are common to all community-led organisations found within the EU.




| | | |
|---|---|---|
| **Control**<br>• Democratic local<br>• Inclusive local<br>• Shareholders local<br>• Publically owned<br>• National stakeholders<br>    o Cooperatives<br>    o Non-governmental organisations<br>• Shareholders<br>    o National<br>    o International | **Organisational type**<br>• Cooperative (producer)<br>• Cooperative (consumer)<br>• Social enterprise<br>• Charity<br>• Commercial company<br>    o Subsidiary<br>    o Subsidised<br>• Public-owned<br>• Hybrid | **Ownership**<br>• Local community (widespread)<br>• Local community (narrow)<br>• Commercial developer (local)<br>• Local authority<br>• Energy company<br>    o National<br>    o International<br>• National not-for-profit<br>• Hybrid |
| **Linkage**<br>• Operating within a micro-grid<br>• Linked to national grid | **Objectives**<br>• Profit<br>• Environmental<br>• Societal | **Focus**<br>• Supply<br>• Consumption<br>• ESCO (energy savings company) – i.e. energy conservation |

**Figure 6: The common structural characteristics of community-led organisations found within the EU**

## 4.4 Outline of appropriate energy management approaches, according to scenario

Each of the following scenarios is presented with an introductory *case summary* that highlight the specific organisational and control structures the community-led organisation that is the focus of the scenario operates under. This is then followed by a graphic representation of the typical characteristics associated with each community approach, after which a graphical representation of the interlinking relationships the main stakeholders share and the types of cooperation mechanisms involved is indicated. In addition, tables have been produced outlining the key drivers, challenges and impacts specific to each scenario with a final section indicating lessons learned and their recommendations.

### 4.4.1 Scenario 1: An energy purchasing cooperative

A group of people concerned about rising energy costs came together to form a group energy purchasing scheme for their community, with the objective of using their collective bargaining power to negotiate more favourable energy pricing for its members. They established the group as a consumers' cooperative society[8], open to membership to all residents and micro-businesses within its locality who are able to use their services and willing to accept the responsibilities of membership, without discrimination. Ownership of the cooperative is directly vested in its membership, who have each contributed equally to the capital through a membership subscription.

The cooperative is an autonomous organisation controlled by its members, all of whom have equal voting rights (so-called one member, one vote). Members actively participate in setting out their policies and making decisions. The membership elects a management board who oversee the governance of the cooperative. A general manager was appointed by, and is answerable to, the management board to run the cooperative on a day-to-day basis.

The cooperative tenders for energy on the open market and acts as a reseller to its members. This collective bargaining enables them to access energy at more competitive pricing than would be available to individuals. Dealing directly with the energy supplier, itself linked to the national grid, the cooperative manages the payment and supply arrangements of its members. Members do not deal with the energy supply company, but rather are invoiced directly by the cooperative. Surpluses are used to develop the cooperative and to provide rebates to members in proportion with their energy purchases from the cooperative. In addition, members have agreed for management to establish a number of easy payment options to help potentially struggling members continue to contribute for as long as is feasible. This forms part of its societal commitment to work for the general good of all members. The advantages associated with membership are also conditional on how active members are. Members who signed up to the cooperative, but then decided to use a different energy provider do not have the same voting rights as those who use cooperative's chosen energy provider, helping to ensure strategic control stays within the organisation.

This emphasis on maintaining local membership has resulted in the cooperative remaining geographically focused to the local area where its members reside. It has impacted on members' attitudes to energy more

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[8] A cooperative society is defined as "*an autonomous association of persons united voluntarily to meet their common economic, social, and cultural needs and aspirations through a jointly owned and democratically controlled enterprise*" https://ica.coop/en/whats-co-op/co-operative-identity-values-principles

generally and their negotiating power within the energy system. Members are no longer atomised consumers, but rather have become active consumers negotiating more favourable pricing conditions than would otherwise be available to them. Associated societal benefits range from more money staying within the local economy to the establishment of stronger local networks enabling members meet wider societal challenges in a more coherent and focused way.

**CHARACTERISTICS of this COMMUNITY APPROACH**

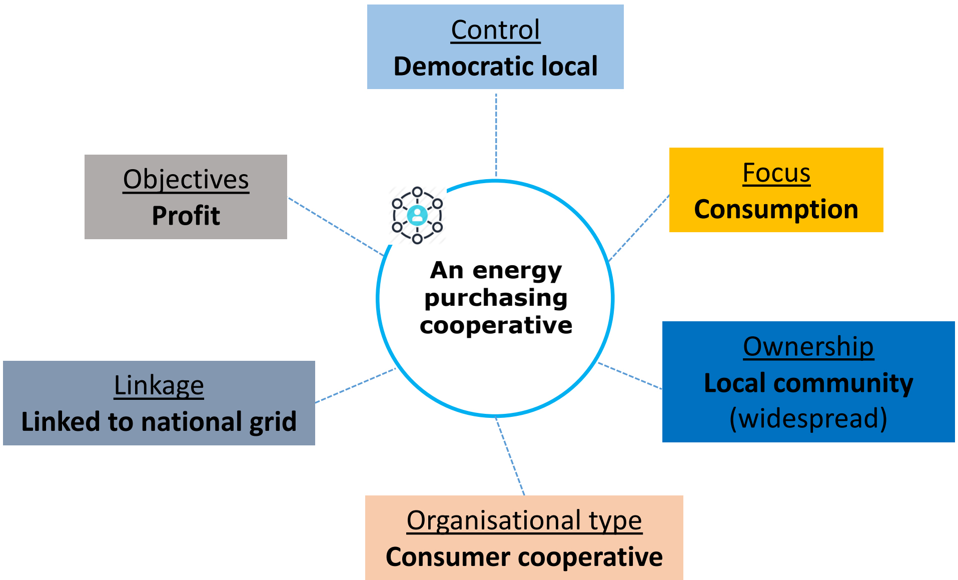


**Figure 7: Key characteristics of an energy purchasing cooperative**

Figure 7 presents the key characteristics of an energy purchasing cooperative discussed in the case summary. Another variable one could consider important is the type of community forming the project. In this case, as with the other scenarios, the location of the community is important and, with everything else being equal, the where the community is situated – with is accumulated historical and geographical heritages – can result in very different outcomes for two communities with very similar goals.

**MAIN STAKEHOLDERS and TYPE OF COOPERATION MECHANISMS**

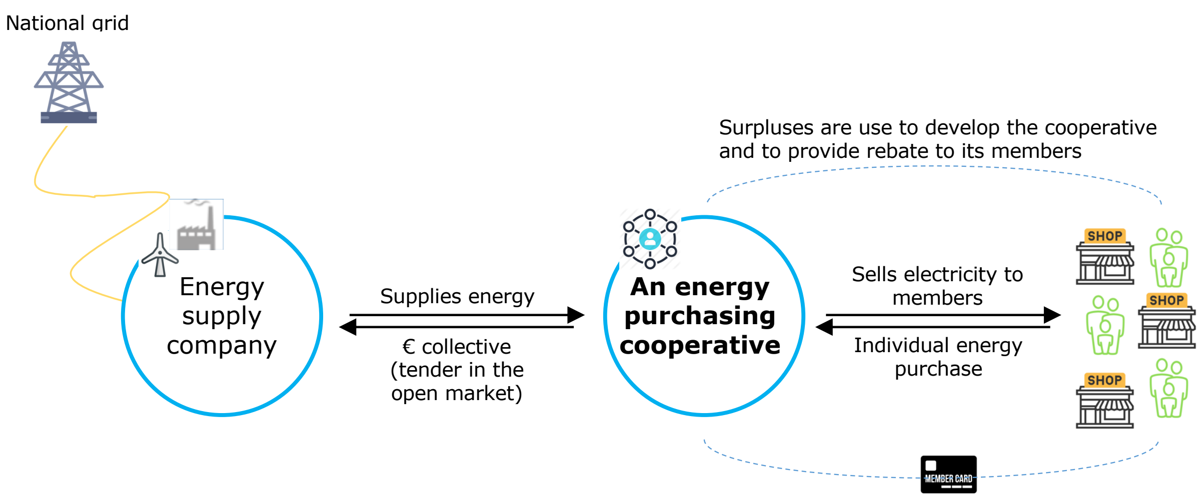


**Figure 8: Schematic of main stakeholders and the types of cooperation mechanisms employed in operation for Scenario 1**

This community approach is a catalyst for projects involving a rather minimal number of key stakeholders, invariably being a relationship between the energy supply company (ESCO) and the wider community, which is represented by the energy purchasing cooperative. The ESCO supplies energy directly to the cooperative at a discounted price – cutting out any intermediary agents that would bring added cost to the purchase – resulting from the greater collectivised power the community has in negotiating that price. Surplus increase generated by the cooperative can be pumped back in to developing the cooperative or providing a further discount to members. Figure 8 shows the main linkages that develop between these two stakeholders.

**Table 7: Key drivers, challenges, impacts and lessons from Scenario 1**

<table>
<tr><th colspan="2">Scenario 1</th></tr>
<tr><td colspan="2">An energy purchasing cooperative</td></tr>
<tr><td>Drivers</td><td>Major challenges</td></tr>
<tr><td>○ Effective communications among independent parties with an interest in group purchasing during start-up phase;<br>○ Communities in some cases connect many individuals to organize purchasing through membership in churches or participation in schools, community trusts;<br>○ Electricity prices subjected to market disruption.</td><td>○ Reach those people who have never switched energy suppliers before;<br>○ Lobbying of big utilities and players;<br>○ The evolution from a start-up, highly entrepreneurial cooperative to one that is more mature.<br>○ Community opposition depending on the energy supplier;</td></tr>
<tr><td colspan="2">Impacts</td></tr>
<tr><td colspan="2">Social –<br>– Active consumer switch;<br>– Establishment of stronger local networks enabling members meet wider societal challenges in a more coherent and focused way (e.g., see Barton, n.d.);<br>– A greater appreciation of sharing by people as a means of working together economically in communities;<br>– Gain greater local control over their energy supply;<br>Economic –<br>– Budget stability by offering fixed rate energy supply costs;<br>– Generation of additional income for members;<br>– Gain opportunities to apply their collective purchasing capability to entirely different economic sectors, for instance, provision of affordable organic food, access to affordable credit and banking services, to affordable housing, to quality affordable child or elder care,<br>Environmental –<br>– When renewable electricity is supplied, the environmental footprint is improved by using their consumer power;</td></tr>
<tr><td colspan="2">Lessons learned</td></tr>
<tr><td colspan="2">– New models for collective consumer action across a range of markets could be explored to inspire innovative models for buying together. For instance, the Department of Business, Innovation & Skills (BIS) and Co-operatives of UK launches, in this perspective, the 'Buy Better Together Challenge' innovation prize (UK Department for Business Innovation & Skills, 2012);</td></tr>
</table>

- An industry association may actively carry out the organizational costs of a purchasing cooperative as an added benefit for its dues paying members (see e.g., Reynolds & Wadsworth, 2009). This type of support is similar to the coordination role played by some chambers of commerce in organizing energy purchasing cooperatives for local businesses.

