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ZENTRUM FÜR SOZIALE INNOVATION
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Social Innovation in the energy field in structurally weak regions.

Insights into European trends and tendencies.

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STADT der Zukunft

Stadt der Zukunft[1] ist ein Forschungs- und Technologieprogramm des Bundesministeriums für Verkehr, Innovation und Technologie. Es wird im Auftrag des BMVIT von der Österreichischen Forschungsförderungsgesellschaft gemeinsam mit der Austria Wirtschaftsservice Gesellschaft mbH und der Österreichischen Gesellschaft für Umwelt und Technik ÖGUT abgewickelt.

[1] https://www.nachhaltigwirtschaften.at/de/sdz/

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Einführung

Energieplanung wird meistens im städtischen Kontext gedacht und weist dabei vornehmlich einen Fokus auf technische Innovation auf. Die Rolle der sozialen Innovation (SI) ist in der Energieplanung ebenso unterrepräsentiert wie jene von strukturschwachen Regionen und deren spezifischen Herausforderungen, die nicht alleine durch technische Innovationen überwunden werden können. Dies ist umso erstaunlicher, als die transformative Kraft von SI gerade im Politikfeld Energie hinsichtlich Verhaltensänderungen, der Auflösung der Grenzen zwischen Produzent und Konsument, sowie den Potentialen für räumliche Entwicklung eine besondere Bedeutung zukommen könnte. Das Projekt PLAISIR – Planning :: Innovation – untersucht die Potenziale, die mit einem ganzheitlichen Ansatz von sozialer Innovation in Energie- und Planungspolitik aktiviert werden können. In Folge werden daraus Empfehlungen abgeleitet, die sich mit den Anforderungen an eine Regionalpolitik, die explizit versucht das transformative Potential von SI zu nutzen, beschäftigt.

Ausgangspunkt ist daher das Verständnis, welche Rolle soziale Innovation im Bereich der Energiepolitik von strukturschwachen Gebieten spielt. Dieser erste analytische Arbeitsschritt beinhaltet den Aufbau einer umfassenden Sammlung von sozial innovativen Energieprojekten in strukturschwachen Regionen Europas. Relevante internationale Datenbanken werden gezielt durchsucht, um relevante und vergleichbare innovative Projekte zu finden. Drei Mappings dienen als Basis für insgesamt rund 1.500 kartierte und detailliert beschriebene Innovationsprojekte, die wir untersuchen, um einerseits eine Grundlage für die Hypothesenbildung und andererseits für die Identifizierung und Charakterisierung von guten Praxisbeispielen zu sozial innovativen Energieprojekten in unseren drei österreichischen Analyseregionen zu bereiten.

Im zweiten Kapitel wird die Rolle von sozialer Innovation in der räumlichen Entwicklung ebenso wie jene von sozialer Innovation im Kontext von Energieprojekten diskutiert. Aufbauend auf dem etablierten 4-I Prozess zur Analyse von SI-Projekten wird ein Set von Leitfragen entwickelt. Diese Fragen werden in Kapitel 3 angewandt, um die verfügbaren Informationen zu den Projekten, die aus den drei Datenbanken herausdestilliert wurden, zu analysieren. Das dritte Kapitel beginnt mit einer Beschreibung der Datenbanken und des Mapping-Prozesses, bevor die zugrundeliegende Idee und die Energiedimensionen der Projekte diskutiert werden. Daran schließt eine Darstellung interner Prozesse und externer Einflüsse auf die Entwicklung und den Erfolg dieser SI an. Basierend auf diesen Erkenntnissen werden Hypothesen formuliert, die später im Projektmit Blick auf die drei österreichischen Fallbeispielregionen des Projekts weiter überprüft werden.

1. Introduction

Energy policy is widely considered as an urban matter with a strong tendency towards technical innovation. The role of social innovation (SI) though is equally underrepresented in energy planning discourses as are peripheral regions and their specific challenges, which cannot be overcome by technical innovation alone. This is even more striking considering the transformative role social innovation can play, especially in a policy field where new behavioural roles emerge and the borders between producers and consumers diminish. This is thought to play an enabling role in territorial developments, especially in structurally weaker regions. The PLAISIR – Planning :: Innovation –project investigates the potential that a better support for social innovation in energy and planning policies can have in order to find solutions that use the transformative potential of SI for the regional development and energy policies. As the main objective of PLAISIR is to develop strategies for a co-creative policy design between this sphere of (regional) policies and socially innovative energy initiatives, a sound understanding of the impact these policies have on the occurrence of such initiatives is needed.

The starting point thus is to understand the role social innovation plays in the energy policy domain in structurally weak regions. This first analytical task builds on a comprehensive collection of socially innovative energy projects in structurally weak European regions. Relevant international databases are examined to find suitable and comparable innovation projects. Three mappings serve as a basis with a total of approximately 1,500 mapped and described innovation projects, which we search in order to prepare the ground for forming our hypothesis as well as for the identification and characterisation of good practice examples of socially innovative energy projects in our three Austrian research regions.

In the second chapter, the role of social innovation in spatial development, as well as the role of social innovation in the context of energy projects, is discussed. Building on the established 4-I process to analyse SI projects, a set of guiding questions are developed. These questions are applied in chapter 3 in order to analyse the available information about the projects derived from the three databases. The third chapter starts with a description of the databases and mapping process, and then the idea and energy dimensions of the projects are discussed. This is followed by an illustration of internal processes as well as external influences of governance and policy on the development and success of these SI. Based on these insights, hypotheses are formulated which will be tested, validated and/or falsified in the three Austrian regions later in the project.

2. Social Innovation in regional development and the energy field

The starting point of the PLAISIR project is building a basis for the research of socially innovative energy projects in three Austrian study regions. This is achieved by analysing already mapped projects from all over Europe. The empirical evidence derives from two international project databases, elaborated in the course of two FP7 research projects ZSI was involved in(CASI and SI-DRIVE), and one additional database that contained especially relevant projects (SIMRA). Projects relevant to PLAISIR are those that are:

1. are socially innovative,
2. can be assigned to the subject area "energy", and
3. are located in a structurally weak region of Europe

For this reason, subchapter 2.1 discusses the significance of SI in the context of spatial development while in subchapter 2.2 the role of SI in energy-related projects is discussed. These discussions build on definitions as well as the operationalisation of the main concepts as applied in the PLAISIR project. The result of this exercise is a set of leading key questions, which are used to analyse the mapped projects.

2.1 Social Innovation and the spatial dimension

Out of the multitude of definitions of social innovation (see, for example, Bock 2016, Howaldt 2014, Moulaert 2009, Mulgan & Pulford 2010), that of Mulgan and Pulford appears particularly valuable in the context of regional development as it incorporates the role of social and relational capital: *"Social innovations are social both in their ends and in their means. Specifically, we define social innovations as new ideas (products, services and models) that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations"* (Mulgan& Pulford 2010: 17-18). With respect to structurally weak regions Zapf points to a crucial link between social innovation and desired social change: *"Social innovations are new ways to achieve goals, especially new forms of organisation, new regulations, new lifestyles that change the direction of social change, solve problems better than previous practices, and therefore worth being imitated and institutionalised."* (Zapf 1989: 177)

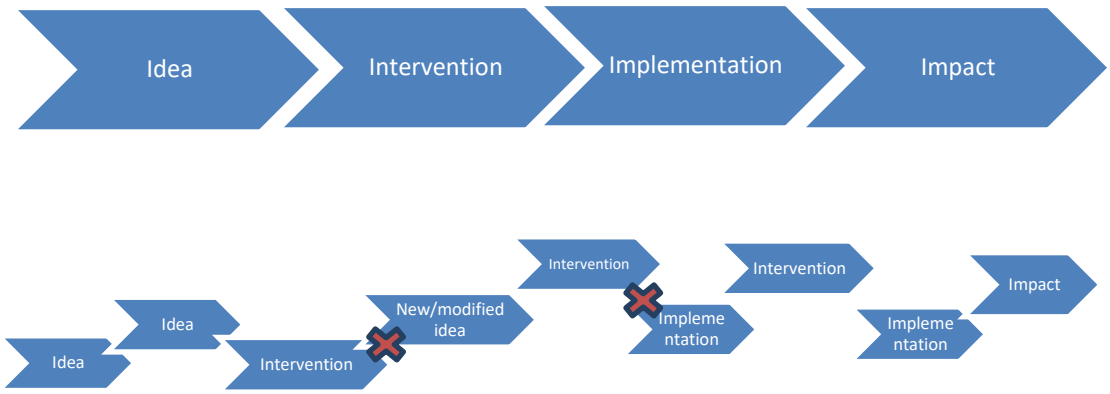
Arguably, these definitions still lack an adequate understanding of the spatial dimension, which is crucial to operationalise the concept of social innovation for regional development in structurally weak regions. Therefore the project will also follow the definition of Frank Moulaert (2013) who adds a spatial perspective to social innovation by highlighting that it "*involves […] the transformation of social relations* ***in space,"*** as well as "*the establishment of* ***place-based*** *and* ***scale-related governance structures"*** (Moulaert 2013, p. 13; emphasis by the authors). As a consequence, the local context of social innovations gains importance, especially focusing on territorially affiliated actors, agents and institutions which negotiate social innovation in a concrete spatial context (ibid.).

