Master's Degree Thesis

Local Businesses on Small Islands: Enabling the Transition to Sustainable Energy

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Abstract

Human activities pressure the socio-ecological system that maintains our quality of life by causing global repercussions such as climate change. The energy system, a major contributor to climate change due to its reliance on fossil fuels makes the transition to sustainable energy an imperative. The purpose of this thesis is to identify focus areas that support businesses in changing their energy habits. This leads to the research question: How can local businesses on small islands become drivers in the transition towards sustainable energy? The Framework for Strategic Sustainable Development (FSSD) enabled us to employ a systems perspective, place sustainable energy into a comprehensive and scientific definition of sustainability, and align our findings' relevance to a strategic approach. The Motivation-capability-implementation-results (MCIR) framework was a suitable tool for our needs. For data collection purposes, literature analysis and a case study on the French island Île d'Oléron were conducted. The main findings of the thesis are that in order for businesses to become drivers in the transition to sustainability energy, Awareness, Consistent and Proactive Political System, Engaged Community, Supporting Infrastructure, Financial Capability and Agile Approach need to be addressed. The six focus areas cover the many barriers and enablers for achieving sustainable energy.

Keywords

renewable energy, energy efficiency, sustainable energy, businesses, islands, systems thinking

Statement of Contribution

Every team member has contributed to the best of their abilities to this research project. Most sections of the report were done together while others were divided into sections that each member had responsibility for. For example, everyone was engaged in finding and reading articles for the literature analysis, although each member focused on different research areas. Everyone was involved in the writing process. Ralph played a significant role in the Introduction chapter, Max in the Methods chapter and Natalia in the Results chapter. Regarding research design, carrying out of methods and written report duties, each team member had a significant and meaningful contribution.

While conducting research on Île d'Oléron, everyone was engaged in developing the data-collection methods, as well as asked relevant questions during the interviews. Besides the common tasks that everyone engaged in, each person had certain areas that they focused on and excelled at.

Apart from the concrete contribution to the writing of the thesis, Max contributed largely to developing the Case Study Protocol, classifying the results from the literature analysis, and worked exceptionally hard on compiling the results that each person had found.

Natalia worked tirelessly on analysing the interviews and classifying the results from the literature analysis into the MCIR table. She was also extremely efficient in administrative tasks, such as keeping track of deadlines, meeting dates, and email correspondence.

Ralph was engaged in developing the Case Study Protocol, and worked extensively with analysing the interviews. He also worked with classifying the results from the literature review into the MCIR table.

Each team member also made a conscious effort to contribute to a positive and uplifting group dynamic, and in moving the thesis closer to its goal.

Karlskrona, Sweden
25 May 2016

Natalia Ginghina Ralph Ferguson Max Jendruk

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We thank Cecilia Bratt for support in refining the thesis subject based on an understanding of what we were looking for and what was available in the academic field. In like manner, we would like to thank Anna Månsson and Daniella Johansson from Energikontor Sydost AB for the introduction to renewable energy in Sweden.

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Merci beaucoup!

Vielen Dank!

Tack så mycket!

Mulţumesc!

Executive Summary

Introduction

The socio-ecological system that we rely on for quality of life is currently facing increased pressure due to the destructive nature of human activities (Jäger and Patel 2012). One of the major questions in the field of sustainability is that surrounding our energy habits. Along with the increased standard of living that energy has contributed to, there have also been many negative effects, of which global warming merits specific consideration. Since most of the energy that is currently used globally comes from fossil fuels, and the relationship between fossil fuel emissions and global warming has, at this point, become incontrovertible, changing current energy habits to transition away from fossil fuels is an imperative (IPCC 2014b).

Global consensus has been mounting in favour of transitioning away from fossil fuels, as can be seen with the United Nations declaring 2014–2024 the Decade of Sustainable Energy for All (United Nations 2014). As small- and medium-sized enterprises (SMEs) constitute 99% of enterprises globally, and are responsible for 13% of global energy consumption (IEA 2015a), it is clear why small businesses play an important role in the transition to sustainable energy, which implies a combination of energy savings, energy efficiency and renewable energy. Islands are especially susceptible to the effects of climate change and the extreme weather conditions caused by it, and therefore benefit from transitioning away from fossil fuels. For these reasons, both businesses and islands merit special attention and serve as good case studies in the transition to sustainable energy.

The research question is therefore formulated as: “How can local businesses on small islands become drivers in the transition towards sustainable energy?”

The purpose of this thesis is to identify focus areas that can contribute to businesses becoming more responsible energy consumers. The focus areas are meant to act as guidance for decision-makers in governing authorities and politics as well as other change-makers whose intention is to support small businesses in this endeavour.

Two frameworks are used in this thesis in order to assist in answering the research question. The Framework for Strategic Sustainable Development (FSSD) enabled us to have a systems perspective when analysing the energy context, to place the goal of our thesis into a comprehensive and scientific definition of sustainability, as well as to align our findings’ relevance to the guidance of a strategic approach. The Motivation-capability-implementation-results (MCIR) framework was a suitable tool for structuring parts of our data in a way that allowed the overview required and recommended by the FSSD.

Methods

The research question was addressed through employing two research tracks, conducted independently from each other, i.e. literature analysis and case study.

The data collection phase for the first research track, literature analysis, provided us with an overview of the broader energy system. It allowed us to extract barriers that inhibit businesses

from transitioning to sustainable energy i.e. obstacles created by political, economic and social conditions, as well as potential enablers that could help overcome these barriers, i.e. possible interventions of governments, policies, prerequisites, incentives, and possible actions by businesses themselves.

We analysed literature on energy efficiency, energy savings, and renewable energy as well as case studies on renewable energy islands, such as Samsø in Denmark and Sumba in Indonesia. We structured the barriers and enablers extracted from the literature as two separate perspectives into the four stages of the MCIR framework. Then we identified categories within the stages and subsequently grouped the barriers and enablers.

The case study was based on the French island Île d'Oléron. This island was a suitable case study as non-renewables were its main source of energy and as the majority of the enterprises on the island were small businesses. For this case study we relied on two types of sources, namely, documentation and interviews. Five interviews were carried out, one with a representative of the local government responsible for energy issues and four with representatives of four local businesses.

The data analysis phase aimed at identifying focus areas that could help change-makers determine necessary actions to create the conditions for small businesses to become drivers in the transition towards sustainable energy. It implied the identification of general themes in both the literature and case study data, the comparison of the two data sets, and finally fusing the knowledge of all previous steps into focus areas.

We paid particular attention to maintaining a broad perspective on the available data, consider the roles of different stakeholders, and identify the focal points for sustainable energy adoption programmes.

Results

We start by giving an overview of the literature analysis results and continue with the case study results. The final section brings together the results from those two research tracks.

The barriers and enablers sorted into the MCIR framework (see Appendix B) from the literature analysis can be clustered into five themes that extend over multiple stages of the framework. The themes are Complexity, Community Engagement, Information and Knowledge, Technical and Administrative Infrastructure, and Financial Incentives and Funding. Selected barriers and enablers are listed in Table 1.

We identified four themes as a result of the case study interviews and written reports. These themes are Business Context, Behaviour Showing Awareness, Connection to Place and Community, and Support Needed. The interview transcripts are available in Appendix C. Table 2 lists a selection of extracted elements.

Most of the barriers and enablers identified by the general literature are mentioned by the case study data as well. Examples are the NIMBY-attitude, the landscape protection laws, and the potential for reduced cost. Some elements are referred to from different perspectives. One example is customer demand of green products as an enabler.

Table 1. A selection of barriers and enablers resulting from the literature analysis

	Barriers	Enablers
Complexity	Split incentives /owner-tenant / principal-agent	Address barriers in a holistic manner Consider the instrument's framework conditions No "natural" superiority of any instrument
Community Engagement	NIMBY – residents, businesses, local government representatives	Local ownership – economic and decision making Direct benefits from successful projects Renewable energy cooperatives Strong cultural identity
Information and Knowledge	Lack of knowledge of benefits for communities and individuals of renewable energy projects Asymmetric calculation of costs (renewables seem more expensive) Jevons paradox – energy savings leading to increased energy use	Information campaigns and education (public awareness activities, direct marketing, door to door visits) Technical support, e.g. ESCos and independent consultants Efficiency improvements coupled with conservation policies
Technical and Administrative Infrastructure	Unstable policies Lack of strong, dedicated institutions High administrative burden Lack of energy policies and political instruments	Clear and transparent measures Grid designed to take in decentrally produced electricity Diversified energy portfolio (energy sources and pathways)
Financial Incentives and Funding	High initial capital demand Energy costs too small part of total expenses Limited financial means	Competitive advantage High fossil fuels taxes Financial assistance (subsidies, mortgages, tax incentives)

Table 2. A selection of elements resulting from the case study

Business Context	• 70.64% of total businesses on the island are self-employed citizens, 26% of them have one to nine employees • solar power is the most feasible renewable energy source • landscape protection may affect up to 34% of the surface • 2050 vision of positive energy island is in place (no fossil fuels and production of renewable energy exceeds the consumption). • The interviewed businesses employ from one to 30 people.
Behaviour Showing Awareness	• The local government initiated a project to identify public or private land suitable for bigger investments in photovoltaic panels i.e. surfaces of over 100sqm. • The campsite installed a transformer allowing the use of reactive power and different renewable energy technologies. • Vignerons d'Oléron invested in a more efficient heating system for the boiler used in the distillation process.
Connection to Place and Community	• Climate change was one of the main concerns for the oyster farm which experiences increased oysters mortality due to increased sea temperature and sees a migration of Southern oyster species to their region

Support Needed	• Financial support from the local government, e.g. subsidies • Incentives for businesses to decrease their consumption, e.g., through higher prices for fossil fuel energy • Counselling from the local government or any public agency • Higher awareness level about sustainability issues among customers, suppliers, partners and other stakeholders

Discussion

The discussion identifies prominent similarities, differences and questions arising from our results. The seven categories based on interpreting the results are Interconnectedness of Barriers and Enablers, Addressing Financial Barriers, Government Involvement, Voluntary and Compulsory Measures, Energy Paradox, Awareness and Societal Engagement.

Based on the gained insights, in the second part of the discussion we derive six focus areas that aim to answer the research question: "How can local businesses on small islands become drivers in the transition towards sustainable energy?" They acknowledge the role of local governments and the community as key stakeholders influencing the context in which businesses operate and are further detailed below.

Awareness. The level of awareness of governments, businesses and communities directly affects the motivation and ability of society to implement sustainable energy projects. The term awareness addresses two perspectives. The first is the knowledge of needs and opportunities with respect to the transition towards sustainable energy, climate change and the broader sustainability challenge. The second perspective of this focus area is to support a general way of thinking that is in line with a strategic systems approach.

Consistent and Proactive Political System. Investors' motivation and ability to pursue sustainable energy projects is heavily dependent on a stable and engaged political system. Political bodies on all levels, i.e. from local to global, need to cooperate and align their policies.

Engaged Community. Customers and social surroundings have an immediate influence on businesses. The participation of local community can reveal issues that need attention in order for projects to be allowed to continue or it can suggest solutions that are not visible for other stakeholders. On small islands, the strong bond to the surrounding nature and between people is a potential that should be utilised.

Supporting Infrastructure. Technical infrastructure, such as the electricity grid, needs to be prepared to cope with decentralised, intermittent sources of energy in order to allow small producers to sell excess energy to the grid.

Financial Capability. Investments in sustainable energy projects need to be financially feasible, as economic considerations are the determining factor for business decisions. There are generally two areas that need to be addressed: financial support in the initial phase and financial incentives during the operation phase.

Agile Approach. The success of any sustainable energy project will additionally depend on the stakeholders' attitudes. This area implies understanding the specific situation of a business or community in order to make informed decisions regarding supporting measures, iterating to find suitable solutions and employing long-term thinking to allow results to become possible by creating space for investments to pay back.

Future research could address validation of the six focus areas in a concrete context. Additional focus areas might be needed if the scope is expanded to include also transportation and businesses' supply chain.

Conclusion

This project started from the idea that sustainability in the area of energy would be the result of the use of energy efficient products and processes, and production of renewable energy. We have analysed literature and pursued a case study for identifying barriers and enablers in relation to the goal above and a selection of most strategic approaches.

The outcome of our research, the six focus areas, Awareness, Consistent and Proactive Political System, Engaged Community, Supporting Infrastructure, Financial Capability, and Agile Approach, cover the many barriers and enablers for achieving sustainable energy. Additionally, they ensure increased political independence and an energy system that is more resilient to natural disasters. The direction given by the focus areas also leads to a number of other benefits for society. Examples are strengthened relationships and trust as a result of the involvement of local citizens as owners and in decision-making processes.

We recommend these six areas in order to avoid the fallacy of investing in individual measures that disregard the broader perspective and are therefore meant to fail in permanently solving global issues.

Within the bigger picture of the sustainability challenge, our research offers guidance for changing the course of one of the biggest systemic errors of modern civilisation, i.e. its heavy reliance on fossil fuels. It has to be noted, however, that an energy supply sector based on sustainable energy as envisioned in this thesis, does not imply full sustainability. Especially social sustainability issues, which we excluded from the scope of this thesis, may still occur.

Glossary

Agenda 21. Non-binding, voluntarily implemented action plan concerned with sustainable development. It is the major outcome of the UN Earth Summit held in Rio de Janeiro, Brazil in 1992.

Backcasting. Approach that supports planning and decision-making where one creates a vision of the future and then puts oneself in the current situation and starts taking actions towards that vision; part of the *Success* level of the FSSD (Broman and Robèrt 2015).

Barriers. Obstacles created by political, economic and social conditions that inhibit businesses to move towards sustainable energy. See also *enabler*, *sustainable energy*.

Communauté de communes (CDC). A federation of municipalities in France in which common tasks are carried out together.

Enabler. Anything that can help to overcome barriers, i.e. possible interventions of governments, policies, motivators, prerequisites, incentives, necessary conditions and possible actions by businesses. See also *barrier*.

Energy Efficiency. The state or quality of using less energy to provide the same or improved level of service (Goldman et al. 2010).

Energy Security. Interconnection between national security and availability of natural resources used for energy production.

Fossil Fuel. A fuel such as petroleum, coal, and natural gas formed by natural processes in the geological past. See also *non-renewable energy*.

Framework for Strategic Sustainable Development (FSSD). A conceptual framework designed to assist in the understanding of sustainability through a systems perspective as well as assist in sustainability-focused planning processes.

Jevons Paradox. Occurs when the more efficient use of a resource, actually increases the overall consumption of the resource.

MCIR Framework. Motivation-capability-implementation-results Framework, conceptual generic framework addressing energy efficiency and proposed by Chai and Yeo (2012).

Non-renewable Energy. Energy obtained from a natural source not capable of being replenished on a human timescale, such as fossil and nuclear fuel. The opposite of renewable energy. See also *fossil fuel*, *renewable energy*.

Renewable Energy. Energy obtained from the continuous or repetitive currents of energy recurring in the natural environment (Twidell and Weir, 1986). See also *non-renewable energy*, *sustainable energy*.

Small- and medium-sized enterprises (SMEs). Enterprises with up to 250 employees.

Sustainable Energy. A combination of energy savings, energy efficiency and renewable energy. See *renewable energy*, *energy efficiency*.

Sustainability Principles. Part of the definition of success in the *Success* level of the FSSD. The Sustainability Principles define the boundaries of a sustainable society and comprise three ecological and five social principles (Broman and Robèrt 2015, 7):
In a sustainable society, nature is not subject to systematically increasing …
1. … concentrations of substances extracted from the Earth's crust
2. … concentrations of substances produced by society
3. … degradation by physical means

and, in that society, people are not subject to structural obstacles to …
4. … health
5. … influence
6. … competence
7. … impartiality
8. … meaning-making

List of Abbreviations

5LF	5-Level Framework
CEO	Chief executive officer
COP21	2015 United Nations Climate Change Conference
CSR	Corporate social responsibility
ESCo	Energy service company
EU	European Union
FSSD	Framework for Strategic Sustainable Development
GDP	Gross domestic product
GHG	Greenhouse gas
MCIR	Motivation-Capability-Implementation-Results
NIMBY	Not in my backyard
R&D	Research and development
SMEs	Small and medium-sized enterprises
SSD	Strategic sustainable development
TEPOS	Territoire à Énergie Positive
UN	United Nations

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List of Figures and Tables

1 Introduction

The socio-ecological system, that maintains our quality of life, is currently facing increased pressure due to the destructive nature of human activities (Jäger and Patel 2012). One of the major questions in the field of sustainability concerns energy consumption, as most of the energy that is currently used comes from fossil fuels (IEA 2015b). As the relationship between fossil fuel emissions and global warming has, at this point, become incontrovertible, changing current energy habits is an imperative (IPCC 2014b). This is especially apparent as over 80% of energy that is currently used globally is from natural gas, oil and coal (Boyle 2012). This chapter addresses the role that businesses play as energy consumers, and outlines why it is important for them to change their current energy habits. Our research will aim at providing focus areas that can support local businesses' transition towards sustainable energy.

1.1 Sustainability Challenge

For most of humanity's history, the influence of humans on the biosphere – the part of the Earth where humanity and all other life exists – was negligibly small (Robèrt 2015, 5–7). This changed with the industrial revolution (Doppelt 2003, 7). Human society has since then increased in both size and economical power. From the 1950 to 2016 world population tripled from 2.5 billion to 7.5 billion and is likely to increase by more than one billion people within the next 15 years (United Nations 2015c). From 1960 to 2015, the worldwide gross domestic product (GDP) increased about sevenfold (Tani 2016). This growth has had many positive effects, such as better living standards and higher life expectancies.

However, along with these improvements, systemic errors have been introduced that now undermine the biosphere's capacity to sustain life. For example, anthropogenic greenhouse-gas (GHG) emissions have led to climate change, ocean acidification, shrinking glaciers and ice sheets, and rising global sea levels (IPCC 2014b); systematic deforestation in turn is likely going to lead mass extinction of species (Brook 2003; Sodhi 2010). Moreover, this development is not happening at a constant rate, but has been systematically increasing. As industrial demand in resources increases, availability of natural resources decreases; a phenomenon that is called the "Great Acceleration" and shown Figure 1.1.

Similarly to the environmental problems, social issues such as poverty, inequality, and worker abuse have not been eliminated. In fact, they are still prevalent in many countries (Amnesty International 2016). The systemic errors within society and the prevalent obstacles to fixing these errors, as well as the potential opportunities that could arise from overcoming these together, compose the sustainability challenge (Robèrt et al. 2015).

In December 1987, the Brundtland Commission published a report called "Our common future" in an effort to unite countries to pursue sustainable development, which they defined as the "development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (Brundtland 1987). In other words, it is the active transition from humanities current unsustainable path towards a socially and ecologically sustainable society. Twenty-seven years later, this goal still has not been achieved.

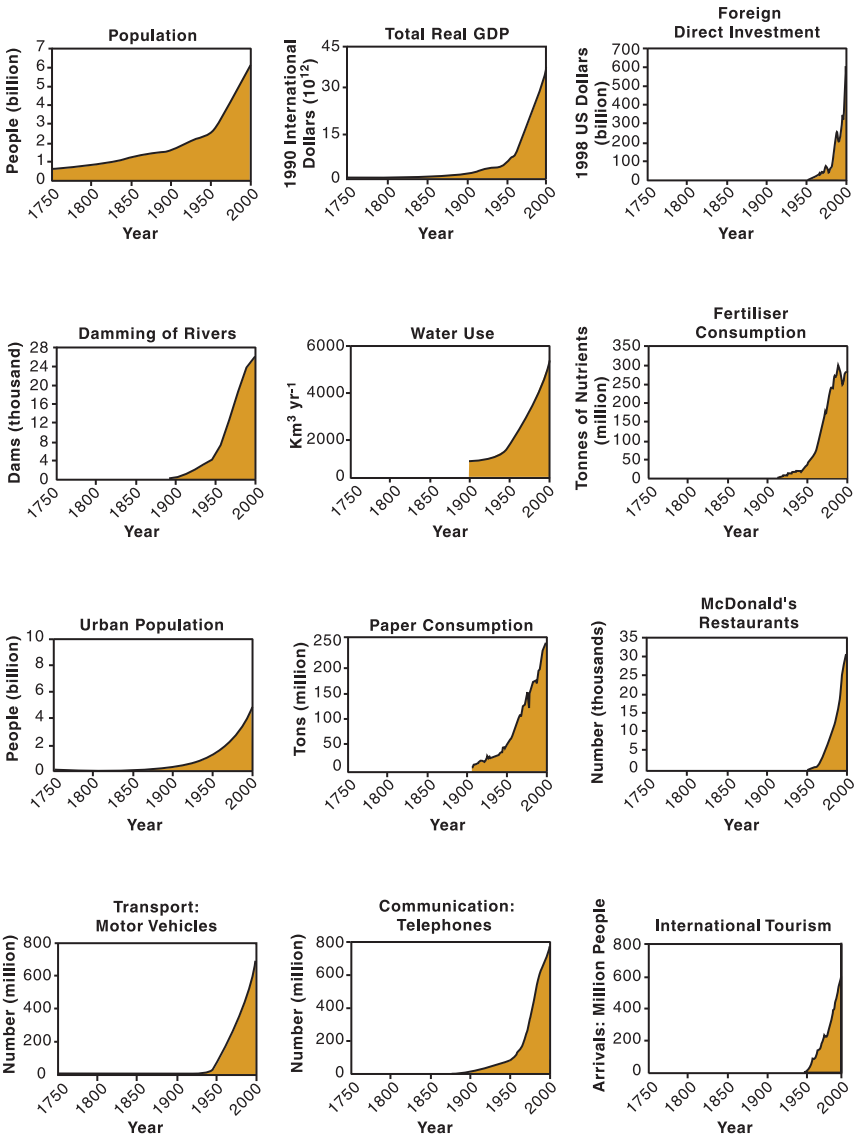

Figure 1.1 The Great Acceleration (Steffen et al. 2004)

1.2 The Energy Supply Sector

One of the greatest challenges that we currently face is climate change. Compelling evidence is given by the fact that during the 2015 United Nations Climate Change Conference (COP21) in Paris, 195 countries reached an agreement, known as the UN Paris Agreement, to "combat climate change and unleash actions and investment towards a low carbon, resilient and sustainable future" (United Nations 2015b). The Paris Agreement's main goal is to keep the global temperature increase below 1.5 °C (United Nations 2015a).

