SI-DRIVE
Social Innovation: Driving Force of Social Change

SOCIAL INNOVATION IN ENERGY SUPPLY: CASE STUDY RESULTS

POLICY FIELD ENERGY SUPPLY
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Remark:
This case study summary is an own interpretation of the case study conductors and policy field leaders based on the information and data accessible and given by the initiatives.

A. METHODOLOGY

1 METHODOLOGY AND DESIGN

In this chapter the methodology of the SI-DRIVE project is described. Part of this methodology is the development of the current summary report based on the results of a number of in-depth case studies.

1.1 SI-DRIVE METHODOLOGY

The SI-DRIVE methodology is constructed as an iterative research process characterised by two empirical phases based on and feeding the three central research pillars of SI-DRIVE: theory, methodology and policy. Starting with a first theoretical, methodological and policy and foresight framework the empirical phase 1 lead to a global mapping of Social Innovation: comparative analysis of 1.005 cases worldwide, seven policy field reports, a global regional report, external database screening, and eight first policy and foresight workshops. These results led to the improvement of the three pillars and set the ground for the second empirical phase: the in-depth case studies, which results will be presented here. A similar report will be written for each of the seven policy fields of SI-DRIVE.[1] Finally, the results of both empirical phases will lead to a summarizing comparative analysis in each of the policy fields and to the final theoretical framework, the final methodology and the final policy and foresight recommendations of SI-DRIVE.

The chosen triangulation and combination of quantitative and qualitative methods has also a sequential aspect: while the quantitative approach is more appropriate for the analysis of 1.005 mapped social innovation cases, the qualitative methodology is more relevant for the in-depth case studies (based on the quantitative and qualitative analysis of the first empirical phase).

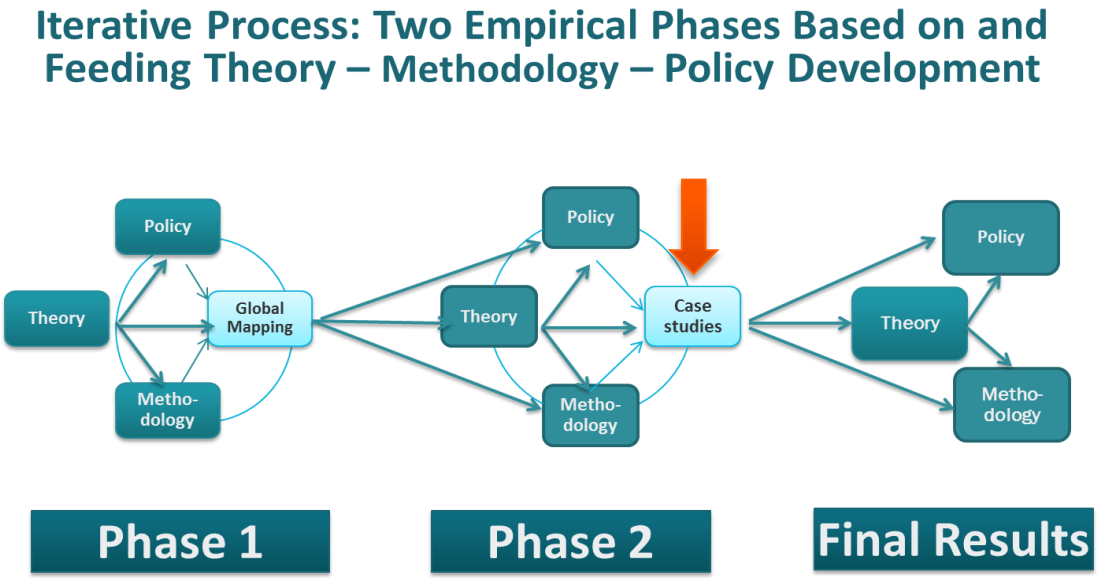


Figure 1: Continuously Updated Research Cycle

Thus, this report is summarising and analysing the case studies conducted in the policy Field Energy Supply, delivering a further depiction for the final comparative analysis within the policy field at the end of the project.

[1] These are: education, employment, environment, energy supply, mobility, health and social care and poverty reduction and sustainable development.

1.1.1 Background and Central Questions of the Case Studies

The focus of the in-depth case studies on which this report is based, is on the dynamic **interrelation between social innovation, the practice field and various mechanisms of social change**. In SI-DRIVE we distinguish between a practice field and related single projects / initiatives when we talk about 'social innovation':

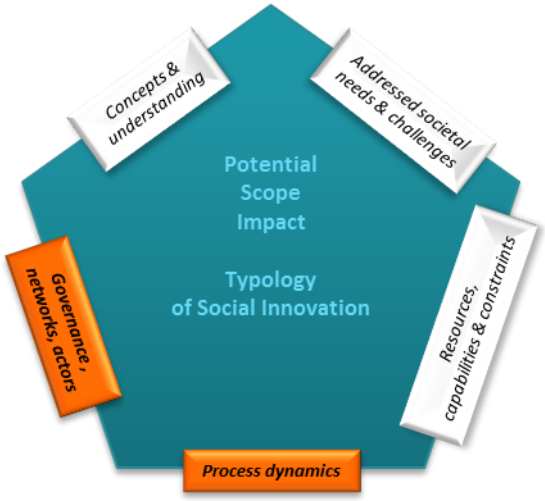
- "**practice field**" is a general type or "summary" of projects and expresses general characteristics common to different related initiatives / projects (e.g. micro-credit systems, car sharing).
- "**project/initiative**" is a single and concrete implementation of a solution responding to social demands, societal challenges or systemic change (e.g. Muhammed Yunus's Grameen Bank which lends micro-credits to poor farmers for improving their economic condition, different car sharing projects or activities at the regional-local level).

Therefore the guiding meta-question for the case studies of SI DRIVE is focusing on **mechanisms of social change**:

Does Social Innovation actively use, reflect or contribute to the defined mechanisms of social change (see annex)? Can we identify other, additional mechanisms?

All these mechanisms are reflected in the five key dimensions, but putting a focus on social change. Related to the five key dimensions of SI-DRIVE the main focus of the case studies is on **Governance, Networks and Actors** as well as on **Process Dynamics**, mainly asking which changes appear and are driven by what/whom (see also the research foci in the Annex). Within these focused key dimensions and mechanisms of change **factors of success** (and **failure**) are of high importance as well.

The **degree of social change** is also considered: **diffusion** in society, degree of **institutionalisation**, and **importance of the practice field / initiative** for everyday life and local communities.



Therefore, the main objectives of the case studies are aiming at a better understanding of:

- the **processes and dynamics** of social innovation in relation to social change (institutionalisation, diffusion and imitation of social practices);
- the **functions and roles of actors and networks** for the development, diffusion, imitation and institutionalisation of social innovations;
- including the identification of **critical success (and failure) factors**, leading to social change.

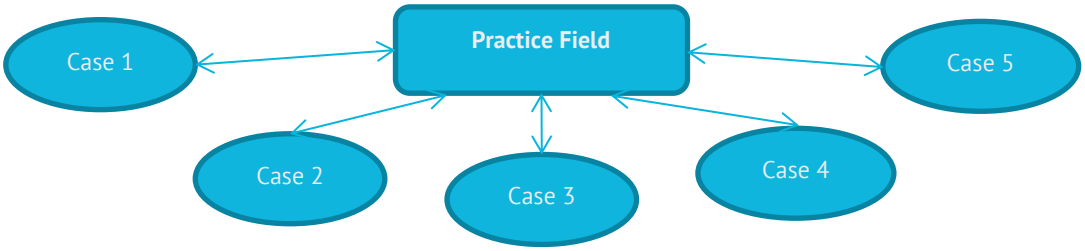
1.1.2 Methodological Design

The methodology consists of two levels for the selection and analysis of cases, corresponding to the structure mentioned before:

- Selection of the relevant **practice fields**.
  Main criteria: Importance for the policy field, already leading to social change.
  Additional documented material, documents analysis.

- Selection of social innovation **initiatives** related to the chosen practice field.
  Main criteria: Connection and contribution of the initiatives to a practice field.
  Main interview partners: people who were *actively* involved in developing the social innovation initiative, project organisers/participants/actors, users and beneficiaries – representing the Social Innovation Ecosystem or sectors (**public, private, civil society, and science).**
  Complemented by additional document analysis.

Because there might be only limited information for the chosen **practice field**, the results of the case studies with the single initiatives will be used as a background for the practice field examination and analyses (**hybrid approach**).



All in all about ten cases were conducted within each policy field, ending up at about 82 case studies. The cases were selected on the background of given framework and the partners' knowledge and experience. Beneath practical points like access to and willingness of social innovations to participate and a general regional variety the following aspects were taken into account:

- For the **selection of the practice field**: The (strategical) relevance for the policy field, the differentiation/ spread of single cases, and an advanced development phase (cases that are already in the implementation, impact phase).
- For the **selection of the related cases**: The selected cases should be already highly developed (implementation or better impact phase, embedded in networks, movements or umbrella organisations), and be representative for the practice field showing its variety in terms of social demands and regions.

Against this background the cases were **selected from the existing mapping data base** from the global mapping 1 phase in the project. If there was a new important case of high interest (not in the database) there was the possibility to add at least **one additional case** per policy field. Because the global mapping stressed that social innovations often comprise more than one policy field **overlapping cases** were taken into account and finally assigned by the policy field leaders.

The template developed for the case studies had a **common, but flexible structure**. This means that the main topics and the related main questions have to be reflected, additional questions helped to structure the deepening of topics appearing as relevant from the interviewees or interviewers perspective, and from the particular context of the initiatives, the actors of the social innovations or practice fields.

While the case study inquiry followed the context and perspective of a single initiative, the structure of the reporting document is starting with the practice field as the overarching context for the related case studies, bundling and summarising the results of the different related cases, illustrating the practice field, summarizing the given topics (reflected in the single case studies).

Therefore the structure of the template for the case study inquiry is the other way round as the template for the reporting:

1. The **case study inquiry** (**bottom-up:** initiative perspective as the starting point) started with the perspective of the initiative, leading to the overarching perspective of the related practice field in the end: focusing on the context of the concrete initiative (starting with the idea, passing the development process and ending with the impact perspective) → leading to and completed by the practice field context (integration of the initiative in the broader practice field background, conclusions, institutionalisation).

2. This **reporting document** (**top down:** context of the practice field as the starting point) is structured the other way round starting with the overarching practice field perspective, activating the overall on social change oriented perspective as a context at the beginning and reflecting the social innovation initiatives from this background.

Already given and available information from the mapping and internet/documents were integrated in the interview template first, including information on the practice field. The practice field information already gathered in the case studies (earlier) were updated continuously in the case study guide.

For the field work and the analysis a common and obligatory structure across all the seven policy fields was developed (case study template, QCA questionnaire, reporting template). The following procedure is characterising the case study performance:

1. Extraction of the given information from the mapping database and integration into the reporting template, interview guide for the specific initiatives.

2. Search for additional documented materials (internet, literature, etc.) and integration of the results in the template as well.

3. Selection and inquiry of key persons for the practice field and the related cases.

4. Interviews, group discussions, site visits etc. (of **all the relevant actors** of the initiative, **including if possible the users, beneficiaries**)

5. Reporting within the given template (integrating all the information of the database, interviews and group discussion in one template).

6. Qualitative Comparative Analysis (QCA)

7. Summarising reporting document (done by the work package leaders).

Within the case study template the questions did not vary a lot between social innovation projects and social practices, but the answers relating to the questions are expected to vary to the different levels of uptake. For instance, in a more mature case/practice field there may be a wider set of competitors as a context feature (e.g. car sharing), whereas in a case that is still in its infancy (although it should be well implemented and show dimensions of success as well) competition may be very different in quality or limited in total. We speak of a social practice when there is already a set of different initiatives, when the original initiators of first social innovation projects (sometimes) are already difficult to identify, variation of the original initiatives have already been applied, maybe a bundle of initiatives exist (institutionalized in a practice field), they have different business models (if any), their services vary, accordingly users vary, incremental differentiation between various offerings.

1.2 ENERGY SUPPLY: PRACTICE FIELD AND CASE SELECTION

In this paragraph the concrete selection of the practice fields and related cases in the policy field is discussed. First, an overview is provided of the practice fields distinguished in the previous phase of the project, the Global mapping 1.

Table 1 Practice fields from Global mapping 1

Practice field	Examples of sub practice fields	Description
Energy collectives	Energy co-operations, Collective purchasing, Business collectives, Energy efficient housing collectives	This practice field is about collective saving and/or production of energy. This can be done by different parties in various compositions. The defining characteristic of this practice field is that there is a collective aspect to the initiatives. Such collectives are often new combinations or figurations of social constellations, often including 'new' actors in new governance arrangements.

Local production of energy	Domestic energy production, Local production of biofuels or biogas, Local production of heat	This practice field regards the local (domestic) production of renewable energy by individuals or 'microgeneration'. These can be individual households, businesses, industries, farmers, etc. By producing energy they start to be 'prosumers'. Individuals can choose to organize microgeneration individually or in (small) collectives (this overlaps with the practice field 'Energy collectives').
Working with smart meters	Reduce consumption, Stimulate behavioural change, Networked, remote management	This practice field relates to the recent (or: ongoing) introduction of smart meters in various European countries. Smart meters not a social innovation by themselves, but their implementation can induce all sorts of new behaviour and relations and makes it possible to address the 'energy problem' in a new way.
Energy services	Energy Service Companies (ESCos), Energy advice, services and solutions for marginalized and socially disadvantaged groups, International innovation networks	This practice field includes all initiatives that provide energy-related services to citizens, companies or governments. They can be considered as social innovations when they use this in a new way to tackle the challenges of renewable energy and energy efficiency.
Providing examples and inspiration	Innovative information campaigns, Renewable Energy Model Regions, Award systems	This practice field relates to public authorities, businesses, NGOs or others setting up campaigns or models that aim to inspire others to take action. Awareness raising projects or projects aimed at changing the behaviour of stakeholders such as businesses or consumers are also part of this practice field.
District and neighbourhood energy systems	District heating projects, energy systems in neighbourhoods	This practice field includes initiatives from citizens, companies or governments to set up and operate district heating projects or other neighbourhood energy systems.
Energy efficient mobility	Bike sharing, electrical cars systems	This practice field includes social innovations which result in energy efficient transport solutions for human mobility. This could be in the form of multi-modal approaches to transport or, in principle, any social innovation that shifts transportation to modes that use less energy and emit less carbon than traditional modes. This practice field overlaps with the policy field of Mobility.

Within this policy field of Energy Supply the partners agreed to select three practice fields out of this list for the Global mapping 2, exemplified by 7 cases. The chosen practice fields are representing the main societal challenges and the most innovative areas. Below an explanation is given for the choice of these practice fields.

1. **Energy Collectives**: This is the largest practice field of social innovation in the energy domain. Therefore the focus of this summary report is on this practice field, which is reflected in the number of cases studied. It is very heterogeneous but is regarded as one practice field in this study since it is not easy to distinguish sub practice fields of this phenomenon. This type of initiative is mostly seen in countries where social innovation in the energy domain is relatively advanced. In Chapter 2 this practice field is discussed in detail. (4 cases)

2. **Local production of energy**: This is a practice field that slightly less crucial from a social innovation perspective since it is more about individual than collective production of energy, but it has a lot of influence on the energy system that is traditionally centrally operated by large companies. (1 case)

3. **Providing examples and inspiration:** This practice field distinguishes from others in that the direct goal is not to reduce energy use or increase sustainable production of energy, but to inform consumers on all levels about the possibilities and inspire them with examples. In that way it can have a large influence on the energy system. (2 cases)

The following table provides an overview of the distribution of practice fields and related cases between the partners and the regions / countries.

Table 2 Distribution of Cases and Practice Fields between Partners and Regions

Partner/Country	Energy collectives	Local production	Providing examples
AIT/Austria			x
LAMA/Italy	x		
Young Foundation/UK	x		
Heliopolis/Egypt		x	
ITU/Turkey			x
UDEUSTO/Spain	x		
ARC Fund/Bulgaria	x		

Table 3 Cases and description

Case No.	Name	Practice field	Country	Partner	Description, Criteria
1.	Cloughjordan EcoVillage	Energy collectives	Ireland	The Young Foundation	Destination for learning about sustainable living with residents living in high-performance green homes, over 20.000 newly planted trees and Ireland's largest renewable energy district heating system. Criteria: It has an interesting management structure and it is growing in size at the moment. It has also been relatively long running.
2.	Solar Community Bologna	Energy collectives	Italy	LAMA Development and Cooperation Agency	Local citizen's initiative created by seven small towns in Emilia Romagna, cofinanced by the Regional administration. Aimed at reducing the energy consumption, and the production/consumption of renewable energy produced locally through PV plants. Criteria: Example of upscaling opportunities, bottom-up approach, public-private partnership.
3.	Goiener	Energy collectives	Spain	Universidad de la Iglesia de Deusto	Renewable energy generation and purchase cooperative. Criteria: Enough information available, no language issues.
4.	Model Region Thayaland	Providing examples and inspiration	Austria	Austrian Institute of Technology	A region that wants to become self-sufficient in energy supply. Criteria: Comprehensive approach of 9 communities working together, embedded institutionally, well documented, already has results.
5.	Energy lady and energy kid	Providing examples and inspiration	Turkey	Istanbul Teknik Universitesi	Education women and children on energy efficiency throughout the country via educational activities and means such as plays, cartoons, and computer games. Criteria: Enough information available.
6.	"Qvinnovindar" (Women of Wind Energy)	Energy collectives	Sweden	Applied Research and Communica-tions Fund	Started by women frustrated by the lack of females involved in the wind energy industry. The organization helps recruit women to the industry and provide career development for those already working with wind power. Criteria: An initiative in Eastern Europe was first choice but there were not many relevant cases and the ones we approached did not respond. Therefore decided to do an interesting Swedish case that addresses gender issues.
7.	Solar powered irrigation system	Local production of energy	Egypt	Heliopolis University	Complete system which provides fresh water for use in households, industries or agriculture, powered by solar energy. Criteria: Well developed, the partner has existing contacts, solves local problems concerning land quality and food supply.