For the investigations in the context of the PLAISIR project a combination of these definitions, highlighting the relational as well as the spatial and the governance perspective, is appropriate and is used throughout the project:

"Social innovations are new ideas that simultaneously meet social needs (more effectively than alternatives) and create new social relationships or collaborations in a concrete spatial context, as well as influence the direction of social change through being imitated, locally re-negotiated and institutionalised." (Plaisir 2018)

One of the core products of the PLAISIR project is the development of a set of indicators on the process dimensions of social innovation (ISIP). At the beginning of the ISIP development the 4-I process criteria (Hochgerner 2013; see Figure 1) were used to map social innovation projects in the energy sector from all over Europe, using three different databases (CASI2020, SI-DRIVE, SIMRA). Hereby, the 4-I process criteria describes an iterative process which characterises the stages of social innovation development.

Figure 1: The 4-I Innovation process model



The 4-I criteria (idea - intervention – implementation – impact) offer a good basis for scrutinizing initiatives and projects regarding their social innovativeness and for focusing on the process dimension of social innovation. However, as an analytical approach towards social innovation, the 4-I criteria perspective is neither tailored towards social innovations and their role in regional development nor towards their territorial embeddedness. Therefore, the 4-I criteria, which are regularly used for the analysis of social innovation, were adapted and expanded to spatial aspects in the course of the mapping process based on the work of Hochgerner (2013) and Moulaert (2017) contributions regarding the territorial component of social innovations:

Starting with **idea**, the focus is put on finding out more about the alternative/new way in which socially innovative projects in the energy field deal with specific situations (presented as a challenge, crisis or problem). For the analysis the following questions are formulated:

- What is the problem?
- What is the intended possible solution?
- How is the solution generated?

This very first stage on the way to creating and establishing an innovation is followed by a second step, learning more about the **intervention** methods for solving the problem. The way to solve a problem consists for example in the combination of existing practices (e.g. bringing together the knowledge of previously segregated groups of experts and/or laypersons), or of the raised awareness

and influencing opinions for changing common practices. For the analysis we formulate the following questions:

- How does the developed concept look like?
- Which methods are used?
- How does the project environment look like?

The third stage of making an idea or an invention into an innovation is **implementation**. In general and in the context of the analysed projects, implementation is the most critical step. At this stage it is decided whether efforts and investments in the previous stages will pay off or not. For the analysis we formulate the following questions:

- How does the implementation process look like?
- In which way is it made sustainable and/or scaled up?
- How is the solution accepted by whom?

Social innovations are usually processes and hardly ever completed, not even if implementation succeeds. As social innovations consist of practices, many may never enter the state of a (final) 'product', ready for use. Though a social practice may be implemented in the strict sense of an institutionalised norm, from case to case a certain degree of flexible interpretation may remain, depending on the social milieu, divergent interests and benefits attainable by deviant behaviour. Changes may occur over time, in particular resulting from use, experimentation and learning from experience. In terms of the social system of law: legal custom can differ from legal rule.

After implementation, innovation processes feature a fourth stage, **impact**. This is the final phase in which an innovation, a new product, process, or a new social practice, actually becomes standard or routine itself. At this stage, completing the '4-I process', innovations reach the end of their life cycle. Any innovation is 'new' and 'innovative' as long as it has not utilised the full potential of its market (prior to saturation of the market) or, in the case of a social innovation, has not become common practice. For the analysis we formulate the following questions:

- How does the process of generating impact look like?
- How does the contribution to change look like?

While the described criteria work well to give a general overview on any socially innovative process, a more targeted framework is necessary to focus on the perspective of regional development and territorial context. The **spatial dimension** needs to be taken into account explicitly on each of the levels of the four main categories. Among others, Moulaert et al. (2007) perceive social innovation as a highly contextual phenomenon that can only be interpreted "*in an institutionally and spatially embedded way"* (Moulaert et al. 2007, p. 197). This means that it is acknowledged, in accordance with Ruijsinket al. (2017), that local issues, actors and institutions can play an important role in the emergence of SI-initiatives. Those initiatives react to *local* and often tangible issues with clear spatial differentiations (Ruijsink at al. 2017: 6).

Besides these local issues, the local embedded activities and relationships of actors involved are not limited to the specific local area. Actors are connected beyond the local level in form of manifold networks and relationships (partly on the initiative level, but mainly structurally and systemically). Therefore, the defined challenges and opportunities and developed SI-initiatives are not always

directly, primarily or fully 'localised', but also embedded on a *translocal* level (Ruijsinket al. 2017: 6). Consequently, our investigations along the 4-I process take into consideration the role of **the local context** as well as of **translocal** connections in the emergence of social innovation initiatives. Consequently, we add the following questions:

- What is the role of the local political and socio-economic context?
- What is the role of translocal connections?
- How can the interactions between different stakeholders explain the emergence of social innovation?

2.2 Social innovation in energy projects

Our core interest is the potential of socially innovative energy projects in structurally weak regions for regional development and social change. Social innovation is gaining importance in this policy field as the energy transition is shaking up long-established structures. While big providers and grid owners have dominated the traditional, central energy systems for decades, the transition from fossil fuels to renewable sources opens up the energy system to a more flexible framework consisting of smaller local sections with an increasing importance of local production and therefore, more room for manoeuvre for social entrepreneurs. Citizens, local communities, civic initiatives or collaborations between these parties and market players and/or government actors can have a major role by deploying (renewable) energy sources complementary to those developed solely by the market and governments (Ooms et al. 2016).

In the context of this energy transition, SI helps driving the whole system towards a new, more sustainable energy production, smarter and more demand responsive technologies and consumption patterns. New cultures and new practices are changing the societal system through which the provision and consumption of energy occurs. Through SI citizen might be enabled to take ownership of the energy transition, benefit from new technologies in order to reduce their bills and participate actively in the market (REScoop 2016).

Energy-related projects can have a variety of different entry points into the existing energy systems, which are comprised by all components related to the production, conversion, delivery, and use of energy (IPCC 2014). However, empirical analyses show that socially innovative projects in the domain of energy do focus on certain aspects of these systems. For example, in the SI-DRIVE[2] project, a pan European project funded by the European Commission under the 7th Framework-Programme that studied more than 1000 social innovation cases from all around the world, the following "practice fields" for social innovation with focus on energy supply and energy efficiency have been identified: First, there are "**energy collectives"** or the collective consumption and/or self-production of energy. This 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. Second, "**local (domestic) production of energy"** becomes more relevant, especially through individual households, businesses, industries, farmers, etc. including prosumers concepts. Local production therefore also implies different interactions with and a new role for, grid administrators, local/regional/national governments, and energy suppliers. Third, new approaches are building on the application of "**smart meters**". Smart meters are more a technology than a social innovation in itself, however, their

[2] For more information forthe project please see: https://www.si-drive.eu/.

application by energy consumers can induce all sorts of new behaviour and relations and makes it possible to address the "energy problem" in a new way. Forth, "**energy services"** are developed which include all initiatives that provide energy-related services to citizens, companies or government bodies. If they apply a new way to tackle the challenges of renewable energy and energy efficiency they may qualify as social innovation. Finally, socially innovative projects can take the approach of **"providing examples and inspiration"**. This form of social innovations is strongly connected to public authorities, businesses, NGOs or others setting up campaigns or models that can inspire others to take action.

Based on these results the working definition of social innovation in the energy policy field has been derived: for social innovation is "*a new combination or figuration of practices in areas of social action, prompted by certain actors or constellations of actors with the goal of better coping with needs and problems than is possible by use of existing practices*," **social innovation in the policy field of energy supply relates to the challenges posed by the transition towards an increase in renewable energy and energy efficiency** (SI-DRIVE 2015, p. 1).

In their operationalisation, Spiesberger and Gomez (2018) capture the transformative nature of SI in the context of energy policy. Their understanding of SI in the energy context is not one of an add-on to classic technology-focused innovation but as **driving the whole transition process in the energy field**. This means also serious repercussions on the regional level, as a more decentralised energy supply system will open-up opportunities for usage of local resources and involvement of citizens and local businesses. They applied the following five categories to illustrate the role that SI plays in the energy field:

- Organisational dimension: e.g. identified consumer/producer associations and cooperatives;
- Social dimension: e.g. measures to combat energy poverty;
- Funding dimension: e.g. financing schemes for energy involving citizen investment, such as crowd funding, citizen financed renewable power stations, innovation vouchers for SMEs etc.;
- Educational dimension: e.g. educational initiatives to advance renewable energy sources and energy efficiency;
- Business dimension: e.g. using socially innovative approaches for the benefit of energy business.

They consider these categories as socially innovative, as they require a strong involvement of citizens or are entirely driven by them. Fitting projects aim to create improvements for either certain social groups (social dimension), they lead to a new organisation of energy production (organisational dimension), involve citizens in financial aspects (funding) and thereby change the energy market (business) or try to raise the acceptance for the ongoing change (educational) and boost its effect.

Comparing the results of the SI-DRIVE report and the categorisation of Spiesberger and Gomez (2018) some key tendencies are observable: While the educational dimension is related to providing "examples and inspiration", the organisational dimension and the "energy collectives" are overlapping. For the second dimension, the funding aspect of collectives plays a role as well. The local production of energy influences the social, organisational and business dimensions but is not clearly attributable to one dimension. Similar, energy services are part both of the social and the

business dimension, depending on the beneficiary. Smart metering is relevant only on a meta-level as it might enable SI once it is completely rolled out.