In the endeavour to curb GHG emissions, particular attention should be paid to the energy supply sector, which accounted for 35% of global emissions in 2010 (IPCC 2014a). In 2013, fossil fuels, such as natural gas, oil, and coal, stood for 81.4% of the total primary energy supply; an issue that has not dramatically improved since 1973 when 86.7% of energy consumed worldwide came from fossil fuels (IEA 2015b). Based on studying the trends in the

sustainability science research, Kajikawa, Tacoa, and Yamaguchi (2014, 436) claim that the energy topic has received increasing attention from scientists in the past years. This highlights the increasing relevance of energy in the academic field as complementary to the political discourse and its priority on global issues agenda.

1.3 Sustainable Energy

Although a number of variations for the definition of renewable energy exist, the one used in this thesis is "energy obtained from the continuous or repetitive currents of energy recurring in the natural environment" (Twidell and Weir, 1986). Common renewable energy sources are solar energy, wind power, hydropower, bioenergy, wave power, tidal energy and geothermal energy, and all of these sources are in line with the aforementioned definition of renewable energy (Boyle, 2012). In the thesis we have not focussed on the term renewable energy, but rather sustainable energy. The reason for this is because renewable energy concerns itself primarily with the source of the energy, and does not take into account the amount of energy consumed. Therefore, we have included energy efficiency in our definition of sustainable energy. The Lawrence Berkeley National Laboratory has defined energy efficiency "using less energy to provide the same or improved level of service" (Goldman et al. 2010). Prindle et al. (2007) state that renewable energy and energy efficiency are the two pillars of sustainable energy, as they address the need to change the source of energy to renewables, as well as address the behaviour regarding energy consumption. The Association NégaWatt (n.d.) outlines a similar approach to sustainable energy on their website, which is based on three principles: "energy sufficiency (favouring low energy services and lifestyles), energy efficiency (ensuring that energy is used in the most productive way), and renewables (developing first the greenest forms of energy for our supply)".

1.4 The Framework for Strategic Sustainable Development (FSSD)

As the socio-ecological system is complex, i.e. consists of interacting components that have nonlinear and complex relationships between one another, having an overarching understanding of sustainability is necessary in order to make real progress (Jäger and Patel 2012). Researchers such as Chai and Yeo (2012) have identified the necessity to understand energy efficiency through a systems perspective, yet there lacks research on approaching sustainable energy through a systems perspective. Thus, having a framework which facilitates systems thinking, and provides a comprehensible and scientific definition of sustainability, is necessary.

The Framework for Strategic Sustainable Development (FSSD), developed by Broman and Robèrt (2015), is a framework designed to assist in the understanding of sustainability through a systems perspective as well as assist in sustainability-focused planning processes. The FSSD is the name given to the Five Level Framework (5LF) when the 5LF is applied to strategic sustainable development (SSD). The FSSD consists of five levels: The *System* level, the *Success* level, the *Strategic* level, the *Actions* level and the *Tools* level. Table 1.1 briefly outlines the most relevant levels for our research. The *Systems* and *Success* levels are relevant for the scope of this thesis, while the purpose of the thesis is to contribute to the *Strategic* level of the FSSD. The *Actions* level are the actions that can be taken in moving towards

sustainability. The actions should be informed by the *Success* level, as well as be in line with the strategies outlined in the *Strategic* level. The *Tools* level consists of the tools and other forms of support, such as measuring results of actions taken, that can be used in moving towards sustainability.

The FSSD allows us to contextualise our thesis within a scientific understanding of sustainability. Sustainable energy development contributes to the *Success* level of the FSSD, as it addresses fossil fuel consumption. Fossil fuels directly contribute to nature being subject to systematically increasing 1) concentrations of substances extracted from the Earth's crust; 2) concentrations of substances produced by society; as well as 3) degradation by physical means. At the same time, the industry surrounding fossil fuels affects also the social sustainability principles.

The FSSD supports us in building a better understanding of how our findings are relevant in transitioning towards sustainability. By contributing primarily to the *Strategic* level, our recommendations will assist in choosing actions that support society's transition to sustainable energy, address relevant points in the sustainability challenge and thus support moving towards sustainability.

Table 1.1 Description of the first three levels of the FSSD as most relevant for this thesis

System	The *System* level is the global socio-ecological system in which life exists. This level includes society, the biosphere and the lithosphere, as well as all of their subsystems.
Success	The *Success* level is the "vision" of what success is; which in the case of the FSSD, is sustainability. Broman and Robèrt (2015) state that there are eight principles that define the conditions that need to be met in order for society to be sustainable. The first three are environmental principles stating that nature is not subject to systematically increasing 1) concentrations of substances extracted from the Earth's crust; 2) concentrations of substances produced by society; 3) degradation by physical means. The last five are social principles stating that people are not subject to structural obstacles to 4) health; 5) competence; 6) influence; 7) impartiality; and 8) meaning-making (Broman and Robèrt, 2015).
Strategic	The *Strategic* level consists of guidelines which can assist in strategically moving towards sustainability – which is defined in the *Success* level. The FSSD has a number of generic strategies that can be used in moving towards sustainability; however, this is not a prescriptive level as innumerable strategies can be added, and as the chess analogy that Robért and Broman give, "there are almost uncountable possible routes towards checkmate".

1.5 MCIR Framework

The Motivation-capability-implementation-results (MCIR) framework is a conceptual generic framework consisting of four stages engaged in a feedback loop (Chai and Yeo 2012, 460). The four stages of the framework are Motivation, Capability, Implementation, and Results and represent the different phases of the adoption process of energy efficient technology (Chai and Yeo 2012, 468). The feedback loop symbolises the positive results feeding into the motivation stage of successful investments. Using the results stage as an example, evidence of positive results potentially motivates further investments, whereas lack of evidence of positive results or experience of negative results most likely become additional barriers for future projects (Chai and Yeo 2012, 469). Figure 1.2 illustrates the four stages and feedback loop.

We have chosen to use the MCIR framework in our research for three reasons. All the reasons are in relation to the contribution it brings, as a tool, to the *Systems* level of the FSSD. Firstly, the MCIR framework supports gaining a holistic perspective on the barriers that inhibit businesses to adopt energy efficient technology (Chai and Yeo 2012, 471). It considers the complete technology adoption process as well as the relation between adoption programmes through the feedback loop (Chai and Yeo 2012, 469). This is in line with the FSSD intention to avoid seeing only individual aspects of the system. Secondly, the MCIR framework acknowledges the need to have an understanding of the different actors by showing their roles and responsibilities within the stages (Chai and Yeo 2012, 471). Paying attention to the different stakeholders is another way of understanding the system. Lastly, the authors of the MCIR framework claim that it can facilitate the identification of stages that need improvement in terms of policies and help formulate policies and actions accordingly (Chai and Yeo 2012, 471). The understanding of the system is facilitated in this way by avoiding focus on just one stage, e.g. the motivation stage.

Given its intended usage, the MCIR framework can be suitable also for an analysis of renewable energy projects. Therefore, the same arguments above apply for both main parts of the sustainable energy goal.

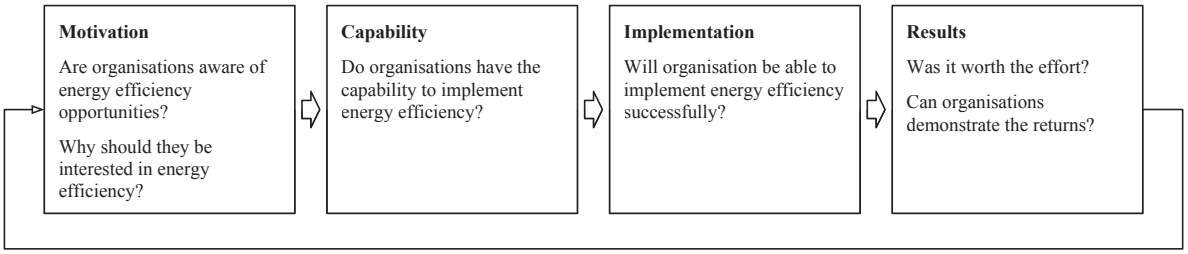

Figure 1.2 Motivation-capability-implementation-results (MCIR) framework (Chai and Yeo 2012, 468)

1.6 Local Businesses on Small Islands

The global consensus regarding the urgent need to transition towards sustainable energy has become clear with overwhelming support for the United Nation's Paris Agreement shown in December 2015 (United Nations 2015a), as well as the unanimous declaration from the General Assembly in making 2014–2024 the Decade of Sustainable Energy for All (United Nations 2014). The Paris Agreement and other similar global initiatives emphasise the importance of making climate change a priority internationally. Yet, in order to materialise the transition towards sustainability, businesses need to take responsibility and be leaders in the process and work towards the same goal (Torres-Rahman et al. 2015).

Small- and medium-sized enterprises (SMEs), which the EU defines as enterprises with up to 250 employees, constitute 99% of enterprises globally, and are responsible for 13% of global energy consumption (IEA 2015a). Energy makes up for 7–11% of businesses' total costs, and 30–35% for businesses that have highly intensive energy habits (Leloux, Harkema, and Popescu 2015). These statistics show that businesses can have potential gains by changing their energy habits, while also contributing to the transition to sustainable energy.

Researchers like Meath, Linnenluecke, and Griffiths (2016), stated their intention "to contribute to the small but emerging body of literature on SME engagement in voluntary energy efficiency actions and programmes." When considering the important role that businesses play in global energy consumption, it is clear that more work needs to be done in understanding how to transition them towards sustainable energy.

Islands, in a similar way to businesses, can benefit from transitioning to sustainable energy. Remote islands that are not connected to national grids stand to gain a higher level of energy autonomy, and mitigate the risks that come with having unsustainable fuels physically transported to them, and thus increase energy security (Kuang et al. 2016). Kuang et al. (2016) also claim that islands are especially susceptible to the effects of global warming as global warming can cause harsh weather conditions and rising sea levels. The latter applies especially to islands that have low elevation and large coastal zones.

1.7 Purpose

The purpose of this thesis is to identify focus areas that can contribute to businesses changing their habits in order to support the transition to sustainable energy. The focus areas are meant to act as a guidance for decision-makers in governing authorities and politics as well as other change-makers whose intention is to support small businesses in this transition. Their purpose is hence to enhance the *Strategic* level within the FSSD, in the context of sustainable energy, by helping to prioritise strategic moves.

1.8 Research Question

The research question is formulated as:

> How can local businesses on small islands become drivers in the transition towards sustainable energy?

1.9 Scope and Limitations

We identified local businesses on small islands as an appropriate scope for this study. The intended audience of our research is decision-makers and change-makers in the energy sector in such communities. Examples of interested parties in our research are local governments, local businesses and pioneers in sustainable energy.

The scope of this thesis includes the environmental sustainability principles, i.e. nature is not subject to systematically increasing 1) concentrations of substances extracted from the Earth's crust; 2) concentrations of substances produced by society; 3) degradation by physical means. The social sustainability principles in contrast are not addressed.

Similarly, energy use in transportation is not included in this research.

The possibilities to validate the relevance and accuracy of the resulting focus areas were limited for this project due to time considerations.

2 Methods

Our research question was addressed through employing two research tracks, conducted independently from each other, i.e. a literature analysis and a case study. This chapter divides between data collection and data analysis for each of the tracks. *Section 2.1* explains the data collection. *Section 2.2 Data Analysis* describes how we identified broad themes meant to structure the results. This section also includes a description of the process used to derive focus areas that need to be given attention to in order to help small businesses become drivers in the transition towards sustainable energy.

2.1 Data Collection

In order to understand how businesses could transition towards sustainable energy, we needed to get an overview of the broader energy supply sector and the interactions between the different aspects within this system. This phase was required and supported by the *Systems* level of the FSSD. As a means to increase validity, we pursued two tracks of data collection, a literature analysis and a case study on an island community. *Section 2.1.1 Literature Analysis* explains how we conducted the analysis with the help of the Motivation-Capability-Implementation-Results (MCIR) framework. *Section 2.1.2 Case Study* describes the methodology of the case study.

2.1.1 Literature Analysis

The aim of the literature analysis was to get a comprehensive overview of barriers that inhibit businesses from transitioning to sustainable energy i.e. obstacles created by political, economic and social conditions, as well as potential enablers that could help overcome these, i.e. *possible interventions* of governments, *policies*, *motivators*, *prerequisites*, *incentives*, necessary *conditions* and *possible actions* by businesses. We analysed literature on energy efficiency, energy savings, and renewable energy as well as case studies on renewable energy islands, such as Samsø in Denmark and Sumba in Indonesia.

Literature was both retrieved through recommendations and online database queries. The queries were performed using the keyword *business*, *government*, *policies*, *island*, *energy efficiency*, and *renewable energy* as well as synonyms thereof. Additionally, we included other relevant sources that had been cited by the examined articles. The final selection of literature included 17 documents, i.e. Chai and Yeo (2012), EPA (2010), Fengzhen et al. (2005), IEA (2011), IIEEE (2009), Lambooy and van ‘t Foort (2013), Langlois-Bertrand et al. (2015), Leloux et al. (2015), Lund (2007), Meath, Linnenluecke, and Griffiths (2016), Möller et al. (2012), Parthan et al. (2010), Reiche and Bechberger (2004), REScoop (2014), Ringel (2006), Sperling et al. (2011), and Wieg (2013).

Following the document retrieval, we systematically extracted and classified all information relating to barriers and enablers. In the next step, we grouped the barriers and enablers using the MCIR framework described below.

MCIR Framework. As mentioned in *Chapter 1 Introduction*, the MCIR framework is a conceptual generic framework consisting of four stages including a feedback loop. It can be seen as a tool within the FSSD that helps to establish a particular perspective of the system.

This section explains the reasons behind choosing the MCIR framework, its application within the literature analysis and how it helped us to gain an understanding of the system.

As mentioned earlier, the literature analysed had either of two broad categories, energy efficiency or renewable energy. The MCIR framework, however, was originally only created for addressing energy efficiency barriers. It was developed by applying a systems perspective that is informed by the following assumptions (Chai and Yeo 2012, 468):

- The industrial sector is a heterogeneous system, comprising various actors that differ in terms of corporate social responsibility (CSR), energy intensiveness, size, etc.
- Technological, organisational and behavioural barriers are interconnected and therefore, influence each other.
- Organisations and governments have different objectives, leading to conflicts of interest that often result in trade-offs.
- The adoption of energy efficiency should be regarded as change processes.

After examining the framework and these assumptions, we assessed that it can be applied to renewable energy as well.

We applied the MCIR framework in the following manner. We sorted the barriers and enablers that were extracted from the literature separately into the four stages of the framework. Then we identified categories within the stages and subsequently grouped the barriers and enablers. The authors of the MCIR framework proposed categories in their paper, which we adopted and adapted where appropriate, guided by our findings from the literature. Table 2.1 outlines the template we used.

The validity of these findings was ensured by triangulation between the authors, i.e. every document was analysed and the findings grouped by all three authors. The individual results were subsequently compared, discussed, and merged.

Table 2.1 Used template for the MCIR Framework analysis

Stage	**Category**	**Perspective 1: Barriers**	**Perspective 2: Enablers**
Motivation	Category 1	• Barrier 1 • Barrier 2	• Enabler 1 • Enabler 2
	Category 2		
Capability			
Implementation			
Results			

The feedback loop was used during data collection for ensuring that elements were placed in the first stage that they affect and therefore inherently hinder the rest of the project development. Several elements will nevertheless be found under several stages, as there can be circumstances in which other elements neutralise their effect in one stage but not in another. The feedback loop also informed our thinking in the data analysis phase.

Grouping the barriers and enablers according to the MCIR framework created the conditions for us to identify themes in the data analysis phase that otherwise would not have been apparent.

2.1.2 Case Study on Île d'Oléron

The case study was based on the French island Île d'Oléron. This island was a suitable case study as its main source of energy was non-renewable and provided by the French national grid. The island also consisted predominantly of small businesses as over 70% of the businesses registered on the island were self-employed. The local government on Île d'Oléron showed eagerness to collaborate in this research project and had already adopted a vision of having 100% sustainable energy by 2050, meaning that the findings of our research would be useful to them.

For this case study, we relied on two types of sources, namely, documentation and interviews. Approaching the different sources from the perspectives of the three researchers allowed us to triangulate between findings and thus, increase their validity.

The collaboration with the local government, the Communauté de Communes (CDC) de l'Île d'Oléron, more specifically with Delphine Le Page as the local project manager for the national project Territoire à Énergie Positive (TEPOS), supported our research with relevant data about the community's current energy-related behaviour and facilitated the contact with the interviewed local businesses.

Case Study Protocol. A case study protocol was created and maintained to structure the overall process as well as to provide support for planning and conducting the interviews. Inspired by the proposal by Yin (2003), the protocol consisted of questions to be studied, study propositions – guiding statements that "[direct] attention to something that should be examined" (Yin 2003, 22) – field procedures, and case study questions. Yin (2003, 74) divides case study questions into five levels. However, we only deemed the first and second level applicable to our study and split our questions accordingly. The main difference between the two levels is that Level 2 questions are directed at the investigator and can be regarded as reminders of information to be collected, whereas Level 1 questions are the concrete questions posed to interviewees and derive from Level 2 questions (Yin 2003, 74f.). The complete case study protocol can be found in Appendix A.

Documentation. For the retrieval of documents and information in general, we relied on the aforementioned representative of the local government, who was responsible for efforts within the energy sector. Through our contact person the TEPOS manager on Île d'Oléron we had access to documents about the island summarising current actions in the field of sustainable energy, as well as the island's scenarios and goals with respect to this subject. We retrieved data from following documents: CDC Île d'Oléron 2016–2030 TEPOS Action Plan (2015); Renewable Energy Potential for Île d'Oléron, Appendix (2015); Oléron Island Energy

Overview 2011–2014, AREC (2015); TEPOS Oléron Stakeholders (2015); Oléron Energy Overview AREC (2014)

The method employed for data collection was to search for elements and themes as apparent from the case study protocol.

Interviews. Five interviews were carried out during a field trip on the island that took three and a half days. All interviews were recorded and the transcription is available in Appendix C.

One interview was held with the representative of the local government, the TEPOS manager, and had a structured format, i.e. followed a preset script (Savin-Baden and Major 2012, 358). It took approximately an hour and was held in English. Our intention was to understand the local context, including energy commitments and current actions in place on the island. The complete list of questions is included in the case study protocol in Appendix A. Additional questions were addressed and answered by online correspondence during the research project.

We interviewed four representatives of four businesses located on the island. They were suggested by the local government representative based on diversity of activity domain and business context. The local government representative participated in the interviews and supported with partial or full translation between French and English. Basic details about the four businesses including contact person are listed in Table 2.2.

Each business interview lasted between two and three hours, was conducted on-site, and included a presentation and tour of the facility. The purpose of the interviews was exploratory, i.e. to learn about the operations of the business, and to gather information about aspects relating to sustainable energy. The latter included the businesses' motivators and barriers for adopting sustainable energy, general concerns, perceived influence in the community's sustainable development efforts and their opinion about the local government's goals and actions.

We chose to conduct the interviews in a semi-structured way to allow for a degree of freedom while still maintaining an overall direction in the line of questioning. Also semi-structured interviews follow preset questions, but differ from structured interviews by including "additional questions in response to participant comments and reactions" (Savin-Baden and Major 2012, 359). As mentioned earlier, preset questions were derived from Level 2 questions. The preset list of questions is included in the case study protocol in Appendix A.

Table 2.2 Interviewed businesses

Business	**Business Type**	**Contact Person**	**Position**
Montauzier	Oyster farm	Sophie Montauzier	Owner
Les Gros Joncs	Campsite	Christophe Cavel	Owner
Vignerons d'Oléron	Vineyard cooperative	Pierre-Luc Alla	Manager
Ocqueteau	Boat manufacturer	Arnaud Ducoudert	Procurement Manager

2.2 Data Analysis

The aim of this phase was to identify focus areas that could help change-makers determine necessary actions to create the conditions for small businesses to become drivers in the transition towards sustainable energy.

During the data analysis, we made use of the backcasting approach mentioned in the FSSD. When backcasting, one creates a vision of the future and then puts oneself in the current situation and starts taking actions towards that vision (Broman and Robèrt 2015). Using the backcasting approach, and having in mind the goal of small businesses as drivers, the overarching question that informed the data analysis was: "What conditions / prerequisites need to be in place for small businesses to become drivers in the transition towards sustainable energy?"

This section divides into the identification of general themes in both the literature and case study data, the comparison of the two data sets, and the process of deriving focus areas. The general themes were an intermediate step that we used as a starting point towards the focus areas. A theme is defined as a group of barriers and enablers clustered based on addressing a recurrent topic.

2.2.1 Literature Data

We used an iterative approach to identify themes in the literature data. The initial themes were chosen based on the following criteria:

- The theme / topic was mentioned by a large number of documents.
- The theme / topic expands over multiple stages or categories in the MCIR framework.

From there, the themes were iteratively refined by comparing them against the data set and asking the following questions:

- Are the themes relatively distinct and do not overlap each other? (Note: due to the characteristic of the domain, a certain level overlap was inevitable.)
- Can themes be merged?
- Are all barriers and enablers covered?

As with the information extraction and categorisation into the MCIR framework, the validity of these findings was ensured by triangulation between the authors, i.e. by comparing, discussing, and eventually merging the individual results.

2.2.2 Case Study Data

We used a similar iterative approach to identify themes in the data from the case study, i.e. interviews and written reports.

The themes were initially structured starting from the expected outcome after the creation of the case study protocol (see Appendix A). The results were clustered based on the patterns revealed by the reports and the answers during the interviews.

Simultaneously, the themes were iteratively refined by comparing them against the data set and asking the following questions:

- Are the themes relatively distinct and do not overlap each other? (Note: due to the characteristic of the domain, a certain level overlap was inevitable.)
- Can themes be merged?
- Is all relevant data covered?

As with the methodology used for the extraction and categorisation of literature into the MCIR framework, the validity of the themes resulting from the case study was ensured by triangulation between the authors, i.e. by comparing, discussing, and eventually merging the individual results.

2.2.3 Comparison between Literature and Case Study

For increased validity, we compared the findings from the two tracks of our research, the literature analysis and case study data.

Similar to the methodology for identifying themes within the two tracks, the following criteria were used:

- The barrier / enabler was mentioned by both literature and the case study data.
- The barrier / enabler was outstanding, i.e. mentioned in only one of the research tracks.
- The barrier / enabler of one track addressed an aspect similar to what is mentioned by the other research track but contradictory or adding a new nuance.