B. PRACTICE FIELDS AND EXEMPLIFYING SOCIAL INNOVATION INITIATIVES

Before discussing the practice fields and case studies, a short overview of the most important developments in the energy domain that influence social innovation in this area is given.

Worldwide, different goals are set to create a sustainable society. These goals are about the reduction of emissions and the increase of use of renewable energy sources. The European Union has created different directives for the member states that should support the transition towards a sustainable society. One of the directives is the directive on energy performance of buildings. By the end of 2018 all new buildings which the government owns should be 'nearly zero-energy buildings'. This means: "a building that has a very high energy performance […] The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby" The next goal in this directive is that by the end of 2020 all new buildings should be 'nearly zero-energy buildings. Other directives are the directive renewable energy, with the goal to have an overall share of renewable energy of twenty percent in 2020 , and the directive energy efficiency, that obligate the national government to reduce the energy consumption in their buildings and purchase of energy efficient products.

Following global and European policy goals, the energy system is in a transition from a central, fossil fuel dominated system to a renewable energy based system including more local production. The current situation differs strongly per (European) country in terms of the mix of energy sources and policy, as shown in the SI-DRIVE State-of-the-Art report. In European countries the energy markets were also liberalised, because of which the governments have less influence over the energy companies. The transition involves many disruptive changes. Consumers are changing from passive consumers of energy to prosumers (consumers producing their own energy). New parties are entering the energy market, incumbents see their business models being threatened. Technology is being developed further. National governments adapt their policy continuously. The outlook on what the future energy system will look like is insecure because of these rapid changes.

Citizens, local communities, civic initiatives or collaborations between these parties and market players and/or government can have a major role by deploying renewable energy sources complementary to those developed solely by the market and governments. However, the traditional energy market is very centrally organised in most countries with a number of large players operating independently, either (partly) government owned or not. This organisation does not leave much room for new players from social innovation initiatives who often operate more locally, based on cooperation and striving for societal rather than commercial goals. In most countries at the moment there is no level playing field in the energy market in which incumbents and newcomers have equal chances.

What makes social innovation even more difficult to achieve is that the topic of energy is surrounded by a lot of political ambivalence as it is a vital need for both households and industry. Economic damage can occur when energy is not properly managed and therefore it is a sensitive subject. Because energy is so vital, governments in many countries seem to find it difficult to allow experiments with it in social innovations. Traditional regulations often prevent experimentation. Governments do not seem to trust civic-led social innovation initiatives with the reliability of the energy system and do not change the system.

A challenge in the transition is that in and outflow of electricity needs to be in balance at each moment. Because of that the system needs to be coordinated. That is easier when there are a few, larger parties that operate stable energy sources. But, the incorporation of renewable energy from different sources that are not always available, and the upcoming of smaller parties such as energy cooperatives or individuals households producing energy, requires new coordinating mechanisms, such as demand response, where demand adapts to supply.

Because of the disruptive and quickly changing nature of the energy system it was found to be complicated to create a complete and meaningful list of practice fields for social innovation in the energy sector. Apart from the technological innovations making this transition possible, a lot of social innovation is taking place. Several types of social innovation have the potential to become at the heart of the newly developing renewable energy system. For instance there is a lot of collective action going on. But because of the relative recentness of many developments in social innovation in the energy system it is difficult to pin down established practice fields of social innovation. Other challenges in

defining practice fields are that energy is a very comprehensive topic that plays a role throughout society. Therefore it is sometimes difficult to distinguish energy initiatives from other initiatives (for example the link energy-environment, energy-poverty, energy-mobility, and so on). Next to that the initiatives differ quite a lot in terms of partners, methods and goals.

The three practice fields that were selected for the Global mapping phase 2 are: (1) Energy collectives, (2) Local production of energy and (3) Providing examples and inspiration. These practice fields will be described in this report based largely on information collected in the different phases of the SI-DRIVE project, and experience in the energy field.

2 PRACTICE FIELD A: ENERGY COLLECTIVES

2.1 DESCRIPTION OF THE PRACTICE FIELD

The practice field of **energy collectives** concerns collective consumption, production and saving of (renewable) energy. Below several sub practice fields including examples are listed:

- **Collective purchasing**. This is done by a coordinated collective of consumers (and/or their representatives) who make agreements for the consumption of energy at a price fixed in advance. In Italy, in 2013 the national consumers association "Altroconsumo" launched a call that led to the membership of 197,000 consumers and 39,000 families to change their supplier of energy. In 2014 this call led to the membership of more than 80,000 members, who signed a collective agreement for a single offer for the supply of electricity and gas which will enable 11,000 families to save in the bill on average 135 € yearly. These kinds of initiatives are the demonstration of the benefits of collective action in a growingly liberalized market. In the Netherlands, several consumer organizations have taken forward similar collective purchasing schemes. Such initiatives can take place at a national scale, but collective purchasing can also be done by smaller, more local collectives.

- **Energy Cooperatives**. These are communities (often formalized in a cooperative structure), that collectively or cooperatively invest, maintain and sometimes even own energy projects. Examples are wind turbine cooperatives in Austria and Denmark, or citizen power plants, so-called "Bürgerbeteiligungskraftwerke" also in Austria as well as in Germany. Related to their financing, see 'new financial tools'.

- **Business collectives**. Energy cooperatives often have a civic connotation, but can be initiated by businesses just as well, with respect to collective purchasing, energy efficiency interventions and renewable energy production interventions. An example is the "Leaf Community" of Loccioni Group, in Marche Region, Italy. Here, local industries developed a complex system of energy efficiency interventions since the '90s and integrated these with renewable energy production interventions in the 2000s. For technologies that enable such collective actions, see 'smart metering'.

- **Energy efficient housing collectives**. In co-housing, people plan, design and build their houses collectively, in order to be able to finance energy efficiency measures, eco-friendly building materials, and perhaps also collectively organized renewable energy generation. By sharing common facilities (washing machines, kitchens) energy savings can be realised as well. Sometimes such co-housing projects are even ecovillages, where people not only collectively invest in energy efficient houses and renewable energy generation, but also share a low-impact lifestyle.

The practice field 'Energy Collectives' overlaps with other practice fields within the energy domain. As can be concluded from the description above, the definition of 'Energy Collectives' is very broad. There are energy collectives that can also be placed in the practice field 'Local Production of Energy' when they locally generate energy. Other energy collectives can be placed in the practice field 'Energy Services' when they provide energy-related services to citizens, companies or governments.

Within the energy domain there are rather vague boundaries between the different practice fields. The main difference between the practice field 'Energy Collectives' and the other practice fields is that energy collectives are basically an initiative of a group of citizens, possibly in cooperation with the government. This practice field is a form of social innovation since such collectives are often new combinations or figurations of social constellations, often including 'new' actors in new governance arrangements. The initiators of energy collectives combine their knowledge and ideas to change their own way of living and show others that renewable energy becomes a new standard.

2.2 ANALYSIS AND CONTEXT OF INITIATIVES

Energy collectives are a relatively new concept in the energy market. Most energy collectives are not older than ten years and the increase in the amount of energy collectives is something of the last years. Technologies for local

production of renewable energy enabled the growth of these collectives. They contribute to the transition towards a sustainable society by producing renewable energy and/or saving energy at a local level. Because they often operate locally, they contribute to a movement from the traditional centrally organised system towards a more decentralized energy system. In decentralized systems there is a reduction of the costs for transmission and distribution of the system, reduce of grid power losses, more efficient data management and a larger share of renewable energy.

Most European countries have energy collectives, but in many cases they are still in the learning and development phase. There are some examples of countries, like Denmark and Italy, in which collectives in general are more common and therefore also energy collectives. But for the state-of-the-art report of SI-DRIVE, it was difficult to find energy collectives in most countries in Eastern Europe. These countries have another history in terms of politics and the production of energy which influences their path to a sustainable energy system.

There are large differences between energy collectives themselves mainly because they are shaped according to local circumstances in terms of culture and what is technologically and geographically possible. Governance, market and financial support also influence the development of an energy collective.

There are different reasons for citizens or other parties to start an energy collective. One central reason is to contribute to a sustainable society. This is an international trend that not only occurs in the energy domain, but is also seen in for instance the local production of food. Another reason for many collectives is to be independent from the traditional players in the energy market such as large suppliers. They are distrusted and thought to be too slow in implementing sustainable energy. This distrust can partly be explained by the liberalisation and following commercialisation of energy companies which can cause companies to take decisions based on commercial value than on societal value. Other reasons for starting collectives are to save money on energy bills and to reinforce the local economy.

The increase in the amount of energy collectives and other new players in the energy market changes the role of local and regional governments since they need operate in a different way towards them compared to the large energy companies they are used to work with. Their role regarding energy collectives can be to cooperate with them and to facilitate their development. Energy collectives often cooperate with a local or regional government to realise their goals.

An important barrier to overcome for energy collectives is that the rules and regulations that are currently in place in most countries are mainly based on the traditional, centralized energy system. This makes the entry of energy collectives to the market more difficult. The current changes in the system and entering of new players to the market require adaptations to these rules and regulations. Another barrier in this respect is the powerful lobby of some of the incumbents to maintain their current position in the market.

In 2013 TNO conducted a study on the success factors of local energy initiatives.[2] These factors were divided into five different categories:

- **Initiator.** The initiator should have strong personal incentives and he or she has the knowledge and skills to start an energy initiative.
- **Approach.** The idea of the collective should be worked out in detail and there is a vision for the future. The goals, approach and ambitions match the target audience.
- **Participants.** The initiative should use existing local social structures to combine people and communicate with them. Also the people need to experience the energy initiative and not only hear stories about it.
- **Environment.** It is important to know who are part of the network and environment of the energy initiative and to involve the local government, local entrepreneurs and students in the energy initiative. Furthermore initiatives should visit other initiatives to learn from them.
- **Internal organisation.** It is important to explicitly describe the roles, tasks, interests and expectations of people within the organisation of an initiative. Next to that it is important that people can easily get into contact with the initiative.

[2] Attema, R. & Rijken, M. (2013). Succesfactoren voor lokale duurzame energie-initiatieven – Learning histories van vier cases. TNO report.

2.3 MECHANISMS OF SOCIAL CHANGE

In this paragraph the mechanisms of social change are addressed that are influencing the development of energy collectives. The full definitions of these mechanisms can be found in the annex.

Learning is reflected in the growing knowledge and capabilities that consumers and other non-professional energy parties have regarding the necessity of making the transition to a renewable energy system, policy options and the technological possibilities of producing renewable energy. The knowledge comes from amongst others scientific reports, media, politics and the internet. This knowledge stimulates people to start an energy collective. Not every participant needs to have the same level of knowledge however. But overall a collective needs a sufficient amount of knowledge.

Variation relates to new collective ideas that inspire change. As mentioned before, collective values and beliefs concerning the importance of sustainability have changed. These is a widespread belief that there is a need for a sustainable energy system. These ideas lead to questions about whether the current system can cover this need. These ideas inspire energy collectives.

The **selection** mechanism involves the process of grown and decline of initiatives. Energy collectives are often started by frontrunners that involve other people in the initiative. They are mostly growing by expanding their networks. Most energy collectives do not strive to become larger and larger, but they mostly want to achieve more impact. It does not happen often that the same initiative is directly copied somewhere else. Every location has their specific possibilities and therefore various types of collectives grow largely separately. :

Conflict arises in the energy market because of growing shares of renewable energy and changes in the balance between incumbents and new players. Energy collectives that are selling and often producing renewable energy are new players and potential competition for the incumbents. Furthermore, many energy collectives do not look friendly upon the traditional players in the energy market because they question whether these parties will make the energy transition happen (fast enough). This conflict is a strong driver for the start of energy collectives.

These conflicts between incumbents and new players lead to different **tensions** in the energy system. Governments want to increase the shares of renewable energy, but also want to maintain their tax levels and ensure a reliable energy supply. There is a strong lobby of large companies with an interest in fossil fuels that slows down the production of renewable energy in general and opportunities for local production. There is a tension in the situation that governments want to change the energy system, but their influence is limited because they are dependent on a largely liberalised energy market. These tensions do create opportunities for energy collectives since goals related to a renewable energy system need to be achieved.

There is strong **competition** going on between bottom-up energy collectives and incumbents. When more and more energy collectives are producing energy locally, the business models of incumbents are threatened. Therefore the incumbents keep a close eye on the development of social innovation and new business models are developed.

Cooperation is a prominent mechanism in energy collectives as these collectives are always a collaboration between different parties or individuals. The added value of an initiative is in the combination of the resources of the different partners.

The **diffusion of technological innovations** for producing renewable energy on a local scale has enabled social innovation in energy and is therefore a crucial driver for all practice fields. As these technologies develop they can influence social change even more because of additional functionalities or lower prices that make them feasible for a larger group.

Planning and institutionalisation of change partly drives the development of energy collectives through governmental policy that makes starting these initiatives more attractive. In most countries there is no policy yet that directly stimulates initiatives. There are general policies that stimulate production of renewable energy that energy collectives can profit from. However, governments are also taking up new roles to cooperate with and facilitate initiatives.

2.4 RELATION BETWEEN PRACTICE FIELD AND CASES

The focus of the case studies and this summary report is on energy collectives, since this is the most prominent, broad and complex type of social innovation in the energy field because of its involvement of several parties and challenging governance. It also formed the largest group of cases included in the previous case study phase of the project of global mapping 1. Within this broad category there is a wide range of initiatives that is not easy to classify but still very diverse. The selection in this summary report includes different types of energy collectives.

One has the form of an ecovillage in which a group of individuals aspires a sustainable way of living in Ireland (Cloughjordan Ecovillage). Then there is a cooperation between six local citizen-led initiatives in six towns in Italy, the municipalities and a university to operate a fund for renewable energy production (Solar Community Bologna). Another is a citizen led energy cooperation mostly working with volunteers started to boost the production of renewable energy in Spain (GoiEner). The last one is a women-only initiative started to introduce more women in the production of wind energy, empower them economically and promote renewable energy (Qvinnovindar).

2.5 SUMMARIES OF CASES IN PRACTICE FIELD ENERGY COLLECTIVES

2.5.1 Case A1: Cloughjordan Ecovillage, Ireland (The Young Foundation)

Description, development of the Social Innovation Initiative

A group of like-minded individuals with a focus on sustainability started talking in 1999 about the possibilities of trailing a more sustainable way of living. This was motivated by a belief in the need to address issues of climate change and sustainability. Working together they began to raise money by selling 'memberships' of a cooperative group of individuals who planned to build houses in a future 'eco-village'. This group came to push forward the project.

The social innovation, Cloughjordan Energy Collective is an energy collective based within an eco-village where the energy innovation exists in the form of a 'renewables strategy' comprised in three dimensions: the building of low energy housing, the dis-incentivisation of car use and the provision of heating through a renewables based district heating system (DHS).

Actors, partnerships, alliances, networks

Sustainable Projects Ireland Ltd. (SPIL) was the driving organization behind the initiative. The project appears to have originated to some degree from Greg Allan, Gavin Harte and the Dublin Food Co-op although members have different statements about this. By June 2000, they had approximately 25 members. They established a constitution (Memorandum and Articles) for the company, and a Membership Agreement outlining the responsibilities of both the company and the members. They also developed an Ecological Charter, outlining the core principles for the development. A board was established which had a number of "respected people" such as politicians and university lecturers in order to offer the project a greater level of sustainability.

Communities, informal networks and social movements were very important to the development of the project. Particularly the growing sustainability movement which was strongly focused around finding more sustainable ways of living. Informal networks of people involved in organizations in Dublin with a sustainability focus were the main driving force behind the development of the innovation. As the innovation has progressed there has been a strengthening of ties between Cloughjordan and larger communities such as the Global Ecovillage Network.

Many of the critical actors in the development of the energy innovation are part of larger communities, particularly members of sustainable living networks. The SPIL is a member of the Global Ecovillage Network (GEN) and many have close ties with the Transition Towns project. In addition many of the people involved in the projects frequently go abroad to look at good examples of sustainable living practice or to conferences.

Innovative solution

The origin of the solution lay in the experience of like-minded individuals who all felt dissatisfied with the level of disconnection from their environment and the lack of sustainability. In addition literature and experiences elsewhere of the sustainable living community heavily informed the development process. There is technical innovation in the use of district heating using wood pellets and sustainable building standards of the houses. Also the management principles of the Viable Systems Model (VSM) and the governance through consensus of the initiative are innovative.

Gaining momentum

The identification of Cloughjordan as a possible location came about when policy makers recommended placing the eco-village next to another village which was suffering as a result of lack of development. After that they started with the consultation of Cloughjordan residents in order to try and overcome the barrier of community fear.

A significant barrier to the project were the costly conditions of the planning permission and the land. They chipped away at the financial 'buffer' that had been built into the financial models and left the project less financially resilient. The global financial crisis was a significant turning point for the innovation which up until this point had enjoyed relatively constant progress. It changed the extent to which people could buy sites and build in the village and was a real barrier to progress. It also had negative impact upon the companies who installed the solar panels which means when the panels failed the companies had folded and there was no one to repair them or to seek compensation from.

Key success factors for this innovation were:

- The **leadership of key individuals**: From the two initiators of the project through to those who take responsibility for individual aspects of the innovation, having people who take responsibility for aspects of this has been extremely important to the success of the project.
- **Funding** through EU projects: The funding received through the SERVE programme was a key success factor for the project. Without this grant the cost to the community for a DHS would have been very high and this may have impacted upon the extent to which the project was able to meet its goals.
- The **sustainability movement**: the growing sustainability movement was a key source of both personnel and 'buy-in', energizing people to want to take part in the project.

Complementary innovation

New information and knowledge was used by looking at other innovations across the world in order find models that work for them, in terms of technology and governance. They even conducted visits to other eco-villages.