In addition, Table 7 above demonstrates the key drivers, major challenges, the social, economic and environmental impacts associated with an energy purchasing cooperative. A number of lessons learned from this scenario are also indicated.

### *4.4.2 Scenario 2: A Commercially-Owned Wind Farm*

Members of a local community decided to approach a commercially-owned wind energy company to see if they can work together to develop a wind farm in their area. The majority of these community members are already involved in local businesses and recognise a business opportunity to bring further investment into the locality. After speaking with local landowners, to gauge the level of approval or potential opposition to such a project, they establish a Community Development Associations (CDA) , electing a three-person sub-committee to carry out research, liaise with other community members and to approach the wind energy company they have identified as most suitable to their area. The committee agrees to approach a wind energy company that has pre-existing links to the area, as it is felt by some that this will build greater trust between the developer and the local community more generally.

The Community Development Association has been set up as not-for-profit and voluntary, and operates with supports from the local development agency and from national and/or EU funding where applicable. After successfully recruiting the wind energy company, members of the CDA and the company established a limited renewable energy company to oversee the planning application and the community-engaged incentives that are common practice with commercially developed wind energy projects. This new company is a subsidiary of the commercial wind company and receives the supports associated with this type of arrangement.

Given the technical complexity, economies of scale, capital costs, and funding challenges of developing a commercial wind farm, the parent wind energy company provided the supports needed during the initial planning application and grid connection phases of the project. Construction costs are also met by the parent company. Electricity produced from the wind farm is fed directly into the national grid at a fixed rate. The company had considered having a private power purchase agreement (PPA), under which the generated capacity would be sold to a third party, but the national grid option was chosen as being most suitable in this instance.

Under this joint venture an annual community fund was also set up to finance sporting and cultural activities throughout the year. This fund is managed with governance and oversight structures built in, with an annual report published on all outgoings and expenses. The commercial company is not involved in the administration of this fund. In addition, a facility was established at the beginning of the project whereby local residents could buy shares in the wind energy company and potentially avail of the annual dividends accruing from any profits made. Under current legislation, commercial wind developers are obliged to adhere to voluntary protocol whereby they must offer a minimum 20% community share ownership for projects worth over €2m. This has resulted in higher rates of community investment in to large-scale, commercial wind farms than is the case elsewhere in Europe.

**CHARACTERISTICS of this COMMUNITY APPROACH**

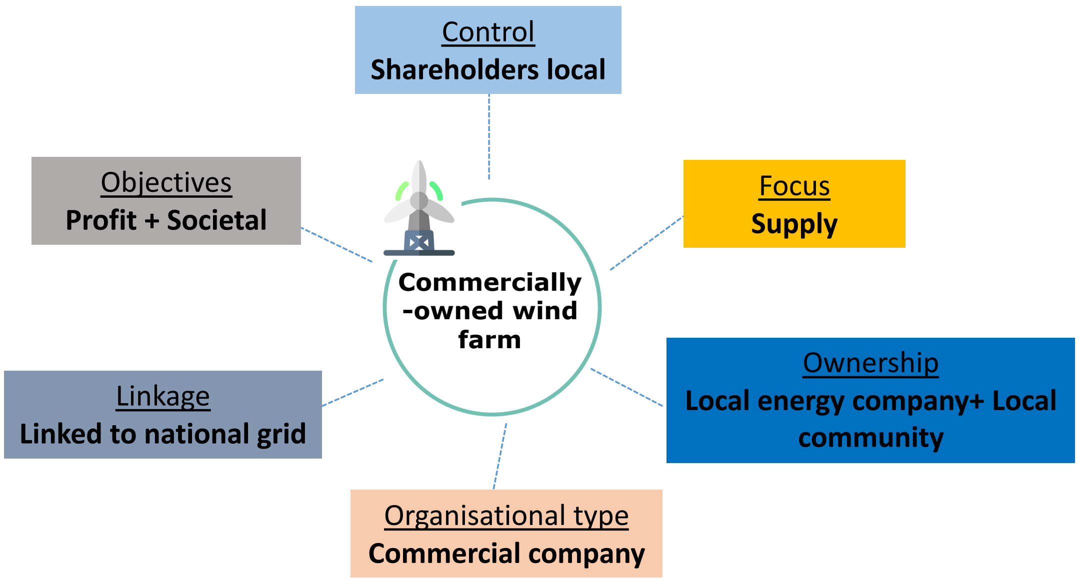


**Figure 9: Key characteristics of a commercially-owned windfarm**

Figure 9 above outlines the key characteristics of the projects discussed in the case summary. Another variable one could consider important is the type of community forming the project. In this case, as with the other scenarios, the location of the community is important and, with everything else being equal, the where the community is situated – with is accumulated historical and geographical heritages – can result in very different outcomes for two communities with very similar goals.

**MAIN STAKEHOLDERS and TYPE OF COOPERATION MECHANISMS**

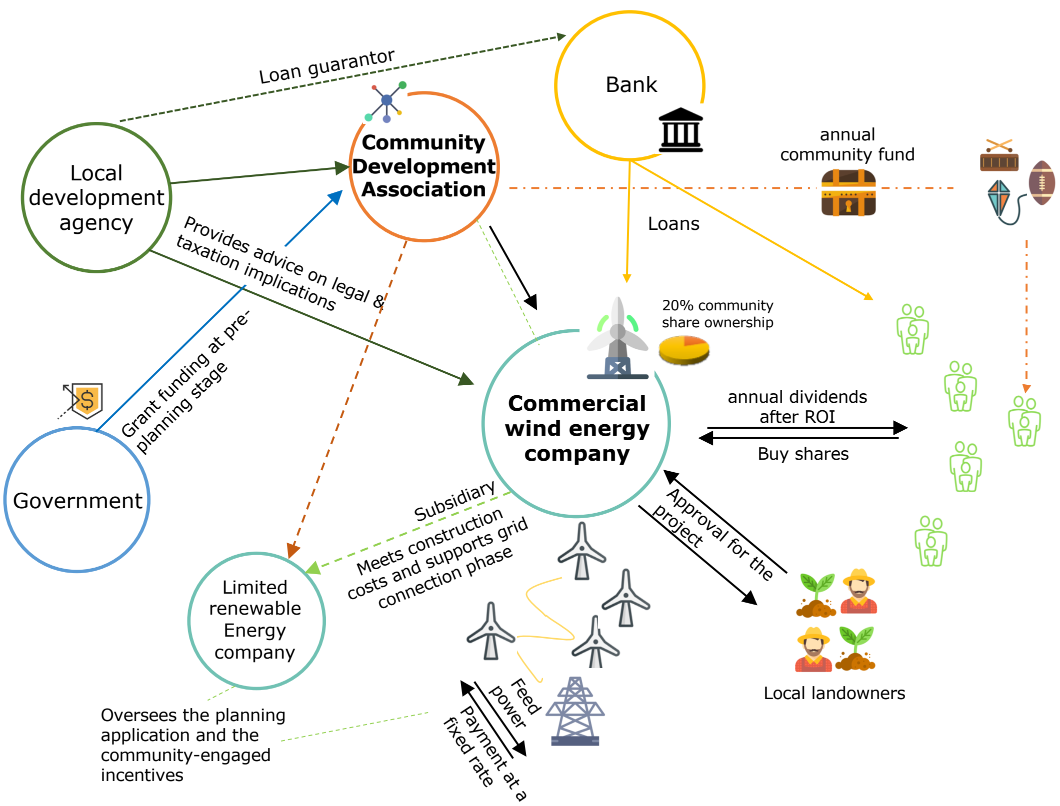


**Figure 10: Schematic of main stakeholders and the types of cooperation mechanisms in operation for Scenario 2**

Figure 10 shows the complex interplay that exists between the various stakeholders that is associated with a commercial wind farm development. At the centre of this network lies the commercial wind energy company, which procures funding and resources to construct the wind farm. The role a community plays can be considered to be a somewhat minor one in this scenario, with various local and extra-local bodies representing its interests. Community members who have the most direct input to the project are the landowners who host the wind turbines wind turbines on their property. While the community does not get a greater proportion of the profits etc. that they would if they were more directly involved, when done correctly they can still benefit from locally-managed funds gifted to the community by commercial wind energy company.

**Table 8: Key drivers, challenges, impacts and lessons from Scenario 2**

<table>
<tr><th colspan="2">Scenario 2</th></tr>
<tr><td colspan="2">A Commercially-Owned Wind Farm</td></tr>
<tr><td>Drivers</td><td>Major challenges</td></tr>
<tr><td>
<ul>
<li>Price support for wind power;</li>
<li>Establishment of tax advantages in the form of tax-free generation, refund of energy and/or $CO_2$ taxes, and favourable depreciation rules for businesses;</li>
<li>The presence of a domestic strong wind turbine manufacturing industry;</li>
<li>Top-down support for the pre-planning and permitting stages, including grants from the Government and bank guarantees from the Local authority;</li>
<li>‘Hands-on’ support and negotiating role of membership-led trade associations acting as development agencies.</li>
</ul>
</td><td>
<ul>
<li>Wind energy is a very capital-intensive technology and longer time horizon is needed to reach a break-even;</li>
<li>The location of the community has a direct impact on the profitability of a turbine;</li>
<li>Over-reliance on supportive policy environments;</li>
<li>There is a lack of uniform interconnection standards in several countries which may incur additional charges (or even feasibility) of interconnection to the grid;</li>
<li>Community opposition to larger and commercial wind farms at the planning and permitting stages (Vaccaro, 2008).</li>
</ul>
</td></tr>
<tr><td colspan="2">Impacts</td></tr>
<tr><td colspan="2">
Social –
<ul>
<li>Enhanced public acceptance of RE projects and increase of the number of individuals with a stake in the success of wind energy;</li>
<li>Creation of a strong sense of community;</li>
<li>Change in member attitudes towards collective decision-making process (see e.g., Willis & Willis, 2012).</li>
</ul>
Economic –<br>
For wind developers and local businesses
<ul>
<li>Access to small investor capital which can often secure financing at rates well below those expected by commercial financiers;</li>
<li>Share of the investment costs and risks;</li>
<li>Reduced transmission costs and/or the need for new transmission lines or upgrades due to the proximity between the farm and the load;</li>
<li>Local service providers can be used when it comes to the maintenance of equipment.</li>
</ul>
Local
<ul>
<li>Generation of additional income for members;</li>
</ul>
</td></tr>
</table>

- Help keep the economic benefits of renewable energy generation in the local economy (on-site employment creation, business activity that results from the project, *etc*.) (see e.g., Tarhan, 2015);
- Gain security by sourcing locally produced wind power that is not subjected to external market disruption.