The outcome of this step was insights for the aspects discussed under *Section 4.1 Interpreting Results* and subsequently *Section 4.2 Deriving Focus Areas*.

2.2.4 Deriving Focus Area

Once we had found the themes in the two tracks and had compared the results, we could derive the focus areas. Firstly, any issues that needed further consideration were discussed. Secondly, the themes and insights from the comparison of the two research tracks and the discussed issues were fused into the focus areas. As with the information extraction and categorisation into the MCIR framework, the validity of these findings was ensured by triangulation between the authors, i.e. by comparing, discussing, and eventually merging the individual results and opinions.

We paid particular attention to maintaining a broad perspective on the available data, to consider the roles of different stakeholders, and to identify the focal points for sustainable energy adoption programmes.

The FSSD was of great help to, for all decisions, remember the systems perspective, the definition of sustainable energy within the broader sustainability goal as defined by the *Success* level and the purpose of the focus areas to support the *Strategic* level.

The MCIR framework was a valuable tool for structuring data in a way that allowed the overview required and recommended by the FSSD.

3 Results

The results section summarises the findings from the two tracks employed as research methodology and used for answering the research question "How can local businesses on small islands become drivers in the transition towards sustainable energy?" We start by giving an overview of the literature analysis results and continue with the case study results. The final section brings together the results from the literature analysis and those from our case study. Most relevant similarities, differences and resulting questions are addressed in *Chapter 4 Discussion*.

3.1 Literature Analysis

The barriers and enablers sorted into the MCIR framework can be clustered into five themes that extend over multiple stages of the framework. The themes are Complexity, Community engagement, Information and Knowledge, Technical and Administrative Infrastructure, and Financial Incentives and Funding. Table 3.1, 3.2, 3.3, 3.4, and 3.5 at the end of each subsection summarise some of the barriers and enablers addressed in the text and serving as the reasoning behind each theme's identification. The complete list of barriers and enablers sorted according to the MCIR framework is available in Appendix B.

3.1.1 Complexity

Several sources address the interconnectedness of, for example, barriers, motivators, and stakeholders within the same stage and category, on the one hand and their interconnectedness across different stages and categories on the other. IEA (2011, 9) recommends to "consider adequately the interactions between policies designed to improve energy security, support economic development and address climate change and environmental concerns". Chai and Yeo (2012, 460) ground the creation of the MCIR framework on the need to "highlight the interconnected nature of the barriers and the need for policymakers to address those barriers in a holistic manner". Meath, Linnenluecke, and Griffiths (2016, 3602) deduct that researchers prioritise "only one or few key barriers, rather than multiple barriers or multiple motivating factors".

After analysing the differences in promoting renewable energies in different EU countries, Reiche and Bechberger (2004, 843) separate the success of an intervention from the specifics of the intervention itself and conclude that "there is no 'natural' superiority of any instrument because the success depends on the respective framework conditions in the individual Member State on the one hand and the specific style of the used promotion models on the other". Ringel (2006, 14) supports this perspective by exemplifying on feed-in tariffs and green certificates as instruments and stating that "it is clear that the final model is not a 'one shoe fits all' solution. […] More important, the precise in-detail regulations will have to be set correctly. They finally will decide on the success or failure of a European policy for the support of renewable energies" (Ringel 2006, 14).

Split incentives highlight the interconnected nature of energy measures but belong just as much to this theme as to all of the other themes in this section. IEA (2011, 37) exemplifies the phenomenon through the "owner-tenant" situation, in which building owners generally

responsible for the technology in the building, do not invest in higher performance technology because the ones benefitting from the low operation costs of the investment would be the tenants. The financial incentives are therefore missing for the building owners but present for the tenants. Chai and Yeo (2012, 461) qualify this duality in perspectives as "the well-documented principal-agent problem". Meath, Linnenluecke, and Griffiths (2016, 3598) add the perspective of stopped investments due to inflexible renting contracts and exemplifies it with the case of SMEs that "may not be allowed to make changes to the building and may not have access to energy consumption data because energy costs form part of the rent for the premise".

The literature addresses both voluntary and mandatory measures. Chai and Yeo (2012, 462) assess that "voluntary measures have been more popular with governments because, compared with regulations, voluntary measures have fewer negative impacts on industrial competitiveness". The same source states that voluntary agreements, a non-legally-binding formal commitment, support the spreading of information about government financial incentives and energy related awareness by usually including mandatory measures, e.g. energy audits, mandatory efficiency standards, appointment of energy managers, trainings, and certifications. In relation to renewable energy, some examples of mandatory measures are quota obligations supported by employing tradable green certificates (Ringel 2006, 6).

Table 3.1. Complexity theme, summarised barriers and enablers sorted in MCIR framework

	Barriers	**Enablers**
Motivation	Split incentives /owner-tenant / principal-agent Inflexible renting contracts	Voluntary measures (green certificates) and agreements alongside mandatory ones (energy audits, energy managers, trainings, certifications, efficiency standards, quota obligations)
Capability		Energy managers, trainings
Implementation	Inflexible renting contracts	Green certificates Energy managers, trainings
Results	The reverse approach of the enablers	Energy audits, certifications Consider interactions between energy security, economic development, environmental concerns Address barriers in a holistic manner Address multiple barriers and motivators No "natural" superiority of any instrument Consider the instrument's framework conditions Consider the specific style of the promotion model Set correct in-detail regulations

3.1.2 Community Engagement

One of the recurring themes in the literature about renewable energy is the so called NIMBY ("Not In My Backyard") attitude of local residents with regards to renewable energy technology (Reiche and Bechberger 2004, 846; Wieg 2013, 3; IEA 2011, 33). Concerns can be environmental, social, or economic. Common arguments against wind turbines are for example visual intrusion, noise, bird habitat disruption and health problems for people and animals due to radiation. Renewable energy technologies can even be perceived as a threat to tourism (Reiche and Bechberger 2004, 846; Möller et al. 2012, 340). The attitude can be encountered also with local authorities that substantially hinder the deployment process (REScoop 2014, 26).

Benefits of renewable energy investments are addressed, among others, the importance of targeting overall energy security. Energy security is "the provision of sufficient and reliable energy supplies to satisfy demand at all times and at affordable prices, while also avoiding environmental impacts" (IEA 2011, 9). The distributed nature of renewable energy can for example reduce infrastructure vulnerability, i.e. increase the national security level due to minimised risk of dependency on a centralised system, which is potentially dependant on other countries and their political climate (EPA 2010, 7). Additionally, the deployment of renewable technologies can reduce financial risks associated with traditional energy sources, such as price volatility (IEA 2011, 13) and fuel supply disruptions (IEA 2011, 11). Furthermore, some renewable energy technologies, such as wind turbines, are considered to be "generally less susceptible to natural disasters" (IEA 2011, 11).

Social and economic benefits for the community include a positive influence on employment and 'green' growth (Leloux, Harkema, and Popescu 2015, 250), by assigning the installation and maintenance of power plants to region-based craftsmen (Wieg 2013, 5). In case they do not yet have the necessary skills, further training can help craftsmen acquire these (IIEEE 2009, 37). Overall, an increase of the local tax base is to be expected (EPA 2010, 6). Additional income can come through appealing to renewable energy tourists (IIEEE 2009, 36) or the transfer of newly acquired knowledge regarding renewable energy projects to other communities (Wieg 2013, 8).

Local ownership is mentioned to play a key role in reducing public resistance (Möller et al. 2012, 340; IIEEE 2009, 36). Firstly, seen from a social perspective, it allows residents to be involved in the decision-making process (IIEEE 2009, 37; Lambooy and van 't Foort 2013, 30) and shape their community. Along with citizens' public knowledge of the community benefits, a fair distribution of costs and benefits is nevertheless critical, as claimed by the success of the German project for wind power *Energiewende* (Wieg 2013, 4). Secondly, from an economic perspective, local ownership allows residents to directly benefit from the success of the project (REScoop 2014, 33; IIEEE 2009, 39; Lambooy and van 't Foort 2013, 32). While there are several schemes to encourage local ownership, such as giving citizens the option to purchase shares (IIEEE 2009, 37), the two which have shown to be particularly successful are community energy projects and renewable energy cooperatives (Wieg 2013, 4). For example, a wind turbine project on 'Neutscher Höhe' hill in Germany was entirely financed with residents' money through a cooperative (Wieg 2013, 6–7). Tertiary revenue streams and compensation for lost value of property (IEA 2011, 42) can also help changing attitudes.

As general enablers in relation to renewable energy projects, a sense of community, strong cultural identity among residents and a local passionate pioneer (IIEEE 2009, 39; IIEEE 2009, 41) are identified by the Danish island Samsø as key factors for benefitting from the potential existing in the local community.

Table 3.2. Community theme, summarised barriers and enablers sorted in MCIR framework

	Barriers	Enablers
Motivation	NIMBY – residents, businesses, local government representatives	Sense of community Strong cultural identity Local passionate pioneer Awareness of the importance of energy security (reduced infrastructure vulnerability, price volatility, fuel supply disruptions) Awareness of employment and "green" growth benefits, e.g. training, increased local tax base, renewable energy tourists / study visits Local ownership – economic and decision making Direct benefits from successful projects Compensation for lost property value
Capability		Training of local craftsmen Local ownership – decision making Community energy projects Renewable energy cooperatives
Implementation	NIMBY – residents, local government representatives	Awareness of employment and "green" growth benefits Local ownership – economic and decision making Community energy projects Renewable energy cooperatives
Results		Direct benefits from successful projects

3.1.3 Information and Knowledge

Our results show that there is a general lack of information or knowledge throughout all stages of the MCIR framework both in terms of renewable energy and energy efficiency.

With regards to renewable energy, the lack of knowledge of benefits for communities and individuals (Leloux, Harkema, and Popescu 2015, 247) is a recurrent theme in the motivation stage of a renewable energy project. Not being aware of the benefits can also extend to negatively affect the creation of cooperatives (REScoop 2014, 26). From a social point of view, countries like France are assumed to have more difficulties in the creation of renewable energy cooperatives and other forms of competition to centralised energy production, as opposed to Germany. The reason is claimed to be the lack of tradition of decentralised models, in the light of a late market liberalisation, i.e. a lack of empirical knowledge about such systems and therefore hesitance towards the models (REScoop 2014, 22). The report highlights also the asymmetric calculation of costs for renewable respectively non-renewable energy and claims that non-renewable energy is favoured by the lack of knowledge about the full costs. Prices for non-renewable energy subtracting costs, such as for decommissioning nuclear power plants or

coal subsidies, will automatically be more attractive than prices that include costs related to the construction and the grid connection of a renewable energy power plant.

The lack of knowledge also inhibits renewable energy projects in the capability stage of the MCIR framework (see Appendix B). For example, a project outlined by Möller et al. (2012, 344) found that "information on sustainable energy solutions, policies and practical examples often was absent among decision-makers". Insufficient information on how renewable technologies can be implemented under current economic and political conditions is emphasised as a problem. What works within one setting, may not be feasible in another (Möller et al. 2012, 340). Institutionalised skills, i.e. the externalisation of specific knowledge create additional barriers for distributed energy generation (IIEEE 2009, 40).

In response to the apparent lack of knowledge, a clear need for information campaigns and education is emphasised (Reiche and Bechberger 2004, 846; IIEEE 2009, 37). Instances of such campaigns are public awareness activities, direct marketing, and door to door visits that trigger the motivation to invest in renewable energy by educating about the economic benefits, available governmental support, and successful projects (IEA 2011, 38). REScoop report (2014, 26) highlights nevertheless the need of information campaigns that present impartial information as opposed to driving the interests of the big energy companies sponsoring them. Capability barriers can be overcome by networking among islands and sharing information on good practices (Möller et al. 2012, 340). Even if the problems that islands face are not the same, they may find inspiration in one another (Möller et al. 2012, 339). Because the lack of information is not specific to one stakeholder, interdisciplinary workshops with various stakeholders and project partners, facilitated by the municipality or other stakeholders, are recommended and already proven to be successful (Möller et al. 2012, 344; IIEEE 2009, 37). Additionally, feasibility studies support acquiring the knowledge for designing renewable energy systems (Lambooy and van 't Foort 2013, 11).

With regards to energy efficiency measures, Langlois-Bertrand et al. (2015, 30) acknowledge two caution areas. The first is "Jevons paradox", according to which it is likely that efficiency improvements will lead to increased use of energy, rather than a lower energy demand. The validity of Jevons paradox, referred to as "rebound effect" by the IIEEE report (2009, 39), is confirmed by the reality on the Danish island Samsø. Although the island prides itself with being "Denmark's (first) Sustainable Energy Island" (VisitSamsø 2015), "islanders […] continue to consume as much energy as before, because they are using cleaner and more efficient technology" (IIEEE 2009, 39). The energy is produced by offshore windmills and used as argument for claiming 100% CO_2 neutrality after compensating for the oil-based heat and private transportation (VisitSamsø 2015). In response to the energy paradox concern, Langlois-Bertrand et al. (2015, 30) recommend that "efficiency improvements need to be governed with care, for instance by being coupled with conservation policies".

The second caution area highlighted by Langlois-Bertrand et al. (2015, 30) is the low number of energy efficiency investments. The problem is referred to as the "energy efficiency gap" and implies a misalignment between the abundant arguments (economic, environmental, cultural and social) in favour of the energy investments and the low number of investments being pursued (Langlois-Bertrand et al. 2015, 30). Chai and Yeo (2012, 461) offer the explanation that "energy efficiency cannot be observed (i.e. it is 'invisible')" leading to managers choosing technology based on other criteria than the low energy consumption, for example by prioritising initial costs over long-term savings.

The continued lack of energy metering and therefore data showing positive returns (Chai and Yeo 2012, 465 and 469) are sorted under Results stage of the MCIR framework. Similar to renewable energy related issues, the lack of experience with energy saving technologies (Chai and Yeo 2012, 469), and a lack of trained staff members (Meath, Linnenluecke, and Griffiths 2016, 3602) negatively affects the capability stage of implementing energy efficiency projects.

Once again, educational measures and activities raising awareness can help reduce the obstacles to implementation of energy efficiency measures. Energy labelling programmes, typically implemented to overcome information problems, and technical support from both energy service companies (ESCos) and independent consultants (Chai and Yeo 2012, 470) are a few examples of possible improvements. The inventory in Appendix B offers more examples of enablers, sorted by MCIR stage. Understanding due to making results visible can be achieved through, e.g., external energy audits and GHG protocols, used either for internal follow-up or for reporting as a mandatory governmental regulation. Regardless of the adopted measure, Meath, Linnenluecke, and Griffiths (2016, 3603) assess that investments should be made in small and adaptive steps to allow energy efficiency programmes to be managed timely and help managers cope with uncertainty regarding measures and future conditions.

Table 3.3 Information and Knowledge theme, summarised barriers and enablers sorted in MCIR framework

	Barriers	Enablers
Motivation	Lack of knowledge of benefits for communities and individuals of renewable energy projects Hesitance towards decentralised models Asymmetric calculation of costs (renewables seem more expensive)	Information campaigns and education (public awareness activities, direct marketing, door to door visits)
Capability	Lack of tradition of decentralised models like cooperatives Uninformed decision-makers Institutionalised skills Lack of experience with energy saving technologies Lack of trained staff members	Networking about good practices Interdisciplinary workshops Pre-feasibility studies Energy labelling programmes Technical support, e.g. ESCos and independent consultants
Implementation	Asymmetric calculation of costs (renewables seem more expensive)	Interdisciplinary workshops
Results	Jevons paradox – savings leading to increased use Energy efficiency gap – low number of investments Lack of energy metering	Networking about good practices Efficiency improvements coupled with conservation policies Data showing positive returns External energy audits GHG protocols Small and adaptive steps

3.1.4 Technical and Administrative Infrastructure

The previous section shows that renewable energy projects have numerous benefits. Once the motivation and capability within a business are established, there are however technical barriers that potentially have to be addressed so as not to jeopardise the implementation stage of a renewable energy project (IIEEE 2009, 40). Firstly, the literature mentions the need to ensure that the power transmission grid is able to handle "a high share of intermittent resources" (Reiche and Bechberger 2004, 848; Lund 2007, 912). This can be challenging in countries where electricity grids have not been designed "to take in decentrally produced electricity but mainly to distribute centrally produced electricity", as it was the case in France (Reiche and Bechberger 2004, 846). Secondly, as addressed under the community theme, fair access to the grid needs to be guaranteed (Reiche and Bechberger 2004, 848).

Another aspect discussed in the literature is energy storage technologies. Although needed in some cases (Leloux, Harkema, and Popescu 2015, 251), current storage technologies are not yet "suitable to accommodate a large-scale penetration of intermittent [renewable energy sources]" (Chen et al. 2007, 1890). Although sorted under the implementation stage of the MCIR framework, the barriers mentioned in this theme have strong implications at the motivation stage.

For ensuring energy availability as part of the energy security mentioned under the *Section 3.1.2 Community Engagement*, IEA (2011, 9) recommends not only "a diversity of energy sources" but also that they are defined by "different supply pathways for each energy source [...] so that one [source] hedges the risk of the other in a portfolio". The importance of a supportive and permissive infrastructure is apparent also in Lund's report (2007). Focused particularly on the case of Denmark, Lund (2009, 917) highlights the need of "replacement of fossil fuels by various sources of renewable energy", as one of the three major technological changes required and concludes that "the making of sustainable energy strategies becomes a matter of introducing and adding flexible energy technologies and designing integrated energy system solutions."

Another aspect addressed by the literature is the extent to which the national and local administrations are equipped and open to support the renewable energy transition. In its information paper, the International Energy Agency (2011, 32) states that a lack of strong, dedicated institutions and a lack of clear responsibilities constitute significant barriers to the deployment of renewable energy technologies. Lambooy and van 't Foort (2013, 30) highlight the lack of coordination between institutions as a considerable problem. The administration's set-up is however not the only point that requires consideration. The specific implementation of permit procedures can amount to high administrative burden and hence influence motivation of investors (Reiche and Bechberger 2004, 845 and 847). An example is Italy where a 2008 study found that at least 50 permits were required to implement renewable energy projects (IEA 2001, 39).

What is mentioned as needed are clear and transparent measures to streamline the approval of projects as well as commitment from local authorities to the cause (Reiche and Bechberger 2004, 848; IIEEE 2009, 36).

In the context of an island, additional hurdles may exist. Möller et al. (2012, 340) found that because islands usually have little influence on regional and national politics, there is a lack in formulation of energy policies and political instruments. The existence of policies that lack long-term stability can nevertheless jeopardise renewable energy projects. Specifically

unstable policies are seen as a considerable threat (IIEEE 2009, 40; REScoop 2014, 5; IEA 2011, 42). For example, the volatile political situation in the United States and thus the frequent change in governmental financial support has led to large fluctuations in the deployment of renewable technologies (IEA 2011, 40). Currency risk and corruption are additional factors that have a negative influence on renewable energy projects. (IEA 2011, 43; IIEEE 2009, 40).

Among the policies enabling a technical and administrative infrastructure supporting renewable energy projects are stable policies manifested through, e.g., the long-term security of feed-in tariffs (IIEEE 2009, 39; Reiche 2004, 847). The base for this mindset would be to "take a long-term view when developing policy and to consider adequately the interactions between policies designed to improve energy security, support economic development, and address climate change and environmental concerns." (IEA 2011, 9).

Table 3.4 Technical and Administrative Infrastructure theme, summarised barriers and enablers sorted in MCIR framework

	Barriers	Enablers
Motivation	Lack of strong, dedicated institutions Permit procedures High administrative burden Lack of energy policies and political instruments Unstable policies Currency risk	Clear and transparent measures Committed local authorities Long-term security of feed-in tariffs
Capability		
Implementation	Inflexible renting contracts Underdeveloped storage technologies Lack of clear responsibilities and coordination between governmental institutions Permit procedures High administrative burden Unstable policies Corruption	Grid able to handle intermittent resources Grid designed to take in decentrally produced electricity Fair access to the grid
Results		Diversified energy portfolio (sources and pathways) Flexible energy technologies Integrated energy system solutions Long-term view Consider interactions between policies

3.1.5 Financial Incentives and Funding

Both renewable energy and energy efficiency projects are subject to economic barriers. An example of a common barrier is the general low morale of the employees due to tough economic times (Meath, Linnenluecke, and Griffiths 2016, 3602).

With regards to renewable energy projects, two market failures are identified. One is the cost disadvantage in comparison to traditional means of energy production, for example due to

continued subsidies of fossil fuels (IEA 2011, 32; Reiche and Bechberger 2004, 844; Ringel 2006, 3). Another market failure is the lack of adequate measures to incorporate negative externalities of fossil fuels and positive externalities of renewable energy into energy prices (REScoop 2014, 26). On islands, the high capital demand of renewable energy projects combined with the limited financial means can represent an additional hurdle (Möller et al. 2012, 339f.). A barrier leading to difficulties in the results stage of the MCIR framework is the deficient resource assessment mentioned by IEA (2011, 58).

Despite the economic barriers, countries like Germany, Denmark and Japan have shown that early investments in renewable technologies lead to a competitive advantage in the long run (IEA 2011, 16). Financial schemes from the national and local governments can either give incentives for new technologies, or discourage the continued consumption of energy from non-renewable sources. High taxes on fossil fuels can be such a discouraging scheme (IIEEE 2009, 37). As mentioned under the *3.1.1 Complexity* theme, supportive incentives are diverse and multifaceted. The success of the support models used to foster the use of renewable energy depends on the specific implementation. Supportive schemes include soft loans, subsidy programmes, mortgages, and tax incentives (IEA 2012, 34; IIEEE 2009, 37f.; Reiche and Bechberger 2004, 846). Additionally, governments can support feasibility studies for renewable energy projects (IEA 2012, 42). Once the renewable energy is on the market different purchasing option for the customer can support their attractiveness, e.g. fixed quantities, share of the monthly consumption, and long-term price security (EPA 2010, 9).

With regards to energy efficiency, we highlight three barriers, also identified by Chai and Yeo (2012, 461 and 469). Firstly, information related market failures as detailed in *Section 3.1.3 Information and Knowledge* cause slow adoption rates of energy efficiency technologies. Examples include the imbalance in information between two parties during a transaction (asymmetric information), unpriced energy costs, such as CO_2 emissions from fossil fuels, and knowledge spillovers (benefits of one stakeholder's investments leaked to external parties). Secondly, characteristic for market failures is a lack of financial incentives both from governments and within the organisations, e.g. if only a small part of a company's expenses is represented by the energy consumption. Thirdly, market failures are defined by insufficient access to financial capital.