The innovation in the initiative is reliant on the expertise of the people owning the sites. Given the relatively small number of members this does mean that the pool of knowledge that they are drawing from is relatively small. There is a limit on the absorptive capacity of the organization because few people have the time to build their understanding of how the technology and processes work.

There was clear demand from a very niche part of the population who felt that they wanted to live more sustainably. However this was seemingly somewhat dependent on the good financial performance was Ireland and significantly reduced- at least in the form available- when the financial crisis hit. Since that time, people have reported, that there has been a shift in demand from buying sites to desiring a rental offer. Technology played a part in the project given that the project centers around more energy efficient building and the district heating system.

Impact, diffusion and imitation

The initiative had a very clear impact upon the energy use of the community which- per household- is far below the Irish average. The district heating system is estimated to save 113.5 tonnes annually of carbon that would be emitted by conventional heating systems. The ecovillage has an ecological footprint of 2 global hectares (gHa) which is the lowest recorded in Ireland. This compares favorably with estimates of Irish people's average ecological footprint. A survey of 79 settlements in Ireland found an average ecological footprint of 4.3gHa, suggesting a significant reduction in Cloughjordan.

The innovation currently suffers from something of a lack of capacity. Too few people understand the district heating system and there are not enough 'enthusiastic young people' to get involved. There is some significant expertise in the village though.

There is no indication that the project has been directly imitated however there have been visits to the project by others looking to set up eco-villages. Building capacity is a very important dimension of diffusion. Community energy provision such as that in Cloughjordan relies on charismatic leaders and it relies on being able to establish processes that enable collective decision making and action. There are distinct competencies that could be shared in order to diffuse at least the principles of the innovation more broadly. For example the principles of consensus decision making and the viable systems model may be examples of competencies that could be built.

Role of policy

There is very little enabling policy that has originated from the Irish Government that supports community energy provision. The lack of social investment infrastructure in Ireland appears to have been problematic for this innovation who are now reluctant to take on commercial debt but who are currently looking for capital in order to expand into rental accommodation. At national level there are changes regarding the newly established MUD Act 2011 obliged any new housing development to set up a management company to manage the estate – Owners Management Company. This influenced SPIL in choosing the ESCO model for the Service Company.

At the local level policy can provide a stifling role when it is not sensitive to the aims and missions of developments and when it responds to innovation with stifling regulation and conditions, in the way that it did in the case of Cloughjordan. During the interviews one participant stated that he felt that they were being viewed as a 'housing developer' rather than as a social endeavor and that they were therefore 'put through the ringer' in terms of the conditions that they had to meet.

One interviewee, in the case study, noted the importance of European policy and their focus on sustainability as having influenced the development of the innovation. It had a positive influence, although some interviewees suggested that the provision of the Concerto funding had been highly bureaucratic and inflexible and this had meant that choices were made regarding energy provision that in fact they would not necessarily make if they had the opportunity over again.

Connectivity to the practice field

The initiative is a key example of the practice field 'energy collectives'. It has become a famous example across the world. It has also contributed to the development of other collective energy projects in Ireland.

The practice field generally and this project specifically have been put in place because of the growing social movement around sustainable and lower carbon living. Energy collectives are also seen as a good way to reduce costs and free consumers from large energy companies that are frequently seen as expensive and/or exploitative or both people and natural resources. Certainly in the UK and the rest of Europe there is growing action, with the rise of renewable options to think about this 'democratization' of energy provision.

This practice field has required generation of knowledge about how to organize energy cooperatives. However other knowledge including how to engineer such collective systems was largely present.

Membership of networks appears to be highly important to the development of the practice field. Particularly the use of informal networks as well as presence at conferences. The showcasing of key examples has also been very important for the development of the practice field.

EU directives have been important in mainstreaming and lowering the price of technologies that allow for more energy efficient buildings. However having appropriate organizational structures and other enabling policies in place is exceptionally important to the development of collective energy projects. This is a practice field where there are high barriers to entry because there is often a very significant capital outlaw upfront. This means that enabling policy is important for 'de-risking' the environment.

The practice field has been shaped by social movements around sustainability which value lower carbon footprints and suggest that people need to take an active role in transforming the ways in which our societies interact with the world around us. The growing consensus around climate change and the greater drive among governments to do something about it seems to have added impetus to those who want to reduce the impact that their own lives have on climate change and environmental degradation.

Legal structures governing such collective organizations differ from country to country. In the context of Ireland there are very few institutional frameworks available for such enterprises outside of cooperative structures and charities. This is a limiting factor on the practice field. Additionally the failure to recognize the social aspects of such innovations within, for example, planning and regulation has meant that projects aimed at producing a social good, that do not prioritize profit, are forced to follow the same stringent and sometimes expensive regulatory framework as profit making enterprises.

The development of technologies that enable collective energy provision has been important, also the development of smaller or even 'purchase-able' energy systems that can be bought by communities has been important. In many cases though there is still a degree to which this is a large capital investment and the lowering of these initial outlay costs could be seen to be a way of further driving the practice of collective energy projects.

Collective energy projects frequently require people who take organization on to their own shoulders and are able to motivate large numbers of people. This is because energy collectives frequently require significant levels of on-going participation by members. Despite their collective nature it is still necessary that there is vision and leadership- particularly in the early days of the project in order to keep momentum going and figure out ways to organize the project and the people involved.

Empowerment and capacity building in this practice field comes about through development of understanding both of how to organize such initiatives but also in how to deal with the technological side of such initiatives. Capacity building and empowerment often occurs through networks, both formal and informal, which frequently share knowledge or provide inspirational examples.

Adoption, diffusion and imitation frequently occurs through inspirational examples or the spreading of ideas to new locations when it is community based. When distinct communities club together into energy cooperatives this can either be done because people have seen positive examples and decided to imitate or it has happened when people have decided to go in to communities and develop the model in almost a franchise style way (e.g. 'Brixton Energy' then spread to 'Hackney Energy').

This practice field is interesting because it aims at systemic change but it aims to do this from a distinctly local approach that builds into disruptive change. This is still in the process of building. Certainly such practices are building to a point where governments are increasingly seeing the need to understand the ways in which communities are providing their own energy in a collective way. This has significant implications for the grid. There are very few contexts where clear solutions to the challenges this presents have been incorporated, however Germany and Australia are offering examples of where policy makers are starting to tackle these issues.

2.5.2 Case A2: Solar Community Bologna, Italy (LAMA)

Description, development of the Social Innovation Initiative

The Comunità Solare (CS) – or solar community – is a cooperative model for the local management of a supplementary fund for sustainable energy production facilities owned by members. In this model, the mutuality creates a local reward mechanism that can operate independently or in addition to the national one, in order to strengthen the economic driver for the promotion of renewable local energy.

Between 2010 and 2014 the Solar Community was created as a result of separate local citizen-led initiatives in six small towns of Emilia Romagna. The initiatives were organized since the beginning in a network of associations,

promoted and recognized by the municipalities and by the Regional administration. In 2015 the network of Solar Communities was extended, with the participation of a new citizen-led initiative in Bologna.

The association Solar Community, which has 220 adherents and 360 supporters, has a fund used to generate energy through the construction of new PV plants. This Energy Fund generates opportunities for its associates, such as ownership of renewable energy production facilities and discounts at local enterprises offering ecological and energy consumption reduction related services.

Actors, partnerships, alliances, networks

The initial network was constituted by the members of the first Solar Communities, who were 150 people. The promotion for this was done by the municipalities, with the collaboration and support of the Chemical Industrial Department staff of the University of Bologna. In the first year, the organizing committee grew to 350 members. Also 30 local enterprises participate in the Solar Community. The main responsible was at first the University of Bologna, that promoted the idea. After that, the municipalities took the leadership of the initiative, and the University became a technical partner.

The communities are the main owners of the initiative, with six municipalities starting up the initiative and the enterprises as enablers of technological and ecological innovation.

Citizens are associates and can participate and support the activities of CS. They have access to all services of the Local Solar Communities Centre. This Centre coordinates the local Solar Communities, which are nonetheless independent and self-managed by the adherents. Within the participators there are first level associates and second level associates. The first level just participates in all the activities, and has access to discounts and services for associates. The second level associates pays a share which is proportionate energy consumed.

The organization is not a member in any network. Nonetheless, the participation of municipalities in the Convenant of Mayors has been central to give an initial incentive for the start-up of the project.

Innovative solution

The lesson learnt which influenced the solution concerns the need of people to have a partner helping them in planning their daily consumption choices regarding energy, lighting, heating, mobility. Another point they have learned is that self-consumption of locally produced energy in itself is not an answer, and should not be priority, because the energy system, globally, is not evolving towards off-grid models. In the course of the project the initiators also learnt the importance of transparency and of the democratic nature of the project.

The initiative is innovative in terms of service innovation, in the way it organizes the participation of citizens and municipalities bottom-up. Thanks to the critical mass participating in the communities, local enterprises can have access to a large group of potential clients.

Gaining momentum

The strategy of the initiators to place the innovative solution in the existing context was to collaborate with municipalities and integrate the local solar communities with local enterprises. They did make a distinction between local Solar Communities and local enterprises so that it did not seem linked to any kind of market interest.

The main drivers are: the willingness of citizens to participate in the Solar Community, the interest of local enterprises and the institutional support form municipalities. Communication and culture are mentioned as barriers for this initiative. It is very difficult for families to understand the proposed consumption models, and to change their lifestyles. This is the reason why the Local Solar Communities Centre is investing not only in energy audits and energy redevelopment, but also in training to adults and in schools.

Success factors are the institutional support and the interest of a first group (around 150 people) of citizens in the initiative. After the start-up period, the re-organization of the system, with the foundation of a service center for local solar communities, has been important for the organizational sustainability of the initiative. In 2015 the official

creation of the network of Solar Communities, with Bologna entering in the network, and the Region recognizing officially the initiative, has been an important success factor. Recently, the organization is investing more in communication, sensitization and training activities.

Complementary innovation

The actions of the Italian government in the last 20 years have been very important to promote the adoption of renewable energies, and some actions are still influencing positively the sector. There are measures that has a positive influence but were perceived negatively by the population. This is, in the view of the interviewed actors, because of a general lack of communication and sensitization on these themes, at a local and national level. Local Solar Community network tries to reduce this communication gap.

The demand for renewable energies has been stimulated by the "Conto Energia" and is now slightly slowing down. At the same time, the increase of costs on the energy bill and the growth in awareness in ecological issues of the population is influencing the demand, which is increasingly expressed, at least by some parts of the population.

The most important element, in the interviewed actors' view, is the increase in trust for their community of the participants to the Local Solar Community network. In other words, the development of "social capital" is central for the good development of the initiative. The smart city is firstly based on a community development process, and technological innovation in itself is not enough to develop it.

Impact, diffusion and imitation

The key actors of the project did not define any indicator to define the success of their initiative. However, the level of success of the initiative has always been measured in terms of participation, and of the diffusion of the practice on other municipalities and other areas. The impact on beneficiaries does not only cover associates who bought energy shares for their own consumption, but also the households who benefited from the energy services. Also the initiative had a remarkable institutional impact on the municipalities, by shaping their environmental policies.

The Local Solar Communities Centre is very interested in disseminating its experience and replicating its model, but at the moment there are no resources dedicated to diffusion activities in new zones, because the network funds are mainly oriented towards growth activities in its territories. The activities of training and sensitization, both with adults and in schools, are central to the further expansion of the solution at a local scale. Local companies are increasingly financing these activities, which does not have to rely only on resources coming from the Energy Fund. Mutual learning also plays a role: the local communities share experiences and solutions, creating a peer network that reinforces the positive effect of training and sensitization activities.

Role of policy

The possibilities given by the 4th "Conto Energia" national programme, in 2011, for setting -up the first Municipal PV platforms, activated the initiative of one of the municipalities. Many policies are now promoting Solar Community networks as a social innovation, in particular the policies incentivizing the adoption of energy efficient solutions and renewable energy production. At national level the "Scambio sul posto" policy is incentivizing the measures promoted by CS. Other measures are also serving as incentives to promote what CS is promoting, like the deduction of 65% of the costs on energy efficiency intervention on houses and buildings. Nonetheless, these policies do not always come with enough communication and promotion on the territory.

At the local level there are also different incentives to promote what CS is promoting. The SIGE (Sistema Integrato di Gestione dell'Energia) is a Memorandum of Understanding between Municipalities to create an integrated management system of local energy. This system is designed according to the main principles of the European directive 28/2009/CE, and pursues the aims promoted through the Covenant of Mayors and the PAES. Its objective is to create platforms of renewable energy managed by municipalities, and to promote renewable energy as a collective and common good, to be managed through participatory processes such as the CS. These measures have been co-financed by the Region of Emilia Romagna.

Connectivity to the practice field

The Solar Community is part of the practice field of energy collectives. It is inspired on energy cooperatives, but also takes elements from consumers' associations. The unicity of CS is the innovation in terms of model, compared to other existing cases of Energy Collectives.

The project did not contribute in shaping the practice field in since this was more actively shaped by cooperatives, already existing in Italy since the beginning of the 20th century. However it contains a new and "lighter" community model to the cooperatives, which can be easily replicated in other contexts.

In the years 2000s, the demand for renewable energies has been stimulated by the "Conto Energia" programme and contributed to the creation and diffusion of the first energy collectives as a side effect. The phenomenon of Energy collectives is now growing at a slower rate, without the national incentives. However, the increase of costs in the energy bill and the growth in awareness in ecological issues of the population is influencing this trend. The liberalization of energy and electricity markets triggered many initiatives at the local level, and the interest is increasingly going from owning the resources to managing the networks.

No official network of energy collectives is existing in Italy. Nonetheless, the interviewed actors know each other, and compare their respective organisation models. It is probable, and recommendable, that these realities will be more connected in the near future.

Policies for renewable energy incentives are defined both at Regional and National level. In general, National incentives presented in this document are the most relevant policy instruments to be considered in Italy, as well as the regulation of networks and the liberalization policies, which were defined at a National level, in most cases in adaptation to European addresses. At a national level, many policies influenced positively the adoption of renewable energies. No specific policy promoted the creation of energy collectives. At a local level, local initiatives have promoted collective solutions for the production and consumption of energy. The case of Solar Community, as an initiative embedded within the Covenant of Mayors, is one of the main examples.

In a bigger extent, empowerment and capacity building is required on the part of users. Investments to increase the energy efficiency of the households and of their building is needed in Italy, before changing their energy consumption choices. The biggest action to be done regards the sensitization of consumers, and the facilitation, at the local level, of bottom-up initiatives such as CS. Mutual learning can play a role: the local communities which already developed experiences and solutions, should create a community of practice for the diffusion of such solutions at the national level as well as for training and sensitizing consumers. This has not happened yet, and might be a field where public and private sectors may co-invest in the future.

Complementary innovations needed (explained in previous sections, only recalled here) are: increase in trust within communities, to be stimulated through community engagement activities and increase in awareness regarding the need of efficiency of existing buildings.

2.5.3 Case A3: GoiEner, Spain (UDEUSTO)

Description, development of the Social Innovation Initiative

GoiEner is a non-profit citizen energy cooperative that promotes the implementation of installations to generate renewable energy. It is an interdisciplinary organization open for those who want to work in favor of an alternative, renewable model for the current energy sector. It is mainly based on cooperation and volunteerism, in which the partners take part actively in each of the decisions of the cooperative.

GoiEner considers that investing in renewable energy, is the way to start up projects that generate renewable energy (solar, biogas, wind power, etc.). It is the only way to achieve a change of energy model without being dependent on large energy suppliers.

GoiEner started in 2012. They got the New Business Ideas Award from GOIEKI (a local new projects promoting agency). This award was the launch for GoiEner. It started with 32 partners and in September 2016 there are more than 5000 partners. Since 2013 the partners can subscribe for a contract to get electricity from GoiEner.

Actors, partnerships, alliances, networks

The person taking initiative was Joanes Maiza, but GoiEner exists thanks to larger group of volunteers. Nowadays there are about 13 people working with a salary at GoiEner but there are also about 100 people working for GoiEner as volunteers. They are members of the cooperative but wanted to do also voluntary work. Each of these volunteers contributed with their knowledge and they got trained in those areas of expertise they needed in the energy cooperative. Volunteering work is divided into 4 main areas: renewable energy generation, marketing, communication and administration.

The value of GoiEner as a citizen cooperative makes them work and take decisions between equals, because each partner means one vote. The members are also represented in the governing council, but the most important decisions are taken at general meetings.

The goal of the members is to change the energy model, and to recover the energy sovereignty promoted by citizen participation. Although the Spanish electricity market was liberalized in 1997, it is still organized mainly around five large electricity companies. Electricity generation is not organized based on a reduction of CO2 emissions but it is based on the economic interests of these companies. GoiEner seeks to change the configuration of the electric mix in favor of a market where the renewable energies are majority.

GoiEner collaborates with other institutions that share its mission, vision and values. GoiEner works together at different levels with Rescoop (European Federation for Renewable Energy Cooperatives), Fiare Banca Etica (an 'ethic' bank) and REAS Euskadi (solidarity economy), among others. Furthermore, in the area of advocacy, they have held several meetings with political representatives where they have exposed the implications of electricity reforms and its impact on the industry, society and the situation in which renewable energies are present.

Innovative solution

Joanes Maiza already knew similar initiatives in Europe which, undoubtedly, favored the launch of the project. However, the first 32 members did not have sufficient knowledge of how to set up an energy cooperative. Therefore they got in touch with another cooperative that was working in Spain, but they did not show a great interest in the collaboration. Because of that the initiators of GoiEner had to get in touch with other European cooperatives and learned from them. Also these first partners had to learn about the Spanish energy regulations.

Although there was large experience with cooperative enterprises in general in the Basque Country, the GoiEner initiative is innovative because it was the first energy collective. It is also an innovative solution because it searches for collaborations between GoiEner's employees (those that get a salary from GoiEner) and volunteers that work in GoiEner's project development.