**Environmental –**

- Generation of electricity without toxic pollution or global warming emissions;
- Noise pollution, bird and bat fatalities and land surface impacts (Wang & Wang, 2015).

**Lessons learned**

- Greater attention should be focused on overcoming the financial barriers to development of smaller scale, commercially own wind farms. These may include:
  - Direct public and local authority support;
  - Local energy office support;
  - Capital support at high risk pre-planning stage;
  - A pre-subscription model to provide additional early funding;
  - Availability of bank loans solely on the security of the shares;
  - Availability of bank loans for members to buy shares;
- A good insurance is needed to minimise financial exposure to operational risks;
- Greater support is needed for wind local associations which provide mutual support and information sharing 'on the ground', whilst lobbying to overcome institutional barriers. A 'best-practice' guidance based on experience from Danish, German and Swedish community owned wind farms movements needs to be promoted.
- More effort should be devoted to studying the overall environmental impacts of wind power, so that society can make informed decisions when weighing the advantages and disadvantages of particular wind power development.
- Greater support is needed for research on the extension of the life span for the existing turbines;
- Wider education and awareness-raising among the general public, politicians, the financial sector and other potential project partners is required to promote commercially-owned wind farms.

In addition, Table 8 above highlights the key drivers, major challenges, the social, economic and environmental impacts associated with a commercially owned wind farm. The lessons learned from this scenario are also indicated in the final section of the table, with a number of suggestions how communities could be allowed to participate meaningfully in this market. An opportunity that has heretofore been not been made available across the European Union.

### *4.4.3 Scenario 3: A Locally-Owned Renewable Energy Project*

A local community cooperative, through a subsidiary company is established, has developed a hydro-electric scheme on a river that runs through their locality. This river is a tributary to a larger catchment area that feeds into a national park. The project was developed by the cooperative to enable local businesses avail of electricity produced at a reduced rate and to provide a sustainable, long-term income that can be used in the area. A portion of this annual income, as a result, has been put into a community-focussed projects fund that benefit the whole community. One such project has been to provide free home insulation to local residents who cannot afford to pay for such upgrades to their home, along with zero-interest loans to those who can. This has resulted in more than half of the residents in the area improving the energy-rating of the homes, with more expected to follow in the coming months and year. Also, a more ambitious plan is underway to make the village, situated in the heart of this community, the country's first carbon-neutral village. These are still being devised. This fund is administered by the community cooperative.

The subsidiary leases approximately ten hectares land running adjacent to the river from the national forestry body that owns the land. Under national legislation this body is obliged to give local communities the opportunity to lease or buy national forest so long as it is for public benefit. The scheme generates enough electricity annually to power over 300 homes, with a projected income of several million euro over a projected 20-year timeframe. Capital for the development came from a successful application for a start-up grant from a national seed fund, followed by a pre-planning loan from the same agency. Additional monies were secured from a well-known, international sustainable bank, along with other funding streams from national agencies tasked with supporting community projects.

A professional, full-time project manager is employed by the subsidiary to oversee the running of the project. This individual is also supported by a committed core team of volunteers to step in when needed. From their experiences, the cooperative produced a "lessons learned" guide for other cooperatives considering a similar initiative. These guidelines range from notes on good governance to the day-to-day savings available to such groups engaged in similar projects. Other smaller projects that have come from this project have been the installation of a number of micro-renewable heating systems in the area, along with planting a community orchard and the establishment of a woodland learning area for the local primary school. Of particular importance to the project, in terms of its long-term viability, has been that it has been able to sell its energy directly to third parties. As a result, the cooperative is able to charge more for every unit of energy they produce, instead of having to adhere to rigid national pricing structures often found elsewhere in Europe, and buyers still pay less than the current market rates that are driven by the large energy utilities.

**CHARACTERISTICS of this COMMUNITY APPROACH**

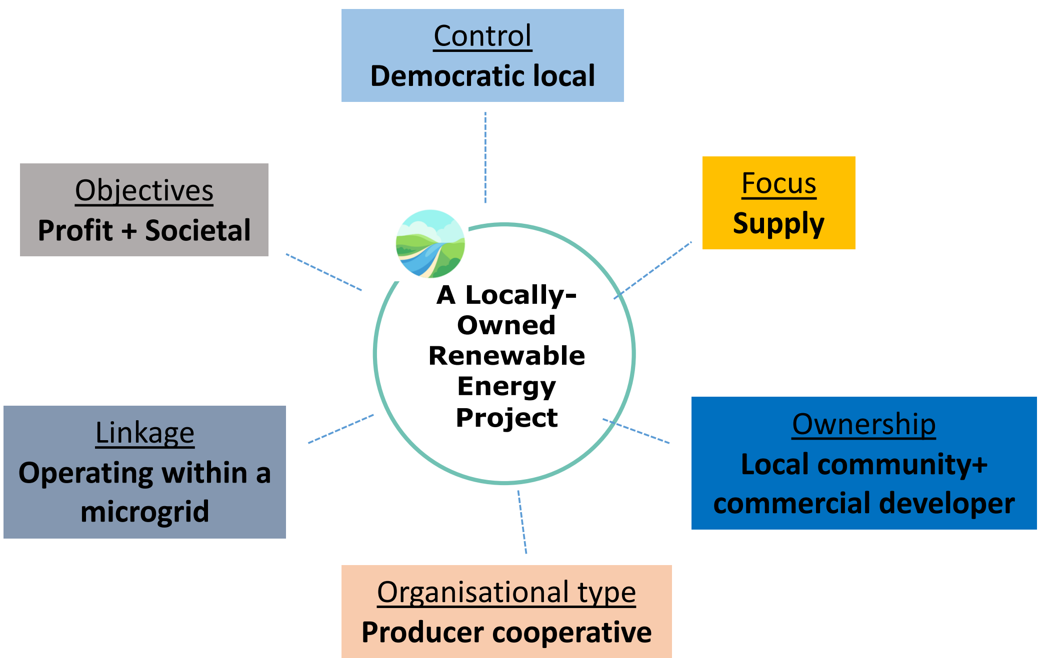


**Figure 11: Key characteristics of a locally-owned renewable energy project**

Figure 11 below outlines the key characteristics of a locally-owned renewable energy project, as discussed in the case summary. Another variable one could consider important is the type of community forming the project. As with the other scenarios, the location of the community is important and, with everything else being equal, the where the community is situated – with is accumulated historical and geographical heritages – can result in very different outcomes for two communities with very similar goals.

**MAIN STAKEHOLDERS and TYPE OF COOPERATION MECHANISMS**

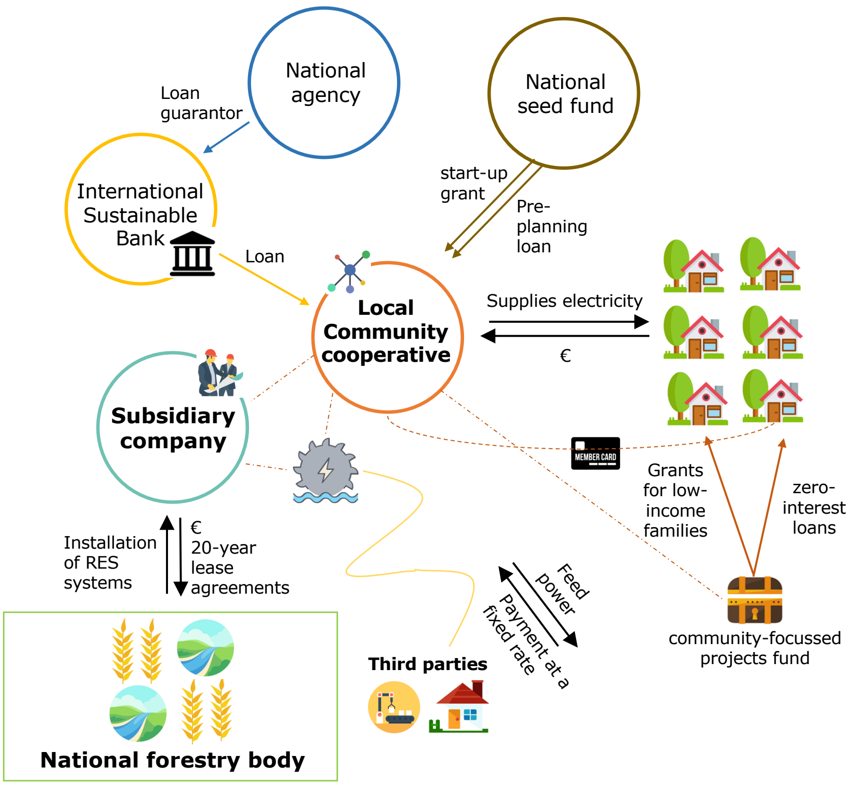


**Figure 12: Schematic of main stakeholders and the types of cooperation mechanisms in operation for Scenario 3**

Figure 12 presents complex cooperation mechanisms that exist when a community cooperative sets up a locally-owned renewable energy project. At the centre of this network lies the community cooperative, which must secure seed funding from outside the locality, usually from national funding bodies or sustainable banking sources. The community cooperative sets up a subsidiary company to oversee the installed of the RES infrastructure and to negotiate contracts, leases etc. The role a community plays in this scenarios is far more proactive than Scenario 2, with the community benefiting through a variety of means including pre-agreed fixed-rate electricity pricing and structured funding for community-centred projects in the area.

**Table 9: Key drivers, challenges, impacts and lessons from Scenario 3**

| **Scenario 3** | |
|---|---|
| ***A Locally-Owned Renewable Energy Project*** | |
| **Drivers** | **Major challenges** |
| ○ Price support for hydro power;<br>○ Top-down support for mini hydro developers during the pre-planning and permitting stages, including grants from | ○ Landowner and fishermen opposition;<br>○ Getting the permits on time (Halton Lune Hydro, n.d.);<br>○ The location of the community has a direct impact on the profitability of this kind of systems;<br>○ Reliance on water levels; |

| | |
|---|---|
| the Government and bank guarantees from the Local authority;<br>○ Technical support from local agencies or development associations during the development process;<br>○ The existence of a local group focused on developing and improving the community for the benefit of residents. | ○ Projects can be difficult to pull off when the governance structure is composed by volunteers;<br>○ Coordination is needed between banks, planners, lawyers, and third parties. |

**Impacts**

### Social –

- Enhanced public acceptance of hydro power projects;
- Improved and enhanced recreational opportunities and sporting activities thanks to the community focused project fund;
- Stronger sense of community.