Several economic factors can motivate businesses to invest in energy efficiency. These include cost reduction of production, market advantage through branding, and reduction of environmental fees (Chai and Yeo 2012, 460; Meath, Linnenluecke, and Griffiths 2016, 3602). In order to offer financial support in the capability stage, different schemes can be employed, such as governmental grants, tax incentives, and schemes for energy efficiency financing allowing businesses to acquire loans to invest in energy efficient technology that are then paid back from the energy savings (Chai and Yeo 2012, 463).

Table 3.5 Financial Incentives and Funding theme, summarised barriers and enablers sorted in MCIR framework

	Barriers	Enablers
Motivation	Cost disadvantage High capital demand Knowledge spillover Energy costs too small part of total expenses Low morale	Competitive advantage High fossil fuels taxes Financial assistance (subsidies, mortgages, tax incentives) Feasibility studies Awareness of benefits (cost reduction of production, market advantage through branding, reduction of environmental fees)
Capability	Limited financial means Asymmetric information	Financial assistance (subsidies, mortgages, tax incentives) Feasibility studies
Implementation		Different purchasing options
Results	Deficient resource assessment	

3.2 Case Study: Interviews and Reports

As a result of the four interviews with local businesses on Île d'Oléron, the interview with the representative of the local government and data available through the written material provided by the local government representative we identified four themes. These are *Business Context*, *Behaviour Showing Awareness*, *Connection to Place and Community*, and *Support Needed*. The interview transcripts used as source for our data are available in Appendix C.

3.2.1 Business Context

This section presents aspects of Île d'Oléron relevant to the context of sustainable energy, followed by an overview of the interviewed businesses.

Île d'Oléron. The island has 3549 registered businesses. Out of those, 70.64% are registered as self-employed citizens (without employees), and 26% have one to nine employees. The remaining 3.35% of businesses have ten or more employees or an unknown number. The majority of the businesses over 50 employees are supermarkets (Le Page 2016).

Businesses and the public sector account for 26% of the energy consumption. Within this group, shops stand for 34%, the tourism sector for 21%, and offices for 15% (AREC 2015). Per type of energy for this sector, electricity needs account for 63%. The following accounts for the diversity in the energy needs by organization type. For offices electricity for office electronic devices represents 36% while heating 40% of the total consumption. The consumption distribution between electricity and heating is similar for shops, whose specific electricity needs are represented by lighting the display windows. Shops have additional considerable electricity needs (ca 20%) for other usage such as cooling and ventilation. For

schools, heating alone accounts for 70% of the energy consumption. The main energy needs for cafés, restaurants and hotels are heating and food preparation (AREC 2014).

The production of renewable energy on the island accounts for 13% of the consumed energy. From the total produced renewable energy, 97% is based on timber. The current harvest rate on Île d'Oléron for wood industry and wood energy is calculated to 151%.

External consultants identify solar power as the most feasible renewable energy source although potentially difficult due to areas being protected as cultural heritage. After excluding historical monuments, 66% of the surface on Île d'Oléron is considered not affected by the landscape protection, 10% assessed as delicate circumstances and for 24% of the surface the deployment is considered difficult to achieve (Renewable Energy Potential for Oléron Island, Appendix 2015).

Regarding offshore wind power the local government is waiting for a national decision to implement a project. The energy produced will be sent to the national grid (Le Page 2016). Some potential exists in the Northern part of the island, where the wind speed can exceed 6.5 m/s, if soil conditions and existence of residencies allow the installation of small wind turbines. The other renewable energy sources are assessed as having limited or no potential. The Northern part offers suitable conditions also for ground source heat. Due to technical considerations, this type of energy source is mainly suitable for new buildings and for heating needs during the summer. Wood energy is considered not suitable for being exploited to a higher extent than today due to the already timber deficit on the island. The potential of using hydropower is also assessed as very weak. Recovering heat energy is discarded, because of the cost of the equipment and the low amount of wastewater on the island due to it being a relatively small community (Renewable Energy Potential for Oléron Island, Appendix 2015).

Local Government Communauté de Communes. The island is divided into eight regions, each with a small leading committee. Representatives from all eight towns form since 2006 the elected board of the Communauté de Commune (CDC). Since recently, the CDC is responsible also for leading the sustainable development efforts formalised through the adoption of the Agenda 21 policy (Le Page 2016). Some of the projects in the action plan are building infrastructure for protecting the coast, building 14 km of cycling paths in the next three years, equipping bikes with GPS and implementing a national label for hotels and campsites showing the amount of CO2 they produce. A bigger project already initiated is the Zero Waste Island (Le Page 2016).

In connection to energy, the community has engaged in an action plan for the period 2016-2018 as member of a national project for regions with positive energy abbreviated TEPOS (Territoires á énergie positive). Positive energy is defined on the island as not using non-renewable energy sources and locally producing more renewable energy than consumed, in this report further referred to as sustainable energy. Our contact person was as mentioned in *Chapter 2 Methodology* the TEPOS project manager for Île d'Oléron, Delphine Le Page. Based on the information she provided, part of the project's objective for the end of 2018, supporting the vision of positive energy by 2050, is to engage at least 20 businesses in sustainable energy commitments and actions (Le Page 2016).

The sections below develop on the projects undertaken by the local government. All funds for the management of the projects, including the subsidies they imply, are funded from existing taxes, grants from the region, national government or European Union without additional taxes on the residents. The local government is currently trying to adjust its operations but continue

investing in sustainability in spite of approximately 10% recurrent yearly cuts in the national subsidies (Le Page 2016).

Les Gros Joncs Campsite. Les Gros Joncs is a 5-star campsite started in 1962, located 180 m from the sea and occupying an area of 50 000 m^2. It employs 18 people. Today it offers 202 renting facilities and several common areas, such as a large indoor and outdoor swimming pool, a spa, grocery shop, and a restaurant (Cavel 2016).

The customers that visit the campsite are generally familiar with the location, and as the owner stated, it is seeing their third generation of loyal customers. Most of the them are foreigners, with a lower income, as opposed to the upper-class customer profile of the campsites in the South of France (Cavel 2016).

Montauzier Oyster Farm. The oyster farm is a small business that began operating in 1996, run by a husband and wife and employing one person. The business primarily produces and sells oysters, but also shrimps, sea beans, and sea salt. All products are produced on the island, and 80% is sold to locals and tourists at the restaurants, local market or the market in the nearby cities. The business owns several marshes, an adjoining building, and a small retail shop in the touristic area. Most of the direct customers, tourists, and locals are loyal customers, familiar with the products and regard sustainability to be very important. All the products are organically certified (Montauzier 2016).

Ocqueteau Boat Manufacturer. The boat manufacturing company employs 30 people and has its factory located on Île d'Oléron. The company uses several buildings for manufacturing of the boat shell, cutting, and fitting of externally produced details such as glass, metallic bars, and for final assembly. An older, uninsulated building is used as personal storage and winter storage of locals' boats (Ducoudert 2016).

The company's production has decreased to approximately 1000 boats per year, compared to previously 5000 boats in 2005, three years before the global financial crisis in 2008. According to our interviewee, the industry is not likely to go back up to the 2005 sales volumes. The sales are not considered to be affected by the environmental concerns of the retailers or the customers. The boat retailers "are struggling to survive, so the environmental concern is not a big thing". Customers of motorboats prefer high engine power, sometimes higher than necessary for the type of boat, for an average yearly time of a single use. Higher potential of environmental interest could be present in sailing boats customers, yet they have put no pressure on the manufacturer up to this point (Ducoudert 2016).

Vignerons d'Oléron Vineyard Cooperative. The vineyard cooperative handles the grape harvest from 20 vineyards located on Île d'Oléron by being responsible for the wine production, distillation, bottling and sales. The cooperative uses in total 30 000 hectares, and offers 52 different products of which the main ones are cognac, pineau and wine. The operations of the cooperative are based on Île d'Oléron, and 80% of products are sold on the island. During the touristic summer season, competitors from outside the island come to sell their products locally (Alla 2016).

3.2.2 Behaviour Showing Awareness

This section outlines the awareness that the local government and businesses on the island have regarding renewable energy, energy efficiency, and other aspects that directly or indirectly

relate to sustainable energy. Awareness, in this meaning, incorporates knowledge, e.g. knowledge of the effects of climate change, as well as understanding and way of thinking, e.g. strategic, long-term thinking, vision regarding energy efficiency and renewable energy. The understanding and way of thinking is assessed based on pursued concrete actions, measures and investments.

Local Government. As mentioned in *Chapter 1 Introduction*, the local government has set a goal to have achieved sustainable energy by 2050. This subsequently implies investing in installing renewable energy technologies and increasing energy efficiency. The local government has identified solar energy, transport, and businesses as three perspectives to initiate action plans around (Le Page 2016).

An example of a concrete project that the local government has initiated is to identify public or private land suitable for bigger investments in photovoltaic panels, i.e. surfaces of over 100sqm. Envisioned locations are roofs of public or private buildings and a bigger public car parking for circa 500 places to be covered with panels for energy generation and providing shade. Another example is a floating photovoltaic panels island on a lake, project in which the TEPOS manager is facilitating the contact between the national government, the private landowner and the investor. Other projects imply increasing the energy efficiency of public buildings by investing in reducing the heat loss. Regarding heat, the local government is researching the possibility of using the green waste, e.g. wood branches currently sent to compost to be instead used for producing wood pellets as source of heating (Le Page 2016).

Through contracting external consultants who performed feasibility studies and scenario analyses, the local government expanded its understanding of the current reality and sustainable energy development on the island. Starting from the business-as-usual scenario, the consultancy report addresses the risks imposed, e.g., by ground source heat being disregarded as possible renewable energy source and instead the number of heating pumps installations continuing to increase; the community missing out on developing innovative installations; the community not becoming proactive with regards to development of renewable energies due to the landscape protection restrictions and hesitance towards installations nearby private homes. The potential is also addressed, in terms of solar energy following the currently ascending trend and a strong development of photovoltaics as result of future legislation for standards for new buildings. In a more ambitious scenario, the report recommends that the island, in spite of the constraints for each individual renewable energy source, still makes efforts to maximise the exploitation of each source except timber. An example is installing small wind turbines to compensate for the missed chance of offshore wind power which falls under national exploitation (Renewable Energy Potential for Oléron Island, Appendix 2015).

Another draft document put at our disposal shows the government's commitment to the vision of sustainable energy 2050 and awareness of the need to collaborate with and engage the local community in the envisioned projects. The document identifies stakeholders to be engaged, from three perspectives: stakeholders who have knowledge about renewable energy, stakeholders who are big energy users and stakeholders in support functions who can for example bring financial and training perspectives (TEPOS Oléron Stakeholders 2015).

An additional step taken by the TEPOS manager was collaborating with academia, such as for this research project and other collaborations with French university students.

Interviewed Business. The businesses on the island have varying degrees of knowledge concerning the environmental effects that human activity has on our planet. All four businesses

have a somewhat varying understanding of the sustainability challenge mentioned in *Chapter 1 Introduction*, but they all appreciated its importance in one way or another.

In the case of the campsite, the owner contributed to the land between the campsite and the seashore becoming protected by law, implying for example that car access on the beach is forbidden (Cavel 2016).

The oyster farm owner states that climate change is "a problem for [the] day-to-day activities", and that if global warming continues it will be a direct problem for their business as they would need to go "further and further in the sea to get colder water to be able to produce oysters" (Montauzier 2016).

The vineyard cooperative manages a small production of organically produced wine, although the choice was made to label it as "naturally produced" wine. One reason is said to be the fact that not using chemicals does not imply that the product is better for the environment. Putting less chemicals on the vine implies for example using more fossil fuels for powering machinery to plough the land more often in order to remove outgrown weed (Alla 2016).

The representative of the boat manufacturing company, although stating that implementation of sustainable measures is difficult for them due to financial limitations, acknowledges the importance for the environment of long-term sustainable energy investments (Ducoudert 2016).

The awareness level in relation to the energy consumption varies between the four interviewed businesses on Île d'Oléron. The oyster farm owner, for example, knows that the cost is 700 € every three months, and that the energy consumption triples during summer due to the heat-exchanger used to ensure sufficiently cold water for the oysters during extreme temperatures. The oyster farm owner had not, however, taken explicit measures to reduce the energy consumption, although she mentions that they aspire to be energy efficient and sufficient. Besides conducting their operations in a somewhat traditional way, she considers buying a hybrid car to transport the oysters, an electric one being impractical as implying more planning or an eventual second car for trips to the market in the nearby city, La Rochelle (Montauzier 2016).

The vineyard cooperative manager also is aware of the energy consumption, and has taken time to identify where energy costs are high and how the energy consumption in certain areas can be reduced. For example, he invested in a more efficient heating system for the boiler used in the distilling process. Due to the reduced energy consumption, although the initial cost of the system was high, he estimates the payback period to five years (Alla 2016).

The boats manufacturing company is aware of their energy usage, and has identified that the heating of the warehouse is what consumes most energy, which is done by a boiler, which uses approximately 10–15 tons of gas a year. Although there are more efficient ways of heating the warehouse, such as with an electric heater that can more effectively measure temperature, the cost of changing the entire system is too high for the boat manufacturing company, as the company is already struggling financially as mentioned under *3.2.1 Business Context*.

The campsite has a long history of measuring its use of resources, as already in 1968 it started recording the water consumption. With regards to energy, the campsite owner is aware of the consumption, and has taken concrete measures to increase its overall energy efficiency, e.g. by

investing in a transformer that utilises their reactive electricity, which is paid for but usually lost. This allowed the campsite to cut its energy costs by 10–15% (Cavel 2016).

Although all four businesses express varying degrees of interest in using renewable energy, the campsite is also the only of the four interviewed businesses that employs renewable energy technologies. The two main forms of renewable energy sources addressed during the interviews are solar and wind power.

Les Gros Joncs has a number of solar panels and photovoltaics installed on the roofs of the main buildings, primarily used to satisfy the hot water needs for the pools and the restaurant. Les Gros Joncs first installed renewable energy technologies on its premises in the 90s. The owner has seen faster returns on the investment than estimated due to higher production rate, i.e. close to 8000 kWh as opposed to 5000 kWh estimated. One of the main difficulties that the campsite had regarding its renewable energy production was that there was a lack of businesses that specialised in the renewable energy technology on the island, and that one solar panel had been broken for approximately five years (Cavel 2016).

3.2.3 Connection to Place and Community

Several aspects are evidence of the interviewees' instinct to protect the local environment, respect traditions and show their pride for being a part of the community.

The interviewed businesses show clear appreciation for the environment and making efforts to preserve it. The campsite owner said that conserving the environment was a priority since the business started, unlike in other parts of the French coast where the locals – in his words – prefer to pave the coastline with cement. His claim is supported by actions he has taken, further detailed under *Section 3.2.3 Behaviour Showing Awareness*. While the dramatic changes of the coastline are a general concern for the inhabitants of the island, the campsite owner expressed his gratitude that the part of coastline under environmental protection closest to his location is not experiencing the level changes (Cavel 2016).

The oyster farm owner highlights her appreciation for the environment by referring to herself as "lucky here in Oléron, with the environment, to have all the salt marshes" (Montauzier 2016). She also repeatedly addresses the global warming issue, as mentioned also in *Section 3.2.3 Behaviour Showing Awareness*, in relation to the increasing mortality of oysters and a migration of Southern species towards the cooler seawater near Île d'Oléron (Montauzier 2016).

Both the campsite and oyster farm, whose clients were mainly tourists, target showing tourists traditional ways of acquiring food. The campsite is looking into promoting the traditional way of catching fish from a time when walls in the sea and the tide were enough for catching fish (Cavel 2016). The owner of the oyster farm mentions that she intentionally limits the production quantity in order not to overexploit or need to modify the environment. For example, the nutrients in the water are sufficient for the quantity of shrimp produced so that there is no need of additional food than what the sea offers (Montauzier 2016). Reference to showing and sharing the beauty of the landscape with tourists is mentioned also by the vineyard cooperative (Alla 2016). Generally, sustainability is mentioned as top of the mind for the people living on the island, because "they are coming to live here for a special, natural setting and a beautiful place, so there is something about it [island's sustainability]" (Montauzier 2016). Due to considerations to tourism, alongside landscape and perceived visual intrusion,

both the campsite and oyster farm owners are opposed to the idea of wind turbines being installed on the island.

The loyal customers and eco-label mentioned in the *Section 3.2.1 Business Context* are reasons of pride for the owners of the campsite and oyster farm. The oyster farm owner mentioned her satisfaction provided by the eco-label and by a national prize for producers of sea and fish products (Montauzier 2016). For the campsite, the eco-label is preferred due to its marketing value, but is mentioned together with the reference to long-term, regular customers as a proof of good service (Cavel 2016).

Long-term thinking is frequently mentioned by the vineyard cooperative manager, often in relation to the specifics of the island, e.g. "[...] we are on an island, it is difficult to bring energy, so try to think about using less energy without thinking of the price of the petrol" (Alla 2016).

The different business contexts detailed in the previous section guide the nature of the business relationships. The oyster farm envisions collaborating with other small local producers in order to reduce costs for products they only need rarely and in limited amount, but can only buy in big quantities (Montauzier 2016). The campsite owner is careful when selecting partners and supports other local, environmentally conscious businesses using eco-labels (Cavel 2016). Furthermore, he encourages the construction companies he collaborates with to invest in the workers' skills. In the collaboration with the banks, he has a pedagogical approach and encourages banks to be more considerate to the characteristics of the business and the evolution in respective business sector. The campsite buys gas for a lower price due to negotiating the contract together with other two big gas consumers in the area. Collaboration is mentioned as a key aspect also in relation to the waste management which is handled collectively by 25 campsites (Cavel 2016). For the boat company, suppliers' tips for new products replace the research and development (R&D) and benchmarking responsibly (Ducoudert 2016). The vineyard cooperative is active in approaching new business opportunities that imply repurposing waste water, e.g. collaborating with local vegetable growers to create "win-win situations" (Alla 2016).

In spite of the interest and concern showed by the interviewed businesses, the local government identifies difficulties in engaging all businesses operating on the island in sustainability measures, energy as well as water consumption and waste management. The reasons is the seasonal characteristic of the island in which a big number of the businesses target tourists and operate only during the summer months. The assumption is that due to the lack of connection with the place and focus on income, the businesses lack incentives for paying attention to their energy, water and waste behaviour (Le Page 2016).

3.2.4 Support Needed

Firstly, this section summarises the perspectives with regard to necessary interventions of the local government and the consultants who performed feasibility studies and, secondly, the information provided by the four business representatives interviewed.

Local Government Assessment. The local government acknowledges the support received from the national government through feed-in tariffs legislation, allowing investors to sell the electricity back to the grid. This type of support from promoting renewable energy is still available for small producers but decreasing for bigger power plants, for the latter making the investments less profitable (Le Page 2016).

The local government assesses the legislation surrounding the energy grid as limiting the possibilities to support local investors with advantageous conditions. The takeover is nevertheless not considered easy to implement and therefore the local government does not have immediate plans for taking on this responsibility. Taking over the grid might still happen in the coming years if the limitations imposed by the national company running the grid seem to have considerable negative effects on the island achieving its 2050 vision. The same reasoning applies for the heating grid, which is considered even more problematic because of the rural area characteristic of the island, e.g. big distances between houses and potential for heat loss during the hot water circuit (Le Page 2016).

The local government acknowledges two additional areas in which the national legislation is a hindrance. Firstly, the energy price decided at a national level is sufficiently low for businesses for the local government to assume that businesses find no incentive to decrease their consumption. Secondly, the legislation for landscape protection is demanding leading to much higher costs or not approved renewable energy projects. Additionally, the long administrative process can stop the development of the business reason for which businesses can choose the non-renewable option which though allows the business to function (Le Page 2016).

Some measures fall directly under the power of influence of the local government. CDC acknowledges the need to financially support businesses and is looking into regulations for subsidies for solar panels, for devices leading to a lower energy consumption and for other investments leading towards the sustainable energy goal. In *Section 3.2.3 Behaviour Showing Awareness* some of the local government's projects addressing renewable energy production were mentioned. One of them was the project for installing photovoltaic panels on surfaces bigger than 100 m². In relation to it, several schemes are being discussed, either supporting the owner with consultancy or subsidies or the local government leasing the surface and selling the energy to the grid.

The consultancy report already mentioned includes suggestions for engaging different business sectors in the community on Île d'Oléron. The examples target behavioural change by encouraging refitting of buildings for heating, energy and water saving purposes, energy efficient lighting, ventilation and cooling systems, and efficient use of office electronic devices (Renewable Energy Potential for Oléron Island, Appendix 2015).

In search of solutions, the TEPOS manager on Île d'Oléron is part of the regional network for TEPOS managers, part of the national network of rural communities working towards a goal of 100% renewable energy, joins forces with colleagues leading project targeting energy efficiency of private houses, transportation, technical specialist in renewable energy issues and is engaged in collaborations with external consultants and academia (Le Page 2016).

Business Perspective. The businesses mention autonomy and resource sufficiency as a motivating factor for energy related actions (Cavel 2016; Montauzier 2016). Nevertheless, additionally needed support is mentioned in relation to policies and lack of information.

Active in drawing inspiration from other countries and suppliers, the campsite owner frequently mentioned France falling behind with energy technology investments. Legislation and administration are referred to as "quite heavy" and slowing down investments (Cavel 2016).

Similar to the TEPOS manager, all businesses mention the landscape protection law as a limitation in terms of employing renewable energy. Because marshes are a particularity of the

area, the oyster farm is not allowed to install solar panels and wind turbines on the land surrounding them. However, there might be a possibility to install solar panels on the roof of the building, an opportunity that the oyster farm showed a clear interest in, although the price will play a role in the final decision (Montauzier 2016). The vineyard cooperative and boat manufacturer are the two businesses for which solar panels are, currently, explicitly not feasible due to additional considerations than the visual effect. The vineyard cooperative is not able to use solar panels because of local fire department restrictions based on the amount of alcohol stored (Alla 2016). Ocqueteau faces the difficulty of currently having a type of roof built with material classified as toxic. In order for solar panels to be installed, the roof would have to be replaced and the company's financial situation cannot cover the costs of disposing of the roof as toxic waste (Ducoudert 2016). The campsite has previously had difficulties in installing photovoltaics and solar panels, but has succeeded with some and sees hope in installing additional ones (Cavel 2016).