Gaining momentum

The initiators indicated different elements of a strategy to place the innovative solution in the existing context. The first element is to get in touch with people, not only from the energy sector but also from the social, environmental and legal fields. The second element is the formulation of milestone-goals that are clear and attainable. The third one is to entrust in the network of the ambition group of people. And the last one is to offer the initiative as an attractive project, not only by its nature, but also by its alternative character.

An initial barrier was the lack of knowledge of the participants about how to start an energy cooperation, however as they overcame the difficulties and gained more experience they have been able to grow. Another barrier was the change in legal frame concerning renewable energy in Spain. The amendment of laws in the field of electricity generation in 2012 has made the project to evolve in a different way than it was originated. The Spanish renewable energy market was based on a feed-in tariff system. So renewable energies investments pay back was calculated

according to this system. But on the 27th of January 2012 the Spanish government temporarily stopped accepting applications for projects beginning operation after January 2013.

The most important driver of the initiative is the promoting group. When GoiEner started in 2010-11 all of partners were volunteers, until it become a company in December 2012. They have worked hard to realize their ideas. The areas where they did not have enough knowledge about, they had to learn.

The most important milestone was when they had enough members to start with the energy trading. There were also some critical milestones during the realisation of the initiative related to capacities: knowing how to create a cooperative, how to start trading energy, communicate with partners and members, investing in employment and recruitment, maintaining a horizontal company structure.

What has helped raise the success of the project has been the enthusiasm of the team members and to know how to look and ask for help. Of course it has been very important that the number of members has been increasing until more than 5000 nowadays. So, although the regulation in Spain has not changed, they have money to invest in new renewable energies projects. GoiEner avoids 'aggressive' or viral campaigns, therefore it grows in a very controlled and organic way. But just with the presentation of the project it has generated additional demand, by attracting a larger amount of members.

Complementary innovation

Changes in the laws and creation of policies are necessary to create renewable energy projects that are profitable. It is also necessary to create awareness in society for the needed changes in the energy system. In the GoiEner's business model the technology's role is more critical on the part of the generation but not so much in the marketing side.

Impact, diffusion and imitation

The success of GoiEner is that it is a new energy model based on a social model where everybody can play a role in taking decisions. The business model takes into account the changes in the energy system towards a renewable system.

Diffusion of the project is not only desirable but also necessary, therefore GoiEner works on this. As mentioned before the volunteers are organized in four areas, one of them being diffusion. The main way of spreading the GoiEner project is through talks and presentations, which are based on an emotional component and on the concept of closeness. If the audience feels that climate change is a real problem that they are part of, there is a stronger emotional component and they are more likely to start participating. Closeness plays a role in that people identify more with problems and people close to them. If a relative or neighbour is participating in an energy cooperative they are more likely to participate as well.

It is possible to imitate the project, but the imitation needs to fit with the region the project takes place in. There are some new initiatives based on the GoiEner model in other regions of Spain, such as: Nosa Enerxía (Galicia, 2014) and Energética (Castilla León, 2014). The main barrier for the new initiatives is to get the necessary knowledge required to start a project. In a project like GoiEner a high level of qualification is a key task so the training has been necessary for the development. Technical know-how (for instance techniques for management of electrical trading) is very important.

Role of policy

The regulations concerning electricity generation in Spain has been a barrier for the development of the initiative. There are two Royal Decrees in the last two years that have gone against the development of renewable energy projects. In Royal Decree 413/2014 one of the most remarkable aspects is that only installations that have not exceeded the installation life (20 years for wind farms, 30 for photovoltaic installations and 25 for the rest installations) will continue to receive premiums.900/2015 Royal Decree taxes the self-consumption facilities, which entails the application of access tolls (colloquially called "taxes on the sun") and which typifies as a very serious infraction the non-registration of the facilities. It does not affect isolated installations. And at region level it also has not been developed a regulation about auto-consumption.

If there is no profit for renewable energy projects, the enterprises will not invest in those types of projects. Also the changes in the regulation make insecurity for investors. Particulars also cannot invest in individual renewable energy projects because self-consumption taxes make it very expensive. So country level policies are key for renewable energies projects progress. The role of local policies is just limited to stimulate consumption projects.

Connectivity to the practice field

GoiEner is a clear example of the practice field energy collectives. The members believe that a cooperative model is more resilient than a large centralized structure. On the other hand, working in a collective means that decision making is a group process, and although there is space for reflection and learning, it is a time-consuming process.

The increased knowledge of the mechanisms of the electricity market and the ability to reach companies has shaped the practice field of energy collectives in Spain. Mutual learning plays a key role in the practice field. It is a fundamental task. It is necessary to learn from each other.

A new collective idea in society that is present in GoiEner is that there is a search for alternatives to the established economic system. The economic model is exhausted and in that sense there are people who are looking for other economic system alternatives. The role of technology is important for cost reduction in management procedures. However, we cannot trust the communication and cultural change in technology. The most the important task for successful audience involvement are the emotional component and the closeness concept.

Before starting GoiEner project there was already an initiative called Som Energia, the only reference in Spain with a comparable profile. GoiEner wants to learn from the experience of Som Energia because they also want to use the Nordic model. During the last years other cooperatives have been developing in Spain. Some of these new projects are cooperating with GoiEner or with Som Energia. These projects were partly started because GoiEner on a regional and Som Energia on a national level have shown how it can be done.

There are also initiatives that have been thinking about starting the process to create a collective and they have given up. This may be because there was no sufficient engine-promoter to start the project or it was missing a well-established social or business aspect. But at the moment there are no cooperatives that have closed once initiated their activity.

2.5.4 Case A4: Qvinnovindar, Sweden (ARCF)

Description, development of the Social Innovation Initiative

Qvinnovindar is a Swedish women-only cooperation in the field of wind energy production, started in 2007 by Wanja Wallemyr, a Swedish farmer and rural activist. The name "Qvinnovindar" is a combination of the Swedish words "kvinnor" (women) and "vind" (wind) and shows that only female members are included in the cooperation. The focus is on the energy industry because it is one of the sectors where male-leadership is more common than female-leadership. The goal of Qvinnovindar is to change this disbalance by empowering women economically and at the same time promoting sustainable energy.

The idea for the women-only initiative came to Wanja Wallemyr's mind during a regional conference on creating economic opportunities for women that she attended in 2007. Prior to the conference, she has heard about a community wind project that was about to be build close to her farm and she wanted to participate, but could not afford the minimum investment on her own. During the regional conference she shared with other women her idea of participating in the wind project and establishing a women-only energy cooperative and found nine other women who were also willing to invest in the project and were ready to take part in her initiative. Two weeks later Qvinnovindar was started and enough money was collected to participate in the wind project. This innovation can be seen as a new type of business ownership which, at present, includes eighty members.

Actors, partnerships, alliances, networks

There was not a pre-established network to start the cooperation, the main initiator herself gathered nine other women to join her in forming Qvinnovindar. Coompanion, a Swedish business advisory company, provided assistance and support in starting Qvinnovindar and has been involved in information and mobilization meetings. It was chosen according to the criteria to be experienced with entrepreneurship and to possess the necessary knowledge to establish and manage a co-operative. The additional partners did not have specific roles, such as the initial partners, and were not chosen according to any certain criteria. At present, all partners in the cooperation are equal. They contribute to the initiative with providing funds and knowledge. Regardless of the amount of money invested, each member of the cooperation has equal responsibility and control in the cooperation.

Innovative solution

Wanja Wallemyr has observed for a long time how the use of nuclear power results in increased pressure to mine uranium in the region of south-central Sweden, which in turn lead to harmful effects on the environment. With her background as a farmer she felt connected to nature. Based on her knowledge of nature and experience with entrepreneurship, she decided to invest in clean energy and to establish Qvinnovindar. The skills and knowledge of the other members of the energy co-operative, who were coming from diverse fields of work, also contributed to the success of the initiative. Another example of creating and sharing knowledge within the initiative is the support of Coompanion during the establishment of the cooperation, which gave the members new knowledge in the field of entrepreneurship and cooperation development.

This initiative is innovative because it combines the gender dimension with an approach to bundle interests in an energy cooperation. This cooperation has not only a financial dimension and does not only want to foster renewable energy sources, but also wants to raise awareness and empower women to become investors by bundling their individual resources.

Gaining momentum

The strategy of Qvinnovindar was to gather women who want to participate in an energy-cooperative. However, there was no specific strategy related to placing the initiative in the existing context. The main barrier that the members experienced was the lack of access to finances. This was mainly because banks in Sweden were not experienced with providing loans for big investments to women. The main drivers of Qvinnovindar were the willingness of women to participate in sustainable energy production and their motivation to contribute to the better future.

Since the start, Qvinnovindar has had a lot of activities and is a frequent lecturer in many contexts. In 2009 and in 2013, two other women-only economic associations started, respectively called Q2 and Qvinnovindar Sweden. These two associations were also supported by Coompanion. Their common goal is not only to invest in wind energy projects, but also to develop the business and to expend to other types of energy.

Complementary innovation

Technological innovation can be considered as a complementary innovation that makes it possible to exploit the innovation successfully. Members have been interested in innovative solutions related to energy saving and other technology developments that could influence the creation of a sustainable environment in a positive way.

The main idea of the initiative is to gather women who are willing to invest in wind power. It is not required for these women to have specific skills or knowledge (capacities or capabilities). But, of course, if they possess any skills or knowledge relevant to the energy field, this is an advantage.

Impact, diffusion and imitation

The members of Qvinnovindar hope that their initiative will inspire women around the world to follow their example and to be active even in fields where their presence is not common. After talking at conferences around Europe, the founder of Qvinnovindar has been contacted by women form Spain, Mexico and Turkey who were inspired by Qvinnovindar and wanted to follow their example.

Diffusion is desirable in order to ensure gender equality in the energy sector and to provide women with more opportunities to participate in innovative projects. But at the moment there is not a specific diffusion strategy developed. There is also no information about any trails of imitating, adapting or transferring the initiative in a different context. However, Qvinnovindar is planning to apply the innovation in the context of farming, to make an all women cooperative in the farming field.

The core business model of Qvinnovindar expects operations to provide a return on investment when the loans are paid. The payback time is predicted to be around 15 years. Since the wind turbine business depends on wind power, interest rates and electricity prices for generating good results, the return cannot be predicted precisely. Although the business model of Qvinnovindar cannot be regarded as an entirely new one, there is a difference between Qvinnovindar and a common stock company – the local involvement, the people of the village get together to make joint investments. This benefits local people and not just investors elsewhere. Qvinnovindar has a cooperative working method which gives the group strength.

Role of policy

Policy actors did not play any decisive role (either active or passive) in the initiative. However, when members of the initiative have meetings with policy actors, they show positive attitude towards the initiative and support it. According to the founder of Qvinnovindar, policies that promote these types of initiatives are required. Women ownership is not common in the energy sector so policies that support it would stimulate women to join the sector. Furthermore, since access to funding is a real challenge for such initiatives, funding support could be important as well.

Connectivity to the practice field

The interviewee agreed that Qvinnovindar can be placed in the “Energy Collectives” practice field. However, she was not able to discuss the questions related to the practice field, since she was not aware of the situation of other projects in this field in Sweden and abroad.

2.6 PRACTICE FIELD CONCLUSIONS

The practice field of energy collectives concerns collective consumption, production and saving of (renewable) energy. The main difference between the practice field ‘Energy Collectives’ and the other practice fields is that energy collectives are basically an initiative of a group of citizens, possibly in cooperation with the government. Energy

collectives are a relatively new concept in the energy market. Most energy collectives are not older than ten years and the increase in the amount of energy collectives is something of the last years. Because they often operate locally, they contribute to a movement from the traditional centrally organised system towards a more decentralized energy system.

There are large differences between energy collectives themselves mainly because they are shaped according to local circumstances in terms of culture and what is technologically and geographically possible. Important reasons for starting or joining an energy collective are to contribute to a sustainable society, to be independent from the traditional players in the energy market, to save money on energy bills or to reinforce the local economy.

The increase in the amount of energy collectives and other new players in the energy market changes the role of local and regional governments since they need operate in a different way towards them compared to the large energy companies they are used to work with. An important barrier to overcome for energy collectives is that the rules and regulations that are currently in place in most countries are mainly based on the traditional, centralized energy system and not on these new and differently operating players.

The most important mechanisms of social change in the practice field of energy collectives are conflict, competition, cooperation and diffusion of technological innovations. Conflict is a strong mechanism leading to change because of the changes in the balance between incumbents and new players. Energy collectives that are selling and often producing renewable energy are new players and potential competition for the incumbents. That is also where competition plays a role in changing the system. Cooperation is a prominent mechanism in energy collectives as these collectives are always a collaboration between different parties or individuals. Lastly the diffusion of technological innovations for producing renewable energy on a local scale has enabled social innovation in energy and is therefore a crucial driver for all practice fields.

3 PRACTICE FIELD B: LOCAL PRODUCTION OF ENERGY

3.1 DESCRIPTION OF THE PRACTICE FIELD

The practice field **Local production of energy** concerns the local production of renewable energy. Often this is called 'micro-generation'. Local production can be undertaken by individual households, businesses, industries, farmers, etc. and showcases a significantly different kind of behaviour than individuals or parties who are mere consumers of energy supplied by centrally coordinated energy sources (mostly fossil or nuclear). Local producers can, for instance, be totally 'off the grid' and self-sufficient, or act as 'prosumers' who are feeding-in energy back to the network, and many times receive a financial reward for it. The term 'local' indicates that local action is involved, but it does not necessarily need to be in a community. Examples of types of initiatives that can be seen in this practice field are:

- **Domestic energy production**. The production of energy on a very small scale. E.g. people putting solar panels on their roofs, solar thermal heating on newly constructed and retrofitted buildings, or the use of renewable heating systems (heat pumps).

- **Local production of biofuels or biogas**. Small local producers of biomass, such as farmers, collaborating with public entities (for instance forestry management agencies) to use their organic residuals to produce biofuels or biogas.

- **Local production of heat**. For instance from gas residuals produced by local industries, that is used for district heating systems.

As mentioned before in the policy field of energy it is difficult to draw a straight line between different types of social innovation. Considering that, the practice field of local production has some overlap with the practice field of energy collectives. However, the initiatives in this practice field are started by individuals or individual parties. On that aspect they can be distinguished from energy collectives that are initiated and governed by more than one party. Therefore local production has a less complex governance structures than social innovation initiatives with more cooperating parties.

The absence of a collective aspect raises the question of whether local production can be regarded as social innovation, as this mostly involves a constellation of actors cooperating. However, we do argue that local production initiatives can be social innovation, because they do imply totally different forms of behaviour to address societal problems. Furthermore, a large number of these initiatives combined have a strong impact on the energy system. They cause social change on the level of the producer and the system. Next to that it often implies the development of different interactions with, and a new role for, grid administrators, governments on all levels, energy suppliers, and so on and so forth.

Although the focus of this practice field is on production, it could also include saving of energy by single parties. Many initiatives include multiple activities, so we do not make a strict distinction in production and saving of energy.

3.2 ANALYSIS AND CONTEXT OF INITIATIVES

In Europe and outside, not only conventional actors in the energy sector but also farmers and private homeowners initiate wind and solar energy projects. The amount of renewable energy produced locally is growing. However it is hard to say what amount of renewable energy is produced local by individual parties. In the SI-DRIVE State-of-the-Art reports on the country level no information has been retrieved on amounts of local production as a specific category. There is information available concerning the amounts of renewable energy produced per country, but it is difficult to collect information on local production as mostly this is not recorded separately. Next to that, part of the local production (for instance from solar panels) cannot be measured because it is currently arranged 'behind the meter' and not fed-in to the network.

Technology is an important precondition for local production. However, some technologies are in general more suitable for local production than others. For instance solar panels are very suitable for application in households and biomass installations or windmills are suitable for farmers or other businesses. Renewable technologies are in general more suitable for local production than fossil fuel based technologies. It is quite hard to fit a coal-fired power station in your garden.

There are differences between (European) countries in the amount renewable energy produced locally, which can be explained by amongst other things local policy including tax systems, culture and average welfare of citizens.

At the moment European and national policy concerning local production of renewable energy is developing quickly. Laws and regulations are being developed to assign a more prominent role to individual consumers in the production of energy. Local parties are stimulated or obliged to produce more renewable energy. When these laws and regulations are further developed and applied, it can become the new norm to produce the energy you need at a local level. The European laws will have to be implemented in the member states. The local policy in the member states, such as the tax system, determines for a large extent the incentives for local production. In Germany for instance there are feed-in tariffs, meaning that local producers of renewable energy get a financial reward for every kilowatt hour that they feed into the electrical system. This makes it attractive to produce renewable energy locally, and even sharing it with your neighbours. In the Netherlands there is a net metering system, meaning that producers do not pay taxes over the energy they produce and use themselves. But they do not receive benefits from feeding back into the system and/or sharing.

In the state-of-the-art report it was concluded that culture plays a role in determining what kind of social innovation will occur in a specific country. It can also give an indication of whether local production fits well with that culture or not. Based on the findings, this type of social innovation is suitable for countries with lower levels of trust and cooperation in society. When these levels are higher, it seems more likely that collective initiatives such as energy cooperatives develop. In countries where these are lower, less collective initiatives will probably develop. In these countries social innovation is more likely to happen in the form of individual action such as local production. Needless to say, in countries with more collective action local production of energy also takes place.

An important requirement for being able to start producing energy locally is the average welfare of citizens. For any party whether it is an individual household or a company, a requirement is that there are sufficient financial resources available to cover the investments. At the moment, parties often lack the financial resources to invest directly in energy efficiency measures or expensive technologies for renewable energy. Or they find it more important to spend their money on other things first. Even if there are lending schemes available, not every party will be inclined to use these. While in some countries, individual parties have high purchasing power and significant capital for investment, in other countries this is very limited. This will have an influence on the amount of local production.