Summarising the discussion above, the PLAISIR project will apply the approach of Spiesberger and Gomez (2018) to categorise the SI dimension of the case studies. For the mapping, however, the key questions for the SI dimension are mostly covered by the idea dimension of the 4-I process:

- What is the problem?
- What is the intended possible solution?
- How is the solution generated?

In order to obtain more specific results in the context of the mapped energy projects, the following questions are added:

- Which SI dimension is present?
- Which element of the energy system is addressed?
- How is renewable energy or energy efficiency enabled?

In the previous sections a basic terminology regarding social innovation and space as well as social innovation and energy has been presented and, additionally, a set of defined key questions for further investigations in the course of the project have been defined. These key questions, derived from the 4-I process, cover aspects of idea, intervention, implementation, and impact of SI in the policy field of energy field and its regional dimensions. These questions (see table 1-3) complemented by barriers and driving factors will constitute the bases of the following project analyses.

4-I dimension	Question
Idea	• What is the problem? • What is the intended possible solution? • How is the solution generated?
Energy field	• Which SI dimension is present? • Which element of the energy system is addressed? • How is renewable energy or energy efficiency enabled?

Table 1: Questions regarding idea and the energy policy field

The overall aim of PLAISIR is to find solutions to use the transformative potential of SI for the regional development policies in the field of (regional) energy policy. Therefore, it is crucial to first understand what the role of SI in the given policy context can be. The leading questions defined in Table 1 are capturing both the idea of the initiative itself as well as their role within the (regional) energy system.

4-I dimension	Question
Implementation	• How does the implementation process look like? • How is the solution accepted by whom? • In which way is it made sustainable and/or scaled up?
Impact	• How does the process of generating impact look like? • How does the contribution to change look like?

Table 2: Questions regarding process dimensions of SI projects

After understanding the basic idea behind these initiatives, the question of how these projects work, needs to be analysed comprehensively in order to design effective policy support measures. These aspects are covered in the 4-I implementation and impact section. The questions describe internal process dimensions of SI projects and how their idea is implemented, made sustainable, and created impact and thereby contributed to a change of practices in the region or field.

4-I dimension	Question
Local context	• What is the role of the local political, institutional and socio-economic context? • How can the interactions between different stakeholders explain the emergence of social innovation?
Translocal context	• What is the role of translocal connections?

Table 3: Questions regarding local context and interaction with the policy sphere

The third and final set of questions derived from the 4-I process, deals with the spatial context of the initiative. These questions acknowledge the fact that these projects are only possible if they are embedded in the regional context of institutional support and in interaction with various stakeholder groups inside and outside the projects main sphere of activity. As the main objective of PLAISIR is to develop strategies for a co-creative policy design between this sphere of (regional) policies and socially innovative energy initiatives, a sound understanding of the impact these policies have on the occurrence of such initiatives is needed. Equipped with such a framework of analysis, the international project database can be scrutinised regarding initial hypotheses that will guide the field work in the following work packages.

3. A typology of energy related SIs in structurally weak regions

Building on the theoretical understanding and leading questions defined in chapter 2, the empirical analysis of the mapped projects is conducted. The analysis is based on SI project information that has been collected in three different European research projects and that has been re-evaluated in the course of the PLAISIR project. The initial database of 1500 mapped innovations has been filtered in order to build a foundation for the PLAISIR project and to prepare the ground for forming hypotheses as well as for the identification and characterisation of good practice examples of socially innovative energy projects in the three Austrian case study regions. The results, presented in the following chapter 3.,build on 21 socially innovative energy projects in structurally weak regions. The chapter is structured as follows: First, we are discussing the database and the selection criteria for the case studies. The following three sections describe the empirical results of the mapped project and their ideas, processes and contexts.

3.1 Database and selection criteria for case studies

Before presenting the mapping and its results, the project databases and the selection criteria for the projects that are selected for the mapping are discussed. The database is comprised by 21 socially innovative energy projects that have been conducted in structurally weak regions. These projects first have been mapped and collected in databases in the course of research projects funded by the European Commission. These projects have different foci. Therefore, not all mapped projects meet the PLAISIR criteria. Therefore, we first discuss the criteria for selecting the projects.

Databases

The database is comprised of three different project data sets that have been mapped in European research projects investigating social and sustainable innovations. Non-of these projects had such a specific focus as the PLAISIR project, therefore the available information covers a broad range of SI and the quality differs. The data sets have been collected in the following projects:

- CASI[3] (*"Public Participation in Developing a Common Framework for Assessment and Management of Sustainable Innovation"*),
- SI-DRIVE[4] (*"Social Innovation: Driving Force of Social Change"*) and
- SIMRA[5] (*"Social Innovation in Marginalised Rural Areas"*)

The Centre for Social Innovation has been involved in the establishment of the first two data sets, while the third one has been derived from the project's website. These three data sets provide a foundation of approximately 1,500 mapped and described innovation projects. However, as not all of these projects met the criteria of the PLAISIR project, the relevant ones needed to be filtered out. The criteria for selecting the projects are that they address an energy dimension and that they are located in a structurally weak region.

Energy dimensions of the project

In order to identify cases relevant in the course of the project, the various aspects of energy related projects have been operationalised. The criteria presented in Table 4 represent a mixture of different aspects relevant to energy projects, subdivided into six main dimensions, covering building and spatial aspects, transport, infrastructure, production and energy sources as well as potentially relevant behavioural criteria. A selected project needs to meet at least one of the criteria presented below.

1. Buildings and land use	2. Mobility and transport	3. Technical infrastructure	4. Production & services	5. Energy supply	6. Behaviour & communication
Insulation	Public transport	Waste management	Agriculture	Solar energy	Awareness
New materials & technologies	Motorised private transport	Sewage disposal	Industry	Biomass	Sharing-concepts
Land use and spatial planning	Pedestrians & bicycle	Electricity & gas supply	Trade & craft	Wind energy	Prosumer concepts[6]
Renovation & refurbishment	Innovative transport systems	District heating & cooling	Tourism	Hydropower	
Green buildings	Traffic control & information systems		Regional production	Geothermal energy	
	Freight traffic			power-heat cogeneration	
				Energy storage	
				fossil energy	

Table 4: The energy dimensions in PLAISIR; *Source:Own elaboration, based on results of the PLEEC project (2013-2016), see Giffinger et al. (2015a:4), Jiménez Navarro &Uihlein (2016), European Commission (o.J.), as well as the Sustainable Development Goals 7, 11, 12 and 13 (UN 2015).*

3 http://www.casi2020.eu/
4 https://www.si-drive.eu/
5 http://www.simra-h2020.eu/
[6]Prosumers are involved as both producers and consumers (Ritzer 2010)

1. Buildings &Land Use: This category applies to the building (insulation, renovation, greening, building materials) and relevant spatial planning criteria such as land use and form of housing estates, but also the thermal remediation behaviour.
2. Mobility & Transport: On the one hand, different modes of transport (public, motorised private transport, pedestrians and bicycle) are depicted, but on the other hand also transport systems and underlying information systems.
3. Technical Infrastructure: The different prerequisites and dynamics of different infrastructure systems are taken into account.
4. Production & Services: A differentiation according to specific economic sectors and aspects of local production, that might help to reduce energy demand, are covered.
5. Energy supply: Different energy sources (with a focus on renewable energies) and storage systems are considered.
6. Behaviour& Communication: Aspects of changing individual and collective behaviour are listed. Thus, by definition, this category represents an important link to social innovation.

The criteria are based on the dimensions elaborated in the project PLEEC[7] but have been reviewed and supplemented with regard to current developments.

Spatial dimensions of the project

Another selection criterion for projects is that these initiatives have to be implemented in the context of structurally weak regions. There are various approaches to defining structurally weak regions already implemented in empirical studies in Europe. However, since the term "structurally weak" does not exist in European regional policy and thus is not used in EU publications and documents on regional development (for example in the Cohesion Report (EU 2017) Statistical Yearbooks of the Regions (Eurostat 2010)), related classification approaches have to be used. After careful considerations of possible methodological approaches, a classification based on the **regional competitiveness index (RCI)** has been deployed. The rationale for applying this approach can be found in Annex B.

The RCI summarises different structural features from all sectors responsible for regions' economic development potentials (e.g. innovation, education, health, accessibility or ICT), and is therefore well suited for differentiating between structurally strong and structurally weak areas. In the context of PLAISIR, the RCI on NUTS 2 level in comparison with all European regions was to coarse in some cases, e.g. remote and structurally weak sub-regions within a wealthy NUTS 2 entity. Therefore, we applied a twofold approach, not only taking the RCI on NUTS 2 but also the GDP on NUTS 3 level into account. As a result, a region is thus labelled "structurally weak" if:

- the RCI index of the associated NUTS 2 region
- or the regional GDP (per capita by purchasing power parity) of the NUTS 3 region is below the respective national average.

If a NUTS 3 region corresponds to an entire state, the comparison has been done using the EU28 average.

[7] Planning for Energy Efficient Cities,(2013-2016), http://www.pleecproject.eu/

The screening of these three databases for fitting projects results in a set of 21 European SI projects in the energy domain that have been implemented in structurally weak regions. A list of these projects can be found in Annex C. These projects have been mapped according to the questions defined in chapter 2. The following three sections describe the findings based on this mapping.

