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Corso di Laurea in Sviluppo, Ambiente e Cooperazione

Samsø, the Green Island:

a case of transition to a green economy

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Academic Year 2009/2010

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Abstract

This master dissertation aim at investigating the transition process, carried out in the period 1997-2003 on the Isle of Samsø, to an energy self-sufficient island and its future perspective. This thesis has a socio-economic background and it is based on field research and data analysis. I've been spent one month working at the Samsø Energy Academy and during this period I carried out a survey. The main purpose of the thesis is to gain insights regarding the factors and the barriers that influenced the process and a special attention is given to the NIMBYsm syndrome and how it has been overcome on Samsø.

Acknowledgements

Many people have been involved in many ways in this thesis, thank you to: Søren Hermansen, Jan Jantzen, Malene Lundén, Anne Albertsen, Peter Christensen, Søren Stensgaard, Mette Løkke, to the all Energy Academy, for their space, time, support, internet, café, cookies and kitchen, to my neighbours on Samsø especially Stephan and his incredible kids, and Gianfranco the owner of the "Pizzeria O' Sole Mio". A special thanks to my colleagues at Turin University for provoking thoughts and for creating a great group of students and to my father who financed this research, thank you Dad.

1. The development of renewable energy projects NIMBY or Social acceptance?

1.1 Introduction

The aim of my thesis is to investigate about the social acceptance of Renewable Energy and my focus is a case study: the Samsø Island in Denmark. A previous study (Jakobsen I. 2008) focused on wind energy social acceptance. However I'm not focusing especially on the wind mill project, even if it's an important part of the overall plan, but on the Samsø Energy integrated System: Samsø represents a complex case which involves wind, biomass, PV and solar panels, working together with just one purpose - to make the island completely self-sufficient. This goal was already reached in 2003 and since then the Energy Island process is still evolving: for example there are figuring out how to use sea weeds to produce energy (see chapter three).

The transition to a renewable energy based society is still controversial because this process involved social acceptance. How these obstacles have been overcome on Samsø? I specify that my aim is not to find a model to follow, I don't think that in the real world a model for a perfect society exists, maybe just in books as “La città del Sole”, and when in the past decades we tried to find one, this led to dictatorship and millions of victims. My aim is rather to find some easy and maybe obvious teachings from farmers.

Samsø represents an unique case of a renewable energy island in the whole world, there are some really interesting agents behind this success which I will try do describe here.

I spent one month working and studying at the Samsø Energy Academy. Therefore my dissertation in mainly referenced by fieldwork: interviews, surveys and personal experience in one month job at the Academy and making interviews on the Island,

starting from September 3, 2010. I was not only researching and writing for my thesis, but during this period I was involved in all aspects of Academy day life. During lectures and meetings I explained my field research, I went with journalists from Taiwan, Italy and Japan to visit wind turbines installation and heating districts, answering to their questions and lecturing about the social transition process. I also attended one event in Copenhagen about RE. This thesis is a full report about my personal experience on the island and, especially in this chapter, I will try to compare, to criticize, or simply to analyze some theoretical figures with facts related to this specific case.

1.2 Theoretical Framework

As I said in paragraph 1.1, a transition towards an RE based society comes through social acceptance.

The space occupied by renewable energy is increasing in the policy agendas of countries around the world. Many technologies are mature or quickly improving and in most of cases this means economies of scale: wind turbines, for example, are generally becoming cheaper, more powerful and longer lasting. Several governments have set ambitious targets for RE production in the following year. For example in Germany the $C0_2$ emissions in 2009 have been reduced by 18% compared to 1990 emissions. The rising importance of environmental issues among the German electorate, initially in the 1970s and 1980s, and legislation such as the 1990 Electricity Feed Law and 2000 Renewable Energy Law have played major roles in advancing the deployment of renewable energy technologies. These laws mandated the purchase of renewable generated electricity by electric utilities and also offered large subsidies and government loans to renewable power producers. (Wüstenhagen et al 2007).

In Denmark (Corriere della Sera 2008) the Rasmussen's government aimed at making Denmark becoming independent from fossil fuel free in 2050.

The EU TGC (Tradable Green Certificate) scheme and the 20-20-20 program are two example which demonstrates the general European interest in RE issues.

In Sweden the TGC (tradable green certificate) scheme was initiated in 2003 and is currently scheduled to last until 2030. The current aim is to add 17 TWh output of

‘green’ power by 2016, roughly corresponding to a legally binding 11% quota (share of total electricity consumption/sales). (Jacobsson et al. 2008).

The success of these policies changes from country to country and also changes which renewable source to invest in, but wind turbines stand out as the number one RE in many countries.