There are different processes and dynamics that have an influence on the uptake of local production by individual parties and therefore can lead to social change. The most important ‘development’ that has been a precondition for this form of social innovation is the development of different technologies that make it possible to produce energy on a local level. This development is ongoing, and as these technologies are becoming more available, easier to implement and less expensive, this will stimulate local production.

Another development that influences local production is the motivation of consumers of energy. The opinions and moral standards in society towards climate change and the importance of renewable energy instead of using fossil fuels are changing. Over the last years it has become more publicly accepted that climate change is a problem that is real and that societies should become more sustainable to prevent further damage to the earth. Following this knowledge, more individual parties start producing or saving renewable energy. And when they start with one action, more action will likely follow. For example a household installing solar panels, achieves more insight into their energy use and will possibly take additional actions accordingly. The fear of climate change is however not the only motivation for individual parties to get involved in local production. Other types of motivation are saving money, being independent from energy companies, interest in technology and gadgets or because it is the new norm (‘the neighbour also installed solar panels’).

A large influence on the development of this practice field comes lastly from the side of policy. In the state-of-the-art report it was concluded that member states are rather behind on reaching their 2020 targets for renewable energy. As

local production is part of that, this can be a sign that the amount of local production is also not growing as quickly as could be wished. When national governments want to increase the amount of renewable energy produced, they have roughly two ways to go. They can go top-down and implement larger, central, renewable energy projects. Or they can stimulate bottom-up action by individual parties and collectives. In most countries both paths will be developed at the same time. Like mentioned before, European guidelines and policies will stimulate individual, local production of renewable energy and will keep doing that in the near future. Whether social change by producing more renewable energy locally will be institutionalised depends on how European policy goals are translated into national action plans. Also, national governments are dependent on energy supplying companies for realising their goals. Since the energy market is largely liberalised the governments do not entirely control the developments in this market.

More processes and dynamics that can lead to social change are mentioned in the paragraph 'mechanisms of social change'.

The most important actors active in local production are: individual households, collective households (such as apartment blocks or social housing companies), businesses (farms, industrial businesses). The national and local government can be involved by facilitating or stimulating local production, for instance by providing subsidies. Local production of renewable energy is driven by multiple factors, such as: motivations of the individual parties (idealistic, saving money, mistrust in the current energy system, follow the example of others), development of technologies for local production and policy programmes stimulating local production. Barriers to the development of this practice field are: hindrances in laws and regulations, lobby of large companies involved in fossil fuels, existing infrastructure that limits technical possibilities.

3.3 MECHANISMS OF SOCIAL CHANGE

The mechanism of **learning** overlaps largely with the practice field energy collectives. The main difference is that in a collective there can be several people with different knowledge and capabilities, that have a sufficient amount of knowledge when added up. However, in individual local production this knowledge needs to be more concentrated in one person, or they need to ask for professional assistance.

Variation relates to new collective ideas that inspire change. As mentioned before, collective values and beliefs concerning the importance of sustainability have changed. These changes are reflected in the activities of individuals in local production and social innovation in energy.

Selection involves the process of grown and decline of initiatives. Initiatives in local production are often taken up by early adopters with different motivations (ideology, interest in technology, saving money). The amount of initiatives spread for instance by individuals seeing successful examples and they will start considering it themselves.

Conflict arises in the energy market because of growing shares of renewable energy and changes in the balance between incumbents and new players. When consumers become prosumers in local production conflicts of interest develop between energy suppliers who see their business models decreasing, governments who see their tax incomes decreasing and local producers. Many local producers look critical upon the traditional energy players, and from this conflict comes part of their motivation.

There is strong **competition** going on between social innovation initiatives and incumbents. When more and more prosumers are producing energy locally, the business models of incumbents are threatened. Therefore the incumbents keep a close eye on the development of social innovation and new business models are developed.

Cooperation is less of a factor for the practice field of local production than for energy collectives, but local producers can join different networks. Also there are organisations stimulating people to become local producers.

The **diffusion of technological innovations** for producing renewable energy on a local scale has enabled social innovation in energy and is therefore a crucial driver for all practice fields. As these technologies develop they can influence social change even more because of additional functionalities or lower prices that make them feasible for a larger group.

Planning and institutionalisation of change influences the development of local production as in many countries it is part of a policy and planning strategy. Policy incentives such as subsidies for installing renewable energy technologies or feed-In tariffs can be a large stimulation of local production. However, policy can also have a very negative influence when stimulating policies are not continuous or when policy is even counteracting the development. In Spain solar energy was growing when it was allowed and it was tax-free. However the development collapsed when policy was put in place that obliged owners of solar panels to pay large taxes. Local production will play an important role in the future energy system with mixed resources. Governments are preparing for a more flexible energy system, in which peaks and off peaks in renewable energy should be balanced with other energy sources.

3.4 RELATION BETWEEN PRACTICE FIELD AND CASES

In the database of the Global mapping phase 1 of SI-DRIVE there was only a limited number of cases in the practice field of local production included. The reason behind this is that it is a less prominent form of social innovation, since social innovation is often considered as a collective effort. However, local production of renewable energy is an upcoming social practice that has high probability of leading to large scale social change. When this practice becomes comprehensive, it will have a significant impact on the energy system.

Since the focus of the case studies and this summary report was on energy collectives, being the most broad and complex type of social innovation because of its involvement of several parties and challenging governance, most cases in this report are considered to be part of that practice field. In this chapter, an interesting case from Egypt is included that was initiated mostly by one party. Because it was not initiated by a collaborating collective of parties, we consider it to be part of local production. Still it includes community-related aspects. The case study performed will be summarized in the next paragraph.

3.5 SUMMARIES OF CASES IN THE PRACTICE FIELD LOCAL PRODUCTION OF ENERGY

3.5.1 Case B1: Solar Energy for Agriculture, Egypt (Heliopolis University)

Description, development of the Social Innovation Initiative

The Egyptian government is taking initiative to reclaim 0.6 million hectares from the desert to move large parts of the population out of the Nile Valley, where the vast bulk of the population currently lives. Because of their expertise in sustainable land reclamation, SEKEM decided to participate in the government initiative by reclaiming a new area at Wahat using the technology of renewable energy in reclaiming new lands. SEKEM is an organization founded to realize the vision of sustainable human development. Its mission is the development of the individual, society and environment through a holistic concept integrating economic, societal life, cultural life and ecology.

In 2008, SEKEM started to expand its land reclamation activities in new desert areas in Egypt for agricultural use. The agricultural land is needed because of rising food demands and to create new societies in remote desert areas. But the desert land needs irrigation to be suitable for agriculture. Irrigation the land was done before by pumping well water using a diesel generator. However, the desert communities faced immense energy shortages, especially during peak time for irrigation. Therefore, SEKEM invested in pumps that use renewable energy generated by solar PV. This way the water availability is secured, there is an integrated solution for the Water-Energy-Food nexus, reduces the costs of irrigation and accordingly increases the possibility of land reclamation and food production. SEKEM is one of the first parties to apply high capacity solar pumping. There were two projects implemented so far. One was that SEKEM implemented the first solar energy operated water pump on their desert farm in Wahat Bahareyia. They had training regarding solar energy and irrigation and are part of an awareness campaign for solar energy in agriculture in Egypt.

Actors, partnerships, alliances, networks

SEKEM was present at the “RaSeed Green Energy in Agriculture” conference, where the attendees had an open dialogue about challenges and opportunities of using solar power in agriculture in Egypt. The involved stakeholders

agreed that solar energy is a valid option to ensure the sustainability of desert farming. Furthermore the New & Renewable Energy Authority (NREA) was established in Egypt to act as the national focal point for expanding efforts to develop and introduce renewable energy technologies on a commercial scale. NREA is entrusted to plan and implement renewable energy programs in coordination with other concerned national and international institutions within the framework of its mandate. Stimulated by these networks, SEKEM decided to use the solar energy generated using PV systems in agriculture.

There are two projects implemented in which solar energy is used for agriculture. In each project there were slightly different partners. The first project was financed by SEKEM through a leasing finance contract with Tamweel, an Egyptian financial institution. Other initial partners were: Aschoff Solar, as system supplier, and Egreen, as partner of Achoff for the installation and maintenance of the PV system. The second project was financed by the OeEB bank. Other initial partners in this project were: Almaden, the supplier of the AgriPV system, and Acropol, a company for renewable energy solutions and the agent of Lorentz German Company, the supplier of the solar pump. Egreen and Aschoff also participated in this project, taking care of the installation of the AgriPV system and the solar pump. Heliopolis University for Sustainable Development (HU) was one of the additional partners. The HU students and technical assistants participated and got trained during the installation of the system. Another additional partner was SEKEM Vocational Trading Centre (VTC). This school trains young people in different professions. SEKEM VTC participated and got trained during the installation of the system.

Innovative solution

There were different ideas, insights and findings that lead to the development of the project. The intense use of electricity by the increasing population is one of the findings. Another finding is that the Nile becomes less attractive for agriculture use, but water is needed for irrigation and the rising food demands. Also the costs of diesel has influence on the project, at the moment, the costs of diesel for irrigation systems are increasing sharply due to the lack of availability of diesel on the markets and the costs rise because of transportation for remote desert farms. It is also important to take in account that Egypt is one of the most potential countries in the MENA region for solar energy. Stand-alone systems for direct irrigation provide a very simple solution, with the pump and a solar inverter being directly connected.

In Egypt, renewable energy was meant to use solar water heaters to produce hot water or use photovoltaic panels to produce electricity for lightening, but it was never used for agriculture purposes especially in remote areas where there is scarcity of water for irrigation agriculture and the lack of availability of diesel in these areas. Using solar pumps will allow irrigation using ground water and on the same time will prevent the need of diesel for the generators.

Gaining momentum

The main driver of the project is the initiative of the Egyptian government to reclaim 0.6 million hectares from the desert. The project is an extension of a decades-old dream of moving large parts of the population out of the Nile Valley, where the vast bulk of the population currently lives. Another driver is the government's intention to remove the fuel subsidies that will increase the prices of the diesel needed for irrigation. Solar PV pumps are becoming a preferred choice in remote locations to replace hand-pumps, grid connected electrical pumps and diesel pumps. In such places, solar PV pumps are even viable economically in comparison to conventionally run pumps.

There are many goals that can be achieved by the initiative: increase the area suitable for planting crops for increasing the food resources, create new societies on desert land, use renewable energy for irrigation as a cost effective, reliable and sustainable system for the long-term, overcome the problem of electricity cuts in remote areas, reduce CO2 emissions, decrease dependency on diesel, raise awareness and disseminate knowledge to other Egyptian farmers and increase the employment opportunities. The main barrier during the project was the high costs of the system.

PV technology is new to the Egyptian market. The introduction of new technologies into rural markets therefore requires prudent consideration of, at least, the following key aspects: distribution channels; delivery model and access to finance; policy and regulatory frameworks; and awareness raising and capacity building. In the specific case of irrigation, additional aspects include, for example, access to markets for food commodities so that farmers can realize income from increased yields to pay back the cost of the system.

The farm owners in remote areas, the farmers and the investors who are interested in land reclamation and creating new communities are the ones who would benefit from the innovation. There is a need to explore how this technology can become interesting for small-scale farmers, providing them with training on the operation and maintenance of the systems, as well as ensuring access to solar markets and relevant services. The new roles that the innovation creates are companies supplying the renewable energy components and taking care of maintenance, performance and quality of the systems.

Because of the high prices for the system, the business model can be made more attractive to all levels of farmers by: government grants for small-scale systems to grid-connected feed-in tariffs for the solar energy generated, subsidy schemes, tax exemptions and other financial incentives, private funding, pay-as-you-go schemes. Besides, inter-sectoral collaboration of relevant ministries is crucial when designing new policies to promote usage of renewable energy sources in agriculture.

The innovation is also an encouraging idea for the government to create new communities in the desert land relying on solar energy and groundwater for agriculture, because in the future Egypt will suffer from a decrease of water resources and an increase in the prices and the absence of conventional fuels.

Impact, diffusion and imitation

The main impact of the initiative is that solar water pumps offer Egyptians the opportunity to live in off-grid desert communities and have access to essential groundwater resources that will help to pull population away from overcrowded Nile and take advantage of the desert's abundance of sun and soil. Diffusion has only taken place on small scale because it is implemented in some farms in Egypt.

Role of policy

In 2008, the Supreme Council of Energy approved an ambitious plan to satisfy twenty percent of the generated electricity by renewable energies by 2020. In 2012, an Egyptian Solar Plan has been approved by the Cabinet targeting to install about 3500 MW by 2027. In September 2014 the Ministry of Electricity & Energy and the Regulatory Agency launched feed-in tariff support system for solar PV and wind projects with capacity less than 50 MW. The goal of the Feed-in Tariff programme is to boost renewable energy production in Egypt and to reach 2300 MW of PV capacity and 2000 MW of wind capacity. In order to encourage the private sector to participate in renewable energy projects, the government made some financial incentives and one of them is exempting all renewable energy equipment and spare parts from the custom duties. The policy programs play an important role since there is an encouragement from the government to the private sector to perform renewable energy projects and there is exemption from the customs duties. There was no influence from these policies on the innovation.

Connectivity to the practice field

The answers to the questions about the practice field could not be addressed by the partner.

3.6 PRACTICE FIELD CONCLUSIONS

Local production of energy concerns the production of renewable energy on a local scale by for instance individual households, businesses or farmers. Examples of their activities are the production of wind or solar energy for individual or shared use. From mere consumers of energy they become 'prosumers'. The practice field has overlap with energy collectives. However, it can be distinguished because the initiatives in this practice field are started by individuals or individual parties instead of a collective with a more complex governance structure. A large number of these initiatives combined can have a strong impact on the energy system and would lead to social change.

In Europe and outside, not only conventional actors in the energy sector but also farmers and private homeowners initiate wind and solar energy projects. The amount of renewable energy produced locally is growing. Technology is an important precondition for local production. However, some technologies are in general more suitable for local production than others.

At the moment European and national policy concerning local production of renewable energy is developing quickly. Laws and regulations are being developed to assign a more prominent role to individual consumers in the production of energy. An important requirement for being able to start producing energy locally is the average welfare of citizens. For any party whether it is an individual household or a company, a requirement is that there are sufficient financial resources available to cover the investments.

Local production of renewable energy is driven by multiple factors, such as: motivations of the individual parties (idealistic, saving money, mistrust in the current energy system, follow the example of others), development of technologies for local production and policy programmes stimulating local production. Barriers to the development of this practice field are: hindrances in laws and regulations, lobby of large companies involved in fossil fuels, existing infrastructure that limits technical possibilities.

The most central mechanism for social change in this practice field are: learning, variation, conflict and diffusion of technological innovation. Learning and variation are important because local production has grown because of the increasing knowledge of consumers and changing beliefs. Conflict is a strong mechanism leading to change because a large amount of local producers are partly driven by a distrust of traditional energy companies. Lastly the diffusion of technological innovations for producing renewable energy on a local scale has enabled social innovation in energy and is therefore a crucial driver.

4 PRACTICE FIELD C: PROVIDING EXAMPLES AND INSPIRATION

4.1 DESCRIPTION OF THE PRACTICE FIELD

The practice field **Providing Examples and Inspiration** concerns initiatives that are started mostly to stimulate other actors to produce renewable energy or to save energy. It consists of three sub practice fields, namely *Information Campaigns*, *Renewable Energy Model Regions* and *Award Systems*.

- The support for **Information Campaigns** by public authorities can generate new forms of organisation between various stakeholders within the practice field, or inspire them to reduce their energy usage.

- Based on the specific local frameworks, actor-networks and potentials for renewable energy supply, tailor-made socio-technical solutions for the increase of renewable energy sources (RES) in a specific local context are designed within the sub-practice field of **Renewable Energy Model Regions**. In such regions new forms and concepts of co-operation, governance and decision making between regional actors are explored and developed and implemented through several activities.

- One common method of encouraging social innovation in the energy domain is through **Awards Systems**. In award programs, individuals, businesses or collectives are stimulated to compete on being the most energy efficient, or using/producing the highest amounts of renewable energy.

The practice field distinguishes from other practice fields in the energy domain in the way that its direct goals are not exclusively to

1. *reduce the energy use* or to *increase sustainable production of local energy* by increasing the self-sufficiency based on regional and renewable energy resources solutions

but also to

2. *inform consumers* on all levels about their possibilities to contribute, to resource-efficient energy use and to *inspire* them with examples.

In that way, the practice field *Providing Examples and Inspiration* is significantly characterised by a mix of initiatives that (1) *stimulate* activities on the one hand and (2) *implement* renewable energy sources (RES) solutions on the other. First, stakeholders are encouraged/empowered to get active mainly through information, knowledge transfer and services. Second, stakeholders are supported in the implementation of RES solutions themselves, mainly through financial support, assistance in the implementation as well through the management and operation of RES solutions.

All three types of initiatives are linked to existing political activities. This is mainly expressed by incorporation through political stakeholders and partnerships with funding programs.

While initiatives in the fields of Award Systems and Information Campaigns mainly perform specifically targeted and *single activities*, initiatives in the sub-field of Renewable Energy Model Regions are *more complex*: in such regions a number of different activities take place which combine also activities that can be found in Award systems and Information Campaigns. This third sub-field is more or less overarching the other two sub-fields. Therefore, it characterizes the practice field *Providing Examples and Inspiration* to a great extent.

The above mentioned “double approach of stimulation and implementation” makes this practice field distinctive from other practice fields in the energy domain. However, also some overlaps were identified. In particular the service character of Information Campaigns overlaps to a certain extent with other, primarily service-based practice fields (e.g.

energy services). Since the implementation of a Renewable Energy Model Region is coupled to a specific local framework and numerous individual measures in every region exist, a general overlap is hard to find. Nevertheless, model regions are often also active with regard to citizen's power plants. Therefore, it can be stated that some overlap between the practice field "energy collectives" exist here.