3.2 Energy and SI dimensions

The first step in the mapping process is a critical assessment of the idea behind the projects and a classification of the cases alongside the categories introduced in the previous chapters (see chapter 2.2 and 3.1). The following questions are used to define the focus more clearly:

4-I dimension	Question
Idea	• What was the problem? • What was the intended possible solution? • How was the solution generated?
Energy field	• Which SI dimension is covered? • Which element of the energy system is addressed? • How is renewable energy or energy efficiency enabled?

While the first dimension (idea) is part of the original 4-I criteria, the second dimension is introduced specifically for the purpose of getting a better understanding of SIs in the energy field. In the process of analysing the mapping this is the first step, setting the base for the further analysis.

Idea

- What is the problem?
- What is the intended possible solution?
- How is the solution generated?

The mapped cases are utilising diverse solutions to tackle different problems in the energy field in their specific region. Although the set of solutions is diverse, there are some trends that are observable. The main issues present in the 21 case studies are related to **production of renewable energy**, **energy efficiency** and **citizen involvement** (e.g. prosumer concepts). Projects in the mapping tackle this issues with a focus on sustainable energy production (e.g. Templederry community wind farm/Ireland) and smarter and more demand responsive technologies and consumption patterns (e.g. SmartPV/Cyprus, UbiGo Mobility/Sweden). Additionally, new cultures and new practices, both on the individual and societal level, are elaborated and spread re-configuring the relations between different stakeholder groups and enabling citizen ownership in the energy field (e.g. Energy Vision Murau/Austria; New Guinea Collective/Greece, Energiepark Micheldorf-Hirt/Austria). Very often the initiatives do not only cover one problem but are tackling multiple issues at the same time as for example in the case of the Templederry community wind farm/Ireland, where not only the production of energy is sustainable but also the community owns the means of production and is able to determine the decision making in their project autonomously.

Most of the projects studied in the mapping can be considered as bottom-up or at least bottom linked. This means they are either elaborated, designed and implemented by a local collective of citizens that identified a social or societal need and tried to act accordingly or at least in close cooperation with the local community. However, this does not necessarily mean, that the

implemented solution was generated collectively. Various examples show that often it is a small group of people that comes up with new and innovative solutions and then seeks alliances to implement this solution for example with the local community. Arguably the further implementation of the solution may still be considered bottom-up and community based even if the core organisation is run by a small group of people (e.g. New Guinea Collective/Greece, Braemar Community Hydro/Scotland).

Energy field

- Which SI dimension is covered?
- Which element of the energy system is addressed?
- How is renewable energy or energy efficiency enabled?

After screening the projects for their principle ideas and solutions towards energy issues, the next step consists in classifying the social innovations in terms of the specific SI dimension they cover and the energy dimension they operate in. This means that the projects in the mapping are assigned to the dimensions and categories identified from the literature and presented in chapter 2.2. and 3.1. Using this approach, a matrix is elaborated that is used to get to a typology of social innovations in the energy field in structurally weak regions (cf. figure 1). While these results are not representative, they still show a trend that affirms the insights gained from more extensive studies conducted in the field (e.g. SI-DRIVE, Spiesberger and Gomez 2018).

It is noteworthy that, although the schematic classification in the form of a matrix suggests clear distinctness of the categories and unequivocal assignability of the projects, this is not the case. The schematic classification through the matrix offers merely an attempt to identify the main SI and energy dimension that a project operates in. Often it would be possible to attribute a single project to multiple dimensions. However, for the sake of analytical clarity, it has been decided to only focus on the respectively most important SI and energy dimension of an innovation. Looking at Figure 1, the energy dimension gathering the most innovations is “Energy supply” (see FigureFigure 3) , showing that the provision of (sustainable and renewable) energy to communities is a major challenge for socially innovative projects, sparking change in organisational, funding and business models.

The matrix illustrates, that the energy dimension “behaviour & communication” goes hand in hand with the “Educational” SI dimension. The dimension “Education” furthermore is the predominant one for projects in terms of SI dimension (see Figure 4). This shows that educational intentions are closely connected with the intention to change individual and collective behaviour. Arguably the energy dimension “behaviour & communication” is especially fruitful for social innovations as intervening in collective behaviour necessarily has a socially innovative connotation. The other energy categories, namely “Buildings & Land Use”, “Mobility & Transport” as well as “Technical infrastructure” seem to be of rather limited relevance for the creation of social innovations, even though some examples can be found. Contrary to this, no innovation is attributable to the energy element of “Production &Services”, highlighting that there is still untapped potential for social innovation on the demand side of energy.

Figure 2: Distribution of cases by energy and SI dimension.

	Organisational	Social	Funding	Educational	Business
Buildings &land Use	Cloughjordan Ecovillage	Drombane/Upperchurch Energy Project			
Mobility & transport				Sustainable Mobility System of Kaunas University	UbiGo mobility service
Technical infrastructure	ACCESS	Heat Smart Orkney			
Production & services					
Energy supply	- Qvinnovindar; Templederry community wind farm; - Udny Community Trust	Real Pearl Foundation	- Using Crowdfunding to Create an Energy Independent School - Braemar Community Hydro - Huntly renewable development project		- Energiepark Micheldorf-Hirt - Using Olive Remains as a Fuel in a Cement Factory
Behaviour & communication				- Model Region Thayaland; - Energy Vision Murau; - New Guinea Collective - SmartPV - Dorf ist Energie(klug) - Sustainability information centre	

Figure 3: SI-projects per energy dimension.

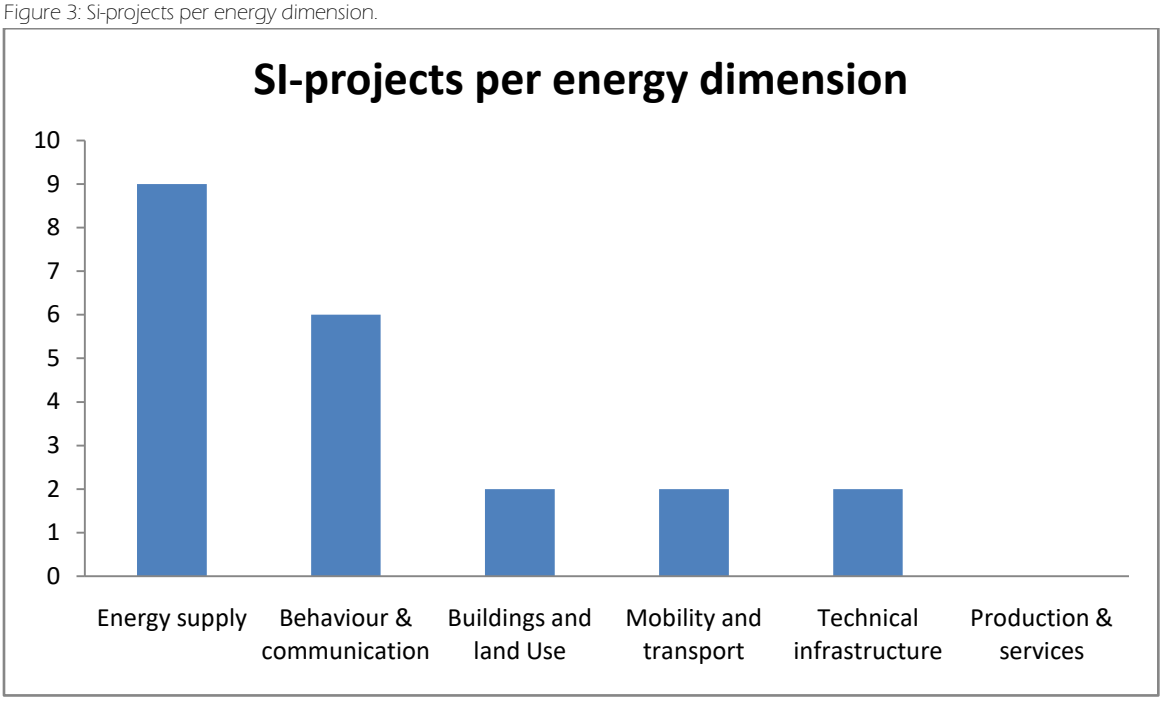
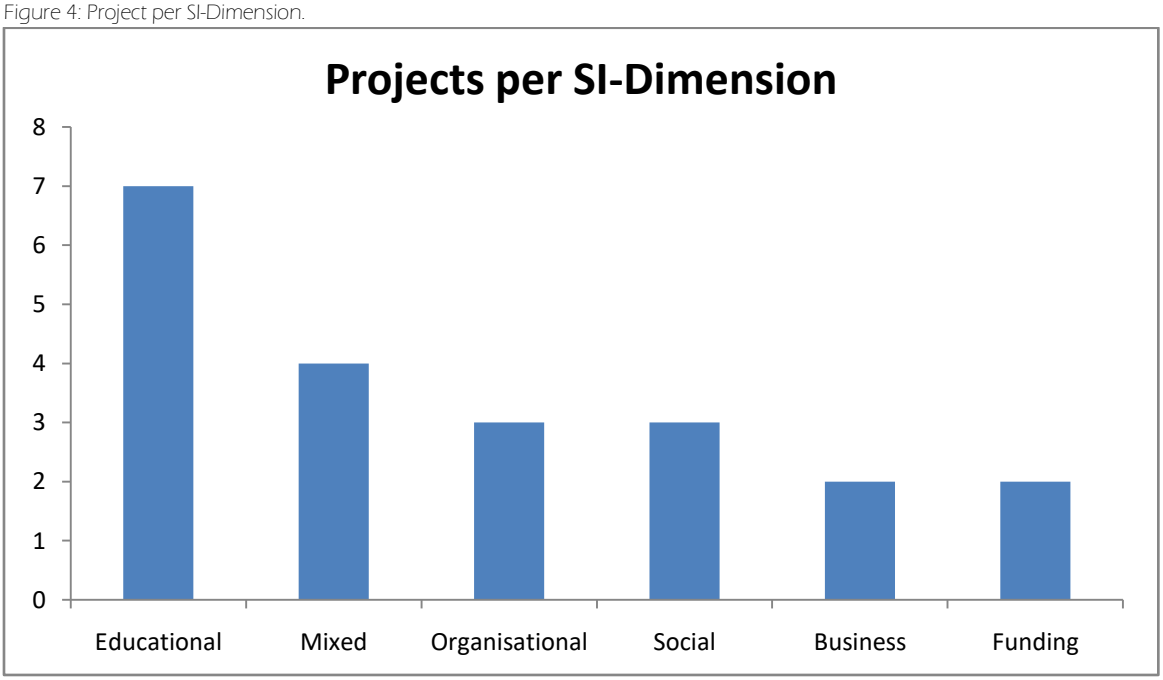