The lack of local businesses to provide services to the campsite is attributed to the changes in regulations, e.g. for feed-in tariffs, that decreased the interest of businesses to invest in renewable energies and therefore suppliers that he was relying on for support with renewable energy technologies on the island eventually closed. The campsite owner himself mentions subsidies as a type of support that would allow him to invest more (Cavel 2016).

Cavel (2016) additionally refers to qualitative technical consultancy as highly necessary in order to "adapt the [technical] system to own energy consumption profile". A higher quality in the services of the banks is also mentioned as beneficial, saving him the need to be pedagogical and explain the way in which campsites' reality has changed since many years ago, for example currently offering spa services and therefore the need of capital for such investments. The need of explaining the reason for investments and therefore a higher awareness level outside their business is addressed also by the vineyard cooperative manager, who mentions struggling to explain to people why they do things differently than before (Alla 2016). With respect to energy investments, he underlines the problem arising from a combination of energy being cheap for the last 13 years and predominant short-term thinking that led to people not seeing the need to invest in renewable energy or save energy (Alla 2016).

Unlike the campsite and vineyard cooperative which are active in searching for innovations, the boat manufacturer relies on inspiration about opportunities from outside the company, i.e. its suppliers, because of a lack of time and dedicated manpower. The company therefore welcomes "counselling from the local government or any public agency", highlighting even more the need of external support (Ducoudert 2016).

In the previous section, we mentioned the oyster farm's collaboration with other local producers in order to comply with the new legislation which prohibits local producers to sell their products in plastic bags at the local markets. The need of support that the oyster farm owner expresses is the local government's contribution to contract a supplier, take over the design of the bag in the name of the community, potentially use the bag for customer awareness purposes, and offer the local producers the opportunity to buy paper bags in smaller quantities (Montauzier 2016). Sustainability educational campaigns and promotion of responsible local businesses as a way to reach more customers is mentioned also by the campsite owner, who places these hopes and expectation in the eco-label (Cavel 2016).

3.3 Literature and Case Study Comparison

The two tracks of our research show both similarities and differences. Most of the barriers and enablers identified by the general literature are mentioned by the documentation and the interviews with businesses and the local government on Île d'Oléron. Some elements are not referred to by both tracks. The following sections summarise the most representative similarities or differences.

3.3.1 Barriers

In terms of barriers, both tracks draw attention to the social resistance with respects to renewable energy technologies, generally known as the NIMBY-attitude. The problem affects different technologies to varying degrees, wind turbines being the least preferred technology. The interviewees not only find this technology visually unappealing to themselves but also assume it to be undesirable for tourists. For Île d'Oléron, the situation can be considered less problematic due to soil stability problems and the national project for offshore wind power, limiting the potential of this type of energy to be exploited by the local community. Nevertheless, the consultancy report identifies some potential for small wind turbines, if the community was to agree to them. Given that literature recommends that energy security and therefore diversity of sources should be targeted, the NIMBY-attitude raises concerns.

Ducoudert (2016) confirms the risk identified by literature, of managers prioritising the initial costs rather than the energy savings in the operation phase. It is the case of the boat manufacturing company, currently operating in a difficult market context. Meath, Linnenluecke, and Griffiths (2016, 3602) defined the barrier as "low morale" in the business. In the case of Ocqueteau this is due to the fact that sales, although not anymore decreasing, do not create the conditions for peace of mind in relation to optional investments.

Permit procedures and unstable policies are barriers repeatedly mentioned by both literature and all interviewees. Cost disadvantages and continued subsidies for fossil fuels also fall under the barriers confirmed by the interviewees (Cavel 2016, Alla 2016, Le Page 2016). The vineyard cooperative attributes the passivity of the population to low energy costs in France, the campsite addresses the cuts in financial incentives for investors in renewable energy technologies and the TEPOS manager mentions the current lower price of energy for businesses as a demotivating factor for investing in renewable energy and energy efficiency.

3.3.2 Enablers

With regards to enablers, commitment in the form of community engagement is a consistent theme in the literature analysis and the case study material. The interviewees highlight the need of commitment from local authorities, the need for businesses to think long-term regardless of the currently relatively low electricity prices and the need for customers to make responsible choices.

Information campaigns are named several times by both the literature and the interviewees. They are mentioned in connection to the internal need of information about the local government's initiatives and support measures, the need for suppliers and collaborators to be

more aware of the interviewed businesses' situation, but also in relation to consumers' preferences.

Another intersection point in terms of enablers is awareness around price volatility. The risk of rising energy prices might be especially relevant for France, given the late liberalisation of the market mentioned by the literature and the known extremely low energy prices during the last decade. Three of the four interviewed businesses mention seeking energy autonomy through renewable energy and energy efficiency investments. Their interest can be attributed to the understanding of the risk for the price of the energy bought from the grid to increase.

The potential of energy efficiency and renewable energy projects to reduce costs is also identified by both research tracks. The camping, vineyard cooperative, oyster farm and, although to a smaller extent, the boat manufacturer mention clear measures that led to cost reductions, e.g. a thermostat for capturing "reactive energy", new boiler heating system, new engine for reducing the water temperature and adjusting the gas boiler capacity.

Data showing positive returns is a clear match between the literature recommendation and what the interviewed businesses assess as motivational. The camping, the vineyard cooperative, and the oyster farm are aware of their energy consumption and seem to be more active in reasoning around energy saving measures. For the boat manufacturer there is an apparent correlation between the basic knowledge about the energy consumption and the lower interest in energy efficiency and renewable energy investments.

Mentioned by the literature as a motivating factor, the customer's demand of green products seems to be given a lower value by the interviewed businesses. Two of the businesses mention loyal customers who appreciate their sustainable business attitude and therefore remain loyal customers. Nevertheless, the customers' attitude to services is mentioned by the businesses themselves as an effect rather than a cause for their engagement in energy efficiency and renewable energy issues. The vineyard cooperative does not mention the "green" demand as a traction force and even considers the organic wine as less damaging but not completely unproblematic for the environment due to the need of using more fossil fuels in ploughing the ground for removing outgrown grass that otherwise would have been prevented by chemicals applied on the vine plants. The boat manufacturer clearly disconnects their customer profile from the environmentally aware customer as mentioned in *Section 3.2.1 Business Context*.

The market advantage through branding seems to be given a higher importance by the literature than by the four businesses on Île d'Oléron. The situation can of course be different for the other businesses on the island and tightly connected to the customer profile.

The three sections above, results from *Section 3.1 Literature Analysis* and *Section 3.2 Case Study: Interviews and Reports* and the insights from *Section 3.3 Literature and Case Study Data Comparison* were necessary steps enabling the discussion and findings in the chapters below.

4 Discussion

This chapter addresses seven prominent similarities, differences and questions arising from our results, each of them discussed under *Section 4.1 Interpreting Results*. The reasoning in this section supports us in building an understanding of the needs brought forth by our research question: "How can local businesses on small islands become drivers in the transition towards sustainable energy?" In *Section 4.2 Deriving Focus Areas,* we provide six focus areas to address those needs.

4.1 Interpreting Results

The aspects we develop on in the following sections are *Interconnectedness of Barriers and Enablers*, *Addressing Financial Barriers*, *Government Involvement*, *Voluntary and Compulsory Measures*, *Energy Paradox*, *Awareness and Societal Engagement*.

4.1.1 Interconnectedness of Barriers and Enablers

As justified in *Chapter 3.1.1 Complexity,* when taking actions towards sustainable energy, the interconnectedness of barriers and enablers needs to be addressed in a holistic manner. Additional considerations need nevertheless to be discussed.

Certain barriers and enablers affect several or all stages of the MCIR framework. For example, unstable policies regarding renewable energy can both demotivate, and impede implementation. Based on multifaceted elements, the emerging themes in *Chapter 3 Results* expand across all stages and categories of the MCIR framework. For example, the barriers and enablers within the *Information and Knowledge* theme come from no fewer than eight categories within the framework. Furthermore, some of the found enablers are suitable to address all stages of the framework. Notably, ESCos, voluntary agreements, and education campaigns are used to disseminate knowledge needed during the different MCIR stages. This suggests that the industry has started to understand the need to examine barriers and enablers from a systems perspective. These are some arguments for why MCIR stages and the themes they support to emerge cannot be addressed independently from one another.

In general, by addressing energy efficiency and renewable energy separately, the literature hints towards considerable differences between these aspects of the energy domain. Reasons for the separation can be the fact that the companies, governmental analysts and researchers specialise in one of these two relatively distinct areas. We distinguish nonetheless several barriers and enablers that affect both renewable energy and energy efficiency projects, e.g. high initial costs for renewable energy or energy efficient technology, lack of information about benefits, mandatory appointments of energy managers, and benefits of data collection. As the literature we analysed did not address both renewable energy and energy efficiency and their interactions, we suggest that these two areas are further looked at in combination. This would increase the chances of achieving the goal of sustainable energy.

4.1.2 Addressing Financial Barriers

There are many reasons why businesses do not invest in energy efficient technologies or renewable energy. Some of the mentioned barriers in *Section 3.1.5 Financial Incentives and Funding* are the high demand and lack of capital, the deficit in governmental incentives and the cost disadvantage of renewables compared to traditional non-renewable energy sources. The literature states that most of the barriers can be traced back to market failures, specifically the cost disadvantage of renewable technologies due to external benefits and costs.

From our results, we summarise two ways of overcoming the cost disadvantage. One way is to alleviate the cost disadvantage by means of subsidies, loans, and other incentives, and another way is to incorporate the external benefits and costs into the final price, allowing a fair comparison by the end consumer.

The first approach, subsidies and loans, is not sufficient on its own. Investors and society in general also need to be aware of the incentives, leading to a need of information campaigns. In the end, subsidies create opportunity, minimise investment risks and can build a momentum if investments are proven successful. The investments need nevertheless to be self-sufficient, profitable in the absence of subsidies and compete with non-renewable energy sources from both financial and other considerations.

The second approach, incorporating external benefits and costs in the energy price and offering full transparency, would have a greater impact. In *Section 3.1.1 Information and Knowledge*, we gave the example of non-renewable energy prices disregarding the costs for decommissioning nuclear power plants but renewable prices including costs for construction of renewable energy plants. The non-financial benefits of renewable energy such as energy security, employment and training opportunities already mentioned in *Section 3.1.2 Community Engagement* could also be evaluated and reflected in the price. Similarly, the non-financial costs of non-renewable energy addressed in *Chapter 1 Introduction*, could be evaluated and reflected in the price. Impartially incorporating all related costs, the high cost of non-renewables would create a strong need for change of our current behaviour. The example of Samsø confirms that high taxes on fossil fuels can be a strong incentive to switch to renewable energy.

In relation to local communities, the case of Île d'Oléron shows that the local government can act on the first approach – subsidies and loans. Their influential power can however be limited in terms of the second approach because of national legislation concerning energy distribution rights.

4.1.3 Government Involvement

Several barriers and enablers involve municipal or national governments. This section puts forth three arguments arising from *Chapter 3 Results* for why governments should be involved in the transition towards sustainable energy.

Firstly, certain issues can only be solved through engagement of governments. These include a high administrative burden from ineffective permit procedures, conflicting policies and an unstable political climate regarding the support of renewable energy as mentioned in *Section 3.1.4 Technical and Administrative Infrastructure* and *Section 3.2.4 Support Needed.*

Secondly, certain measures should be implemented by governments to make sure that they are impartial and fair. Conversely, as mentioned in *Section 3.1.3 Information and Knowledge*, some awareness raising campaigns had been influenced by big energy companies with the result that they were later described as being biased. For this reason, such campaigns should be carried out by governments without the help of the private sector, in case bias cannot be ruled out. Other measures that should also be implemented by governments for the same reasons are financial funding, and ensuring a fair access to the electricity grid (*3.1.4 Technical and Administrative Infrastructure*).

Thirdly, governments should be engaged because in some cases, they can be obstacles themselves. Examples are when deficient knowledge in areas such as the cooperative model detailed on under *Section 3.1.3 Information and Knowledge* or community benefits of renewable energy, leads to opposition towards renewable energy projects, as shown under *Section 3.1.2 Community Engagement*. Especially pertinent to our case study, the national government should, at the very least, not inhibit local authorities from being able to move towards sustainable energy. In the example of Île d'Oléron, the high emphasis of the landscape protection legislation on visual considerations has turned the implementation of renewable energy projects into a big administrative hassle. It additionally led to creating the impression that renewable energy technology does not match the island's charm. Consideration should be given to where boundaries can be drawn and which trade-offs should be made.

On the contrary, if local governments are interested and allowed to take an active role in community development, they can support renewable energy projects in various ways. As the example of Samsø illustrated in *Section 3.1.3 Information and Knowledge*, the municipality was a key actor in the efforts to transition to renewable energy and helped to encourage participation and bring stakeholders together.

4.1.4 Voluntary and Compulsory Measures

Our results have shown that policies implemented by governments can be either voluntary or compulsory. Voluntary measures mentioned in previous chapter include financial incentives, such as feed-in tariffs and tax exemptions. Examples of compulsory measures are minimum efficiency standards for common technology and buildings, and quota obligations. As already shown in *Section 3.1.1 Complexity*, voluntary measures have been preferred by legislators due to fewer negative consequences on the competitiveness of businesses.

Compulsory measures can however act as initial motivators for businesses to further develop more energy efficient products. Once a compulsory label is introduced, businesses tend to become more willing to sign voluntary agreements, with governments and other businesses, to find innovative solutions and comply with the regulations. We suggest that compulsory policies can act in like manner for investments in more energy efficient business processes and renewable energy technologies given that attention is being paid to fairness and competitiveness.

4.1.5 Energy Paradox

The subject of the paradoxes mentioned in *Section 3.1.3 Information and Knowledge* merits being highlighted.

In spite of the benefits, investments in energy efficiency and renewable energy experience the problem of not materializing, in part due to small economic gains for individual investors. We suggest that the issue needs to be addressed from a higher aggregation level, e.g. several consumers or potentially the entire island community. Information campaigns can both draw attention to the benefits of energy savings as mentioned in *Chapter 1 Introduction* from a broader perspective and under several sections under *Chapter 3 Results* from communities' perspective. Acknowledging and informing about the population's tendency to use the saved energy for other energy consuming activities also merits being disseminated.

A lack of visible results leading to a lack of motivation in maintaining the habit can be noticed. This further reinforces the understanding and usage of the MCIR framework as a sequential stage identification framework.

Although we are aware that awareness does not guarantee behaviour change, information campaigns are the first step while additional measures complement the strategy.

4.1.6 Awareness

When analysing how businesses could become drivers in the transition towards sustainable energy, lack of knowledge and information was a recurring theme. For example, lack of awareness regarding community benefits in local authorities can lead to resistance that can be critical to the success of renewable energy projects (*3.1.3 Information and Knowledge*). It goes to reason that a business that is not knowledgeable of the effect that fossil fuels have on global warming, would not concern itself with sustainable energy as it would not understand the reasoning behind why it is important to do so. Another need for behavioural change in this theme refers to become aware of the energy consumed, in terms of its amount and source, i.e. renewables or non-renewables.

The second aspect of awareness relates more to a mindset and way of thinking rather than knowledge of specific information. Businesses acting from a strategic approach (independently taking actions that assist in moving towards a long-term goal or vision), is one of the most effective ways for businesses to move towards sustainable energy. What is of key importance in having a business adopt a long-term strategic approach to sustainable energy is that they are able and most suitable to assess whether the actions that they are taking are effective. A systems perspective goes hand-in-hand with having a strategic perspective. It allows businesses to see how they directly as a business or indirectly through their customers, suppliers and partners contribute to achieving the goal of sustainable energy.

Governmental and community awareness of the need to strategically approach sustainable energy is of just as high importance, as these stakeholders directly affect businesses' motivation and capacity to transition towards sustainable energy. For achieving societal awareness, effective communication between all these stakeholders is therefore extremely important.

4.1.7 Societal Engagement

Engaging the citizens and involving them in what happens in their surroundings allows them to feel a part of the changes taking place, and subsequently influences their acceptance of these changes. One aspect of societal engagement is the spreading of awareness of the benefits of sustainable energy, e.g. the possible positive influence on employment and 'green jobs' mentioned in *Section 3.3.2 Enablers*, while acknowledging common concerns about sustainable energy, e.g. visual and audial pollution of wind turbines (*Section 3.3.1 Barriers*). However, apart from emphasising the individual citizen's benefits from sustainable energy projects, ensuring that the society's values are in line with sustainable energy development is a more secure and resilient way of implementing successful sustainable energy projects. Local ownership has shown to play a key role in reducing resistance to sustainable energy projects, as it allows residents to directly benefit from the success of such projects and involves them in the decision-making process (*Section 3.3.2 Enablers*).

4.2 Deriving Focus Areas

Based on the results and reflections on the aspects detailed in *Section 4.1 Interpreting Results* and employing the reasoning detailed in *Section 2.2.3 Deriving Focus Areas*, six focus areas have been identified. They acknowledge the role of local governments and the community as key stakeholders influencing the context in which businesses operate. The areas are Awareness, Consistent and Proactive Political System, Engaged Community, Supporting Infrastructure, Financial Capability, Agile Approach. The sections below describe them and give examples of what they can imply. The six focus areas are equally important and the level in which they need to be acted on depends on the specific political, economic and social context where they are applied.

4.2.1 Awareness

Awareness is an important aspect to consider when analysing businesses transition to sustainable energy, as it incorporates knowledge and information as well as understanding and way of thinking.

As the results regarding awareness place such emphasis on government, businesses and community, it goes to reason that the level of awareness of all these stakeholders regarding sustainable energy directly affects the society's motivation and ability to implement sustainable energy projects.

Two main aspects became apparent from our research. The first aspect is the availability and ease of access to information and knowledge. The focus in this case is on creating awareness of, e.g., the need and opportunities regarding transitioning to sustainable energy, or knowledge of climate change and the sustainability challenge as described in *Chapter 1 Introduction*.

The second aspect relates to understanding, meaning the relationship to the acquired knowledge. In this case the focus is on the way of thinking about sustainable energy, e.g. a strategic systems approach.

Awareness as focus area implies …

- staying informed as to progressions in the field of sustainable energy.
- informing businesses of the imperative to move towards sustainable energy. See reasoning in *Chapter 1 Introduction* for potential support.
- informing businesses about available support and benefits, e.g. existing technologies and best-practices, financial and non-financial benefits of transitioning towards sustainable energy. See examples in *Chapter 3 Results* for potential support.
- supporting businesses in understanding their current energy related behaviour, energy consumption, energy demanding processes and measure their energy use in order to reveal areas where gains can be made.
- assisting businesses in thinking long-term, strategically, holistically about sustainable energy. Understanding the imperative of addressing the climate change alongside close stakeholder relationships will support this behaviour.

4.2.2 Consistent and Proactive Political System

Previous chapter and sections highlighted the effects of policies and a stable and engaged political system on potential investors' motivation and ability to support the sustainable energy development. As shown, the proactiveness of the political bodies ranging from local to global level can actively streamline the potential for sustainable energy projects to be initiated.

Different interests at the local and national levels have nevertheless the contrary effects. Division of responsibilities is natural, but what is apparent is that currently there is a considerable risk of a lack of cooperation and alignment between the policies implemented at different levels (or even at same political level but by different governing bodies).

At the core of this focus area is the purpose of the political representatives to support societal development. The task can be accomplished due to the favourable position facilitating the overview of society's shortcomings and opportunities.

Consistent and Proactive Political System as focus area implies …

- agreement between different political levels acknowledging the sustainability challenge and the importance of transitioning to sustainable energy.
- implementing policies that are in line with transitioning to sustainable energy.
- taking an active role in sustainable energy approaches.

4.2.3 Engaged Community

Societal engagement is an important aspect if we consider as an example the influence that customers and the immediate social surroundings have on businesses. At least for small communities as our case study has shown, the society's attitude towards certain phenomenon can influence the businesses' attitudes on energy investments to pursue or general business decisions to take. Similarly, the government representatives are susceptible to the societal pressure.

While no stakeholder can have the full perspective, an engaged community can reveal issues that need attention and find solutions from within to overcome them.

Similar to the Danish island Samsø where success was in big part attributed to the high community engagement of islanders, the interviewees on Île d'Oléron proved a strong connection to the surrounding nature and people. Such potential would need to be nurtured more as it will among others affect the way in which the community responds to any global challenges and opportunities as presented in *Chapter 1 Introduction*.

Engaged Community as focus area implies …

- supporting citizens' awareness as detailed under *Section 4.2.1 Awareness.*
- aligning people's values with the vision of sustainable energy.
- empowering citizens to be involved in decision-making processes, and allowing for the possibility of local ownership of sustainable energy projects.
- addressing legitimate concerns from the society, e.g. NIMBY attitude.

4.2.4 Supporting Infrastructure

Permissive technical infrastructure is necessary to ensure that businesses and communities are able to benefit from the implementation of sustainable energy projects.

One of the main points regarding supporting infrastructure that was recurrent in the findings was the reference to the electricity grid. As sustainable energy is characterised by a big number of producers harvesting small amounts of energy, as opposed to non-renewable energy generally under the operation of big companies, the electricity grid needs to support receiving and distributing energy as such. For small communities such as Île d'Oléron, an electricity grid supporting renewable energy generation would therefore allow small producers to sell the sustainably produced excess energy and thus increases the financial incentive of investing in renewable energy technologies.

Coordination between producers of different renewable energy sources will increase the resilience of the power supply. Technical support for different renewable energy technologies needs to be accessible, e.g. competent consultants, technology suppliers.

Supporting Infrastructure as focus area implies …

- permissive electricity grid.
- access to technical support for renewable energy technologies.
- cooperation pathways between sustainable energy producers.

4.2.5 Financial Capability

Although the benefits of sustainable energy are broader than just concerning the financial aspects, i.e. added environmental and community benefits, investments need to be financially feasible to be pursued from a business perspective. The capability of businesses to implement projects, once other prerequisites such as awareness and motivation are in place, is a prerequisite for their transition towards sustainable energy. What both the literature analysis

and the case study reveal is that financial considerations are the determining factor for business decisions, sustainable energy investments being no exception.