### Economic –

#### *Local residents*

- By making sure the power is used locally and does not have to travel for miles, the community gets cheaper bills;
- Grants for low-income families and zero-interest loans;
- Help keep the economic benefits of renewable energy generation in the local economy (on-site employment creation, business activity that results from the project, *etc*.) (see e.g., Tarhan, 2015);

#### *Small businesses*

- Third parties still pay less than the current market rates that are driven by the large energy utilities.
- Gain security by sourcing locally produced hydro power that is not subjected to external market disruption.

### Environmental –

- Flood control, irrigation and water supply;
- Use of water, a clean fuel source;
- Support to energy efficiency measures and carbon reducing technologies in the community thanks to the community focused project fund (reducing home energy use, reducing home water use, using sustainable home building materials, encouraging the use of appropriate renewable technologies, improved public and community transport

**Lessons learned**

- Greater attention should be focused on overcoming the technical and financial barriers to development of smaller scale, hydro power projects. These may include:
  - Direct public and local authority support;
  - Local energy office support;
  - Availability of bank loans solely on the security of the shares;
  - Availability of bank loans for members to buy shares;
  - Exempt mini-hydro plants from technical requirements imposed on bigger plants;
  - Establishment of simplified authorisation procedures, including through simple notification, for small-scale renewable hydro projects;
- Greater support is needed for empowering local agencies to provide technical advice to project partners and to help the them to negotiate with key stakeholders;
- Awareness raising campaigns to community members and small businesses are required to promote hydro-power projects as a viable business model and overcome negative perceptions;
- Local organisations are increasingly recognised as the best coordinators of the community focused project fund (see e.g., Halton Lune Hydro, n.d.);

- More effort should be devoted to studying the overall environmental impacts of hydro power, so that society can make informed decisions when weighing the advantages and disadvantages of particular hydro power development.

Table 9 above demonstrates the key drivers, major challenges, the social, economic and environmental impacts associated with a locally-owned renewable energy project. Under the right conditions, and financial supports, this scenario should appeal to community-focused cooperatives across the European Union. The lessons learned from this scenario are also indicated, with suggestions on how policy makers could foster greater interest in this type of development.

### *4.4.4 Scenario 4: A bioenergy community in a rural area, hosting a decentralised energy cooperative*

A group of 20 farmers sought to find better ways of storing and disposing of the manure produced in their pig and other livestock enterprises. A biogas production facility was proposed, and a feasibility study was conducted. At the same time as the farmers recognised this business opportunity, their local community wanted to install a CHP plant to generate electricity and provide district heating to the community. An initial survey of local residents was carried out to gauge their interest in participating, and to clarify their motivations. During this initial phase two interlinked co-operatives operating two energy systems, were established. The first one, was a farmer-owned biogas cooperative, which uses pig slurry from the farm members, together with a range of other organic wastes, to produce methane gas. The biogas is then received at the CHP plant of the second one– a consumer-owned district heating co-operative – to supply heat to its local consumers (schools, nursing homes, sports complexes, private homes and small businesses).

The farmer-owned biogas cooperative is governed by a board of five directors that is made up from the farmer membership. The board meets monthly with the full-time manager who has day-to-day management responsibility of the plant. In addition to the regular board meetings, an annual general meeting is held for all members. Over and above these meetings, all members are in regular communication with the cooperative to organise the dispatch and return of animal manures.

The district heating cooperative, on the other hand, is open to all inhabitants within the locality. Residents were given the options of becoming members and investors in the local project through the purchase of preference shares. The board is formed by seven independent directors; five are elected by members, and the remaining two are appointed by the local council. Both the biogas plant and the CHP plant are managed by the same person, a multidisciplinary engineer.

**CHARACTERISTICS of this COMMUNITY APPROACH**

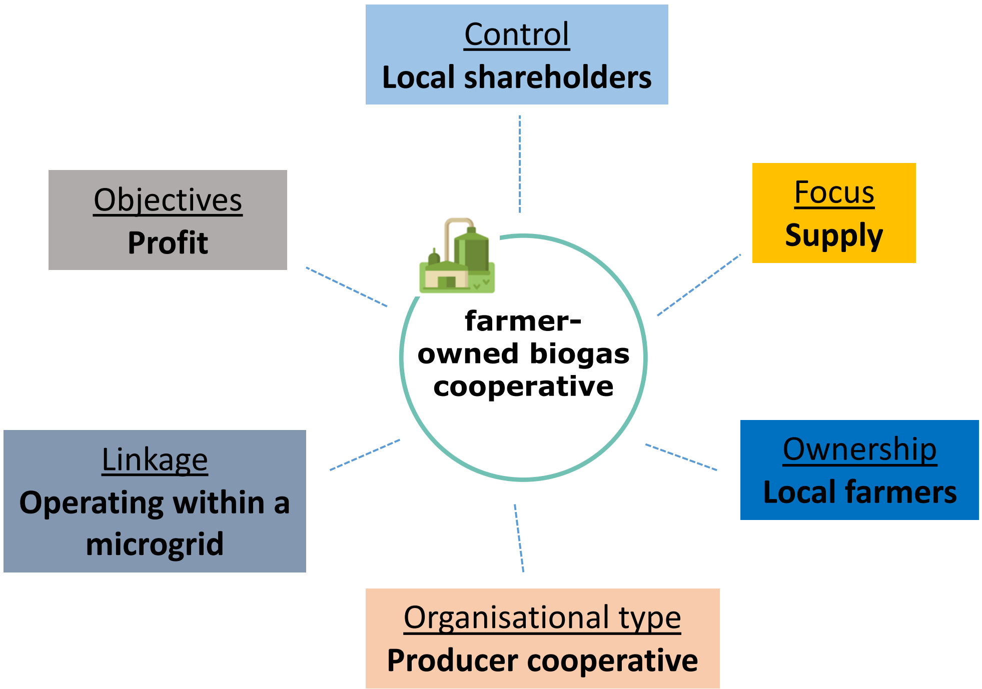


**Figure 13: Key characteristics of a farmer-owned biogas cooperative**

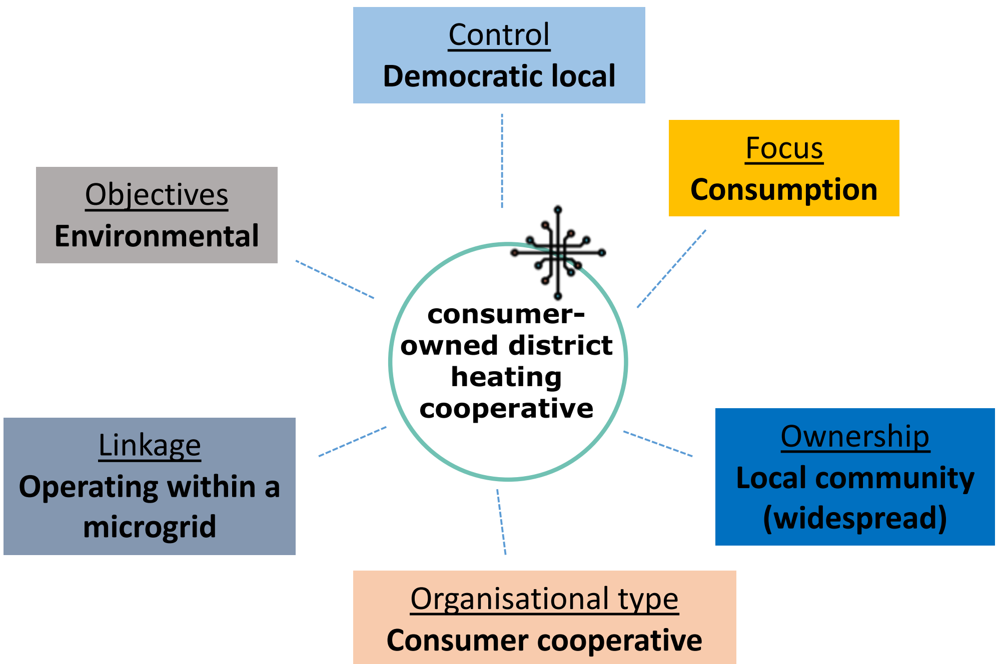


**Figure 14: Key characteristics of a consumer-owned district heating cooperative**

Figures 13 and 14 above demonstrate the key characteristics of the projects discussed in the case summary. Another variable one could consider important is the type of community forming the project. In this case, as with the other scenarios, the location of the community is important and, with everything else being equal, the where the community is situated – with is accumulated historical and geographical heritages – can result in very different outcomes for two communities with very similar goals.