Figure 4: Project per SI-Dimension.



3.3 Process dimensions

This chapter mainly looks at the process dimensions influencing the genesis of social innovations. The analysis shown below was mainly structured along the guiding questions formulated in the conjunction with the 4-I dimensions in chapter 2.1.:

4-I dimension	Question
Implementation	• How does the implementation process look like? • In which way is it made sustainable and/or scaled up? • How is the solution accepted by whom?
Impact	• How does the process of generating impact look like?

	• How does the contribution to change look like?

In the mapping, these questions are also processed in three dimensions: implementation, impact, and drivers & obstacles. The synthesis results below are presented in the line of this structure.

Implementation process

- How does the implementation process look like?
- How is the solution accepted by whom?
- In which way is it made sustainable and/or scaled up?

Most of the analysed socially innovative projects are strongly embedded in or connected to local structures: for instance, an association of communities focusing on the implementation of renewable energy solutions in the region (e.g. Model Region Thayaland/Austria), a cooperation of agencies with the aim to reduce fuel consumption and spending and stimulating the local economy (The Drombane/Upperchurch Energy Project/Ireland) or a community development trust, founded by local people to invest in local projects, focusing on RES (Huntly renewable development project/United Kingdom).

Whereas the project implementation process differ between the analysed projects it can be observed that a successful implementation is positively influenced by

- the development of a conclusive project concept / business plan,
- together with stakeholders (politicians, regional companies, funding bodies etc.) which are affected by the objectives of the project and could and should support it, as well as
- the receipt of monetary funding.

Especially at the beginning of a project the availability of seed capital decisively influences the success of a project. The observed funding models differed: public, private and/or mixed forms.

With respect to the outputs/solutions of the projects the above stated involvement of affected stakeholders is an important factor. First of all, a concrete definition of the beneficiaries is crucial. A couple of analysed projects focused on the generation of added value on an individual level. Some of the projects are characterised by the involvement of potential parties concerned from the very beginning. Some of the investigated projects are collectively purchased and organised (e.g. the Templederry community wind farm/Ireland, Cloughjordan Ecovillage/Ireland, Qvinnovindar/Sweden, Braemar Community Hydro/United Kingdom and ACCESS: Assisting Communities to Connect to Electric Sustainable/United Kingdom). Local citizens/households do not only consume produced solutions, they are also joint partners. The local commitment to socially innovative projects seemed to be positively influenced by the engagement of locally based initiators. Particularly important for the legitimisation of actions in some of the projects was the support of political stakeholders. Generally, the balance within the project system (project leader/initiator – policy – beneficiaries – additional parties concerned, e.g. companies) needs to be stable for a successful project implementation and therefore needs to be (re)identified and taken into account continuously.

With respect to sustainability and scalability, it became clear that both terms can hardly be analysed without taking into account the context. In other words: should sustainability and scalability be investigated in terms of the achieved outputs and/or the project (structure) itself? Most of the investigated projects seemed to be sustainable in so far as the developed outputs/solutions are

utilised. At the time of analysis, the investigated projects are also stable in their existence. In this regard, stability needs to be defined flexible: Whereas the „Energy Independent Primary School Ostrog/Croatia" has been committed to environmental protection and nature protection for more than 30 years, other projects are comparatively young (some of the projects have been founded in the late 2000s). This indicates that only the well-known and successful projects made it into the original datasets and that we do have a bias for not considering failed projects in this analysis. A further aggravating factor is that data focusing on sustainability/scalability aspects is not available for all analysed projects. In summary, the impression arose that especially scalability concepts were processed in less detail during the project implementation and if so, the focus is laying on quantitative scaling (e.g. within the "Dorf ist Energie(klug)" project (Germany), a transfer concept of a successfully tested initiative to strengthen energy efficiency on local level was developed). An important aspect in the context of the diffusion of solutions is the availability of the necessary absorptive capacity on the level of the potential new beneficiaries. Probably the necessary capacity needs to be built in before the transfer can be started.

Impact

- How does the process of generating impact look like?
- How does the contribution to change look like?

The start of a so-called "(mutual) learning process" was observed in many of the analysed projects. The involved stakeholders learned of and with each other. On the one hand, specific competences (on e.g. technical, organisational, management-financial, political and institutional level) increased. On the other hand, a general change of attitudes regarding the particular project objectives becomes obvious. For example, a change in routines and patterns on individual (citizens) and organisational (e.g. companies and public institutions) level is described by stakeholders of the "Model Region Thayaland" project (Austria). The latter could be classified as a strong reference to a systemic change, which is initiated through the project. The *"readiness to learn"*, which is strongly observed on the level of the project stakeholders, is achieved through a strong commitment of the local policymakers to establish (amongst others) a new technology "from outside" (photovoltaic systems), combined with the provision of funding schemes for different stakeholder groups (companies, households, etc.).

The greater independence from a centralised energy system, which is the aim of some of the analysed projects, results in independent planning possibilities of the local energy future. Besides short-term consequences like the creation of new jobs (e.g. ACCESS: Assisting Communities to Connect to Electric Sustainable/United Kingdom), the received policymaking power of the responsible stakeholders also influences a medium and long-term systemic change.

Effects on specific target groups (e.g. the sensitisation of the Roma community for a sustainable lifestyle – Sustainability information centre/Hungary, disadvantaged village inhabitants got trained in the production of biomass briquettes and can cover part of their heating material needs since then – Real Pearl Foundation - Against fuel poverty with biomass briquettes/Hungary) are in the focus of specific initiatives as well. Whereas the socially innovative initiative has a positive effect on specific target groups, others experienced negative effects, like the break off of business areas. For instance, the demand for illegally extracted firewood decreases due to the successfully established biomass

briquettes production. As consequence, the initiative is badmouthed by actors profiting from the old system.

3.4 Governance and other external factors

After highlighting some trends regarding process dimensions of social innovations in the energy field, this chapter looks at the external factors shaping the inception, implementation and diffusion of them. Insights gained from the mapping show that, while certain trends are detectable all over Europe, the concrete manifestation of social innovations varies according to the institutional, socio-economic and political context in the project country or region. This context shapes not only which social innovations develop, but also which specific form they take and how they can or cannot advance. In order to specifically focus the analysis on this local context and the trans-local connections, as fleshed out in chapter 2.1., the subsequent guiding questions lead the analytical process:

4-I dimension	Question
Local context	• What is the role of the local political, institutional and socio-economic context? • How can the interactions between different stakeholders explain the emergence of social innovation?
Trans-local connections	• What is the role of trans-local connections?

Furthermore, the dimensions **"drivers"** and **"barriers"** are focused by the following two questions:

- Which factors make the solution successful?
- Which critical factors/obstacles are identified and which coping strategies are developed to overcome challenges?

In the mapping, these questions are mainly processed in four different dimensions: context (embedment of social innovation in local and trans-local settings), role of policy, success factors and barriers. In the following, the results of the mapping are presented in conjunction with these four categories:

Context

In terms of context, one can distinguish between local factors such as relation to the local communities or businesses and trans-local factors such as connections to international social movements, initiatives or programs. The results of the mapping show that the case studies can roughly be classified into three types of social innovations regarding the (trans) local context: First, there are those social innovations that are formed out of a grass-roots movement, deeply connected to the local community and mostly maintained through charity work (e.g.: Udny Community Trust/Scotland, New Guinea Collective/Greece, Templederry community wind farm/Ireland). These innovations try to act as autonomous organisations pertaining to the civil society sector, but can also take the form of a social enterprise.

Second, innovations can develop in close cooperation with local municipalities, bringing different actors of the political, economic and social sphere together and including them in the process of social innovation (e.g.: Drombane/Upperchurch Energy Project/Ireland, Model Region

Thayaland/Austria, Energy Vision Murau/Austria, Braemar Community Hydro/Scotland). The local embeddedness is especially strong in this type of innovations, as various actors from the region are interacting towards a common goal and social relations between these actors are reshaping the local setting.