The approaches to financial empowerment for renewable energy and energy efficiency investments do not show big differences. Whether the support comes from government, other businesses or citizens, it has, in essence, two main functions which ultimately serve the same purpose – increasing businesses ability to pursue sustainable energy initiatives.

Firstly, there is support for overcoming the initial cost of sustainable energy technologies. It can take the form of loans, feed-in tariffs, grants, governmentally paid pre-feasibility studies or other financial assistance not necessarily directly profitable for a business, but rather reducing the investment's risks and burden.

Secondly, the support can address financial capability post initial cost, meaning in the operation phase. In this case, the support can come for example in form of tax exemptions and free technical consultancy alleviating staff costs.

Financial Capability as focus area implies …

- ensuring financial support both in the initial phase and during operations.
- supporting long-term financial stability.

4.2.6 Agile Approach

The sustainability challenge described in *Chapter 1 Introduction* hinted towards a high level of complexity surrounding sustainable energy. Our research question demanded and created the opportunity for a multitude of barriers and enablers to be identified in *Chapter 3 Results*. We compiled our results through different iterations and presented them through lenses such as the MCIR framework and the emerging nine themes from the literature analysis and case study material.

The two research tracks aimed for understanding of the system while keeping the goal of sustainable energy in mind. They have supported us in identifying the six focus areas as the answer to our research question. The stepwise methodology enabling our research proves the necessity of first and foremost understanding the system of the problem at hand and iterating for finding suitable solutions.

We have applied the system and success focus on barriers and enablers at a general level and to a lesser extent on particular small businesses in a certain community. Both tracks highlight the necessity of understanding the specific situation of a community and of a business in order to address it with relevant measures.

One particular aspect is apparent in both *Chapter 1 Introduction* detailing on the sustainability challenge and *Chapter 3 Results* highlighting approaches that enable reaching sustainable energy as defined goal. A long-term thinking allows results to be possible by creating space for investments to happen even if they might not seem financially profitable in the short run. They prove to be financially profitable in long term and additionally enable energy security, community development and bring environmental benefits.

Agile Approach as focus area implies …

- early understanding of context, i.e. barriers and enablers for the community at hand.
- flexible support measures tailored to address the idiosyncratic needs of small local businesses.
- proactive and long-term business mindset.

4.3 Validity

Due to the relatively small set of analysed documents and interviews, it cannot be ruled out that additional focus areas need to be added after validation. We are however confident that all aspects addressed are necessary. The methodology employed to derive the focus areas could be criticised for its high reliance on the judgement of the researchers. As described in *Chapter 2 Methods,* we sought to address this issue through triangulation between the authors.

4.3.1 MCIR Framework

As mentioned under *Chapter 2 Methodology*, the MCIR framework was designed to map and analyse barriers and motivators and stakeholders' roles in relation to energy efficiency. We have additionally applied this framework in the context of renewable energy. Additionally, using the framework for general barriers and enablers as opposed to one specific context, we encountered certain difficulties in drawing clear lines between stages as well as placing elements strictly under one stage. Given the embryonic level of the framework, we see the difficulties we experienced as natural, but acknowledge that different researchers can question the way elements have been categorised.

One considerable adaptation of the framework has been to add barriers and enablers that hinder or make results possible to the results stage. These are specific elements that affect the results, regardless of the effect of the elements under the previous stages.

4.3.2 Case Study

The documentation and the interviews for our case study implied to a great extent the use of the French language. For revising the written reports, we made use of the team's French language skills and internet translations. We relied also on key aspects provided in English by our contact person, TEPOS manager on Île d'Oléron. For three of the interviews, Delphine Le Page also supported us with translating the questions to the interviewees and the majority of their responses. Only for one of the interviews, there was a need for specific parts of the English conversation to be clarified in French. We also relied on the TEPOS manager for the final validation of our summary of the documentation and the interviews. Our results may have missed out on subtleties that disappear due to linguistic limitations.

Regarding the interviews, only one person within each business was interviewed and therefore speaking on behalf of the business. Since in three cases, the interviewee was the founder or manager of the business, we assume a high level of understanding of the business and therefore relevance of the information. The fourth interview has the advantage of perhaps presenting the business from a more transparent position in relation to the difficulties of the business. It can

at the same time incorrectly suggest that the management team also reflects the inherent lack of awareness of the interviewee who is not occupying a CEO position.

Questions arose also about the generalisability of the interview results considering that only four businesses were interviewed. Because initial contact was facilitated by the local government representative, there is a risk that the businesses were more open to the collaboration and gave more favourable answers regarding their openness to sustainable energy than they would have in other circumstances. We tried to address this risk by asking questions aiming for past behaviour and actions rather than intentions.

4.4 Future Research

As mentioned in *Section 1.3 Scope and Limitations*, we did not validate the final selection of focus areas. Therefore, future research needs to start with a validation of the findings. Due to time considerations, this research did not assess the extent to which the focus areas can be operationalised, i.e. how the focus areas could be applied in concrete contexts. Time considerations did also not allow us to address the social sustainability issues related to the energy efficiency measures or investments in renewable energy technologies.

Additionally, we mention this limitation especially in connection to sustainability in the supply chain. Our research addressed only energy usage in the business process and excludes analysis of the energy used in production of purchased materials going into the final products as well as the products' energy output. Since we advocate a holistic approach, we assess that if possible, these aspects should not be ignored by future research assessing actions towards goals such as "100% renewable energy island". We do not consider offsets as a means for achieving such goals. Therefore, similarly, we would like to draw attention to the implications of energy intensive, fossil fuel heavy processes in the supply chain and raise questions regarding whether a business having such processes in the supply chain can be seen as supporting the transition towards sustainable energy.

Future research could additionally address the degree to which research concerning both energy efficiency and renewable energy can be combined.

Our research addresses the difficulties and driving forces behind operations of and investments made by established businesses. Some of the identified difficulties can be removed through proactive measures before businesses are established, e.g. consultancy support ensuring that businesses avoid trade-offs in the initial phase that are harder to correct later in the process, and start-up programmes incorporating the sustainable energy perspective.

5 Conclusion

This project started from the idea that sustainability in the area of energy would be the result of the mainstream adoption of minimalistic energy use and energy savings as a habit, use of energy efficient products and processes, and production of renewable energy. We have analysed literature and pursued a case study for identifying barriers and enablers in relation to the goal above and a selection of most strategic approaches.

The results indicated that no specific measures can be recommended since the success of each action depends on its construction and context where it is applied. Traditionally, barriers and enablers have been addressed individually. More recent research advocates for a shift towards a holistic, systems approach, addressing the barriers and enablers from the perspective of their interrelatedness.

We identified six focus areas that need consideration by local governments, business representatives, customers or local pioneers in order to drive their communities' transition towards sustainable energy. The six focus areas are:

Awareness. The level of awareness of governments, businesses and communities directly affects the motivation and ability of society to implement sustainable energy projects. Therefore, there is a clear need for easily accessible information and knowledge. The term awareness includes knowledge of needs and opportunities not only with respect to the transition towards sustainable energy but also climate change and the broader sustainability challenge. This focus area additionally supports a general way of thinking that is in line with a strategic systems approach.

Consistent and Proactive Political System. Investors' motivation and ability to pursue sustainable energy projects is heavily depended on a stable and engaged political system. Political bodies on all levels, i.e. from local to global, need to cooperate and align their policies, so that they can fulfil their main purpose in the transition towards sustainable energy, i.e. support societal development.

Engaged Community. Customers and social surroundings have an immediate influence on businesses. Therefore, societal engagement is critical to the success of sustainable energy projects. It can reveal issues that need attention in order for projects to be allowed to continue or it can support with solutions that are not visible for other stakeholders. In small communities, specifically people's strong bond to the surrounding nature and people is a potential that should be utilised.

Supporting Infrastructure. Technical infrastructure, such as the electricity grid, needs to be prepared to cope with decentralised, intermittent sources of energy in order to allow small producers to sell excess energy to the grid. Furthermore, technical support for different renewable energy technologies needs to be accessible.

Financial Capability. Investments in sustainable energy projects need to be financially feasible, as economic considerations are the determining factor for business decisions. There are generally two areas that need to be addressed: financial support in the initial phase and financial incentives during the operation phase.

Agile Approach. The success of any sustainable energy project has three essential requirements. Understanding the specific situation of a business or community in order to make informed decisions regarding supporting measures. Iterating to find suitable solutions. Employing long-term thinking allowing results to become possible by creating space for investments to pay back.

The six focus areas cover the many barriers and enablers for achieving sustainable energy. Additionally, they ensure increased political independence and an energy system that is more resilient to natural disasters. The direction given by the focus areas also lead to a number of other benefits for society. Examples are strengthened relationships and trust as a result of the involvement of local citizens as owners and in decision-making processes.

We recommend these six areas in order to avoid the fallacy of investing in individual measures that disregard the broader perspective and are therefore meant to fail in permanently solving global issues.

Within the bigger picture of the sustainability challenge, our research offers guidance for changing the course of one of the biggest systemic errors of modern civilisation, i.e. its heavy reliance on fossil fuels. It has to be noted, however, that an energy supply sector based on sustainable energy, as envisioned in this thesis, does not imply full compliance with the Sustainability Principles. Especially social sustainability issues, which we excluded from the scope of this thesis, may still occur.

Two frameworks are used in this thesis in order to assist in answering the research question. The Framework for Strategic Sustainable Development (FSSD) enabled us to have a systems perspective when analysing the energy context, to place the goal of our thesis into a comprehensive and scientific definition of sustainability, as well as to align our findings' relevance to the guidance of a strategic approach. The Motivation-capability-implementation-results (MCIR) framework was a suitable tool for structuring parts of our data in a way that allowed the overview required and recommended by the FSSD.

Future research could address validation of the six focus areas in a concrete context. Additional focus areas might be needed if the scope is expanded to include also transportation and businesses' supply chain.

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Appendix A: Case Study Protocol

Île d'Oléron, France

Overview

Case Study Questions

- *"Why hasn't Île d'Oléron completely switched to sustainable energy yet?"*
- *"Which steps has the local government taken towards sustainable energy?"*
- *"How does it support businesses in doing so?"*
- *"What barriers do businesses face towards sustainable energy?"*

Propositions

Propositions are initial ideas on how the research questions might be answered. (Note: Be aware of *confirmation bias*!) They shape the data collection process, as they outline the potential focus areas of the study.

- The island has set itself a goal.
- The island has already taken some steps towards sustainable energy.
- The island has identified businesses as an important stakeholder.
- Businesses deal with certain barriers with regards to transitioning towards sustainable energy.
- Businesses have not yet completely transitioned towards sustainable energy; there is room for improvement.

Field Procedures

- Primary note-taker: _____
    - Recording device: _____
    - Write down time the recording starts, and time of relevant points in interview (alternatively write down time every 10min)
    - Checks regularly that the device is recording
- Holds structure of interview: _____
    - Makes sure that main points are brought up
    - Supports with questions – makes sure the interview moves forward

- Engages with the person(s) being interviewed: _____
    - Asks if it's ok to record
    - Explains that it's an explorative interview
    - Explains the thesis and context – show protocol (both)
    - Explains that the purpose of the interview is to get an overview/better understanding of renewable energy, and businesses' relationship to it
    - At the end, asks if it's ok to use their names (and company name)
    - Further contact
    - Does not finish the sentences of the interviewee
- Checklist Before Interview
    - Make sure that interview is relatively well structured (what are the main points that you **have to** cover)

Case Study Questions

Level 1: Business Representatives

1. Have you taken any energy efficiency measures?
2. Do you buy renewable energy today?
3. Do you produce own energy / renewable energy today?
4. Do you use electric vehicles?
5. Are you aware of your today's energy consumption?
6. Are you aware of your today's transport routines / costs?
7. Do you follow-up on your energy consumption? (keep an eye on changes over time, compare with last year's consumption etc.)
8. What products do you buy most? (check sustainability behaviour)
9. The government has the goal of completely switching to renewable energy by the year 2050. Do you see that goal as realistic for your own energy use?
10. What do you think may help the island to reach 100% renewable energy by 2050? What could government / other stakeholders do?
11. What would motivate you?
12. Have you engaged in any sustainability initiative before? Which and why?
13. Have you done anything with regards to your waste management?
14. What are you (business) most worried about? (advertise renewable energy as something else depending on their sensitive spots)
15. How do you see your role / power in changing course of the climate change?
16. Do you have enough time, money to invest in renewable energy? What resources are the businesses willing to give? (e.g. money, time, expertise?)
17. Do you have any preferences for specific type of renewable energy? Would you prefer a wind turbine or solar panels?
18. Do you think the island is doing enough in terms of sustainability? In terms of renewable energy?
19. Do you have recurrent customers or occasional ones?
20. Did you receive any recommendations / questions from your customers about your sustainability engagement?

Level 1: Local Representative

1. What is the broader vision for the government on Île d'Oléron with respects to the sustainability? (check for the proper conditions needed for the charter to work)
2. What are success indicators for the charter / label? How many users? Which behaviour change?
3. What are the legislative bounds of the government?
4. What are the financial bounds of the government (which resources is the government offering for the goal of transitioning to renewable energy)?
5. What energy efficiency measures have businesses historically shown willingness to take?
6. What sustainability initiatives have businesses historically shown interest in / supported?
7. Which projects are currently being developed on the island?
8. What's the plan with leasing solar panels to businesses?
    a. What resources exist for these kind of measures?

Level 2

Prerequisites B5, B6

1. What's the businesses' opinion about renewable energy and sustainability on the island? (For/against, tired of / enthusiastic about)
2. What's the public's / consumers' opinion about renewable energy and sustainability on the island?
3. Do businesses see a link between climate change and renewable energy?
4. What is the broader vision of the government on Île d'Oléron?
5. How attached is the local government to the label? Open to drop it if we do not see it recommendable? Answer based on discussions with Delphine
6. What are the financial and legislative bounds of the government?
7. What other policies exist / are being implemented on the island that could influence the success of the local energy label / charter?
8. Are there bureaucracy barriers for businesses that the local government could address? Is the local government open to lighten these barriers?
9. Do businesses find interest in differentiating themselves from other islands in competing for tourists?
10. What is the life-cycle of this label / charter? Withdrawn / not applicable once 100% renewable energy island or sooner?
11. Do businesses rank waste and energy sustainability differently?

12. What would motivate you to switch to renewable energy?

Energy Efficiency and Energy Use Reduction (Dematerialisation)

1. What energy efficiency measures do businesses currently take?
2. What energy efficiency measures are businesses willing to take?

Substitution of Energy (non-renewable – renewable)

1. Would businesses support transition to renewable energy?
    a. Why?
    b. Which? Any preferences for specific type of renewable energy?
2. How is electricity bought in France? Answer based on discussions with Delphine + lit review
    a. How does the energy grid work – old or new system?
    b. Are businesses able to choose between different energy providers?
    c. Do they have different options: 10% renewable energy, 50%, 100%?

Energy Production

1. Can local producers sell their energy back to the grid? Answer based on discussions with Delphine + lit review

Motivation		Barriers	Enablers

	Economic	• imperfect market: unpriced energy costs, spillover nature of R&D (e.g. environmental) N35, M51.1 N109
		• lack of governmental incentives, weak policies / legislation M43 N109
		• lack of data showing positive returns M36
		• uncertainty about future energy price M43
		• lack of internal financial incentives M39
		• lack of awareness of opportunities M39 M43 N3
		• principal-agent problem / split incentives M34.1 N4 N59
		• perceived high cost of energy investment M43
		• initial costs prioritised over annual savings M34.3 N59
		• other capital investments are more important M43
		• deficit in formulation of energy policies and political instrument M47
		• cost disadvantage (e.g., through imperfect market) M50
		• specific renewable transaction cost N86
		• some renewables more expensive than others N17 N18 M77
		• currency risk N32
		• external benefits and costs N60 N70
		• unfair distribution costs and benefits N65
		• short support duration N32
		• capital demand N60 N30 N31 N18 N38
		• operation costs N60 N30 N31 N18
		• slow return on investment M57
		• low total remuneration N32
		• lack of knowledge of economic benefits M57 N68
		• energy efficiency prioritised over renewable energy N8
			• energy efficiency financing (allows to repay from the savings) M6 (+ cap)
			• *cost reduction of production M25*
			• *increases firms' competitiveness M25*
			• reduce environmental fees / meet environmental quality standards N76
			• market advantage (branding) N76
			• *increased CSR (people, planet, profit) R2.2 (+ soc env)*
			• *potential for new energy storage systems being developed R3.4 R3.5*
			• *avoid financial risks: price volatility, fuel supply disruptions, additional environmental regulations N83 N95 N98*
			  ○ *unreliability of transportation of fuel (for remote islands) R1.5*
			• *diminishing availability of fossil fuels increase incentive for renewables M27 N100*
			• *significant percentage of total expenses are energy costs (7-10% for SMEs) M32*
			• *faster reopening in case of disasters (e.g. wind turbines) N97*
			• *first-mover advantage N103*
			• feed-in tariffs M7 M9 N1 N2 N17
			• quota obligations / tradable green certificates M9 M12 N1 N2
			• feed-in premium systems N5
			• long-term security of feed-in tariffs M101
			• additional income
			  ○ renewable energy tourism M26 R1.2
			  ○ transfer of knowledge and preparatory planning (additional income) M31
			• financial benefits of community projects, coops and other forms of ownership
			  ○ management of electricity – a cooperatively owned local utility R5.9
			  ○ fair distribution of costs and benefits M80
			• benefit directly from the the success of the project N7 N17 N67 M114 N63 N72
			• compensation for lost value of property N9
			• local citizens' option to purchase (wind turbines) shares N9 R5.7 M111
			• technology-specific remuneration M15 N11 N17
			• financial assistance
			  ○ subsidies: soft loans, investment grants, tax incentives / allowance / exemptions M3 M5 M12 M13 M93 N1 N2 N17 R5.6 M108 (+ cap)
			  ○ guarantee fund to support financing of preliminary investigations N9
			  ○ cooperation with banks to obtain loans R5.8 M112
			  ○ municipality granted mortgages R5.14
			  ○ subscription to future renewable energy certificates N89 (+ cap)
			  ○ new financing models (SPPA) N90 (+ cap)
			• originally high energy costs (i.a. taxes on fossil fuels) N17 M90 M91 M98
			• benefits of distributed economies N47
			• early sign-up advantage M113
			• raising public awareness, public competitions N8
			• reduce costs N17 N73
			• portfolio analysis N79 N93

	Barriers	Enablers
Environmental	• Not-In-My-Back-Yard (NIMBY) (birds, health issues caused by radiation) N60 • lack of awareness of climate change	• *lower carbon footprint / reduce impact on environment / become more sustainable N76* • *energy efficiency: most effective tool to CO_2 emissions M24* • a green scheme to enhance local scenic and recreational value N9 • GHG emissions inventory N78 • *Reduce environmental impacts N82* • *increased CSR (people, planet, profit) R2.2 (+ eco soc)*

Social	• general low morale N59
	• intention of selling business N59
	• Not-In-My-Back-Yard (NIMBY) (noise, visually intruding) M54 N109 (+ imp)
	• cultural diversity, low social capital M122 M104 N38 (+ imp)
	• seen as threat to tourism R1.1 M48 (+ imp)
	• lack of knowledge of community benefits N68
	• lack of awareness of possibility to switch energy source N1
	• awareness campaigns biased in favor of sponsor N70
	• conventional sources too accessible M122 M51.1 M51.2 N109 (+ imp)
	• hesitation towards decentralised models N71 (+ imp)
	• lack of sustainability champion N59
	• consumer-financed development (miscellaneous) N29 (+ political element)
	• internal barriers (e.g., hesitance, insecurity)
		• energy labeling programs M3 (+ cap)
		  ○ become partner of a bigger organisation (ecoBiz) / label N76
		• *customer demand for 'green' products (lower carbon footprint) N3*
		• long tradition of civic engagement and community ownership N19 M94
		• sense of community N17 N73 M100
		• institutional trust N19
		• public participation M103
		• voluntary purchases N80
		• strong cultural identity / rooted community N17 M102
		• differentiate products N84
		• local leadership M10 N17 M99 N84
		• acceptance of RES due to ownership M10 R5.8 R5.9 R1.4 M103 M111
		• electric bills include information about electricity mix M11 N10
		• energy cooperative that motivates owners to install PV systems M16.2
		• installation and maintenance of plants by region-based craftsmen for added regional value M30
		• social pressure N17
		• trust and close relationships N17 M95
		• commitment from authorities M10
		• direct marketing
		  ○ open house visits R5.4
		  ○ house calls by energy advisors R5.3
		  ○ collection of signatures from individual homeowners R5.15 (+ imp)
		  ○ promotion of RES (by relevant stakeholders) R1.9
		• acceptance benefits of community projects, coops and other forms of ownership
		  ○ citizen involvement as owners / in decision-making M16 N17 M106 M80 (+ imp)
		  ○ ownership M10 R5.8 R5.9 R1.4 M103 M111
		• find inspiration in other islands M67
		• *renewable energies have local benefits (environmental, health, employment, 'green' growth) M33 M114 N85 N101*
		• *increased CSR (people, planet, profit) R2.2 (+ eco env)*

		Barriers	Enablers

	Political	• too many government stakeholders / conflicting policies M44 (+ imp)
		• unstable policies M122 N29 N31 N32 N38 (+ imp)
		• little decision making power in local politics M47 (+ imp)
		• voluntary measures instead of compulsory N50
		• Not-In-My-Back-Yard (NIMBY) (local public representatives) N68
		• set-up of permit procedures, high administrative burden / hurdles M52 M55 N26 N28 N109 (+ imp)
		• lack of knowledge / legitimacy / political support regarding the cooperative model N31 N68
		• lack of strong, dedicated institutions N109
		• lack of clear responsibilities N109
			• efficiency standards
			  ○ minimum efficiency standards for common equipment M4
			  ○ mandatory efficiency standards for new buildings or technologies N4 N17
			  ○ buildings energy performance standards and codes M8
			  ○ target setting (by government) for energy efficiency M19
			• energy audits M4 M5 M23 (+ res)
			• international obligations as incentives N12
			• *avoid risk of mass migration and regional conflict N99*
			• *reduce infrastructure vulnerability N85*
			• *avoid being blackmailed by fossil-fuel-rich countries N95*
			• clear and transparent measures concerning approval (one-stop-shops) M15 N28 (+ imp)
			• tenders (public procurement) M12 N1 N2
			• stable policies M14 N19 N32 N33 N102
			• consumer-financed development (miscellaneous) N29 (+ social barrier)
			• Renewable Energy Sources Act N9 N66 N69
			• target risks
			  ○ international private and public risk insurance N112
			  ○ identify and mitigate risks associated with deployment N106
			• targeted and adaptable policy tools N107 N108
			• liberalisation of the market N13
			• require regional investments towards economic and social welfare M76