**MAIN STAKEHOLDERS and TYPE OF COOPERATION MECHANISMS**

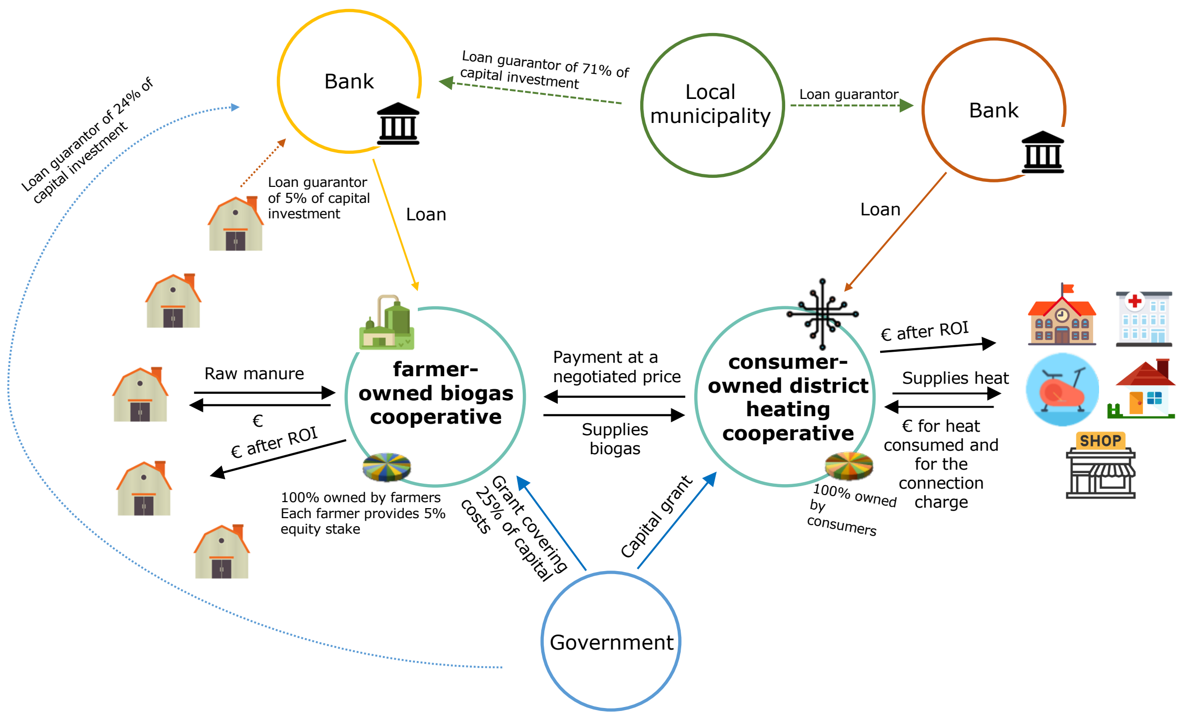


**Figure 15: Schematic of main stakeholders and the types of cooperation mechanisms in operation for Scenario 4**

This community approach acts as a catalyst for projects involving a range of stakeholders such as local authorities, farmers, property managers and the wider community. Figure 15 demonstrates the main linkages that develop between stakeholders. This scenario demonstrates the key role a local government or a municipality play as a guarantor the projects, with central government supporting the project with grants and other funding mechanisms. Note the linkages between residents and farmers through two cooperatives.

**Table 10: Key drivers, challenges, impacts and lessons from Scenario 4**

| **Scenario 4** | |
|---|---|
| ***A bioenergy community in a rural area, hosting a decentralised energy cooperative*** | |
| **Drivers** | **Major challenges** |
| ○ Stricter legislation regarding the handling of manure in a country which has a highly intensive livestock sector;<br>○ Support for research to develop biogas technology and district heating;<br>○ Support for the capital costs of project implementation: Top down support from the Government, including grants and major guarantor role of the local municipality. Bottom up support from farmers, providing equity stake; | ○ Negative public perception and so-called not-in-my-backyard (NIMBY) movement: there have been occasions in ongoing projects where smells from the plant have caused nuisance to local residents (DTI Global Watch, 2004);<br>○ Access to capital, especially during their startup phase: High capital investment is required for installing the biogas production facility and CHP plant and distribution infrastructure; |

| | |
|---|---|
| ○ Establishment of a fiscal framework which ensures the economic viability of producing biogas against other fossil fuels, in particular natural gas;<br>○ Establishment of a fiscal framework supporting the price for CHP electricity; | ○ Problems have been experienced obtaining bank guarantees and establishing the relationships between farmers. |

**Impacts**

**Social –**

- Improved linkages within the entire community, by bringing together multiple stakeholders (farmers and residents) through joint ownership and professional service contracts (see e.g., Tarhan, 2015).

**Economic –**

*For farmers*

- Pool sufficient volumes of livestock manure to justify an investment in facilities that can economically produce biogas in sufficient volumes to supply a local CHP plant;
- Share their investment risk and reduce their individual investment exposure;
- Gain opportunities to add value to livestock manure;
- Gain opportunities to access a new market in the form of generating revenues from gate fees by processing waste from the food sector;
- Generation of additional income for farmer members through buying their manure, livestock and other biological sources for energy generation purposes. Furthermore, farmer members received the processed manure back as an improved fertilizer.

*For cooperative members*

- Have control over their heating utility within the local community;
- Gain security by sourcing locally produced biogas that is not subjected to external market disruption;

**Environmental –**

- Reductions in the greenhouse gas methane;
- Opportunities to process other organic wastes alongside manures, such as food industry waste;
- Opportunities to remove surplus phosphates;
- Protection of ground water for drinking.

**Lessons learned**

- Government should establish new investment vehicles which can be used to mobilise equity for projects from the wider community. Further in-depth research is required to identify strategies that could enable low-income communities and community members to participate in consumer-owned cooperatives;
- Government support should be provided to promote model rules and 'best practice' guidance based on experience from the UK, Danish, German and Swedish farmer owned co-operative movements;
- Partnerships with Danish, Swedish and German farmer-owned co-operatives should be developed in order to facilitate technology transfer and share knowledge and expertise;
- Additional investments to further reduce smell emissions need to be planned from the initial phase;
- Local government should play a more proactive role in using planning powers to make consumers connect to new networks: Denmark, for instance, has directed investment into district heating, creating heat markets which have enabled fuel flexibility and enhanced the viability of combined heat and power (CHP);
- Wider education and awareness-raising is required to promote bioenergy projects as a viable business model and overcome negative perceptions.

Table 10 above demonstrates the key drivers, major challenges, the social, economic and environmental impacts associated with a community hosting a decentralised, locally-owned renewable energy project in a rural area. Under the right conditions, and financial supports, this scenario should also appeal to community-focused cooperatives across the European Union. The lessons learned from this scenario are indicated, along with suggestions on how greater interest in this type of development could be fostered and rolled out more widely across the European Union.

### *4.4.5 Scenario 5: MUSH (municipalities, universities, schools and hospitals) energy producer*

The MUSH sector (municipalities, universities, schools and hospitals) is increasingly looking at generating and/or incentivising renewable energy as a means to saving on both energy use and the resulting energy costs, securing local energy supply, creating local employment, improving community resilience, and addressing local and global ecological issues. Since the municipality is the public institution owning and managing these public facilities of the city (universities, schools and hospitals), they usually have some sort of role to play in the establishment of community-based renewable energy projects, although their part may vary strongly. Its close proximity and accountability to the local population gives them a key role in the decentralisation and democratisation of the energy sector.

In this case study, the mayor or other representatives of the municipality initiate a local community owned project, with the objective of increasing the uptake of sustainable energy through the installation of renewable energy systems and the implementation of energy efficiency measures in public buildings. They established the group as a MUSH cooperative, where residents can become members and invest in local renewable power generation through the purchase of preference shares, which provide the capital to finance local projects. Each membership share provides voting rights. The MUSH coop will promote the opportunity to buy shares in the locality of the school, hospital or university.

The MUSH cooperative invests in solar photovoltaic (PV) plants/arrays mounted on the roofs of public education institutions and public hospitals. Electricity produced from the PV plant is fed directly into the buildings (schools, hospitals and universities) and excess is sent back into the grid. Installing PV panels on these buildings means that the energy is produced where it is needed: complex buildings with high energy requirements (usually a combination of electricity, heating and cooling). The Coop exists to enable its member schools/hospitals/universities to successfully install renewable energy infrastructure and to support them in their environmental, educational and community work. It is not just a purely financial arrangement.

Income from the annual feed-in tariff and from the sale of electricity, both to the school/hospital and exported via the grid, is retained by the MUSH coop to recoup the cost of the solar panels and to pay interest to its members. All the MUSH coop's profits, after paying interest etc., are put into a community-focussed projects fund that benefit these public buildings used by the community. The first project was the implementation of an energy efficiency programme including new insulation of school and hospital buildings and optimising heating systems. Due to these measures, the energy needs of these public buildings decreased by more than 50%. Projects like this help to build community and make people feel responsible for the public buildings: For schools, for example, this scheme takes community engagement to the next level and delivers tangible benefits that will have a ripple effect as children take their experiences home with them

**CHARACTERISTICS of this COMMUNITY APPROACH**

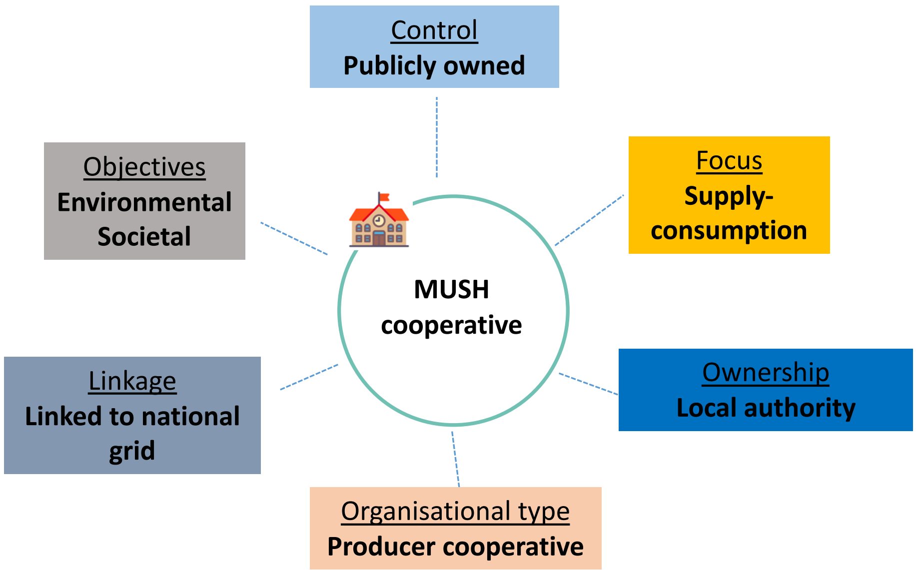


**Figure 16: Key characteristics of a MUSH cooperative**

Figure 16 above demonstrates the key characteristics of the projects discussed in the case summary of MUSH cooperatives. Another variable one could consider important is the type of community forming the project. In this case, as with the other scenarios, the location of the community is important and, with everything else being equal, the where the community is situated – with is accumulated historical and geographical heritages – can result in very different outcomes for two communities with very similar goals

**MAIN STAKEHOLDERS and TYPE OF COOPERATION MECHANISMS**

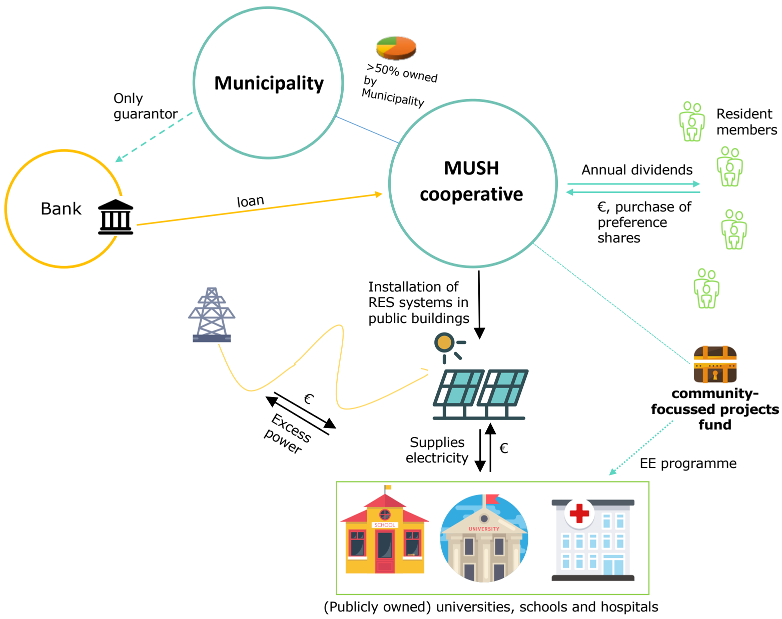


**Figure 17: Schematic of main stakeholders and the types of cooperation mechanisms in operation for Scenario 5**

The schematic in Figure 17 shows the key cooperation mechanisms associated with MUSH cooperatives when they set up a local energy producing project. At the centre of this network lies the MUSH cooperative, secures capital from the local municipality and banking institutions by way of loans and matching funding. The MUSH cooperative installs the chosen RES system in/on public buildings under its purview, which in turn supplies electricity to those same buildings reducing the overall energy costs it is liable for. In addition, monies generated from this electricity production may be set aside for projects that directly benefit the community in which the buildings/institutions are situated.