Third, there are social innovations, which are led by a public institution, or where a public institution is at least a key player in the process of the innovation. This means that it is a state-driven initiative, often represented by local municipal representatives, that interacts with local actors from the business and civil society sector, but does not grant full autonomy to them in terms of decision making (e.g.: Sustainable Mobility System of Kaunas University/Lithuania, Real Pearl Foundation/Hungary, ACCESS/Scotland).

Additionally, another factor that is spread over these three types of social innovations is the embeddedness in trans-local movements. Often, social innovation projects see themselves as part of a bigger movement and/or function as role model for other initiatives themselves. As a specific sub-sector of these trans-locally embedded initiatives, EU funded projects have to be mentioned. In some cases, socially innovative ideas were first supported by EU project funds, especially when no national funds were available. In this way, supra-national steering competencies sparked socially innovative processes in different local settings, partly circumventing involvement of political actors on a national or regional level. Nevertheless, the participation and interest of municipalities seems to be crucial in these forms of innovations, as leaving these players out of the loop would inhibit a sound implementation in most of the cases. These observations already lead to the next dimension of external factors, namely the role of policy.

Role of policy

As already indicated above, the role of policy in social innovations in the energy field is manifold. It is obvious that political actors set the policy framework for which kind of innovations can develop in a certain context. This framework can be managed by different actors on different levels. In terms of policy actors, we can distinguish between four different levels that can play a role in socially innovative processes: municipal, regional, national and supra-national. In the studied projects, the most dominant level is the municipal level. Representatives of this level are crucial actors in the majority of the projects and they shape social innovation processes significantly.

The regional level is often acting as an intermediary between the municipality and national organisations. Depending on the democratic regime in place, the steering competency of the regional level varies drastically in different European countries. This has consequences for social innovations in the energy field, as the topic of decentralisation is e.g. very important regarding the organisation of energy supply. It is observable that, especially in countries with strong federal structures, the issue of connecting local and regional actors to change energy supply or delivery patterns is predominant (e.g.: Energy Vision Murau/Austria; Modelregion Thayaland/Austria; Dorf ist Energie(klug)/Germany).

On the national level, the relevance of policy can be both inhibiting and fostering. While in some cases socially innovative initiatives are only possible with the strong support of national governmental agencies or funding institutions (e.g. UbiGo mobility service/Sweden, ACCESS/Scotland, Energiepark Micheldorf-Hirt/Austria), others are deliberately avoiding these contacts to remain completely autonomous (e.g.: Udny Community Trust/Ireland, New Guinea Collective/Greece, Templederry community wind farm/Ireland).

The last category is related to supra-national policy levels, more specifically the EU through its various (funding) programmes and initiatives. This policy level can become especially important if no state-led initiatives for fostering innovations in the energy sectors are accessible, or if resources in this area are scare (e.g.: Cloughjordan Ecovillage/Ireland, SmartPV/Cyprus, Huntly renewable development project/Scotland). Arguably, the last point already touches another crucial issues for social innovations, namely the question of funding resources, which can at the same time be a success factor and a barrier if no funding is accessible.

Success factors

A number of success factors has already been presented in the above chapter, as success factors can be both internal and external. However, from a perspective of external factors, the **role of policy** can be critical for both the initial and the long-term success of social innovations. In the initial phase, the policy framework can create an environment where social innovations can flourish, be it through funding provided or through offering access to existing networks (e.g. Model Region Thayaland/Austria, Huntly renewable development project/Scotland, Dorf ist Energie(klug)/Germany). On a long-term basis, the question of financing remains important for most of the innovations. Additionally, the question of up-scaling potential occurs, which means that the policy framework needs to be adaptive if social innovations are to be institutionalised. Arguably, innovations that try to demarcate themselves from political actors are less sensitive to political agenda changes, but nevertheless they act in a given policy framework and they have to arrange their practices accordingly.

Another success factor is the **connection to transnational networks**. Especially taking the perspective of social innovations in structurally weak regions, connections to transnational social movements, initiatives or programmes can be a key factor (e.g. Cloughjordan Ecovillage). The mobilisation of exogenous capital is especially relevant regarding knowledge transfer. Through these connections, knowledge can be brought into a region and new ideas can be spread that potentially contribute to a reinforcement of local social and business structures.

Besides this exogenous capital, social innovations in structurally weak regions also need to **tap existing endogenous potentials**. Case studies from the mapping show that the mobilisation of existing institutions, organisations and networks in the region contributes to a successful implementation of socially innovative processes (e.g. Energiepark Micheldorf-Hirt/Austria, Braemar Community Hydro/Scotland, Energy Vision Murau/Austria). The embeddedness of social innovations in a local structure of business, civil society and policy institutions needs to be recognised as a highly diverse field of interests marked by hierarchic power structures in which social innovations can only strive if they manage to form alliances and use the existing regional resources to their advantage. A fruitful flourishment of initiatives is strongly influenced by a **continuous balancing of bottom-up and top-down-interactions**. If this is not achieved, the institutional setting can also act as a barrier to social innovations, as resources in structurally weak regions may be scare and the persistence of the few established actors may be high.

Barriers

The predominant issue present in the case studies as a barrier is the **financial situation** of social innovations. If social innovations are not self-sustained right from the beginning, which usually they are not, the question of financial support becomes very relevant, both for civil society initiatives like

community energy production organisations (e.g. Braemar Community Hydro/Scotland) or business models of socially innovative applications (e.g. UbiGo mobility service/Sweden). The issue of financing links to the role of policy which often offers initial funding but hardly contributes to long-term sustainability.

Arguably, policy can also become a problem if the **costs of bureaucracy** are too high for socially innovative projects and if the **policy framework does not offer easy understandable and manageable support measures**. The issue of **complexity** is also relevant regarding the local embeddedness and endogenous potential for social capital mobilisation. If the social initiatives are dealing with a highly diverse environment of stakeholders, it can be challenging and costly to manoeuvre in this field for the good of the social innovation. This creates an area of tension, where different stakeholder groups interact, are subject to constant change and therefore exposed to disbalances for example through a decrease from political support due to priority shifts in political agendas – triggered through changes in the political scene after elections, but also due to sometimes beyond the local region extending crises.

The case studies show that regarding the specific constellation of social innovations in the energy field in structurally weak regions, the **(non-) existence of technical infrastructure can pose a serious barrier** for the implementation of social innovations. At the same time, **lacks in technical infrastructure can also spark new social innovations** dealing with this issue. In terms of energy supply, the non-existence of adequate technical infrastructure often sparks a do-it-yourself styled approach in social innovations and contributes to a change in local culture. This is important because local culture can pose a barrier to social innovations, as e.g. ecologically harmful practices are predominant and cannot be changed easily. Here social innovations have to invest in changing societal behaviour to make room for new social practices that contribute to an ecologically sustainable development of structurally weak regions (e.g. New Guinea Collective/Greece, Sustainability information centre).

4. Synthesis and hypotheses on core indicators for SI in structurally week regions in Austria in the energy field

The aim of this report is to provide a conceptual basis for the PLAISIR project, which has the main objective to develop strategies for a co-creative policy design between the sphere of (regional) policies and socially innovative energy initiatives. Therefore, we started by discussing the main elements shaping the project – social innovation, structurally weak regions and the elements composing an energy system. First step in this process is to deduce a definition of social innovation from the literature, which is also suitable in the course of regional development and energy systems discourses. Based on this definition, a set of analytical questions and selection criteria to analyse socially innovative energy projects in structurally weak regions is derived. These analytical questions are clustered around the 4-I dimensions idea, intervention, implementation, impact and extended by energy field related aspects as well as by factors aiming at the local and translocal context of such interventions.

The data used for testing the analysis framework draft, is comprised of 21 SI projects in Europe. These examples have been mapped in the course of three different projects and therefore the data basis is varying to some extent. However, the available information is sufficient to derive the following results.

The main issues present in the case studies are related to production of renewable energy, energy efficiency and citizen involvement. The most common energy dimensions present are energy supply and behaviour and communication, while the most common SI dimensions are educational, mixed or organisational measures. This indicates that most SI related energy projects are dealing with rather soft-interventions into the system rather than to provision of infrastructure – even though these projects exist as well.

Most of the analysed socially innovative projects are strongly embedded in or connected to local structures – e.g. in an association of communities, a cooperation of agencies or a community development trust – and strong cooperation and financial commitment of the stakeholder groups including the political level is beneficial for the success of a project. Once a project is successfully implemented, it has the potential for institutionalisation as the high average age of the analysed projects indicates. The induced learning processes indicate a potential for systematic change within the regions and the transformative potential of socially innovative energy projects.

In general, these learning processes can develop on three levels, involving different actors depending on scope and objective of the initiative. First, one can distinguish between local factors such as relation to the local communities or businesses and translocal factors such as connections to international social movements, initiatives or programs. Second, innovations can develop in close cooperation with local municipalities, bringing different actors of the political, economic and social sphere together and including them in the process of social innovation. Third, there are social innovations, which are led by a public institution, or where a public institution is at least a key player in the process of the innovation. This is also related to the role policy can be play.