4.2 ANALYSIS AND CONTEXT OF INITIATIVES

As can be seen in the State of the Art report[3], which reflects the current situation of the practice field *Providing Examples and Inspiration*, the different initiatives from Sweden, Austria, Germany, Turkey, Ireland and Latvia are on different maturity levels and therefore the spread of activities also varies across the countries.

It shows that the development of initiatives in the three sub practice fields of Renewable Energy Regions, Award Systems and Information Campaigns are not homogeneous in the different countries. Initiatives in the sub field of Energy Regions gained momentum about the turn of the century. Originating mainly from Germany, Information Campaign initiatives gained momentum in the middle of the first decade[4]. In contrast, Award Systems related initiatives are wide-spread and therefore originated much earlier than the other two.

Based on the State-of-Art Report Sweden, Austria and Germany show significant social innovations in the field of energy and renewable energy solutions, which directly corresponds to the advanced maturity levels of their initiatives in the practice field. An Example of this advanced maturity levels is the Austrian region "KEM Thayaland" which already has made several visible outputs and impacts including photovoltaic- and energy monitoring systems. Also the German model region "Pellworm", which lead to several outputs like the installation of a public unit for local heating as well as Sweden's model region "Jämtland" which lead to total domestic and renewable energy use represent the advanced maturity level of initiatives in the sub-practice field of Energy Model Regions.[5]

It was found that initiatives in the sub practice field of Energy Model Regions are consistently and strongly supported by actors from public networks, political partners, local Energy Agencies and professional funding agencies. Political support and financial backup were identified as the main drivers in this sub practice field. The main barriers are a lack of financial support and a lack of visible outputs.

As described in the State of the Art Report, the initiatives of Turkey, Ireland and Latvia have lower maturity levels and can all be comprised within the two sub practice fields Information Campaigns and Award Systems.

A good example of a combination of these two sub practice fields in one initiative is the Turkish initiative "Energy Lady/Kid" mentioned before. Besides the informational character of the initiative it also awards energy efficient behaviour. With courses for more than 20 thousand Turkish women it can be classified as a mature initiative. A different mature approach of learning and changing behaviour via Informational Campaigns can be found in the Irish "Cloughjordan EcoVillage" where residents contribute to and live in high-performance green homes. Latvia's initiative of an energy monitoring platform in cooperation with the local heating company "Salaspils siltums" seems to be not as mature as the other initiatives.

In contrast to the initiatives in the sub field of Renewable Energy Model Regions, which are mainly supported by policy networks, agencies and funding programs, it was found that initiatives in the sub fields of Information Campaigns and Award Systems are mainly supported by local industrial- and institutional partners like private companies and research institutes, followed by the support through policy[6]. Main drivers are support of networks of individuals and private groups and their "will for participation and innovation". Funding challenges, a lack of personal and restrictions through legal frameworks are the main barriers in these sub practice fields.

Overall, it was found that the main process dynamics that lead to social change in the practice field originate from:

[3] STATE-OF-THE-ART REPORT - SOCIAL INNOVATION IN ENERGY SUPPLY FROM A EUROPEAN AND GLOBAL PERSPECTIVE

[4] Cases "KEM Thayaland", "Micheldorf-Hirt", "Pellworm", "100ee Region Flecken Steyerberg", "Energy region Jämtland" and "ENNEREG Pioneer Region Blekinge" taken from Database

[5] Cases "KEM Thayaland", "Pellworm" and "Energy region Jämtlandtaken from Database

[6] Cases "Cloughjordan Ecovillage", "Energy Lady/Kid" and "Salaspils siltums" taken from Database

(1) external climate targets,
(2) the possibility of funding program participation and
(3) the active change in mind set.[7]

An active change of mind set is a precondition for social change in the in the energy domain. External climate targets and the possibility of funding program participation are also main drivers.

4.3 MECHANISMS OF SOCIAL CHANGE

As already mentioned, the practice field *Providing Examples and Inspiration* distinguishes from other practice fields in the way that its direct goals are not exclusively to increase the energy self-sufficiency by renewable energy resources, but also to inform consumers on all levels about their possibilities to contribute to resource-efficient energy use.

Therefore, the practice field follows a two dimensional transfer mechanism. On the one hand, the practice field comprises activities like provision of information, demonstration of working principles and an active change of mindset (see also above). On the other hand, the initiators/management within the practice field are managing/operating RES solutions and support other actors (beneficiaries/target group) to take implementation actions themselves (e.g. through activities like financing, setting up business models, services).

For the following section we can refer only to existing data collected in the sub practice field Renewable Model Regions as this was most thoroughly addressed in the case study in this field. As this sub-field is overarching to a large extent also the other two sub-fields, we transfer these insights to the entire practice field.

Based on the information available, the main identified mechanisms of social change throughout the practice field are

(1) learning,
(2) selection and
(3) competition.

The mechanism of learning is one of the most important aspects in the practice field. This can particularly be seen by the variety and diversity of measures that are initiated to consciously promote and stimulate a learning process within the practice field.

The mechanism of selection incorporates the processes of adoption, diffusion and imitation. This is a strong mechanism of social change within the practice field. Especially the process of imitation can be seen throughout the whole practice field. This process is mainly expressed by the wish of one project owner to adopt or imitate a particular project, measure or activity of another initiative that implemented it with success. A good example of programme adoption is the occurrence of a car-sharing trend that started from one KEM region and now spreads to more and more KEM regions which imitate projects in this sector.

Since the mechanism of competition is a powerful mechanism to stimulate social change, it is actively used throughout the practice field, particularly by Award Systems related initiatives. An example of this mechanism can be found in the sub-practice field Renewable Energy Model Regions where 'best KEM project of the year' and the 'best KEM manager of the year' is voted annually.

4.4 RELATION BETWEEN PRACTICE FIELD AND CASES

All three sub-fields described above are important for the entire practice field and address different target groups with different measures/activities within the renewable energy domain.

[7] Taking into account all relevant Case-Data of the practice field from Database and the State of the Art report.

Examples of initiatives in the field of Information Campaigns are the Irish "Cloughjordan Ecovillage", which is an educational charity and learning destination for sustainable living with over 100 residents living in high-performance green homes.[8] Or the Turkish "Energy Lady/Kid" project, which educates women and children in energy efficiency via educational activities and means such as plays, cartoons, and computer games. Also Latvia's publicly owned heating company “Salaspils siltums” and its platform to raise public awareness about residential energy consumption points out the informational character of such initiatives. This initiative is not covered in the present report.

One common method of encouraging social innovation in the energy domain is through awards. In award programs, individuals, businesses or collectives are stimulated to compete on being the most energy efficient, or using/producing the highest amounts of renewable energy. Such Award Systems can be found in various countries throughout, for instance the "Energy Lady/Kid" project in Turkey. These awards can come from public or private sectors as well as universities, chambers of commerce and associations and tend to focus on energy efficiency as well as environmentally friendly operations and as such encourage social innovation. The range of awards spreads from material prizes, cash- and/or funding-prizes to actual certificates or awards.[9]

In Renewable Energy Model Regions, new forms and concepts of co-operation, governance and decision making between regional actors are explored and developed and implemented through several activities. Every Renewable Energy Model Region is characterised by a specific set and combination of technological renewable energy solutions, social practices and business models. The overall tasks of all these Model regions are in fact to increase energy security, to get independent by supra-regional energy providers, as well as to generate local added value and to protect the environment. Examples of Renewable Energy Model Regions are the Austrian region "KEM Thayaland"[10], the German region “Flecken Steyerberg”[11] or the Swedish region "Blekinge"[12].

While *Information Campaigns* cover mainly the "push side" of the practice field and therefore promote/stimulate sustainable development within the practice field, *Award systems* are located rather at the "end of the pipe", focusing on the existing output and implementation. Information campaigns and Awarding systems are actively used throughout the practice field to stimulate social change. Both types of initiatives have in common that they have a supra-regional focus rather than a local one. Complementary, the *Renewable Energy Regions* cover both sides of the activities but are regionally limited.

4.5 SUMMARIES OF CASES IN THE PRACTICE FIELD PROVIDING EXAMPLES AND INSPIRATION

4.5.1 Case C1: Climate and Energy Model Region „KEM Thayaland”, Austria (AIT)

Description, development of the Social Innovation Initiative

The *Climate and Energy Model Region Zukunftsraum Thayaland* (KEM Thayaland) wants to strengthen local economy and sustainability by becoming energy self-sufficient through a mix of measures in the fields of heating, power generation and mobility.

The KEM Thayaland comprises the region Zukunftsraum Thayaland and consists of the fifteen communities of the district Waidhofen an der Thaya. Besides traditional agricultural holdings, also innovative technology companies and modern handicraft businesses are settled in the region. Compared to other Austrian KEM regions, the KEM region Zukunftsraum Thayaland was initiated comparatively early and has already passed two phases of continuation. Therefore it can be classified as a mature KEM region. Several visible outputs and impacts make Thayaland to a pioneer project in its region as well as in the federal state of Lower Austria.

[8] In this summary report, the case ‘Cloughjordan Ecovillage’ is reported under ‘Energy collectives’, because of the collective and active aspect. However it could be part of more practice fields.
[9] STATE-OF-THE-ART REPORT - SOCIAL INNOVATION IN ENERGY SUPPLY FROM A EUROPEAN AND GLOBAL PERSPECTIVE
[10] http://www.thayaland.at/cms/kem/index.php?lang=2&idcatside=262
[11] http://www.steyerberg100ee.info/
[12] http://de.climate-data.org/region/460/

With the foundation of the association Zukunftsraum Thayaland in 2006, the structural and economic strengths of the 15 communities of the district Waidhofen an der Thaya were combined. On the basis of that existing collaboration, a first implementation concept, for becoming also a KEM region, was developed and submitted by the association, with the aim of implementing RES solutions in the KEM region. The main action fields of this concept were electric mobility, power storage, wind power, building refurbishments and energy contracting. The concept was accepted in August 2011 by the KLIEN.

In June 2012, DI Ansberth Sturm became the KEM region manager. With the support of his two employers, the association Zukunftsraum Thayaland and the Energy Agency of the Regions, the KEM manager worked out a measure catalogue for project extension and acquired the first extension period of the KEM Thayaland in 2013. This measure catalogue expands the range of measures by adding project management, networking, communication, photovoltaic systems and solar heat.

In 2014, the association Zukunftsklub Thayaland was founded with support of the KEM. This association itself acts as a support network within the KEM region. A second project extension has been applied and accepted in October 2015. The aim of the second project extention is to continue the initial projects (electric mobility and car sharing, power storage, building refurbishment) successfully, and to broaden the variety of the measures (for example by promoting bike-mobility).

In order to broaden the base of funds for the several current and future RES and mobility projects, in particular car-sharing and photovoltaic, the TRE Thayaland GmbH was founded in the beginning of 2016.

Actors, partnerships, alliances, networks

In order to implement and speed up RES solutions in the KEM region Thayaland successfully, three legal entities were founded throughout the development phases of the KEM, namely the Zukunftsraum Thayaland (2006), the Zukunftsklub Thayaland (2014) and the TRE Thayaland GmbH (2016) (see below). The idea is that the interplay and co-operation of these three organisations increases the share of RES solutions in the KEM region.

Zukunftsraum Thayaland
With the foundation of the association Zukunftsraum Thayaland in 2006, the former separated micro-regions Thayaland (11 communities) and PWGD (4 communities) were combined to the Zukunftsraum Thayaland, which led to a stabilisation and standardisation of the regional structures.

The purpose of the association is to contribute to a sustainable, region-suitable and comprehensive development of the district Waidhofen. The KEM management is located in the association since the KEM manager is part-time employed by the association. Further, the association co-finances the activities/measures of the implementation concept of the KEM Thayaland.

The Zukunftsraum Thayaland is one of the two contracting partners of the public-public-partnership (PPP) with the Climate and Energy Funds Austria (KLIEN). The KLIEN co-funds the association's KEM-related activities (e.g. KEM management, information events, networking/marketing) within the PPP.

Zukunftsklub Thayaland
The association Zukunftsklub Thayaland acts as a support network for 100% RES measures in the KEM region. The association represents a broad participation of private individuals and households, companies and institutions. This association is complimentary to the Zukunftsraum Thayaland, where only communities can get members. With entry-fees and membership fees, the Zukunftsklub Thayaland raised 2/3 of the share capital of the TRE Thayaland GmbH.

TRE Thayaland GmbH
The TRE Thayaland GmbH was founded by the two associations Zukunftsraum Thayaland and Zukunftsklub Thayaland in the beginning of 2016. This organisation (ltd.) acts as an implementation structure for RES measures in the KEM region and its main financing source is a citizen's participation model only for members of the Zukunftsklub Thayaland. The TRE Thayaland GmbH establishes itself as energy service provider and project owner within the KEM region.

Innovative solution

According to the KLIEN KEM Programme Management the purely operational and technological implementation of RES solutions (e.g. photovoltaic systems, biomass, solar thermal systems, e-mobility) should not be understood as the main innovation in the context of the KEM. The innovative character of the KEM lays in the methods and models of project initiation. An example of such a model is the public participation model, in which private individuals and households can contribute to RES solutions like photovoltaic plants financially. “[...] I mainly see the innovative character in the set-up and implementation of such projects". Further he emphasises that "without the KEM program, in many cases the projects would not have been developed the way they were".

In detail, the novel solutions of the KEM Thayaland, which are therefore mainly characterized by non-tangible and socio-technological innovations for the region, can be grouped along the following dimensions:

New Services: One important novel solution of the KEM Thayaland is to provide consulting services for private individuals in the community. On a regular basis, the KEM organises information events which cover themes like the usage of RES solutions for private households, e-mobility and the use of car-sharing, LED usage, solar power installations, RES funding and energy saving devices

Process Innovations: Another dimension of the KEM's novel solutions are process innovations. These innovations cover (1) the working group Modellregion (group's principal task is to work out different RES related projects and concepts for the KEM region), and (2) the cooperation of the KEM with politics, institutions and companies. The specific stimulation of cooperation between the KEM, local politics and regional companies and institutions is crucial for generating a so called “KEM identity”, and is therefore an important aspect of process innovation.

Technological Innovation: Existing RES solutions and technologies like energy monitoring systems for communities, public institutions and companies, solar power systems, e-mobility and car-sharing solutions, hydro power systems, solar heat installations, biogas systems and power storage plants were implemented. Besides that, a particular mobile app (e-county) was developed. This innovative app solution facilitates the entry and computing of energy data for private households.

Organizational Innovation: The KEM Thayaland's organisational innovations include (1) institutional innovations and (2) the development of business models. The institutional innovation character of the KEM is emphasised by the foundation of the Zukunftsklub Thayaland in 2014 and the financing of projects through the TRE Thayaland GmbH, which is part of the "Thayaland Triangle" since early 2016.

Gaining momentum

In the starting phase of the KEM Thayaland, the existence of established local structures like Zukunftsraum Thayaland and the Energy Agency of the Regions where the SI initiatives could closely link with and profit from, was crucial for gaining momentum and acceptance of the KEM management.

Especially the “Energy Agency of the Regions” was a strong driver at the beginning phase since they manage applications, requests, planning work and provide access to relevant networks. Furthermore, they assist the KEM management by co-writing the implementation concept.

At a later point in time, the KEM management established to a strong driver themselves. Also the generation of quick results, like short-term implementation of photovoltaic systems and the acquisition of funds from outside the region, increased acceptance, especially from the side of decision makers, and therefore legitimize future actions to be taken by the KEM.

Additionally, the SI initiative would not work without professional and passionate individuals (e.g. KEM managers and local multipliers) that “live for it 24/7”. It became obvious, that the KEM manager is lost if he is a stand-alone actor within the region. He essentially needs trust based and strong network partners with leverage. In particular political and public support as well as the embeddedness in existing local structures and networks is necessary for success and sustainability. Trust based, professional and informal network structures (politics, administrations, management of KEM, agency, associations, companies, etc.) are therefore decisive.

Public funding and support from local-, regional- and national funds is also crucial for gaining momentum, especially in the starting phase of the KEM, where private capital and solid business models are lacking. Also due to the "de facto" non-profit orientation of most RES projects. In mature phases, the founding of (implementation) institutions (e.g. associations and ltd.) for the financing and implementation of RES measures became helpful/necessary.

Complementary innovation

To be successful as a KEM it is decisive that there are also change dynamics resp. complementary innovations on the side of KEM network partners and users. This especially holds true with regard to the change of mind set, the building up of capacities through information and consulting and learning processes connected with new business models and the setup of new organisational structures (see also above "novel solutions").

Particular examples for such complementary innovations that took place in the KEM Thayaland are learning processes between and within particular stakeholder groups (about possibilities, added value, costs, technologies, financing, business models, organisational structures etc.), the increase of competences on the side of the institutional partners on the community level, a general change in mind set regarding RES particular on the level of individual citizens (e.g. starting in schools but also household) and a change in routines and use patterns (mobility, energy) on the level of individuals as well as organisations (e.g. companies and public institutions).

Impact, diffusion and imitation

The impacts of the KEM Thayaland can be grouped along the dimensions (1) Impacts on Renewable Energy Use and Regional Economy, (2) on funding, (3) on society and people and (4) on organization and institutionalization.

The impacts on RES use and regional economy are mainly tangible outputs of projects which can be measured by energy indicators like for example the nominal power kWp of photovoltaic systems or the saved amount of greenhouse gas emission. Examples are Energy monitoring software solutions, solar power projects or e-car initiatives.

The SI initiative KEM Thayaland has an impact on funding through the increased mobilization of funds from inside the region (from the Zukunftsklub Thayaland and the Zukunftsraum Thayaland) and from outside the region (from funds of the Climate and Energy Funds Austria).

The impacts on society and people are mainly intangible. Overall, an increase of RES information events in the communities can be stated. The KEM's aims of awareness- and capacity building lead successfully to a change of mind-set in the region since the RES related topics and systems get more popular. This can be seen by the development of regional networks and the increasing willingness of citizens to participate financially or practically in KEM related projects.