**Table 11: Key drivers, challenges, impacts and lessons from Scenario 5**

| **Scenario 5** | |
|---|---|
| *MUSH (municipalities, universities, schools and hospitals) energy producer* | |
| **Drivers** | **Major challenges** |
| ○ An active municipality with a leading role;<br>○ An enabling policy framework, at both national and local levels (FIT funding programmes for solar technologies, preferential energy tax tariffs, subsidies, along with loans and guarantees from energy funds);<br>○ A community with joint ownership of public buildings and goods, such as playgrounds, roads, parking lots, and sewage systems. | ○ Connection to the grid;<br>○ Reliance on grants at start up stage;<br>○ Bad perception of the project because it is the municipality which leads the project (lack of credibility and confidence);<br>○ Need of appropriate spaces for installation in public buildings (rooftops, gardens);<br>○ Instability of part of the revenues as a result of changing tax and subsidy legislation. |
| **Impacts** | |
| **Social –**<br>– Increased community's energy literacy by bringing energy use to the front of younger student's minds;<br>– Creation of a deeper relationship between local people and where they get their energy from;<br>– Increased public confidence in social enterprises;<br>– Community members feel "more responsible" for the public buildings.<br>**Economic –**<br>*For the community*<br>– Save on public buildings' energy costs;<br>– Securing local energy supply that is not subjected to external market disruption;<br>– Economic benefits of renewable energy generation are kept in the local economy (on-site employment creation, business activity that results from the project, *etc.*) (Tarhan, 2015);<br>– Improved educational and health care services;<br>*For cooperative members*<br>– Generation of additional income for members;<br>**Environmental –**<br>– Cut in greenhouse gas emissions;<br>– Decrease the energy needs of public buildings by more than 50% (energy efficiency programmes);<br>– Generation of energy from solar energy; | |
| **Lessons learned** | |
| ○ Since the price for electricity depends on the cost for distribution and the actual generation, a diversified portfolio can help to lower production costs. MUSH cooperatives could therefore focus on | |

a mix of renewable energy technologies (biomass, biogas and solar), engage in the district heating sector and in various activities along the value chain.

- The MUSH model could also consider having a private power purchase agreement (PPA), under which the generated capacity would be sold to a third party, for example. Or a combination of both.
- A strong educational campaign, launched in parallel in schools and hospitals, will help to familiarize the public about the MUSH model and its RE installations (The Schools Energy Co-operative Ltd., 2014);
- The MUSH cooperative could also serve as energy demonstration projects for residents to discover, discuss, and share with peers the role that renewables can play for more sustainable futures. These demonstrators should be conceived of as socio-economic and technical pilots for innovation and market uptake.

Table 11 above demonstrates the key drivers, major challenges, the social, economic and environmental impacts associated with a MUSH (municipalities, universities, schools and hospitals) energy producer. This type of scenario will appeal to institutions that have very specific commitments to their localities, while at the same time wish to reduce their own energy costs. Access to financial capital to facilitate such developments should prove easier for this type of cooperative than may be the case for others. The lessons learned from this scenario are also presented, along with suggestions on how generate greater interest in this type of development.

### *4.4.6 Scenario 6: An Environmental Finance Service*

A group of local landowners decided they wanted to improve the general biodiversity of their area, including reviving an ancient animal species associated there. The area, had seen a steady population decline in recent years, with fewer and fewer opportunities available for younger people to work and live there. As a result, the local community wanted to try and tackle this rural land abandonment (and the associated socio-economic infrastructure pressures that arose from this) by developing proven nature-based economic models that emerge after restoring the self-sustaining ecosystems that originally existed in their area. This involved approaching Rewilding Europe, the continent's first 'rewilding enterprise' funding facility, which provides financial loans to new and existing businesses that both directly and indirectly support rewilding activities in Europe.

From this, they were able to create a business model that would see the reintroduction of an iconic, ancient wildlife species to their area, in this case the European bison. With Rewilding Europe's help they were able to secure a loan from the European Investment Bank, backed by the EU's Natural Capital Financing Facility. The project involved a series of educational programs for landscape owners and local residents, along other technical, financial and promotional supports, that encouraged active rewilding of land that was no longer in agricultural use. In addition, land this in agricultural use was integrated into the overall landscape strategy for the area. Consequently, habitat loss was reversed, wildlife populations increased, sustainable employment opportunities emerged and there was a reduction in the dependency on agricultural subsidies that had characterised much of the farming practices up-until-then. The shift in income, now associated with wildlife and nature-based tourism, has had a number of indirect, knock-on effects especially in terms of other sections of the economy. Greater emphasis is now placed micro-power generation amongst smaller clusters of settlements and returning rarely used roads in the area to a more natural state.

The community also availed of a Rewilding Europe Capital (REC) loan to develop sustainable renewable energy projects in the area, in addition to providing energy efficiency measures such as insulation retrofitting and solar thermal (and photovoltaic) installations in existing residential and commercial buildings.

**CHARACTERISTICS of this COMMUNITY APPROACH**

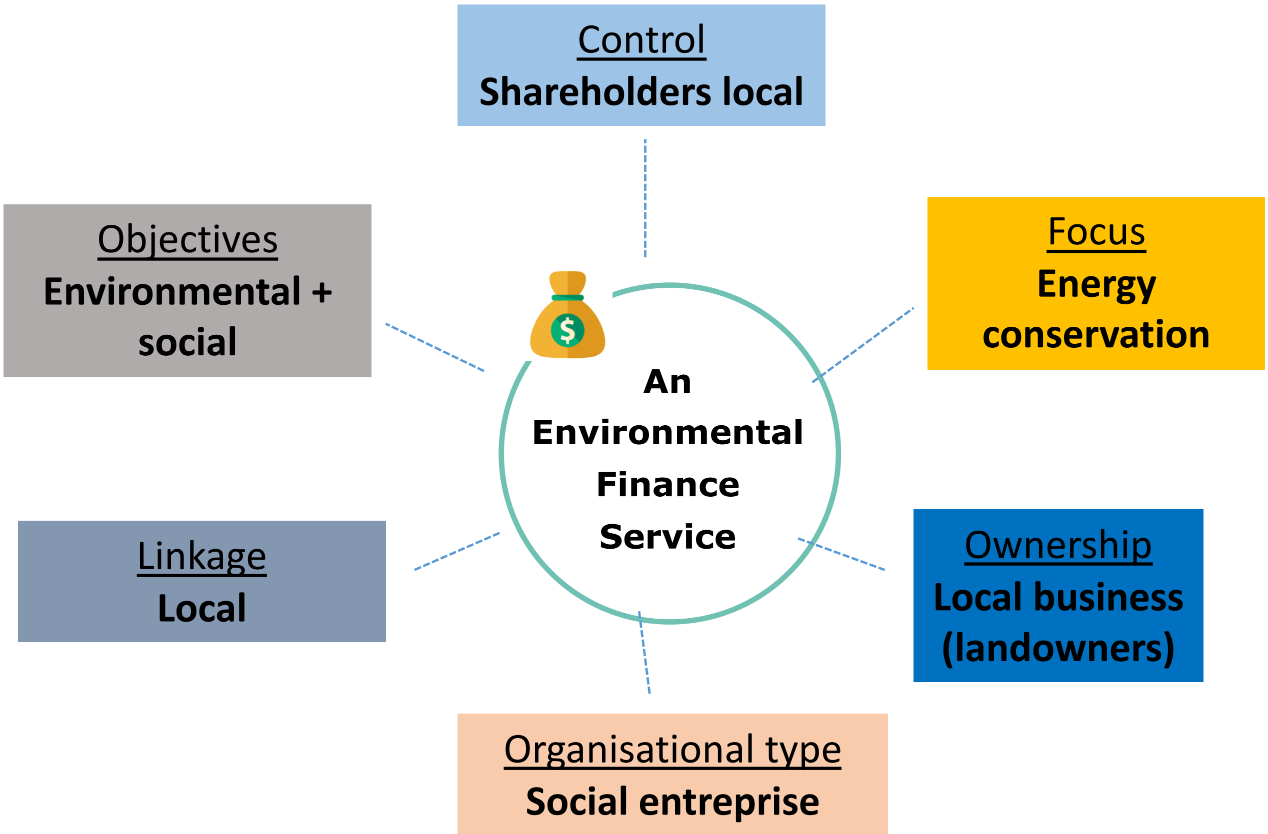


**Figure 18: Key characteristics of an environmental (energy-related) finance service**

Figure 18 above highlights the key characteristics of an environmental finance service discussed in the case summary. In this case the location of the community is not as important as with other scenarios. Instead, access is to financial services and funding sources is more important.