In terms of policy actors, we can distinguish between four different levels that can play a role in socially innovative processes: municipal, regional, national and supra-national. In the studied projects, the most dominant level is the municipal level. Representatives of this level are crucial actors in the majority of the projects and they shape social innovation processes significantly. The

regional level is often acting as an intermediary bridging municipality and national organisations. While national and supra-national policy levels are mostly relevant from a funding perspective.

Hypotheses

Even though the non-representative sample of case studies does not allow drawing general conclusions, it is still possible to elaborate several tentative hypotheses on the favourable or non-favourable conditions for social innovation in the energy field in structurally weak regions. While these conclusions were derived in an inductive way by analysing the mapped case studies, they also align with the critical issues elaborated from a more exhaustive case study analysis in the SI-DRIVE project, focusing on social innovation in energy supply (see Boonstra et. al. 2015). According to this case study analysis, the critical external issues for social innovations are culture, governance and market structures, national governments, indigenous fossil resources, financial support and technological and geographical potentials and / or challenges. In combination with the insights gained through the prevailing study, this allows proposing the following hypothesis regarding favourable conditions for social innovations in the energy field:

- **Embeddedness in the local community:** the embeddedness of a social innovation in the local structure of actors, institutions and stakeholders is crucial for a successful implementation. Endogenous capital needs to be tapped to ensure a sustainable development in structurally weak regions.
- **Connection to trans-local networks:** as structurally weak regions per definition lack crucial assets of a fruitful environment for social innovations, the connections to trans-local movements, initiatives or networks needs to be highlighted as a key factor. Making use of exogenous capital contributes to reviving structurally weak regions.
- **Multi-level government support:** even though some initiatives draw clear boundaries to policy actors, it is of utmost importance that policy frameworks create an enabling environment for social innovations. This might happen on a local, regional, national or supra-national level and includes financial support measures. Especially important in this context are links to local communities, enabling social innovations in a bottom-up or bottom-linked styled form. The role of steering networks and the availability of seed-money to kick-start bottom-up initiatives should be paid special attention to in areas with low social capital endowment.
- **Market structure:** The concrete structure of the energy market in the respective region has a shaping influence on the social innovations that form in a region. The liberalisation of energy markets and progress in RES might open potentials for local initiatives.
- **Spatial peculiarities:** Structurally weak regions often have to deal with spatial peculiarities that exacerbate endogenous development. A crucial component is the non-existence of adequate infrastructure that is particularly prevalent in structurally weak regions. This circumstances influence the specific form and content of social innovations in the energy field considerably.
- **Local culture– absorptive capacity:** Especially in the energy field, ecologically harmful practices are often still dominant and cannot be changed easily. This can be a serious threat to social innovations, which therefore also have to aim at changing local patterns of individual and collective production and consumption. The assurance and/or building of absorptive capacity at the beginning of socially innovative initiatives can be seen as a first challenge which needs to be taken seriously.

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Annex A. - Analysing social innovations along the 4-Iprocess

Idea – Novelty

Area of concern	Specifications
Meeting social demand/societal challenges in a specific region	• Social demands or societal challenges in the field of energy, which are met by the project/initiative. • Reflection of previous activities in addressing social challenges in the field of energy. • New social approach or new solution in the field of energy, which is offered by the project/initiative. • Degree of critical analysis of the project/initiative (e.g. background, nascency, stakeholders).
Target group(s)	• Form of involvement of the target group(s). • Concrete and enduring use of the project/initiative for the target group(s). • Form of encouragement of the potential of the target group. • Form of the project's/initiative's contribution to the society's esteem for the target group.
Idea generation process	• Circumstances in which the idea was born. • Idea developer (e.g. individual/s, target group, organisation, cooperation, etc.). • Form of idea generation process (e.g. integration of different views through the involvement of different disciplines/competencies/groups). • Obstacles, which have been faced when actors with different perspectives were included.

Intervention – Involvement

Area of concern	Specifications
Territorial and socio-economic context	• Form of integration of the project/initiative into the local and regional environment. • Form of incorporation of relevant social, economic and environmental circumstances into the project/initiative. • Strategy towards target groups: e.g. bottom-up involvement, top-down involvement, service provision. • Form of engagement of relevant local/regional stakeholders into / informed about the project/initiative.
Setting up an fruitful environment	• Form of project realisation: e.g. creation of an inventive, resourceful and creative environment. • Form of dialogue and cooperation with other institutions / organisations. • Internal transparency: e.g. in terms of decision-making, finances and monitoring and evaluation. • Degree of flexibility of the project/initiative. E.g. adaptability to change along changing needs (e.g. changing project environment).
Development process	• "Project/initiative drivers" • Success factors of the further development of the idea towards an invention. • Identified failures and approach.

(Successful) implementation / Institutionalisation – Effectiveness

Area of concern	Specifications
Acceptance by society	• Implemented strategies for reducing barriers (e.g. the promotion of: positive government policies; supportive legal and administrative

	framework, good cross-sectoral relations and a culture of cooperation; connections with institutions capable of scaling up the innovation; opportunities for increasing skills and expertise). • Degree of acceptance and support of the idea by the (region's) society.
Sustainability	• Degree of broadening the funding base (i.e. non-dependency from single donors/mentors) as well as its knowledge base (i.e. know-how transfer between stakeholders). • Form of connections to existing transnational/national/regional/local programmes, structures and strategies: e.g. relationships with Structural Funds, ERDF.
Mainstreaming & Scaling up	• Form of the learning ability of the project/initiative from both successes and failures. • Amount of project modifications made based on lessons learned. • Degree of interest in the project/initiative by other organisations, media, sponsors, politicians. • Form of mainstreaming and scaling up support at both governance and project/initiative level.
Implementation process	• Development of the project/initiative "ownership" (e.g. from a single ownership of an individual/organisation towards a widely supported project). • Way of sharing of the project's/initiative's responsibility between stakeholders. • Central success factors in terms of building a solid basis for the project (stable financial fundament, skills and know-how of persons involved, etc.). • Coping strategies of obstacles: e.g. legal, financial, economic, institutional difficulties

Impact – Dissemination

Area of concern	**Specifications**
Process of generating Impact	• Warranty of monitoring and evaluation. • Form of determination of the range of impacts: e.g. by the size of groups affected (target groups and by dissemination and replication). • Identified indirect (and maybe unintended negative) effects beyond the target groups and objectives. • Time-horizon of immediate and potential future impacts. • Feasibility to assess the end of the innovation's life cycle (e.g. becoming common practice) in short periods like months or years or e.g. generations. • Availability of potential impact measurements (e.g. external evaluation or self-assessment; e.g. ex-post/ex-ante). • Form of impacts which have been generated: e.g. ecological impacts, economic efficiency, distributional equity, etc.
Contribution to change	• Observable effects (e.g. new regulations which adapt the legal capacity of specific target groups, and which shift the balance of power on societal level) • Efficacy of meeting intended social demands or societal challenges. • Form of contribution of the project/initiative to systemic change. • Form of contribution of the project/initiative to changing roles (of individuals, civil society organisations, corporate business, and public institutions), relations (in professional and private environments,

	networks, and collectives), norms (at different levels, legal requirements) and values (customs, manners, mores, and ethical/unethical behaviour). • Degree of resolution of societal challenges in the field of energy. • Degree of acceptance, adoption and utilisation of the new solution by the individuals, social groups and organisations concerned.

Annex B. - Festlegung von strukturschwachen Regionen

Zur Festlegung von strukturschwachen Regionen gibt es verschiedene Ansätze, die in empirischen Untersuchungen für Europa bereits empirisch umgesetzt wurden. Da der Begriff „strukturschwach“ in der Europäischen Regionalpolitik jedoch nicht vorkommt und damit auch in Publikationen und Dokumenten der EU zur regionalen Entwicklung (z.B. in Kohäsionsberichten oder Statistischen Jahrbüchern der Regionen) nicht verwendet wird, müssen verwandte Typisierungsansätze herangezogen werden. Dabei bieten sich vor allem Klassifizierungen von Regionen nach folgenden Kriterien an:

1. Städtische oder ländliche Strukturen
2. Wirtschaftliche Leistung (BRP pro Kopf)
3. Regionale Wettbewerbsfähigkeit (Regionale Bedingungen)

Aufbauend auf einer von der OECD entwickelten Methodik wurden in Zusammenarbeit von 4 Generaldirektionen der Europäischen Kommission die NUTS3-Regionen der EU nach ihrer Einwohnerdichte und der Größe ihrer städtischen Zentren in drei Kategorien unterschieden:

1. Überwiegend städtische Regionen
2. Intermediäre Regionen
3. Überwiegendländliche Regionen

Obwohl sich PLAISIR auf ländliche strukturschwache Gebiete konzentriert und viele ländliche Gebiete erhebliche Strukturschwächen aufweisen, ist diese ausschließlich auf Siedlungsstrukturen begründete Typisierung nur sehr eingeschränkt dafür geeignet, um strukturschwache Gebiete in der EU abzugrenzen. Gerade im alpinen Raum finden sich viele ländliche Regionen, die hochkompetitive wirtschaftliche Strukturen und eine überdurchschnittliche Wirtschaftsleistung aufweisen. Folglich wird diese Typologie nicht für zur Selektion von Projekten in strukturschwachen Regionen, dafür aber zur groben Charakterisierung der Standortregionen verwendet.