In course of the set up and development of the "KEM Thayaland" several organisational structures have been established (Zukunftsraum Thayaland, Zukunftsklub Thayaland, TRE Thayaland GmbH, KEM management), which are examples of impacts on organization and institutionalization.

Role of policy

In order to be successful, the KEM management needs strong network partners with leverage. In particular political and public support as well as the embeddedness in existing local structures and networks is necessary for success and sustainability of the KEM.

Particularly the cooperation with regional political multipliers like majors, heads of local administration but also with representatives from political interest groups (e.g. chamber of agriculture and chamber economy) is throughout important to gain support and trust in projects. The political community representatives play a key role as they are local implementation partners of the KEM management, decision makers and local multipliers with leverage. The community institutions are represented by Head officials and Energy commissioners of the community. Their role is the support of the KEM management by concrete measure and activities. The interest groups are gate keepers and partners/multipliers for RES projects, especially with private companies.

On the other side, close relationship of the KEM management to politicians can also slow down the development of the KEM. Especially if a political shift takes place which subsequently leads to the loss of project support (i.e. new mayor and/or another political party in charge). Also priority shifts in political agendas can be of hindrance.

Connectivity to the practice field

The practice field "Providing Examples and Inspiration" relates to public authorities, businesses, NGOs or others setting up campaigns or models that can inspire others to take action. It comprises the sub-fields of Innovative information campaigns, Award systems or Renewable Energy Model Regions.

Within this practice field the Climate and Energy Fund Austria financially supports Austrian regions (so called Climate and Energy Model Regions - KEM regions) that have made the independence of fossil fuels their prime target. This target is fulfilled by increasing the support of the regions' own resources and by implementation of a smart mix of renewable energy generation, enhanced energy efficiency and smart controls.

The programme has by now developed a great dynamic in Austria, and has created 112 KEM regions (by 2016) with more than 1.165 participating communities. Together, these regions inhabit more than 2.7 million citizens. The project's dynamic can be seen by looking at the increased number of projects implied in these regions and by the participation of many important stakeholders. As can be read in the KEM factsheet, Ingmar Höbarth, one of the General Managers of the Climate and Energy Fund describes the advantages of the KEM programme as follows:

"Contrary to the prevailing practice of a top-down approach in funding, [...] the KEM regions follows a different approach: Bottom-up – The regions develop their own way towards reducing their energy consumption and enhancing the use of renewable energies. The advantages of this approach are the increased public identification through high levels of participation and the possibility of focusing on a region's strengths when it comes to its thematic alignment."

4.5.2 Case C2: Energy Lady/Kid, Turkey (ITU)

Description, development of the Social Innovation Initiative

The Energy Efficiency Association ("The Association") is a non-governmental organization founded in 2008 in Turkey. Its project "Enerji Hanım" (Energy Lady) along with Energy Kid are outreach efforts to raise energy efficiency awareness in home-maker women. The association also aims to continually conduct scientific research and to increase public knowledge by sharing those findings with public enterprises and citizens.

The project is carried out as a series of well-organized lectures in schools and at home, reaching an audience of 34,000 in 21 provinces of Turkey between 2013-2015. As an innovative aspect, the lectures were carefully organized in collaboration with local government authorities, their content was well-crafted including lecturer personality selection, and introduced practical methods of energy saving such as "unplug your iron five minutes before you are done with ironing," and thereby aim to improve Turkey's energy deficit directly through the efforts of households.

In 2012, the Association started to work more systematically on projects related to energy efficiency. In December 2012, the idea of the "Energy Lady" project originated in the Board, which consists of wealthy businessmen, and the project officially started early in 2013. Yeşim Beyla, was chosen as general secretary of the Energy Efficiency Association and the Energy Lady/Kid project team decided to take women and children as the target group.

The Ministry of Family and Social Policies was involved with the Energy Lady project in early 2013 and helped organize training sessions in selected cities especially with required permissions. Also the Ministry of National Education was involved with seminars and plays for students in the Energy Kid project. For the Energy Kid project, only state schools were chosen as target..

A pilot study for the measurement of energy usage at homes took place in Ankara and the first seminars were conducted in the Kayseri province. Between 2013 and 2015 a series of 20 Trainings took place and in March 2015 the 21st and last Training was progressed in the City of Isparta.

In December 2015 the project was noticed by Indian officials while the Paris COP21 Forum about climate change leading to a presentation in India. The Indian Minister of Environment and Climate Change also attended the presentation and a protocol was signed. The Energy Lady Project was to start in India in September of 2016 in cooperation with Indian Ministry of Environment and Climate Change and Turkish Ministry of Energy and Natural Resources. Currently, it is expected to start at the end of the year.

Actors, partnerships, alliances, networks

Beneath the initial network, namely the Board of EEA, headed by the Chairman of the Board of Istanbul Chamber of Commerce, also additional partners namely the Ministry of Education, Turkcell and the Women Entrepreneurs Association of Turkey form the actor landscape.

Initial network:

The Board of EEA, headed by the Chairman of the Board of Istanbul Chamber of Commerce, originated the project. The members of the board are all Chairmen or CEOs of the leading firms in the energy sector in Turkey. The project gained support from governmental authorities (Ministry of Energy and Natural Resources, Ministry of Family and Social Policies and Ministry of National Education) at the very early stages of the project.

Additional partners:

Public Training Centers of the *Ministry of Education* are part of a long-standing tradition in Turkey and were utilized to perform theatre plays to children and provide training sessions to women. Because the ministries smoothed out procedural issues and access to public schools, the role of the ministries in these projects was necessary and critical.

Turkcell, the leading mobile network operator in Turkey, became the communication sponsor later in the project, helping with measuring performance. Also, another research firm joined the team later to measure performance.

Many local associations such as *Women Entrepreneurs Association of Turkey* were interested in the activities of Energy Lady. These groups also supported the activities by reaching many women in their cities and advertising the events of the project and the campaign as a whole by distributing flyers, brochures and hanging posters.

Innovative solution

The Project was not inspired by any pre-existing project as EEA is the only non-governmental organization working on energy efficiency projects in Turkey. As the coordinator was previously employed by a major environmental NGO (TEMA), awareness of social issues especially related to energy efficiency and environment and climate change were successfully transferred to Energy Lady/Kid projects.

Communication was identified as the main driver, and the team planned to organize seminars and conferences for women and children, publish brochures for them, organize performance of theatre plays on energy efficiency to children at their schools etc. Specifically, teaching women how to use the electronic devices correctly and more efficiently at their homes was a key strategy. Economic gains by using these devices correctly were emphasized.

Twelve electronic devices that are most commonly used at homes were selected: oven, dishwasher, electric water heater, television, air conditioner, lighting, washing machine, flat iron, vacuum cleaner, hair dryer, and electric heaters. The general principles for efficient energy consumption at homes were explained. Although there have been many energy saving campaigns in Turkey before, some of which were mainly conducted through the one and only TV station, the state-owned and operated TRT, the direct demonstration and specific demonstrations seem particularly useful. Also, these campaigns did not seem to particularly attempt to measure the performance given the technologies available at the time.

In both projects, attitude change was observed in energy consumption behaviour of households (through women and children). In most other similar efforts, there are no follow ups. As a systemic innovation, the level of energy consumption of the selected households was measured each month, analysed, and compared with previous electricity

and water bills. The results showed that the energy consumption behaviour of the selected households have changed significantly that they started to use the energy more efficiently.

Gaining momentum

There was no cooperation with another non-governmental organization, and the project was not a follow up or imitation of another project. The main problem that was identified was inefficient energy consumption at homes, and teaching women and kids the importance of efficient energy usage in general and how they can benefit from it was the main strategy. Since this goal was uncontroversial and heavily supported by the government (ministries to national and local non-governmental organizations), coupled with the experience and background of the board and project managers, the project gained momentum.

Competition did not play a significant role in this process. The board, which consists of preeminent business leaders in Turkey, was eager to realize this project. The Ministry of Energy and Natural Resources and Ministry of Family and Social Policies always supported the projects and the association. Their support was critical in terms of access to the target population and logistics, especially related to permissions. Since it is well-known that Turkey has a large current account deficit, of which a great portion is due to energy deficit, there was full cooperation between all actors involved.

This project aimed to measure performance. In particular, the utility bills of the households at the end of the year were compared with previous year's bills, which showed that the project is successful. This success is attributed to conducting the project in an organized and systematic way coupled with the necessary support from the authorities at the critical times of the project.

Furthermore, there is a high level of awareness and excitement among the initiators and actors of the project that contributed at different stages. The project team was already experienced in non-governmental work. Yeşim Beyla, as the responsible person of the project, already had many years of experience in non-governmental organizations, has conducted many projects related environment and energy. Leadership, although not necessarily charismatic leadership, also played an important role in terms of working in cooperation with government authorities. The initiators of the projects are all not only nationally but also globally well-known businessperson and experts.

Complementary innovation

An active website facilitated the logistics and information flow in the project. Measuring the performance was another important element of this project. The usage of a smart device during pilot studies to report energy consumption benefited the project.

Turkcell, the leading mobile network operator in Turkey, became the communication sponsor, and provided a device which can measure energy consumption at home from a long distance by linking it with a smart phone application. Turkcell Women Club used this device and application to monitor the energy usage in their homes while they are away.

Impact, diffusion and imitation

The project reached out to 21 cities in Turkey and 34,000 women directly. Advertisements in all of 81 provinces were conducted though, increasing immensely the number of households potentially reached. In ten of the cities where projects are conducted, the association's researches measured and analysed the results, in the other eleven cities, a research firm was hired. The results showed that there is a 10-35 Turkish Lira (roughly 3-10 Euros) decrease in electricity bills per household per month. This corresponds to the expectations set at the beginning of the project. In terms of behaviour change, the target was to change the consumption behaviour of 50% of the directly contacted households, and the outcome was much higher.

"Energy Lady" and "Energy Kid" adapted to "Energy Efficient Industrial", "Energy Efficient Transportation" projects which are also conducted by the same association. In terms of global diffusion, the Paris COP21 Forum about climate change was a pivotal event. The project was noticed by Indian officials leading to another presentation in India. Indian Minister of Environment and Climate Change also attended the presentation and a protocol was signed. The Energy

Lady Project was to start in India in September of 2016 in cooperation with Indian Ministry of Environment and Climate Change and Turkish Ministry of Energy and Natural Resources. Currently, it is expected to start at the end of the year.

There are plans to present the Energy Kid Project to the United Nations and initiate the project in UN countries with no such projects. One strategy that could not be employed due to lack funding was to organize competitions among the households.

Role of policy

Without the support of the Ministry of Energy and Natural Resources and Ministry of Family and Social Policies, the projects could not have been successful or the results would be accomplished at a much slower rate. Of particular importance is the need to get necessary permissions to conduct informative meetings and reach out the school children. All of these were facilitated by the supporting government agencies.

According to Yeşim Bayla, an NGO's success crucially depends on the support of government authorities, and not just in Turkey. She believes, to increase the projects or campaigns impact, an NGO needs to communicate well with the government authorities and even cooperate or collaborate with them, plain activism does not create high-impact and sustainable results.

Connectivity to the practice field

The practice field "Providing Examples and Inspiration" relates to public authorities, businesses, NGOs or others setting up campaigns or models that can inspire others to take action. It comprises the sub-fields of Innovative information campaigns, Award systems or Renewable Energy Model Regions.

Within the practice field "Providing Examples and Inspiration", the Energy Lady/Kid initiative is part of the "Innovative information campaigns" sub practice field. This social innovation project contributed to configuring the practice field by raising awareness on the issue of saving energy and becoming more energy-efficient. It became evident that energy efficiency can be achieved with educational programs, and this awareness contributed to environmental sustainability as well.

There are some other foundations and associations who work in this practice field. However, the Association's projects were not the result of a social movement or any other umbrella. Other associations or NGOs also do not seem to attempt to form a social movement. There was no feedback from similar organizations regarding the project.

Energy is itself an issue in the economic policy context. Turkey has a large current account deficit due to significant imports of energy. In this well-known policy context, the project received acceptance from all ranks of government and society, it was not difficult to form consensus on the aims of the project. There were no conflicts or tensions identified within this practice field. It is hard to imagine any opposition to an effort aiming at energy efficiency and improving energy saving behaviours, which is a culturally well rooted behaviour in Turkey. So no major new ideas were needed at the societal level, but organizational and systemic innovations can be useful as in Energy Lady/Kid. Perhaps one exception is the idea that energy consumption need not increase with more advanced technology, at least linearly.

Although the state is the lead actor in driving energy saving efforts through mandating or subsidizing heat insulation in buildings and similar efforts, the private and the non-profit sector is playing a significant role as well. Blogs, websites, a guide by the Association of Engineers and Architects, as well as the Association are some examples.

At the practice level, charismatic leadership is a success factor, such as the members of the board of the association. However, gaining awareness, taking initiative and responsibility by individuals, and passing on this awareness to the next generations is required for empowerment in the practice field. Unfortunately, there is not much competition in the field, which would have been an advantage for social innovation, so most diffusion was accomplished under the umbrella of the associations.

4.6 PRACTICE FIELD CONCLUSIONS

The practice field Providing Examples and Inspiration is significantly characterised by a mix of initiatives that stimulate activities on the one hand and implement renewable energy sources (RES) solutions on the other. This makes this practice field distinctive from other practice fields in the energy domain. While initiatives in the fields of Award Systems and Information Campaigns mainly perform specifically targeted and single activities, initiatives in the sub-field of Renewable Energy Model Regions are more complex: in such regions a number of different activities take place which combine also activities that can be found in Award systems and Information Campaigns.

While Information Campaigns cover mainly the "push side" of the practice field and therefore promote/stimulate sustainable development within the practice field, Award systems are located rather at the "end of the pipe", focusing on the existing output and implementation. Information campaigns and Awarding systems are actively used throughout the practice field to stimulate social change. Both types of initiatives have in common that they have a supra-regional focus rather than a local one. Complementary, the Renewable Energy Regions cover both sides of the activities but are regionally limited.

In contrast to the initiatives in the sub field of Renewable Energy Model Regions, which are mainly supported by policy networks, agencies and funding programs, it was found that initiatives in the sub fields of Information Campaigns and Award Systems are mainly supported by local industrial- and institutional partners like private companies and research institutes, followed by the support through policy. Main drivers are support of networks of individuals and private groups and their "will for participation and innovation". Funding challenges, a lack of personal and restrictions through legal frameworks are the main barriers.

The mechanism of learning is one of the most important aspects in the practice field. This can particularly be seen by the variety and diversity of measures that are initiated to consciously promote and stimulate a learning process within the practice field. The mechanism of selection incorporates the processes of adoption, diffusion and imitation. This is a strong mechanism of social change within the practice field. Especially the process of imitation can be seen throughout the whole practice field. Since the mechanism of competition is a powerful mechanism to stimulate social change, it is actively used throughout the practice field, particularly by Award Systems related initiatives.

5 SUMMARY AND CONCLUSIONS FOR THE POLICY FIELD ENERGY SUPPLY

5.1 MECHANISMS OF SOCIAL CHANGE

The overarching question for this report on several case studies is: does Social Innovation (SI) actively use, reflect or contribute to the defined mechanisms of social change? Can we identify other, additional drivers that emerge in the context of these mechanisms? In this conclusion the mechanisms of social change that are driving social innovation in the policy field of energy supply are discussed. The mechanisms that were already defined in the project based on literature (see annex) are discussed and some additional mechanisms are added.

At the moment there are disruptive changes occurring in the policy of field Energy Supply that are reflected in many mechanisms of social change. These changes are driven by the need for a more sustainable energy system to prevent further climate change and damage to the earth caused by the use of fossil fuels, and by the need to become more independent from existing energy sources and systems of supply and distribution. These are the two main societal needs that are primarily addressed by the social innovation initiatives (among other actors) in energy and that have stimulated the overall development of these initiatives.

5.1.1 Learning

The mechanism of learning is reflected in the growing knowledge that consumers and other parties involved in energy have from scientific reports, media and politics regarding the necessity of realising a sustainable system. Next to that they have growing knowledge of technical and legal possibilities relating to renewable energy. They develop capacities needed to produce or save energy which stimulates the start of local initiatives. This makes them more empowered to take action towards realising a sustainable future.

5.1.2 Variation

The mechanism of variation implies that collective ideas are the cause and consequence of social change. The need for a sustainable energy system and widespread belief of this necessity are becoming collective ideas and are thus stimulating growth of social innovations in the energy field. These ideas also lead to questions about whether the current energy system can cover this need and the willingness to take additional action in the form of social innovation.

5.1.3 Selection

Selection is about the process that initiatives experience as they grow and decline. Initiatives in the energy field are mostly growing by expanding their networks. The purpose of this growth is often to achieve a higher impact and/or maintain or improve their position. Most initiatives do not strive for becoming bigger and bigger, but they want to achieve more impact. In many cases imitation takes place because similar initiatives develop in different locations, but mostly these are not directly copied. Also the diversity in activities and goals between initiatives is significant, although there are commonalities. For instance there are various energy collectives, but each initiative has their own specific lay-out.

5.1.4 Diffusion of (technological) innovations

The diffusion of (technological) innovations is a very important mechanism that influences social innovation in the energy field. Even, social innovation in energy has become possible because of enabling technologies for renewable production on a regional and local level. Twenty years ago it was unthinkable that small consumers could produce electricity themselves. But even though technologies for producing renewable energy and saving energy are important enablers, they are only part of the success. Still they need to be implemented in a smart way that takes into account the context such as the users of the technologies and the laws and regulations.