**MAIN STAKEHOLDERS and TYPE OF COOPERATION MECHANISMS**

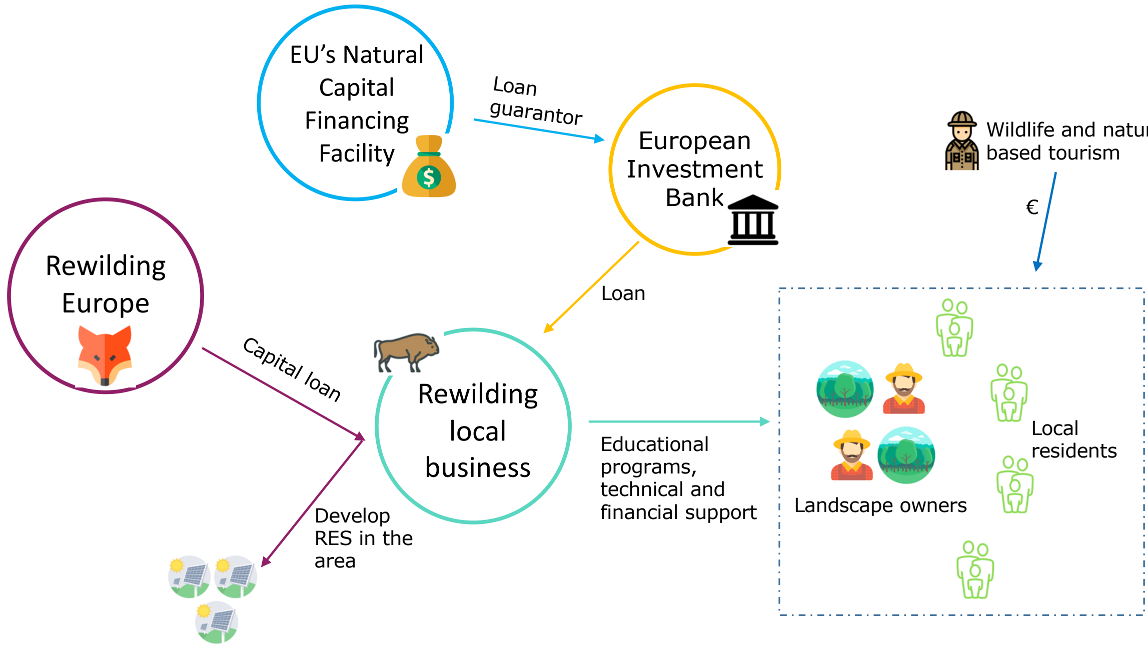


**Figure 19: Schematic of main stakeholders and the types of cooperation mechanisms in operation for Scenario 6**

The schematic in Figure 19 shows the main stakeholders and key cooperation mechanisms associated with a cooperative that utilises an environment financial service with very clear outcomes of what it hopes to achieve. In this instance, linkages to wider European initiatives and institutions was important. At the centre of this network is the rewilding local business that secures capital and engages with local landowners and residents to realise overall project goals. Ancillary benefits, including monies generated from localised wildlife and nature-based tourism activities, are supported and in turn feed-back in to the local economy.

**Table 12: Key drivers, challenges, impacts and lessons from Scenario 6**

| **Scenario 6** | |
|---|---|
| *An Environmental Finance Service* | |
| **Drivers** | **Major challenges** |
| ○ A group of committed landowners;<br>○ Top-down support to secure loans;<br>○ An existing support organisation committed to rewilding Europe,<br>○ Growing understanding of the real need for wilderness and the potential within rewilding;<br>○ Initial approaches in rewilding have shown that European ecosystems have a high potential for regeneration. | ○ Conservation in Europe is often dependent on public subsidies and private engagement;<br>○ Urbanisation, infrastructure development, industrialisation of agriculture, forestry and fishery. |
| **Impacts** | |
| **Social –** | |
| – Increased public confidence in social nature-based enterprises; | |

| |
|---|
| – Improved health and wellbeing, building a shared sense of humanity and pride (e..g, Allen, Bosman, Helmer, & Schepers, 2017);<br>**Economic –**<br>– Increased sustainable employment opportunities;<br>– Reduction in the dependency on agricultural subsidies;<br>– Increased wildlife and nature-based tourism;<br>– Local community earning a fair living from nature-based enterprises.<br>**Environmental –**<br>– Restoring the self-sustaining ecosystems that originally existed in their area;<br>– Reversed habitat loss;<br>– Increased wildlife populations;<br>– Uptake of sustainable renewable energy projects in the area. |
| **Recommendations** |
| To scale up the rewilding process across Europe, the following communication and marketing work is strongly encouraged:<br>○ Sharing lessons and experiences on rewilding as a conservation approach, through the European Rewilding Network (Allen et al., 2017);<br>○ Developing strategic partnerships with organisations at a European, national or local level, to enable collaboration on achieving shared objectives;<br>○ Working with Scientific institutions across Europe, and publishing and promoting academic rewilding related articles in respected, peer-reviewed journals;<br>○ Building a coalition to influence EU conservation policy towards rewilding; |

Table 12 above demonstrates the key drivers, major challenges, the social, economic and environmental impacts associated with an environment financial service. Under the right conditions, and access to the relevant financial supports, this scenario can be replicated across the European Union. The lessons learned from this scenario are presented in the Recommendations section with suggestions on how to promote this type of development other member states.

### *4.4.7 Scenario 7: Energy cooperatives focusing on renewable community based power*

Members of a local community decided to establish an energy cooperative focusing on renewable community based power, with the objective of increasing the uptake of sustainable energy in the community through the renewable energy they would collectively be selling to the grid.

The energy cooperative is a for-profit membership based organisation; residents can become members and invest in local renewable power generation through the purchase of preference shares, which provide the capital to finance local projects, wholly-owned by the energy cooperative via its members. Each membership share provides voting rights.

The membership elects a board who is responsible for contracts, projects, reserve funds, dividends and surplus distribution, and borrowing (typically not remunerated). Advisory committees are formed to provide recommendations the board on business, technical, and communication issues. A management team is appointed by, and is answerable to, the board to run the operations, legal counsel and technical services on a day-to-day basis.

For a round of projects, the energy cooperative enters typically into 20-year lease agreements with property owners in the community to use their land or rooftops for the installation of PV energy systems. Each of the projects feeds power to the regional electricity grid under already approved feed-in tariff contracts with the power authority. Once the installations are in place, the renewable energy produced generates revenue through the local Feed-in Tariff (FIT) program, which provides guaranteed payment for each kilowatt hour (kWh) of electricity produced. This enables the energy cooperative to fully repay invested capital to investor members along with a dividend over a 20-year period (after operational costs are covered).

**SUSTAINABLE DEVELOMENT CHARACTERISTICS (COMMUNITY APPROACHES)**

This case study contributes to decentralised energy production, which is a larger category than decentralised renewables, and provides electricity to the grid of Distribution System Operators (DSOs). This community approach is committed to community-based power generation by providing residents the opportunity to invest money into solar rooftop projects within their community. It is a community approach that fully integrates the social, ecological and economic imperatives of sustainable development.