Die zweite Möglichkeit, strukturschwache Regionen ausfindig zu machen, besteht in der Abbildung der regionalen Wirtschaftsleistung. Auch die regionalpolitischen Instrumente der EU nehmen seit vielen Jahrzehnten Bezug zum wirtschaftlichen Output der Regionen und differenzieren Art und Höhe der Förderungen nach dem Bruttoregionalprodukt. In der derzeit laufenden Programmplanungsperiode 2014-2020 unterscheiden die Fördergramme zum Ziel „Investieren in Wachstum und Beschäftigung (IWB)“ etwa nach dem BRP (gerechnet pro Kopf und nach Kaufkraftparitäten) „stärker entwickelte Regionen“, „Übergangregionen“ und „weniger entwickelte Regionen“. Der aktuelle Entwicklungsstand der Europäischen NUTS2-Regionen ist im 7.Kohäsionsbericht (European Commission 2017) dokumentiert, die Daten sind aber auch auf NUTS3-Ebene jährlich verfügbar. Diese Untergliederung bewertet zwar den wirtschaftlichen Output in einer vergangenen Periode, nimmt aber keinen Bezug zu den sozioökonomischen Bedingungen, die erheblichen Einfluss auf die zukünftigen Entwicklungschancen einer Region haben. Trotz des in der Praxis meist engen Zusammenhangs zwischen regionalen Strukturschwächen und niedriger Wirtschaftsleistung, ist daher eine Gleichsetzung von „weniger entwickelten“ und „strukturschwachen“ Regionen eine grobe Vereinfachung.

Zur Abbildung strukturellen Voraussetzungen von Regionen eignet sich ein anderer Bewertungsansatz, der von der Europäischen Kommission verfolgt wird. Das Konzept der „regionalen

Wettbewerbsfähigkeit“ beruht auf 73 überwiegend regionalen Indikatoren, die zu 11 „Säulen“ in 3 „Gruppen“ zusammengefasst werden:

(A) **Grundvoraussetzungen** (v.a. für die weniger entwickelten Regionen)
- (1) Qualität der Institutionen
- (2) makroökonomischeStabilität
- (3) Infrastruktur
- (4) Gesundheit
- (5) Qualität der Primar- und Sekundarbildung.

(B) **Effizienzverstärker** (für alle Regionen)
- (6) Arbeitsmarkteffizienz
- (7) Marktgröße

(C) **Innovation** (v.a. für Übergangsregionen und für hoch entwickelte Regionen)
- (8) Technologische Bereitschaft
- (9) Ausgereiftheit des Unternehmensumfelds
- (10) Innovation

Durch die Gewichtung der 3 Indikatorengruppen nach dem Entwicklungsstand der Regionen wird deren unterschiedliche Bedeutung für verschiedene Regionstypen berücksichtigt. Um das Aufsplitten funktionaler Wirtschaftsräume zu vermeiden, werden in der Berechnung manche Kernstadtregionen mit ihren umgebenden NUTS2-Regionen zusammengefasst. Da der Index der Wettbewerbsfähigkeit (RCI-Index) unterschiedliche Strukturmerkmale aus allen Bereichen, die für die wirtschaftlichen Entwicklungschancen von Regionen verantwortlich sind (z.B. Innovation, Bildung, Gesundheit, Erreichbarkeit oder IKT), zusammenfasst, eignet er sich gut zur Differenzierung von strukturstarken und strukturschwachen Gebieten. Er stellt damit die strukturellen Voraussetzungen und Produktionsbedingungen und nicht den tatsächlichen wirtschaftlichen Output in den Europäischen Regionen dar.

Das Problem besteht jedoch in der geringen räumlichen Differenzierung: Einerseits ist die Nuts-2-Ebene in vielen Fällen sehr grob, um regionale Strukturschwächen zu identifizieren. Andererseits ist trotz einer erheblichen Schwankungsbreite innerhalb einiger Mitgliedsstaaten ein deutlicher Niveauunterschied zwischen den Ländern in Bezug auf den RCI-Index zu erkennen. Im Europäischen Maßstab betrachtet befinden sich die meisten Regionen mit niedriger Wettbewerbsfähigkeit in den neuen Mitgliedsländern in Mittel- und Osteuropa sowie in den Mittelmeerstaaten, jedoch nur in Einzelfällen in Zentraleuropa. Um bei der Projektauswahl ganze Staaten wie Deutschland, Niederlande oder Schweden nicht komplett auszuschließen, werden all jene Regionen als „strukturschwach“ qualifiziert, deren Index der Wettbewerbsfähigkeit im Vergleich zum nationalen Durchschnitt niedrig bewertet ist. Damit könnten auch Projekte in den relativ strukturschwachen Gebieten Ostdeutschlands oder Nordschwedens betrachtet werden, während die im nationalen Vergleich relativ gut ausgestatteten Zentralregionen Griechenlands, Bulgariens oder Rumäniens ausgeklammert werden. In kleinen Mitgliedsländern, die nur aus einer einzigen NUTS-2- oder sogar NUTS-3-Region bestehen (wie etwa Zypern oder Luxemburg) und daher kein Bezug zum nationalen Durchschnitt hergestellt werden kann, wird der Durchschnittswert der gesamten EU28 als Referenzgröße verwendet.

Unter Berücksichtigung dieser Überlegungen erfolgt die Auswahl von strukturschwachen Regionen zum Zweck der Projektselektion durch die Kombination von Daten zum Index der Wettbewerbsfähigkeit (auf NUTS-2-Ebene) sowie zum GDP (auf NUTS-3-Ebene). Die Standortregionen der aus den internationalen Projektdatenbanken CASI und SI-DRIVE ausgewählten sozial innovativen Projekte werden dann als „strukturschwach“ gekennzeichnet, wenn diese

- entweder in Bezug auf den RCI-Index der zugehörigen NUTS-2- Region
- oder hinsichtlich des regionalen GDP (pro Kopf nach Kaufkraftparitäten) der zugehörigen NUTS-3-Region

unter dem jeweiligen nationalen Durchschnittswert liegen. Wenn eine NUTS-3-Region einem gesamten Staat entspricht wurde der Vergleich zum jeweiligen EU28-Schnitt herangezogen. Die „urban/rural typology“ der zugehörigen NUTS-3-Region wurde nicht als Selektionskriterium für die untersuchten Projekte verwendet, sondern dient zusätzlich zur groben Charakterisierung der Projektregion.

Annex C. – List of projects

Project	Source	Link(s)
Model Region Thayaland	SI-Drive: Social innovatio in energy supply: case study results	https://www.si-drive.eu/wp-content/uploads/2017/03/SI-DRIVE-Deliverable-D7_3-Energy-1.pdf
Cloughjordan Ecovillage	SI-Drive: Social innovatio in energy supply: case study results	https://www.si-drive.eu/wp-content/uploads/2017/03/SI-DRIVE-Deliverable-D7_3-Energy-1.pdf
Qvinnovindar	SI-Drive: Social innovatio in energy supply: case study results	https://www.si-drive.eu/wp-content/uploads/2017/03/SI-DRIVE-Deliverable-D7_3-Energy-1.pdf
The Drombane/Upperchurch Energy Project	SI_Drive_Survey	https://drive.google.com/file/d/0BwcS7LhL0G-reTJYREFiaVpnbkE/edit www.facebook.com/duenergy
Energiepark Micheldorf-Hirt	SI_Drive_Survey	https://nachhaltigwirtschaften.at/de/edz/projekte/energiepark-micheldorf-hirt.php
Energievision Murau -Socio-technical support model - energy vision Murau	SI_Drive_Survey	http://www.eao.st/cms/projekte/energievision/default.asp
Templederry community wind farm	SI_Drive_Survey	http://www.fedarene.org/wp-content/uploads/2015/10/10-Manage-Energy-Templederry.pdfhttps://tippenergy.ie/projects/templederry-community-wind-farm/
New Guinea Collective	CASI2020	http://neaguinea.org/category/english/
SmartPV	CASI2020	www.smartpvproject.eu
Dorf ist Energie(klug)	CASI2020	https://dorf-ist-energieklug.de
UbiGo mobility service	CASI2020	http://web.viktoria.se/ubigo/las-mer/about-english/
Real Pearl Foundation - Against fuel poverty with biomass briquettes	CASI2020	http://igazgyongy-alapitvany.hu/en/foundation/biobrikett-program/
Sustainable Mobility System of Kaunas University of Technology	CASI2020	http://ktu.edu
Using Olive Remains as a Fuel in a Cement Factory	CASI2020	http://www.cemex.hr/CEMEXzapoceosprojektomzbrinjavanjakominemasline.aspx
Sustainability information centre	CASI2020	http://www.ecolinst.hu/index.php/goemoeri-informacios-koezpont-sp-937947167
Using Crowdfunding to Create an Energy Independent School	CASI2020	https://www.indiegogo.com/projects/energy-independent-school
Udny Community Trust Community Wind Turbine	SIMRA	https://udnytrust.wordpress.com/
Braemar Community Hydro	SIMRA	http://braemarhydro.org.uk/
ACCESS: Assisting Communities to Connect to Electric Sustainable	SIMRA	http://www.accessproject.org.uk/
Heat Smart Orkney	SIMRA	http://www.rewdt.org/
Huntly renewable development project	SIMRA	www.huntlydevelopmenttrust.org