Because of a combination of technological innovation and the need to change the system to a renewable system described already, the energy market is changing. Traditionally the energy market was centrally organised, dominated by large players with strong lobbying power in business and government. But because of the growing shares of renewable energy created by both top-down and bottom-up action, this system and the roles of government, businesses and citizens are changing. Incumbents such as large energy suppliers are losing importance because other newcomers (such as energy cooperatives) start producing and selling energy as well. Social innovation initiatives become competitors of the incumbents. This leads to businesses reconsidering their business models and adapting their policies. The government also needs to deal with the newcomers and is looking for new ways to govern the changing system. In the past, governments and energy companies were closely connected because these companies were state owned. Because of the liberalization of the European energy market, these ties were cut. But they are still used to operate the energy market together. Now they need to relate to newcomers.

5.1.5 Conflict

The changes in the energy market because of the growing shares of renewable energy are leading to conflict between incumbents and newcomers (such as energy cooperatives) in the energy market. Partly this is a conflict between a central and a de-central production system. Growing shares or renewable energy and local production decrease the turnover of the incumbents. They force the traditional players to change their roles. Some newcomers are highly critical towards the incumbents because they question whether the current, central system of businesses and established government institutions can address the needs sufficiently. The domination of the incumbents in the energy system and their perceived lack of action creates a conflict between them and newcomers. That makes conflict a strong driver of social innovation initiatives who want to change the energy system. A number of initiatives is driven by the wish to become independent of the traditional energy system and provide an alternative for using the services of the incumbents.

5.1.6 Competition

Social innovation in energy is stimulated by competition between the mostly bottom-up social innovation initiatives and the more top-down traditional parties operating in the energy system (incumbents such as energy suppliers). Social innovation initiatives want to provide an alternative for the mostly top-down operating incumbents and boost renewable energy production. However, also the incumbents are adapting their business models to include more renewable energy as they need to compete with newcomers in the market.

5.1.7 Cooperation

Cooperation is to a certain extent always happening in social innovation initiatives in energy. This mechanism is most prominent in the practice fields of energy collectives and providing examples and inspiration. Cooperation is taking place between for instance citizens, civil society organisations, different levels of government, businesses and citizens, system operators and energy companies. In many of the initiatives studied it was mentioned that you cannot operate in isolation.

5.1.8 Tension and adaptation

There are large tensions in the energy system because of the increasing shares of renewable energy. This creates space for social innovation initiatives in the before very centrally operated energy market.

5.1.9 Planning and institutionalisation of change

Social change in the energy sector is partly driven by planning and institutionalisation. To some extent this encompasses top-down implementation of activities to realise a sustainable energy system. Parts of these activities in some countries are incentives for local production or saving of energy. However, there policies are often not directed at stimulating social innovation. Planned policies, laws and regulations can have a both a strong positive and negative effect on the development of social innovation in the energy sector. Also via this mechanism new formats and organisations for the implementation of RES measures and solutions are established, such as the Energy Model Regions in Austria. Other types of initiatives, such as many energy collectives, are not the result of planning. However

some of them are professionalising to become more stable and are institutionalised in that process.

Besides the mechanisms that are derived from literature and serve as guidelines in the overall SI-DRIVE project some **additional mechanisms** of social change are found that play an overarching role over the different practice fields in the policy field of energy supply. These are described in the following paragraphs.

5.1.10 External development (new!)

An additional mechanism of social change that is reflected in some previous mechanisms are external developments. These are events or developments that are prior to the occurrence of another mechanism. The mechanism of social change, such as diffusion of innovations or learning, takes place because of this development. In the energy field the external developments are that it has become widely known that fossil fuels are limitedly available, that by using them we are damaging the earth in many ways, and that we will feel the consequences of it in the form of climate change. First these developments occur, which sets in motion different activities such as technological innovation. When people are learning about these developments they can get a motivation to act on it.

5.1.11 Societal needs (new!)

Another additional mechanism are the societal needs that are driving social innovation. Social innovation initiatives in energy are addressing several societal needs, of which the most central one is the need of a sustainable energy system. However, next to that, initiatives are addressing societal issues such as (energy) poverty, decreasing local liveability, decreasing social cohesion and economic downturn in rural areas, democratization of the energy sector and inclusion of all groups in society in the transition towards a renewable system.

5.1.12 Intrinsic motivation (new!)

Over the last years, the intrinsic motivation of actor groups such as private consumers, energy cooperatives, civil society but also businesses and local and national governments to foster the transition towards a renewable energy system has increased. They often have manifold professional or personal reasons why they see the need to change such as the wish to become energy neutral for environmental reasons, independence from politically questionable countries that supply fossil fuels or dissatisfaction with the current system that is mostly interested in maximizing profits and less in societal values. This general increased motivation is a strong driving force of social innovation that is partly addressed in some of the defined mechanisms of social change but was not yet completely covered.

5.1.13 Culture (new!)

A last additional mechanism is the local culture in a country or region. This is something that also influences other mechanisms of social change since the mechanisms at work can be different in different countries, as the transition towards a renewable energy system develops in various forms and speeds. Also the type and amount of social innovation differs widely per country, as was shown in the State-of-the-Art report. It also depends on the specific energy resources in the country: nuclear energy and hydro-energy are sustainable resources, which are often centrally organised. Some countries already had a lot of collectives. And some countries have a more centrally organised energy system than others. For instance, in Germany already a lot is organized on a local level.

5.2 RECOMMENDATIONS FOR POLICY MAKERS

On the background of the existing insights on the mechanisms of social change and the case studies we drafted some recommendations for policy makers on the national and local levels who aim to stimulate social innovation in the policy field of energy supply. These recommendations illustrate what can be considered by policy makers when supporting the initiatives in the practice fields described in this report and other types of social innovation in the energy field. This support should lead to well-functioning initiatives that can grow and diffuse.

Overall, a precondition for the blooming of social innovation initiatives is the opening up of the existing largely traditional energy market for new players and the transition towards renewable energy. In order for social innovation

to prosper, reorganisation of the actor landscape including new actor groups such as social innovation initiatives is necessary. Therefore, policy makers who want to support these initiatives need to have instruments to arrive to a level playing field that allows both established parties and newcomers in the market. To achieve this level playing field some institutional impediments need to be addressed. One impediment is (tax) regulation related to entering the energy market that is currently often restricting for social innovation initiatives. Another impediment is that there are insufficient local and supra-regional networks between government, incumbents of the market and newcomers.

From the experiences in the cases studies the following operational recommendations are derived:

(1) Become a proactive supporter of SI initiatives. Reach out to the initiatives and try to become an active part of their network. Policy makers can have an important role in supporting initiatives in for example building a network and they can fulfil this role better if they have direct contact with the initiatives. This can in turn increase trust of initiatives in policy makers.

(2) Build on existing structures and networks. This can speed up the development of SI initiatives. To achieve this, look for synergies and cooperation with existing, established players when possible and feasible. Particularly in Energy Model regions links can be made with someone who can support such initiatives on the public side. These persons could be prominent advocates or politicians (for instance a major).

(3) Connect to the leaders or initiators of an SI initiative. Often, these are people with strong intrinsic motivation and need to find supporters for their initiative. Additionally, it is import not just to support the initiators of the SI and providers of RES solutions, but also to make sure that the target group of the initiative is involved. Then they profit directly from support and services and are enabled to build up knowledge and competences themselves. Consequently, the initiative will have more impact and will become more sustainable.

(4) Provide in-kind resources and funding to stimulate the development of existing social innovation initiatives or the setup of new initiatives. This is still crucial for the growth of social innovation. The funding can be a subsidy or for instance facilitation of materials, processes and networks. Sometimes networks need some “glue money”.

(5) Support the initiatives in organising themselves. Help them to form networks by providing network partners and connecting people with similar interests. Stimulate the transfer of knowledge and know-how between stakeholders, also to stimulate upscaling of initiatives. Upscaling can be the growth of an existing initiative, or reproducing the initiative in another area.

(6) Provide tailor-made support for different types of initiatives. Initiatives vary widely in shape and form. Therefore not every initiative is supported by the same things. The support needs to be flexible enough to provide tailor-made solutions. For instance, the provision of knowledge or expertise relating to renewable energy technologies or setting up a co-operation can be particularly important for energy collectives but funding of management resources can be more important for an energy model region.

(7) Foster professionalization of process management, planning and the development of competences within the initiatives. Aim directly at the management of an initiative and set clear and measurable goals together with them. Another option is to provide professional monitoring as a service for initiatives to improve themselves. Support the management or initiators of an initiative also with professional network partners such as energy agencies. Fund external advice and services for the management.

(8) Be patient on the long run when funding an initiative or supporting them in other ways, but also ask for some quick results and communication about those results. Showing and sharing results keeps stakeholders interested and motivated and legitimises the initiative in the public and towards policy makers and (other) potential funders.

(9) Focus on success and outputs of an initiative and at the same time prevent an overload of paperwork and administration. The parties involved in initiatives are not always used to dealing with administration or motivated for it. A large amount of administration can decrease the motivation of initiators of social innovation.

(10) Be aware of tensions or conflicts between newcomers in the energy market from social innovation initiatives and the traditional parties (the incumbents) involved. Newcomers often have ideas to change the energy system and are critical of incumbents, and incumbents can feel threatened by the newcomers. This tension makes collaboration sensitive. Expect these tensions to arise at some point and be sensitive to them. Treat collaboration carefully and try to moderate such conflicts. Look for shared interests and goals.

6 ANNEX

6.1 MECHANISMS OF SOCIAL CHANGE (BASED ON WILTERDINK 2014)

1. **Learning**: Evolutionary theories (Dosi, 1982; Nelson & Winter, 1982) in social sciences stress the cumulative nature of human knowledge. Actors realize mistakes, apply new ideas and engage in processes of learning, which results in tacit and codified new knowledge (Cowan, David, & Foray, 2000).

2. **Variation**: Variation can range from 1) new (collective) ideas to 2) single innovation projects which introduce novelty and hence variation. Ad 1) Collective ideas are the cause and consequence of social change. The spread of beliefs, values, value systems, of fashions, of **religions**, of cultural symbols, of rules of behavior. Ad 2) Single innovation projects are on the one hand incremental innovation projects that innovate along a given trajectory; on the other hand, radical innovations that deviate from the trajectory and may lay the ground for a new trajectory.

3. **Selection**: This incorporates processes of adoption, diffusion and imitation, but also processes of **decline** and death of initiatives.

4. **Conflict**: Group conflict has often been viewed as a basic mechanism for social change, these **include** revolutions, but also minor conflicts. Social change in this view, is the result of the struggle between a predominant class and a dominated class which strives for (radical) change. (conflict model of society by Ralf Dahrendorf)

5. **Competition**: seen as a powerful mechanism of change as competition makes it more likely to **introduce** innovations in order to have competitive advantages.

6. **Cooperation**: Although competition as a driver dominates theories that put individualism, individual utility at the fore, where social change is the results of individuals pursuing their self-**interest**, other strands of literature have shown that cooperation (e.g. literature on innovation systems, game theory) or altruism (e.g. Ernst Fehr) also lay the basis for human action.

7. **Tension and adaptation**: In structural functionalism social change is seen as an adaption to some tension in the social system. E.g. a gap between fast-changing technology and necessary **associated** institutional change of some type (see W. Fielding Ogburn)

8. **Diffusion of (technological) innovations**: Some social changes results from innovations adopted in society, may be technological invention, scientific knowledge, but also new beliefs, ideas, values, religions, in short ideas. High uncertainty, most innovations disappear, those that survive follow an S-curve of adoption (cf. Geroski, 2000).

9. **Planning and institutionalisation of change**: Social change may result from goal-directed large scale planning, by governments, bureaucracies, and other large scale organisations. The wider the **scope**, the more the competencies needed, the more difficult to reach goals and the more likely that unforeseen events interfere. Planning implies institutionalisation of change, but institutionalisation does not imply planning (Wilterdink, 2014). Included here are changes in the organisation of the state, interstate relations, laws and directives, programmes etc.

6.2 RESEARCH FOCI OF SI-DRIVE DERIVED OUT OF THE KEY DIMENSIONS

The critical literature review opened the view on a theoretically sound concept of social innovation grounded in theories of social change, innovation studies and social innovation research. Based on the results of the critical literature review eight, first research propositions were elaborated and became the basis for the empirical work of the global mapping.

Research Focus 1: Concepts and Understanding
Social innovations in the perspective of SI-DRIVE encompass new practices – concepts, policy instruments, new forms of cooperation and organisation – methods, processes and regulations that are developed and/or adopted by citizens, customers, politicians etc. in order to meet social demands and to resolve societal challenges in a better way than existing practices. The emergence of such new social practices, including patterns of imitation and adaptation, will be subject to research of SI-Drive.

In this perspective, research will be focused on analysing the process of invention, implementation (introduction to a context of use), diffusion and institutionalisation of new social practices in different areas of social action. A great deal of attention should be devoted to better understanding the relationship to technological innovation as well as innovation oriented at creation of economic rather than social value.

Research Focus 2: Ambivalence
Referring to both the normative and analytical concepts of social innovation (cf. CLR of SI-Drive) highlights the importance of identifying to whom a social innovation is ‚desirable' – whose objectives and whose demands are being met and whose objectives and demands are being overlooked?
This difficulty is reflected in heterogeneous and conflicting interests in different societal sectors, e.g. in civil society (Scoppetta, Butzin, & Rehfeld). We also have to consider *"unforeseeable social side effects"* (Howaldt & Schwarz) of social innovations. Their impact may differ according to different actors or groups of actors and there may be winners and losers of social innovation, e.g. according to *"different perspectives of development"* (e.g. Western against native).
Establishing a new social practice can mean – using a Schumpeterian term – 'creative destruction' of another previously dominating social practice. In this regard the empirical research will put more emphasis on analysing the ambivalence of the outcomes of social innovation (i.e. social side effects, unforeseeable consequences, different perspectives), also in relation to actors' intentions.

Research Focus 3: Process Dynamics
Considering the experiences in the field of technological innovation a pending task would be thinking towards a concept of Social Innovation Assessment, as one aspect of policy recommendations to be developed.
The successful implementation and/or active dissemination of a new social fact *usually* follows targeted intervention but can occur also through unplanned diffusion (Greenhalgh et al., 2004) – how much this is the case will be subject to research.
From this perspective one of the main objectives of the empirical work of the SI-DRIVE project should be analysing the process dynamics of social innovation (idea –implementation – social practice – institutionalisation).

Research Focus 4: Relation to Social Change
While social and economic problems identified in public discourse are increasingly prompting a call for extensive social innovation, the relationship between social innovation and social change remains a largely under-explored area in the social sciences as well as government innovation policies. To better understand the relationship between social innovation and social change we have to analyse the mechanisms of social innovation processes (e.g. imitation and social learning).
Special attention will be devoted to social innovation as a mechanism of change residing at the micro and meso level. In the context of the broad debate surrounding sustainable development and necessary social transformation processes (Geels & Schot, 2007) the question of the relationship between social innovations and social change arises again. To better understand this relationship we have to analyse the social embeddedness of any innovation in a dense network of innovation streams.
Taking into account the micro-foundation of social change we have to analyse how processes of social change can be initiated which go beyond the illusion of centralist management concepts to link social innovations from the mainstream of society with the intended social transformation processes.

Research Focus 5: Governance

To understand the modes of governance of social innovation, one focus should be on networks, including social networks, and their actor constellations, modes of cooperation and communication channels.

The literature review has provided starting points of how diverse modes of governance might be according to the mode of innovating. For example, governance structures might differ according to the intention or purpose of actors (i.e. the formation of a strategic alliance to communicate interests, to have access to various resources in the process of innovating/ community of practice, etc.). As with innovation management within firms, the role of employees and the governance of employee involvement in innovation processes at the work place is a central question. Concepts such as frugal and reverse innovation originating from the global south describe alternative innovation logics (downscaling and innovations diffusing from the global south to the global north) with supposedly different governance structures that need to be understood to grasp the variety of types of social innovation and vice versa.
As a conclusion relating to the diverse forms of governance we suggest studying the specific governance in different types of social innovation processes and assess the particularities as compared to other innovation processes.
To develop an integrated understanding of the role of various actors in social innovation, a broader concept is needed that appreciates social entrepreneurship but also takes account of other actor types.

Research Focus 6: Actors

The different roles and functions of actors will be studied by SI-DRIVE. Especially in comparison to social entrepreneurs, there is an under-representation of the various other actor types and their specific impulses and impacts as generators of social innovation. As a conclusion, different types of actors and their roles in the generation and spread of social innovations will be discussed.
Furthermore, a research focus on diverse actor types relates – again – to the issue of adequateness and transferability of existing concepts. While actor constellations in innovative environments have been conceptualised by triple and quadruple helix models, there should also be openness towards the potential of developing new conceptual models describing actors' relations and functions in social innovation.

Research focus 7: Drivers and Barriers

In order to establish a systemic view upon social innovation, it is suggested to put an additional research focus on the drivers and barriers of social innovation - including the influence of power, the role of conflict, and the relation to inequality.

Various concepts reflected in this report have been helpful to understand drivers, barriers and governance of innovations and because of their pertinent clarity they are also widely diffused in political programs and strategies to support innovation.
There is a lot to learn from these concepts for scholars of social innovation and it should be thoroughly tested, in how far concepts of innovation studies are applicable to study the systemic dimension of social innovation and thus are of relevance for better understanding of particular drivers, barriers and governance.

Research Focus 8: Civil Society and Citizen Empowerment

We have to put a strong focus on the role of civil society (citizens, NGOs, social movements, communities) in the innovation process. In particular, we should analyse how the social innovation cases in SI-DRIVE have diffused and whether this facilitated the empowerment of citizens.

However, given the fact that SI-DRIVE is a research project of global reach, the conception of what is considered as civil society might need adjustment to the specific contexts of the diverse world regions. Alongside civil society, the social economy is environment equally often mentioned as an important source of social innovation. It is thus suggested to pay particular attention to the environments of civil society and the social economy in order to understand their particular distinctions. Studying these distinctions is of special relevance for public decision makers, as it provides the relevant background against which supporting infrastructures can be developed. So the research focus will be to understand the particular distinctions of these areas/fields, especially related to the set-up of supporting infrastructures for social innovation.