Capability	Technical	• ESCOs lacking in specialised knowledge M44 • lack of information on / experience on energy and savings technology technologies M40 M43 • lack of staff awareness / trained manpower M40 M43 M44 N59 • lack of information on sustainable energy solutions with local governments R1.9 • institutionalised (externalised) skills N38 • lack of information on how technologies work under actual economical, organisational and political settings M49	• ESCOs lacking in specialised knowledge M44 • lack of information on / experience on energy and savings technology technologies M40 M43 • lack of staff awareness / trained manpower M40 M43 M44 N59 • lack of information on sustainable energy solutions with local governments R1.9 • institutionalised (externalised) skills N38 • lack of information on how technologies work under actual economical, organisational and political settings M49
	Financial	• lack of financial resources, access to capital / budget M40 M43 • high capital investment M57 M122 R1.1 • limited economics means M45 R1.4	• subsidies: soft loans, investment grants, tax incentives / allowance / exemptions M3 M5 M12 M13 N1 N2 N17 R5.6 M108 (+ mot) • subscription to future renewable energy certificates N89 (+ mot) • new financing models (SPPA) N90 (+ mot)

		Barriers	Enablers
Implementation	Technical	• renting premises N27 • space constraint M44 • no time and staff N40 • legacy system M43 • short window of opportunity (manufacturing operates 24/7) M41 • limited capacity of the power transmission grid M56 • seasonality of tourism poses challenges in meeting peak demands M46 • intermittency of renewable energy sources R3.2 M65 • infrastructure M122 • difficulties with grid integration N39 N60 M53 N109 • current storage technologies not suitable for large-scale RES R3.3	• efforts in the area of power supply system M15 • decentralised energy system N17 M92 • access to renewable sources N17 M90 M91 M98 • storage applications for off-grid (future) N75
	Political	• too many government stakeholders / conflicting policies M44 (+ mot) • little decision making power in local politics M47 (+ mot) • corruption M122 N38 • unstable policies M122 N29 N31 N32 N38 (+ mot) • set-up of permit procedures, high administrative burden / hurdles M52 M55 N26 N28 N109 (+ mot) • multiple disconnected actors M122 N38 (+ mot? + cap?)	• centralised support for local energy planning R4.4 (+ cap) • clear and transparent measures concerning approval M15 N28 (+ mot) • different purchasing options N88
	Resistance to Change	• resistance to change M41 M43 • fear of disrupting production / loss in production greater than savings M35 M43 N37 N59 M41 • internal management N59 • conventional sources too accessible M122 M51.1 M51.2 N109 (+ mot) • Not-In-My-Back-Yard (NIMBY) (noise, visually intruding) M54 N109 (+ mot) • seen as threat to tourism R1.1 M48 (+ mot) • hesitation towards decentralised models N71 (+ mot) • transient population M122 N38 • cultural diversity, low social capital M122 M104 N38 (+ mot) • behavioural patterns M122 N38 N59 (+ cap?)	• cross-functional teams for implementing energy efficiency across organisation M21 (+ cap) • trust and close relationships N17 • reduce local resistance M15 • citizen involvement as owners / in decision-making M16 N17 M106 (+ mot) • collection of signatures from individual homeowners R5.15 (+ mot)
Results	Making Results Visible	• energy efficiency gap / energy paradox M34.2 M38 M42 R5.16 • rebound effect (as much electricity consumed as before) R5.17 • jevons paradox M37 • component level improvements easily offset by other changes M36 • lack of energy metering M43 • literature not focused on SMEs yet N23	• energy audits M4 M5 M23 (+ mot) • establishment of a standard protocol for energy reporting M19 • collect relevant and accurate data on savings and efficiency improvements (+ benchmarking) (Smart Meter) M22 M18 (+ cap) • govern efficiency improvements with care (through conservation policies) M63

	Barriers	Enablers
Making Results Possible	• deficient resource assessment N111 • carbon offsets N15	• renewable energy allied with energy efficiency found imperative to meet goals of sustainable and competitive energy supplies M58 • keep industrial competitiveness in mind M60 • unclear if overcoming most significant barriers leads to better energy efficiency M60 • consider interactions between barriers N43 • understand barriers early and continuously N105 N25 N61 • understand motivators and their interactions N53 N61 • small and adaptive steps N62 • avoid to bundle businesses together N24 N40 • long-term view N91 • consider interactions between policies N91 • no “natural” superiority of any instrument N42 • target overall energy security N92 • diversify energy portfolio (sources, pathways) N96 N93 R6.1 • both centralised applications and bottom-up initiatives have to be pursued M78 N6 • economic benefits stronger driving force than environmental benefits N20 • consider definition of renewables in specific country M71 M72 N41 • adapt and divide energy systems to local conditions R1.3 R4.3 R1.7 R6.2 • target energy savings, efficiency improvements in the energy production, and replacement of fossil fuels R6.1 • introducing and adding flexible energy technologies R6.2 • examine islands individually in their context because of institutional, organisational, habitual M66 R1.8
Feel Good	• negative branding e.g. greenwashing N87	• improved employee morale by meeting internal environmental objectives N84 • certification M5 • provide recognition N84 • possibility to be ‘branded’ as renewable energy island R1.2 • possibility to win awards regarding RES R3.1 • provide recognition N62 N84

Overarching Issues

- voluntary agreements M5 N3
- establishment of ESCOs M6 M23 N16
- seeking help from consultants M20
- mandatory appointment + training of energy manager M4 M5 M20
- information campaigns and education N3
- establishment of an energy academy M105
- community energy projects and renewable energy cooperatives M16.1
- information campaigns and education M13 N2 N3 N8 R5.1 M107

Legend

Text Energy Efficiency

Text Renewable Energy

Text Motivator

Text Internal

(+ abc) Also in other category

References

M1 (Möller et al. 2012, 340); M2 (Möller et al. 2012, 344); M3 (Chai and Yeo 2012, 461); M4 (Chai and Yeo 2012, 462);
M5 (Chai and Yeo 2012, 462); M6 (Chai and Yeo 2012, 463); M7 (Parthan et al. 2010, 92); M8 (Parthan et al. 2010, 92);
M9 (Ringel 2006, 6); M10 (IIEEE 2009, 36); M11 (Reiche and Bechberger 2004, 846);
M12 (Reiche and Bechberger 2004, 846); M13 (Reiche and Bechberger 2004, 846);
M14 (Reiche and Bechberger 2004, 847); M15 (Reiche and Bechberger 2004, 848); M16 (Wieg 2013, 3);
M16.1 (Wieg 2013, 4); M16.2 (Wieg 2013, 5–6); M18 (Leloux, Harkema, and Popescu, Harkema, and Popescu 2015, 252);
M19 (Chai and Yeo 2012, 470); M20 (Chai and Yeo 2012, 470); M21 (Chai and Yeo 2012, 470);
M22 (Chai and Yeo 2012, 470); M23 (Chai and Yeo 2012, 470); M24 (Chai and Yeo 2012, 460);
M25 (Chai and Yeo 2012, 460); M26 (IIEEE 2009, 36); M27 (Reiche and Bechberger 2004, 844); M30 (Wieg 2013, 5);
M31 (Wieg 2013, 8); M32 (Leloux, Harkema, and Popescu 2015, 250); M33 (Leloux, Harkema, and Popescu 2015, 250);
M34.1 (Chai and Yeo 2012, 461); M34.2 (Chai and Yeo 2012, 461); M34.3 (Chai and Yeo 2012, 461);
M35 (Chai and Yeo and Yeo 2012, 465); M36 (Chai and Yeo 2012, 465); M37 (Langlois-Bertrand et al. 2015, 30);
M38 (Langlois-Bertrand et al. 2015, 30); M39 (Chai and Yeo 2012, 469); M40 (Chai and Yeo 2012, 469);
M41 (Chai and Yeo 2012, 469); M42 (Chai and Yeo 2012, 469); M43 (Chai and Yeo 2012, 463);
M44 (Chai and Yeo 2012, 467); M45 (Möller et al. 2012, 340); M46 (Möller et al. 2012, 340);
M47 (Möller et al. 2012, 340); M48 (Möller et al. 2012, 340); M49 (Möller et al. 2012, 340); M50 (Ringel 2006, 3);
M51.1 (Reiche and Bechberger 2004, 844); M51.2 (Reiche and Bechberger 2004, 844);
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M54 (Reiche and Bechberger 2004, 846); M55 (Reiche and Bechberger 2004, 847);
M56 (Reiche and Bechberger 2004, 848); M57 (Leloux, Harkema, and Popescu 2015, 247);
M58 (Leloux, Harkema, and Popescu 2015, 249); M59 (Chai and Yeo 2012, 462); M60 (Chai and Yeo 2012, 462);
M63 (Langlois-Bertrand et al. 2015, 30); M65 (Lund 2007, 912); M66 (Möller et al. 2012, 339);
M67 (Möller et al. 2012, 339); M71 (Reiche and Bechberger 2004, 844); M72 (Reiche and Bechberger 2004, 844);
M76 (Reiche and Bechberger 2004, 847); M77 (Reiche and Bechberger 2004, 848);
M78 (Reiche and Bechberger 2004, 849); M80 (Wieg 2013, 4); M90 (IIEEE 2009, 37); M91 (IIEEE 2009, 37);
M92 (IIEEE 2009, 37); M93 (IIEEE 2009, 37); M94 (IIEEE 2009, 37); M95 (IIEEE 2009, 37); M96 (IIEEE 2009, 37);
M98 (IIEEE 2009, 39); M99 (IIEEE 2009, 39); M100 (IIEEE 2009, 39); M101 (IIEEE 2009, 39); M102 (IIEEE 2009, 41);
M103 (IIEEE 2009, 37); M104 (IIEEE 2009, 37); M105 (IIEEE 2009, 37); M106 (IIEEE 2009, 37);
M107 (IIEEE 2009, 37); M108 (IIEEE 2009, 37); M109 (IIEEE 2009, 37); M110 (IIEEE 2009, 37);
M111 (IIEEE 2009, 37); M112 (IIEEE 2009, 37); M113 (IIEEE 2009, 38); M114 (IIEEE 2009, 39); M122 (IIEEE 2009, 40)

N1 (IEA 2011, 34); N2 (Reiche and Bechberger 2004, 846); N3 (Chai and Yeo 2012, 471); N4 (IEA 2011, 37);
N5 (REScoop 2014, 16); N6 (Reiche and Bechberger 2004, 849); N7 (REScoop 2014, 33); N8 (IEA 2011, 38);
N9 (IEA 2011, 42); N10 (Reiche and Bechberger 2004, 846); N11 (Reiche and Bechberger 2004, 848);
N12 (Reiche and Bechberger 2004, 845); N13 (Reiche and Bechberger 2004, 845); N15 (IIEEE 2009, 38);
N16 (Chai and Yeo 2012, 465); N17 (IIEEE 2009, 2009); N18 (IIEEE 2009 2009); N19 (IIEEE 2009, 40);
N20 (IIEEE 2009, 42); N23 (Meath, Linnenluecke, and Griffiths 2016, 3603);
N24 (Meath, Linnenluecke, and Griffiths 2016, 3603); N25 (Meath, Linnenluecke, and Griffiths 2016, 3603);
N26 (IEA 2011, 37) ; N27 (Meath, Linnenluecke, and Griffiths 2016, 3598);
N28 (Meath, Linnenluecke, and Griffiths 2016, 3598); N29 (IEA 2011, 40); N30 (REScoop 2014, 4);
N31 (REScoop 2014, 5); N32 (IEA 2011, 42); N33 (IEA 2011, 45); N35 (Chai and Yeo 2012, 461);
N37 (Meath, Linnenluecke, and Griffiths 2016, 3598); N38 (IIEEE 2009 2009, 40);
N39 (Reiche and Bechberger 2004, 846); N40 (Meath, Linnenluecke, and Griffiths 2016, 3598);
N41 (Reiche and Bechberger 2004, 843); N42 (Reiche and Bechberger 2004, 843); N43 (Chai and Yeo 2012, 460);
N47 (IIEEE 2009 2009, 2); N51 (Meath, Linnenluecke, and Griffiths 2016, 3598);
N53 (Meath, Linnenluecke, and Griffiths 2016, 3602); N59 (Meath, Linnenluecke, and Griffiths 2016, 3602);
N60 (IEA 2011, 33); N61 (Meath, Linnenluecke, and Griffiths 2016, 3597);
N62 (Meath, Linnenluecke, and Griffiths 2016, 3603); N63 (Wieg 2013, 3); N65 (Wieg 2013, 4); N66 (Wieg 2013, 4);
N67 (Wieg 2013, 7); N68 (REScoop 2014, 26); N69 (REScoop 2014, 27); N70 (REScoop 2014, 26);
N71 (REScoop 2014, 22); N72 (Leloux, Harkema, and Popescu 2015, 249);
N73 (Leloux, Harkema, and Popescu 2015, 250); N75 (Leloux, Harkema, and Popescu 2015, 251);
N76 (Meath, Linnenluecke, and Griffiths 2016, 3602); N78 (EPA 2010, 29); N79 (EPA 2010, 3); N80 (EPA 2010, 2);
N81 (EPA 2010, 4); N82 (EPA 2010, 5); N83 (EPA 2010, 5); N84 (EPA 2010, 6); N85 (EPA 2010, 6f.); N86 (EPA 2010, 8);
N87 (EPA 2010, 8); N88 (EPA 2010, 9); N89 (EPA 2010, 11); N90 (EPA 2010, 13); N91 (IEA 2011, 9); N92 (IEA 2011, 9);
N93 (IEA 2011, 9); N95 (IEA 2011, 11); N96 (IEA 2011, 11); N97 (IEA 2011, 11); N98 (IEA 2011, 13);
N99 (IEA 2011, 13); N100 (IEA 2011, 13); N101 (IEA 2011, 15); N102 (IEA 2011, 15); N103 (IEA 2011, 16);
N105 (IEA 2011, 31); N106 (IEA 2011, 31); N107 (IEA 2011, 31); N108 (IEA 2011, 32); N109 (IEA 2011, 32f.);
N111 (IEA 2011, 58); N112 (IEA 2011, 59); N113 (IEA 2011, 59)

R1.1 (Möller et al. 2012, 339); R1.2 (Möller et al. 2012, 339); R1.3 (Möller et al. 2012, 339f.);
R1.4 (Möller et al. 2012, 340); R1.5 (Möller et al. 2012, 340); R1.7 (Möller et al. 2012, 341); R1.8 (Möller et al. 2012, 343);
R1.9 (Möller et al. 2012, 344); R2.2 (Lambooy and van ’t Foort 2013, 5); R2.3 (Lambooy and van ’t Foort 2013, 11);
R2.4 (Lambooy and van ’t Foort 2013, 11); R2.5 (Lambooy and van ’t Foort 2013, 17); R3.1 (Fengzhen et al. 2005, 1891);
R3.2 (Fengzhen et al. 2005, 1890); R3.3 (Fengzhen et al. 2005, 1890); R3.4 (Fengzhen et al. 2005, 1894);
R3.5 (Fengzhen et al. 2005, 1897); R4.3 (Sperling, Hvelplund, and Vad Mathiesen 2011, 1338);
R4.4 (Sperling, Hvelplund, and Vad Mathiesen 2011, 1338); R4.5 (Sperling, Hvelplund, and Vad Mathiesen 2011, 1338f.);
R5.1 (IIEEE 2009, 37); R5.2 (IIEEE 2009, 37); R5.3 (IIEEE 2009, 37); R5.4 (IIEEE 2009, 37); R5.5 (IIEEE 2009, 37);
R5.6 (IIEEE 2009, 37); R5.7 (IIEEE 2009, 37); R5.8 (IIEEE 2009, 37); R5.9 (IIEEE 2009, 37); R5.14 (IIEEE 2009, 38);
R5.15 (IIEEE 2009, 38); R5.16 (IIEEE 2009, 38); R5.17 (IIEEE 2009, 39); R6.1 (Lund 2007, 915); R6.2 (Lund 2007, 917)

Appendix C: Partial Transcription of Interviews

Les Gros Joncs, Mr. Cavel

[Part 1] 00:05:03 They are showing the eco-label here. But they are paying nationally they are paying for the label. So they want to get promotion back from the national label, and it's what they are not getting at the moment. And because they have been doing it, and it's in their routine to look after water consumption, for example, they don't especially need the label. They need the promotion, but they don't especially need the label to [run well] the campsite.

Interviewer: In which terms promotion? As in to be in a catalogue?

[Part 1] 00:06:33 There could be TV, there could be catalogue[s], tourism offices. Just [the headquarters] to promote to the general public the eco-label, and why it's important to go into campsites with eco-label. Especially [promotion] about what they are doing day-to-day [as an eco-label certified campsite].

[Part 1] 00:06:33 For example, Mr. Cavel told us that the campsite opened in 1962 here. And in 1968 they had a big water leakage, so they had to monitor and to know what the consumption was. So since '68 they've been measuring the water consumption, and some campsites still are not doing things like this. But here they're doing it and they put meters around the campsite to manage the water consumption.

[Part 1] 00:08:05 It's a photo of the campsite. [the campsite] is 5.000sqm from the beginning. 50.000sqm now. 180m from the sea.

[Part 1] 00:11:00 Since '62 the coastline here – (translator's explanation: the coastline in Oleron is quite a big thing, …the coastline is moving up and down, and in some places you got 10-20m going into the land which has changed since the 60s) hasn't moved because maybe of the protection.

[Part 1] 00:12:06 The dune is, keeping the soil stable here (there are plants stabilizing it). You've got one specific thing as well – into the sea, you've got a specific way of catching fish. People used to build walls at low tide and the fish could come into this wall. So the fish are staying there at low tide.It's 17 [dams] now. [There were] 300 in the middle age and 17 of them in Oléron.

[Part 1] 00:13:32 It's quite unique. They are protected.

[Part 1] 00:14:24 In the beginning on Oléron, there was no bridge, so people were living quite close [to each other] with a little bit of vegetables and fruits, maybe a cow, and a bit of fishing and a bit of vineyard. It was kind of an autonomy and self-sufficiency. Now this fish catching scheme is still there, and it's protected. And Mr. Cavel wants to promote it here for the tourists, as our heritage, because it's quite unique and people are not fishing anymore because there's no more fish. He filmed with the drone.

[Part 1] 00:10:26 Now the people used to go [driving their cars] there, so Mr. Clavel insisted to have this land protected. So you got barriers so you can only go walking now. It's protected as national land now, under environmental protection.

[Part 1] 00:19:30 The idea at the beginning of the campsite was always to protect the environment because they didn't want – like other parts of the French coast want to have cement [etc] – they really wanted to run the business with the environment, from the beginning. So it's always been the idea in mind.

[Part 1] 00:23:56 So it's 253 places on the campsite and 202 look like [are] renting buildings. [the campsite is responsible] to wash the sheets [etc.]. They didn't find a business [on Île d'Oléron] to wash the laundry so they built one. [They] would send it to La Rochelle, which is too far away. So they built it inside [the campsite].

[Part 1] 00:25:22 Maybe other projects. Because legislation is getting easier to implement solar panels. So maybe other projects can [happen].

[Part 1] 00:29:46 So one electric meter for all [this] area. And one other meter for all the campsite. They cut by 10 – 15% their consumption. When you have a big electricity bill, or big power supply, you consume two types of electricity: the active one, and the reactive one. And you pay for those two types, but you do not consume the reactive part. And this device [They installed a device wattless which allows the campsite to transform this [reactive] part, and to consume it, so it's why it cut the power [consumption].. Because they want to consume a part they were not able to use before, but they were paying [for] it. He saw that [the device] in a big campsite show, so he bought it. He had his return on investment in one year. So from now, it's just [profit/savings].

[Part 1] 00:32:40 He's been going around lots of different campsites, especially in Europe, he saw a campsite in Germany with photovoltaic energy. He went in Austria this year, and they do not have as much (the same [amount of]) sun as we have, and they have got more solar panels than we have in France. So we are quite back.

[Part 1] 00:49:06 The problem is, like Mr. Cavel said before, the techniques exist, but we do not have the business on [the island] to maintain it. So for example they've got one solar panel here which is out [of service?] since about 5 years, and he doesn't have the company on place, and the technical staff on his side [to take care of it].

[Part 1] 00:50:26 The problem is about the material, because the solar, especially photovoltaic, used to be (maybe 5 years ago) used to be very profitable in France, so you had lots of businesses coming up. But when the government cut down on the feed-in tariff, suddenly everyone disappeared. And the material as well, suddenly, the German material is really good quality, but most of the material now is coming from China, with not as much good quality as German material. And if a business wants to get on the market now, they sell Chinese material and not German material, so it's difficult to get good quality.

[Part 1] 00:51:38 Even in France we don't have good [providers], maybe [only] one business [manufacturing] photovoltaic panels. So here he asked for German material for photovoltaic.

[Part 1] 00:52:40 The productivity [for photovoltaic panels] was estimated at 5000 kWh per year, and it's actually 8000kWh per year. So it's more.

[Part 1] 00:53:31 They know the electricity cost is going to go up anyway, the price of electricity in France is the cheapest one of Europe. And the national producer is keeping prices low, but we've got big concerns at the moment with nuclear power plants, and the cost of

maintaining nuclear power plants, estimated to about 1000 billion euros. And we know the cost is going to increase.

[Part 1] 00:55:24 Something got lost at one point in France, because when you cross the border to Germany, suddenly you see photovoltaics and solar-panels everywhere, and in France not. So there is something missing here, and we need to go forward. EDF, the national producer, the solution chosen by the government, was to go for nuclear.

[Part 1] 00:56:37 In Geneva maybe 10 years ago, they had already solar power plants which were built 20 years before, and Geneva is not the most sunny place in the world.

[Part 1] 00:58:55 The people are not especially coming here because of sustainability. They are coming here because of the price. The price is [little] compared to the other campsites in Italy or Spain, where the same service is provided with more sand, but is more expensive. And Portugal as well.

Q: In terms of the different types of renewable energy, such as solar, wind and hydro, do you see advantages with any specific one?

[Part 1] 1:00:40 The wind [energy] is not possible for different reasons (he personally doesn't like them visually). Only solar works for them. The landscape is windy.