**CHARACTERISTICS of this COMMUNITY APPROACH**

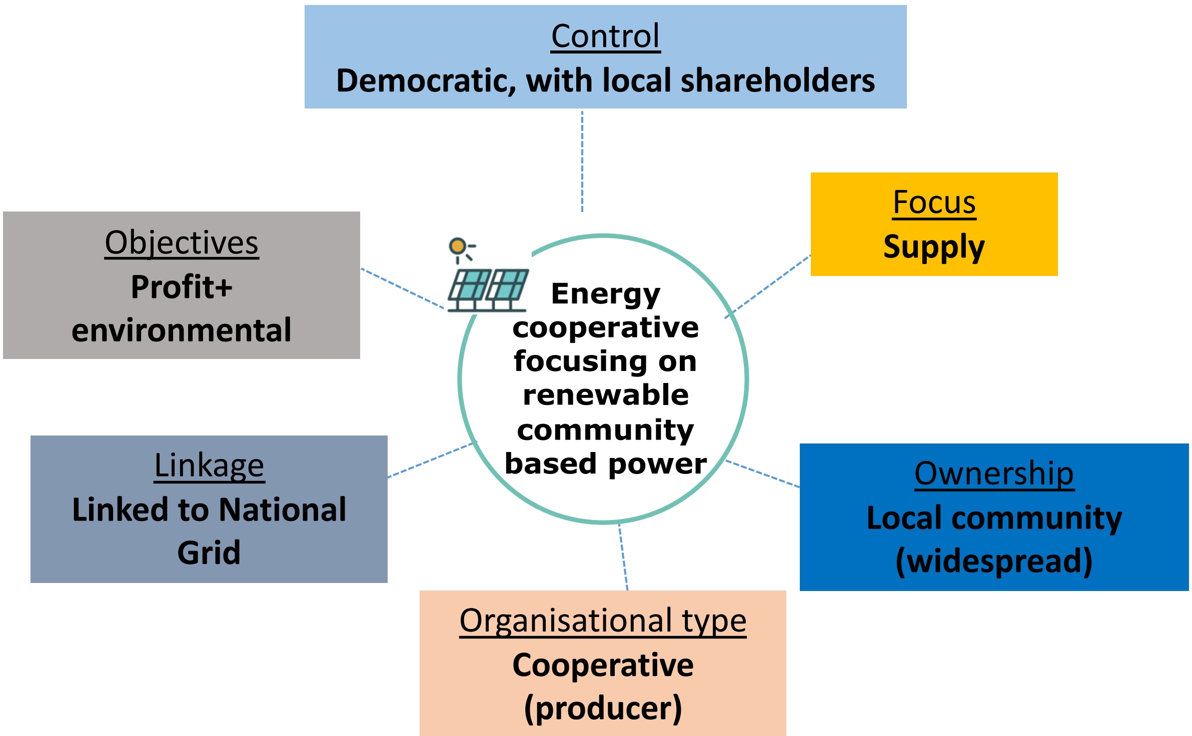


**Figure 20: Key characteristics of a community-based renewable energy cooperative**

**MAIN STAKEHOLDERS and TYPE OF COOPERATION MECHANISMS**

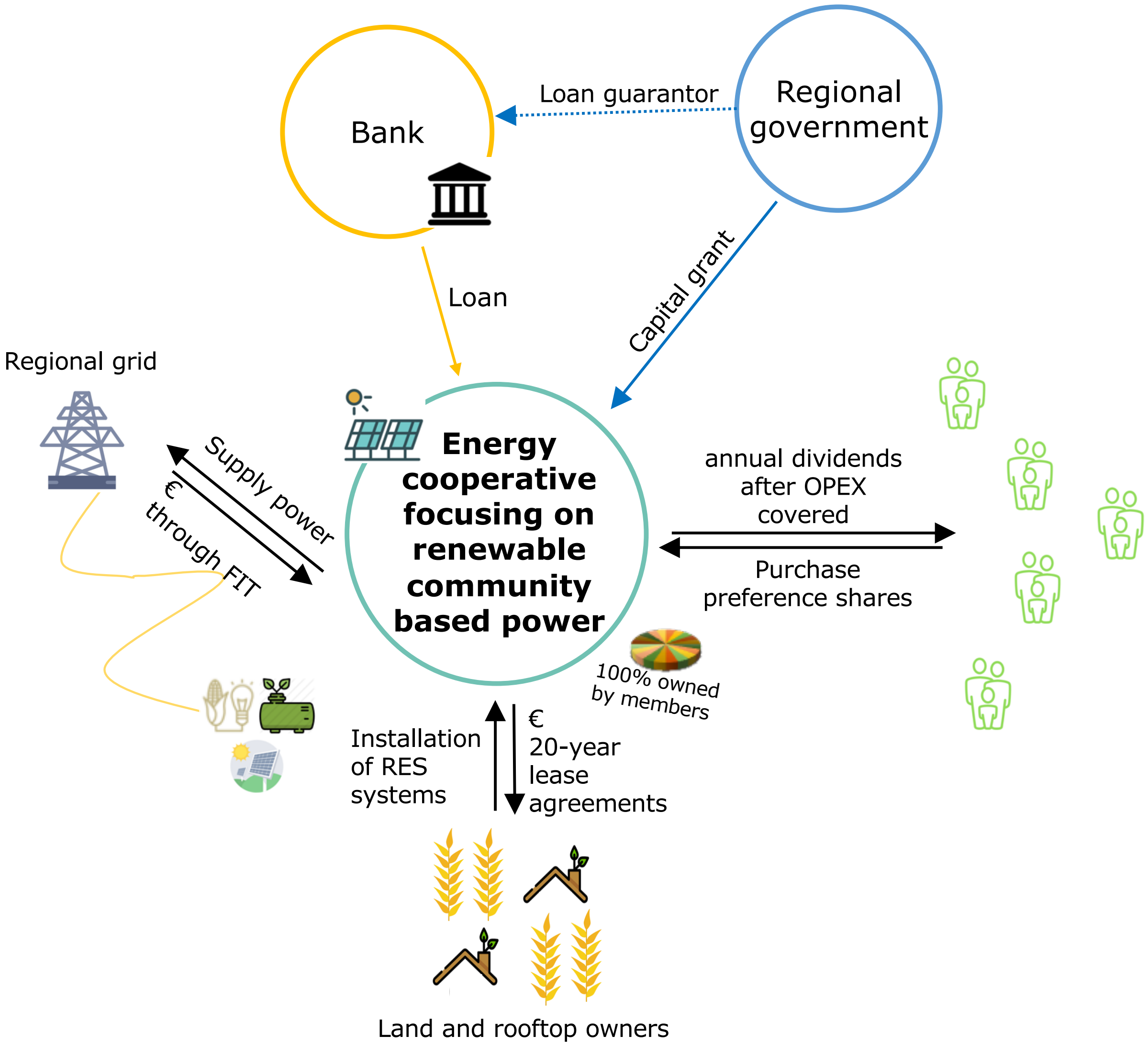


**Figure 21: Schematic of main stakeholders and the types of cooperation mechanisms in operation for Scenario 7**

The visual representation in Figure 21 shows the main stakeholders and key cooperation mechanisms connected to an energy cooperative focusing on renewable, community-based power generation. The cooperative, which is one hundred percent owned by its members, operates at very heart of this network. It negotiates the lease agreements with the commercial and domestic property owners, and the installation of the RES systems on those properties. At the same time, it secures loans and capital grants to fund the rolling out of the RES infrastructure – the local or regional government acts as loan guarantor – and negotiates the selling and procurement of power to the national grid through feed-in-tariffs (FITs). While the commitment, on the part of local community members, is significantly greater than for those in some of the other scenarios the subsequent additional benefits for the local economy are much greater.

**Table 13: Key drivers, challenges, impacts and lessons from Scenario 7**

| **Scenario 7** | |
|---|---|
| *Energy cooperatives focusing on renewable community-based power* | |
| **Drivers** | **Major challenges** |
| ○ An enabling policy framework, at both national and local levels (FIT funding programmes, preferential energy tax tariffs, subsidies, along with loans and guarantees from energy funds);<br>○ A board integrated by dedicated individuals that have strong connections to the community and indeed, knowledge of small scale PV systems;<br>○ Visibility and networking with umbrella organisations supporting local energy cooperatives;<br>○ Beneficial physical conditions that benefit solar energy production. | ○ Searching for new projects in their community, which can be limited by grid capacity issues in some locations (Foon & Dale, 2014);<br>○ Identifying the right building and at the same time, willing to lease their roof for a 20-year time commitment;<br>○ The grid could also be a major barrier to the scaling up;<br>○ Over-reliance on supportive policies;<br>○ Due to the for-profit nature of this type of organization, access to grant money is limited during the start-up phase. |
| **Impacts** | |
| **Social –**<br>– Build social capital in the community through strong community engagement and outreach programs about renewable energy;<br>**Economic –**<br>– All profits, after operational costs have been covered, are distributed to member investors;<br>– Local economic growth associated with community-level renewable projects;<br>– Local economic diversification;<br>**Environmental –**<br>– Uptake of sustainable energy in the community;<br>– Contribution to a decentralised energy production. | |
| **Recommendations** | |
| ○ Authorities can facilitate and develop frameworks in terms of regulations to promote sustainable energy production at decentralised level subsidy. A dialogue with the involved parties creates trust and understanding, possibly resulting in room for further investment in renewable energy projects;<br>○ Since the price for electricity depends on the cost for distribution and the actual generation, a diversified portfolio can help to lower production costs and thereby increasing potential profit margins (combination of solar, biogas and biomass);<br>○ Support should be provided to umbrella organisations supporting local energy cooperatives to lobby government over cooperative issues, in addition to raising concerns over limitations on rates of return for member investors;<br>○ The establishment of simplified authorisation procedures, including through simple notification, will help develop small-scale renewable energy projects;<br>○ Deployment of adequate smart meters and allow for aggregators to facilitate consumer participation in the wholesale market. | |

Table 13 above demonstrates the key drivers, major challenges, the social, economic and environmental impacts associated with an energy cooperative focusing on renewable, community-based power generation. Under the right conditions, and financial supports, this scenario should also appeal to community-focused cooperatives across the European Union that are willing to take on the added responsibilities involved. The recommendations associated with this scenario are also presented in the table, in addition to suggestions on how policy makers can facilitate wider community take-up across the European Union.

## *4.5 Conclusion*

Each of the seven scenarios discussed in this section demonstrate how a community-focused, renewable energy project can be developed using innovative approaches towards realising the energy transition. Using existing funding mechanisms and novel cooperation mechanisms it is very possible for communities to implement goal-orientated energy projects that come to terms with (or indeed benefit from) the dynamic multi-scalar relationships associated with medium-to-large scale energy projects. While the situation at the local level in member states across the European Union can vary quite differently – due to complex enmeshments of physical environment, established cultural norms and place-orientated historical geographies – the very nature of the European Union offers policy makers an opportunity to learn from successes found elsewhere in the EU. This can, in part, be achieved by focusing on the contractual arrangements that go in to ensuring such projects are completed successfully and the seven scenarios presented in here can help motivated communities to co-design community-oriented projects that fit the locally-specific contexts in which they are to be situated. The scenarios also demonstrate the potential for operationalising more proactive locally-orientated energy projects that incorporate social justice considerations in their organisational structures and accommodate the needs of the most vulnerable in those communities. While this has not always been the case up until now, the potential is there.

# 5 Conclusions

This report demonstrates how new policy mixes and innovative cooperation mechanisms can be implemented by communities to promote and support the energy transition. Where possible we have shown how this can be down more equitably, providing seven scenarios as examples to show how such approaches can be done. In this way, it is hoped that community members intending to embark on their own transition have clear and applicable examples from which to learn from.

Resulting from key findings from WP5, the report has also applied the lessons learned from Task 4.1 to develop the cooperation mechanisms that will prove useful to policy makers tasked with driving the energy transition at the various socio-political and infrastructural levels of Europe's energy transition. At present, the European energy system – along with the numerous local, national and transnational networks that comprise it – must contend with numerous cross-sectional challenges including the ongoing effects of climate change, issues relating to energy security, as well as the continuing impacts on human health and the environment our reliance of fossil fuels engenders. Task 4.1 of the ENTRUST project focused on the policy landscape of energy transitions in the European Union and provides an up-to-date assessment of the current situation concerning the policies and regulations relating to the energy system across a number of European countries, in addition to a wider European assessment. Consortium partners examined key technological, social and market factors in order to better understand the various energy policy frameworks in Ireland, Spain, the United Kingdom, France, Italy, and Germany. This was accompanied by an analysis of public dialogues in each of the member states mentioned and focused on key public discourses currently taking place, along with an assessment of the main barriers to implementing low carbon measures in each country.

Therefore, as we have seen in previous work packages, implementing the energy transition been both an arduous and highly complex task for policy makers with mixed success seen across the European Union to date. The constant (re)negotiating of the various socio-technical systems with their competing representations of reality, expectations, and indeed wider societal resilience in each of the member states has contributed to this complexity. Therefore, the decision to implement a new energy transition has not been simply a matter of policy makers adopting a "build it and they will come" approach, but rather is the beginning of a complex struggle between competing political, commercial and social actors; which in turn merge with pre-existing conflicts over regulation, property rights and access to resources. As a consequence, a notable preoccupation of governments at all levels has been to manage in a stable way the distributional fall-out that inevitably occurs.

Providing citizens with the appropriate political, financial and business tools necessary to access a fairer portion of this constantly realigning, (re)distributed resource pie – in this instance, the new renewable energy sources at the centre of the energy transition – should be a primary task for policy makers going forward. One approach towards enabling communities realise this goal, is to provide a wide variety of contractual options for community members to avail of when engaging with the developers, financial institutions and government bodies that is requirement of such projects. While this may be an intimidating prospect for community members not used to such experiences the provision of flexible, transparent, modularised partnering and alliancing contractual models can potentially act as a positive driver towards establishing the types of sustainable communities needed to maintain the more decentralised energy systems currently being transitioned to. An additional potential, resulting from this approach, is the very real prospect of greater, more diversified employment opportunities that can emerge from more sustainable patterns of development.

This report is the final deliverable for WP5 and draws from the experiences and lessons learned in this and other work packages, most notably **Task 4.1 Mapping of policy & regulation landscape** in WP4. The insights outlined in this report are adaptable and available to other energy user communities outside of the ENTRUST project, where the socio-political and socio-technical variables at play in their respective communities can be met, or indeed harnessed, by implementing a variation of the types of scenarios presented here.

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