[Part 1] 01:01:18 It's integrated in the landscape, the solar panels. So you don't really see it when you walk around the campsite.

[Part 1] 1:02:30 The ideal would be to be independent, autonomous.

[Part 1]01:04:45 They used to have petrol/gas heating, and they changed to low-consumption gas. A gas boiler.

[Part 1] 01:06:36 Regarding gas, they are one of the three biggest gas consumers of the region (like the close region). So they negotiate a price with Total gas, the three businesses together. They've got the lowest price you can get. But they know they have to go independent because the gas will always depend on the price in [?Rotterdam] the brand and the petrol.

[Part 1] 01:09:04 You need to work with a steady consultant, a technical consultant, to adapt the system to your own energy consumption profile. It's still new, so they [technical consultants] are still doing mistakes. And especially the consultant working here, at the beginning made a big mistake because the sun is going down, they still need hot water so they need the boiler to start.

[Part 1] 01:13:05 They're choosing their partners. They started a partnership with a local NGO called 'une Afrique', which is collecting oil from the chips, and reusing them in cars and tractors. He was one of the first partners, he is one of the first to collect from the campsites.

[Part 1] 01:13:53 They have the eco-label, they have to support people who have eco-labels as well. It's what they are doing. He's getting more and more other business using eco-labels, there used to be not as many.

[Part 1] 01:16:51 He is open to any project but he wants energy on both sides. So if he gets subsidies he would go further on the renewable energy side. It is always the method in France to give subsidies to businesses.

[Part 1] 01:18:00 Six years ago, he went to Sweden, North of Stockholm. There they were building passive houses. The principal is that the house is heating itself, collecting the heat. If it's possible there, it should be in France too.

[Part 1] 01:19:22 He has been asking his partners, the people who build in partnership, to get trained, to learn new skills. It takes time. The national policy on training is quite bad. Especially life-long training, it's quite bad. It's a big lack.

[Part 1] 01:21:19 Every time he invested, people thought he was mad. But now [the investment] has been here for 10 years and it has been running well. Even the bank [thought he was crazy] He has to be pedagogical with the bank to give him money.

[Part 1] 01:24:51 In the tourism sector most of the businesses were not investing at this cost/amount. Quite an unique project. The banks do not know our specific problems. We have to be pedagogical with the banks. Before they were open only in July and August. Now they are open all year round, including for small holidays, now that the park has more comfort. But it was a progression.

[Part 2] 00:02:49 Waste management is not handled by the local municipality, but by the 25 campsites collectively. They have a specific market for this. Waste and recycling as well.

[Part 3] 00:06:00 A specific device is used for the chlorine in the pool. Chemicals can irritate the skin, so this device was used. It took some convincing because government regulations did not permit its use. As a result [of the device] chlorine use was cut in half while maintaining the health standards. The devices are used for the building with the pool, which was 30% cost to the investment. At the time of the investment, the best equipment was chosen.

[Part 4] 00:00:01 Everything there is for the gas, the gas tanks are old. The legislation was not clear at the time of the build, so they built specific units of gas.

Montauzier oyster farm, Mrs. Sophie Montauzier

[Part 1] 00:22:55 Cost of energy every 2,5 months is €700 $. Energy [is mainly used] for pumps, to wash the oysters, cool down the oysters' water, especially during the summer. They didn't use to need to cool down the water, but the oysters are now more sensitive. They use a heat exchanger to cool the water.

[Part 1] 00:03:32 They're always doing small productions, they don't want to have external things, to make the production more important. They just want to use the natural environment, but not at an extensive rate.

[Part 1] 0:4:06.7 By working with a small density of shrimps in the marshes, they don't need to feed the shrimp because the environment gives enough food for them.

[Part 1] 0:31:55 Traditional way of producing oysters in this farm, small production compared to other Oyster producers on Oleron, who buy GMO, baby-oysters and send them to Brittany, Portugal to grow for about 1,5 years Ω-

[Part 1] 00:08:35 People are quite sensitive to sustainability here on the island, because they [are] coming to live here for a special setting and natural setting and beautiful place, so there is something about it (people care about sustainability)

[Part 1] 00:26:45 Because of landscape protection, wind turbines they would not be able to do it and even PV, not allowed.

[Part 1] 00:24:04 There was some awareness raising especially this year, because they won a national prize for fish and sea products. Usually it is big fisheries getting the prize and now, this year, it was a small local producer so it shows that there is a concern about locally products activities, products and climate change so it's getting there.

[Part 1] 00:10:10 Law enforced in France in few months, that you won't be allowed to give plastic bags on markets anymore. But if they want to buy paper bags and design it to for example say the product is locally produced and organic, the bag sellers are selling quantities that take 10 years to use, local government can help by promoting with paper bags like designing the bags or providing the bags so that few producers can buy all together, because they can't produce or buy small amounts, with a logo or sentence promoting the island, so one entity providing the bag and selling it to back the small producers so they can be more sustainable and to help them avoid big costs (some form of cooperation).

[Part 1] 00:25:12 They are looking to be sufficient.

[Part 2]00:01:30 They are thinking about getting a hybrid vehicle to go to the market. The electric vehicle that the CDC has [can run] 100 km, so it could be used by them for the market. [There would be] difficulty in going to La Rochelle with an electric vehicle [because of the distance], need to plan the trip and make sure to be able to charge the car och have a second vehicle so hybrid might be better, but they are not very common.

[Part 2]0:18:04 Perspective on climate change? It's a problem for her day-to-day activities. It's the reason why the shells/oysters are dying, because of global warming. They are finding species in the sea that used to live a lot more south but are coming North because it's cooler water. The ecosystem is changing.

[Part 2] 00:26:08 PV panels yes, they are thinking about it. Depends on the price. Because of the landscape protection, wind turbines they would not be able to do it and even PV, not allowed. The tide is not strong enough to produce energy. There is one power plant in Brittany using tide to produce electricity but it is a massive one and the current is really strong and the different between low and high tide is 12 meters, but here it is too little.

[Part 2] 00:28:26 Around the marshes, she doesn't know, never looked at it. They would like to have PV around but because of the landscape protection they are not sure yet.

[Part 3] 00:00:01 Interviewer: What is she worried about? Both ecological and financial.

Ecological: if we can't slow down global warming, they won't be able to produce oysters anymore because they'll need to go further and further in the sea to get a colder water to be able to produce oysters. They don't need to do it now, have not moved yet, but there are tests that say that it is happening, the water quality is not as good anymore. What we put into the water, the water treatment is not good enough. We are lucky here, because we don't have so

intensive industry and agriculture. But if you want to produce oysters in Lyon, in wouldn't be possible, you need really good water quality.

[Part 3] 00:1:55 They are lucky here in Oléron, with the environment, to have all the marshes.

[Part 3] 00:16:01 Because the weather was quite mild this winter, the water is not cold enough so the oysters are dying more than they should. The climate change is definitely a problem. Even less than 1 degree makes a big difference.

Vignerons Oléron vineyard cooperative, Mr. Pierre-Luc Alla

00:03:54 We produce organic wine.

00:06:27 CO2 [emissions] for organic and normal wine is the same

00:05:43 Took time with the team to know where it is possible to make economy, identify where energy/costs are high – to manage them/decrease them

00:10:30 In this new process you heat [the] atmosphere,

00:12:00 It's very expensive. You need 5 years to [get back the] investment. But [it uses] less energy. Now with the down price of gas, it's 10 years. If the gas price goes up, then it's 2 years $ #0:12:32.6# But when they made the estimates, it was expected to pay off in 5 years.

00:05:42 We don't want to … pollute the workers and tourists

00:13:40 The facility (convenience) is always the best for all people. We prefer to think that we are on an island, it is difficult to bring energy, so try to think about using less energy without thinking of the price of petrol, gas. For me in 20 years there are less and less fossil energy sources, we don't have to think about the day immediately after today, think in 10 years. ≈ think 20 years ahead

00:01:35 I proposed to a grower to make a solar house and use my water for the vegetables. Like this is win-win.

00:02:03 There is one guy who understands this because he is an old engineer and understands immediately the benefits.

00:03:50 Solar panel, imagine if they could do it!

00:04:50 In France there are laws, and the firemen have the last word, they can be stronger than the law if they think there is a risk.

00:06:10 doesn't see a risk, because in order for the alcohol to explodem you need fire and there is no fire source. But the problem is the quantity.

00:08:30 Not possible to use the waste for vinegre. In France, it is forbidden to make food products with waste, and the wine without the alcohol is considered waste.

00:11:53 You have to take time, you have to explain to people why you do things in this new way

00:11:50 In europe, during the last 13 years, we had a lot of energy so we spent a lot of energy because we didn't think, care about it.

Ocqueteau boat manufacturer, Mr. Arnaud Ducoudert

[Part 2] 00:55.03 Opinion about the local government's goals, vision of sustainability – he's not the boss, hard to speak in the name of the company. Personally, yes, for sure, it is good. It is a question of being able to invest in the long term, not always easy. Definitely an important thing to do and carry on.

[Part 1]00:31:20 Maybe for heating, they could start the engine 1h earlier than needed or stop it 1h before leaving. They are not actually following the number of the energy consumption.

[Part 2] 00:52:28 Ideas about what anyone could do to help sustainability cause? Insulate the building. Optimize the heating and therefore energy cost, heat the molds locally, save energy.

00:26:35 Not an efficient way to heat the building, the system is not sensitive enough. Only possible to start/stop the heating since it is on gas, would have been more economically with an electronic system where the temperature can be set and a system that starts/stop independently

01.43.50 I guess it is the supplier [who suggests more ecological options – benchmarking], instead of them searching better solutions by themselves. No R&D or benchmarking responsible, they receive information directly from suppliers who want to sell their innovative products

01.19.00 The engine supplier offers them hybrid engine but it is still very expensive for them to change.

00:58:00. Solar panels, PV – needs to replace the roof if they want to install solar panels, which is very expensive. As long as they don't move it, the roof is ok. It is considered toxic waste and it would cost a lot to take it off.

[Part 3] 00:55:30 good that the local gov takes contact like this (with this visit), always a good step to get counseling from the local government or any public agency because they are used to their day to day activity and don't have time to look at other initiative. E.g. for the safe work place the people are arriving and telling them what others are doing and it is quicker than looking for solutions by themselves, faster to know what is going on outside.

Communauté de Commune CDC, TEPOS project manager, Mrs. Delphine Le Page

[Part 1] 00:00:25 The broader vision is the Agenda 21 policy. We are having a sustainable development vision of the island. Not as the MSLS programme would with principles, but more like, we are doing something about it. We know we are in a sensitive environment and

we have to do something about it. It's tackling the subject by putting action in place [unclear] thinking about sustainable development. Protecting the coast, building cycle paths [...] It was a 3-year-process to put it [Agenda 21] in place.

[Part 1] 00:02:20 The communauté de commune got formed 10 years ago in 2006. That's quite recent. It got formed at the beginning to deal with waste management. After, they got more and more competencies coming. It's quite recent, the sustainable development aspect.

[Part 1] 00:03:20 So you've got the island. You've got names all around here. There are eight of them, which are communes, which are more like villages. The communauté de commune is all the island. It's like the local government for all the island. And you've got eight different small governments.

[Part 1] 00:05:05 For 2018, the objective is to have 20 businesses on board, signing this charter, but if we have more, it's better. For the label to be a success in 2050, it would mean that 100% of businesses on the island are using 100% renewable energy. And they have been cutting their consumption by probably 20%. I don't have the exact figure of the consumption cut.

[Part 1] 00:06:20 To be able to say, we are an 100% renewable energy island that means are producing as much as we are consuming.

[Part 1] 00:08:40 What the [national] government is actually doing to promote renewable energy, is feed-in tariffs. It means that if you put for example photovoltaic panels on your roof, you get paid to sell the electricity back to the grid and you get paid more than if you bought electricity from the grid. For the moment, this feed-in tariff is getting lower and lower. To be able to have the same price [non-subsidized] – it's a European legislation that renewable energy should come on the market, the energy market, like coal and nuclear power, which it [legislation] was not up until last year. All the renewable energy had a specific feed-in tariff run by governments, but the EU said it can't continue like this anymore, because it's not giving a stable energy market.

Interviewer: So it was more profitable before?

[Part 1] 00:10:11 Yes, it was more profitable. It's more complicated now for big renewable energy power plants. The small one is still – if you want to put a photovoltaic panel on your roof, which is 20 square meters, you still have feed-in tariffs and still no complicated paperwork. So that's the legal frame around renewable energy and what the government does about it. One big structure as well is the grid to be able to manage the energy produced locally. And the grid is run by a national company as well. If we – the Communauté de Commune – wanted to, we could take back the grid for itself, but it's quite complicated to run a grid. So for the moment, it's not the project for the next three years, but maybe in a few years, we will say that we can't do what we want with a national company running the grid, so maybe we take it back. It's like water [management]. In France, lots of local governments are taking back the operational things around distributing water and waste treatment as well. For electricity, that's the case here and for heating, you could have a grid as well. I guess in Karlskrona, you have one. It's a local heating system with hot water [pipe system] going around town giving heating to all the houses.

[Part 1] 00:12:38 So we could do this, but it's not – there is one grid like this in the south of the island, which is in Le Chateau d'Oléron, one communal heating grid, but for the moment, it's not the project either, because in a rural area, it's quite difficult to do. In a city, it's easy,

because it's quite dense, so people are – there is a need of heating and it's easy to carry the hot water around without having to much heat loss, but here it's a bit more difficult. That's the grid and the feed-in tariffs. We have the national legislation around it.

Interviewer: In terms of the local government, how can local government influence laws and policies?

[Part 1] 00:13:55 Yes, they can, but it's quite difficult. As a democracy, they can just call the deputy or the national assembly to enforce laws and change laws. We have a problem regarding one specific aspect, the landscape protection – we informed the national minister that we have a problem, because the landscape is protected, but our elected board wants – and the national government told us to do so – to be 100% renewable in 2050, but we can't put solar panels, so we wrote a letter to inform about this to the national government, which is saying they are looking at it. "Maybe in 6 months you will have an answer". That's the way we can do these things.

Interviewer: I was asking if there is the possibility for any kind of laws that are not – or projects that are not voluntary like the label, but maybe compulsory?

[Part 1] 00:16:55 Yes, what we could do locally is to give subsidies for example, [we could decide] that we want to subsidies you, because you are using solar panels or we want to subsidies you, because you are buying devices to cut your energy consumption. So, we could implement policies like this, but we can't implement feed-in tariffs for examples, we can't go on top of the national feed-in tariffs, that's not possible.

[Part 1] 00:18:05 We got as I said for subsidies, we got quite a lot of freedom. Subsidies regarding, if you renovate a house or if you implement renewable energy. There is quite a lot of freedom. We can use the land owned by the communauté de commune to promote renewable energy projects for examples what we are doing at the moment is, we got a big swimming pool with a big car park in the front of the swimming pool and it's owned by us. So what we are doing is we will put photovoltaic panels on top of the car park to have shade as well produce energy. So that's something and that is going to be a big power plant, because the car park is probably 500 places [big]. These are things we can implement if we want and have the positive impact on it. And if someone wants to do a big renewable energy power plant on private land we can help them to make it happen. It is what I'm doing for the photovoltaic floating power plant for example. I'm facilitating contact with the national government and the private landowner and the industry owner as well to make it happen. That is what we are doing. It's what is possible to do. At the end, it is often a question of money, where the money comes from. Not to put too much taxes on the local people. The money we get is from local taxes and from the national government as well, which is collecting national taxes.

Interviewer: What are the financial bounds of the local government? And which resources is the government offering for the goal of transitioning towards renewable energy?

[Part 1] 00:21:43 The resources are either grants from the region or from the national government or from the EU to make projects happen on the island. And local taxes as well. Maybe in 2020, the bridge to come on the island won't be free anymore. You will have to pay to cross the bridge. All the money collected will go to either transport services on the island to avoid using the car on the island or biodiversity protection projects. [...] The bridge is belonging to a department [region]. It's a big area. It's owned by that department, the big area around here. And the communauté de commune asked the department to make it paid. They will

[decide] this year if they want to do it or not. If they want to do it, we have to implement the project – it's quite a big project – so it will be done by 2020. And that's for the elected board here, it's a very important measure to implement, because the national government is cutting off subsidies for local governments. It is around 10% of subsidy cut by year. It's quite a lot of money not coming back to the local government anymore. But we still have the same competences and the same projects to run. [...] That's one big revenue to come (the bridge tax). So we have local taxes, because you build a house, or each year because you live on the island. [...] We are dealing with a tourist tax, everyone coming here in the summer has to pay a tax per day, it is given back to the tourist office to provide services for the tourists.

Interviewer: Can this be used to finance other projects?

[Part 1] 00:27:40 Yes, for example the tourist tax is used to provide a GPS for bikes, used to promote projects around sustainable tourism. Last Monday there was a meetings about a national label for hotels and campsites to show how much CO2 they produce, to show their progress regarding environmental concerns, The tourism office will lead and finance this project.

Interviewer: Which kind of projects are currently developed on the island apart from the ones already discussed?

[Part 1] 00:29:13 One is the coast protection project. Because of the big storm, the island is quite vulnerable to sea rise so we are running a big project to protect the coast. Some big cement blocks, like a wall, in front of the coast to protect the houses. That is a big project and a big concern of the local people, to protect the island. Another big project would be to install PV on as many public building as we can. And to facilitate private owners to install PV panels as well. When I say private is more big companies, so roof above 100sqm, not private houses, we want to go as fast as possible so bigger surfaces. We have a big project called Zero Waste island. Inside of it you got like 40 different actions to help people, inform them and help them cut the waste. They are giving away hens to reduce the compost that is sent to compost station, give it to the hen instead.

[Part 1] 00:33:05 We are looking after an industry that can produce wood pellets [as resource for heating] from recycled materials and wood branches, green waste. Now used for compost, but most of the waste is full of wood which is slow to degrade. That would be great, to use the wood pellets as resource for heating. To renovate the public buildings, to make them energy efficient. Another project is to continue to build cycle paths, 14km in the next 3 years.

Interviewer: What energy efficiency measures have businesses historically seem willing to take?

[Part 1] 00:36:25 I don't have a big knowledge, historically, what has happened on the island. What i know, what is difficult for businesses is that the energy is less expensive for businesses than for us, inhabitants, so that it is not a great incentive for them to cut the consumption, because it's not so expensive. The reason is political, national. The cost of electricity is decided at a national level, to support businesses to have less costs. And we've got lots of nuclear power. No previous activities for businesses in the past. They've been trying to implement solar thermal on campsite and hotels but because of landscape protection it was too difficult. Some of them have it, like the campsite we are interviewing, but it is more difficult in other places, it takes more time to have a permit and it is more demanding regarding landscape. The process is that if you do it legally, you ask for a permit to do it, you have a landscape architect

to come on site who gives recommendations, and the project either gets more expensive or the project is not approved. It has been like this for the past years., It take about 6 months to go through this permit. Businesses can't wait, "forget it, I'll put an electric device and have hot water".

Interviewer: How much do you think this has set you back?

[Part 1] 00:40:45 This law was enforced in Oleron 2011. If we hadn't had it, probably we would have a lot more solar panels and PV. I don't have figure and don't have another island to compare, I'm not sure.

Interviewer: Looking at general sustainability initiatives and receptiveness of businesses on sustainability, how would you assess the situation on the islan`?

[Part 1] 00:41:55 Some businesses are going further. For agriculture, some businesses are going further, using labels. Some are producing local products, wine, meat. You have the campsite promoting the sustainable waste, showing messages to the customers, about water usage. The campsite interviewed [Le Gros Joncs] is getting into the EU eco-label. At the same time we have a lot of businesses who are run just during the summer season. They are here just to make as much as they can in three months. They don't really care about energy, waste, they just want to sell as much ice-cream and souvenirs as they can. Some businesses are doing good things, taking sustainability measures, but some no. Because they are really small, maybe 1-2 people working.

[Part 1] 00:45:05 We are trying to have a map of which businesses are here all year through and which less, few months, it's difficult to call all of them to track. It's a big job to follow the businesses, it's a bit more difficult than in other place, because so many have less than 10 employees.

Interviewer: We spoke about solar panels. I think you said there is a project going on to put panels on public buildings. You were mentioning in one of our discussions the possibility to lease solar panels?

[Part 1] 00:48:00 We are looking at how to lease either a public roof which we don't own, or a private roof to install the power plant on. It would be the local government who would be responsible. It has been done in other places, by other public governments.

[Part 1] 00:49:45 I've just received last week a study showing the potential of our buildings regarding PV power plants, we've had a private company doing a study on all the public roof. From April to August I will have an intern studying a map. We've got lots of data. The person will identify all roofs above 100sqm with potential to install PV power plants. First public roofs because it's easier and then private.

Interviewer: The owner of the roofs would be rather passive. Can they also suggest if they want themselves to have panels on the roof, if they want to lease the panels, to invest in the power plant?

[Part 1] 00:52:50 I will go to see the roofs first, talk to the owners, if they can invest it would be better. If not, would they agree to lease us the roof? If not, I have to find something else. Maybe there is a third way, that we invest and in 20 years they pay us every year and they get

the power plant as well. To put the plant and us to consume the electricity locally and sell the one not used to the grid. We've got different ways.

[Part 1] 00:54:18 The only thing we can't do is for us to invest in PV power plant and to sell the electricity to the businesses. The only way to do this is to be a national electricity provider and we are not. It's a national legislation. That's a shame because it would be a lot more logical. The legislation is separate for producers, grid operators and sellers.

Interviewer: If we were to sum up the work force, people on the local government working on the energy subject.

[Part 1] 00:56:12 The people financing us are supporting as well, dealing with energy subject, we are working together as a network and exchanging information on how we're doing things. I have this network in the territory and other territories. I am part as well of a national network of rural communities going towards 100% renewable energy and it's where I'm getting information whenever I need to. For example on the leasing of roofs, I got a lot of information from them. Locally, I run a lot of projects and specific actions. I've got one colleague dealing on private house renovation. One with transports and another coming in April. Probably one person coming in July to deal with technical aspects of renewable energy problems. And one intern in April. And maybe another one, Quentin. I know the school he's going to and MSLS, both appreciated, good opportunity for me to learn. And collaborating with students like you, quite often, for example on waste, 15 students looked at waste management for businesses, energy was supposed to be included but waste was a more burning issue for businesses so energy was dropped.

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