Wind Turbines are a good example because they now represents the most mature RE technology. Wind turbines have also given rise to controversial debate issue. Many “green” parties in Europe (for example the Italian Greens) are hostile to wind technology because of landscape changes, bird casualties, shadow and noise. These were also the main reasons for initial hostility in Samsø when the project started in 1997.[1]

1.2.1 Social Acceptance: evolution in the last decades

"Social Acceptance of Renewable Energy Innovation" is the title of a conference held in Tramelan, Switzerland in February 2006 at The University of St. Gallen, Institute for Economy and the Environment, (IWOe-HSG) and supported by the Swiss Federal Office of Energy, Research Programme Wind Energy. The conference attracted a dedicated group of 30 social scientists from 12 countries, who presented and discussed their research papers.

Best papers have been published in a Special Issue 35/5 of the Journal Energy Policy (guest editors: Rolf Wüstenhagen and Mary-Jean Bürer). (Wüstenhagen et al. 2007).

Social Acceptance as part of the RE technology implementation was absent from the agenda of policy-makers before the 1980s. Carlman (1982) was the first to publish an article about the importance of “the non-technical factors” importance in implementing

[1] I don't know where these prejudices come from, and I don't want to investigate but once, during my first visit to the windmills park in Samsø, I heard a question from a Japanese professor about birds killed by mill blade. In this occasion Søren Hermansen's reply was:

“We have already solved the problem of birds here in Samsø. We (the Academy) have an agreement with the local restaurants. Every morning they come here and they are collecting the birds. The favorite local dish on the island, is bird.”

wind energy technology in Sweden. In that period certain sections of public opinion started questioning about fossil fuel and oil economy; the success of "The Limit to Growth" and the raise of the No Nuke movement were surely part of this process. Most developers, including energy companies, authorities, and private local investors thought that implementation was not a problem, because the first surveys on the public acceptance of renewables, in particular wind power, revealed very high levels of support for the technology. Policy-makers, on the other hand, underrated the social acceptance "because of a high level of general public support for renewable energy technologies". (Wüstenhagen et al. 2007. Page 2684)

However some further studies, (see Carlman, 1984; Bosley and Bosley, 1988; Thayer, 1988; Wolsink, 1987), started to demonstrate that this acceptance was not automatic. These studies revealed that the most crucial issue was about wind mills impact on the landscape. Furthermore, questions about the social foundations of renewables in relation to the scale of the installations and the options for ownership of installations and of decentralized power supply were raised. In Samsø's case the impact of turbines on land scape has been one of the most debated topics during the open meetings (see chapter 3), held on the island before the installation of land-based turbines. The turbines' location in the original master plan has been changed several times to gain more consensus for the project: some of the installed turbines don't stand now in the best anemometric spots, but citizens are generally happy and the turbines are well integrated in the countryside. Moreover the ownership scheme assumed on the island responds both to market and social (cooperative) needs. (See chapter 3).

Then, during the nineties, the technological improvements introduced new aspects to the debate on social acceptance.

"For one, renewable energy plants tend to be smaller-scale than conventional power plants, increasing the number of siting decisions that need to be taken. In some cases, such as micro-generation in residential buildings, the siting decision becomes in effect an individual investment decision. Secondly, as renewable energy conversion tends to be characterized by lower energy densities, the relative visual impact (per MWh of output) tends to be higher. This is partly reinforced by the fact that resource extraction

in the case of fossil or nuclear energy happens below the earth's surface and is thus invisible for the everyday life of a citizen, while wind turbines and other renewable plants harness energy in a more visible way. It also means that renewable energy conversion tends to happen closer to where the energy consumer lives (the ''backyard''), thereby increasing its visibility and bringing the environmental impact closer to their residence. Thirdly, given the ubiquitous presence of externalities in the energy sector, most renewable energy technologies do not compete with incumbent technologies on a level playing field, thereby making acceptance of them a choice between short-term costs and long-term benefits." (Wüstenhagen et al. 2007. Page 2684).

1.2.2 The NIMBY syndrome

The most common explanation for the general revealed reluctance about RE, especially wind mills (Bell, D., Gray, T., Haggett, C., 2005) is the "Not In My Back Yard" theory, with its acronym NIMBY. This theory is frequently used to explain the gap between political action and local opposition: people support renewable energy as long as producion plants remain far from their neighboroods.

Another way to consider this theory is to model it as a public good game: a social dilemma with a dominant strategy of defection. Participants in public good games have to choose whether to cooperate in the production of a public good or defect, leaving to others the corresponding costs. As it is impossible to exclude anyone from the benefits generated by the public good, each participant is tempted to defect, with the consequence that the public good is not produced. In the case of RE, the benefit generated by the public good is clearly in terms of low-carbon energy, while most of the costs are paid for by the individuals living near the production plants. NIMBY means hence that most people would like to profit from the low environmental impact of RE use, but few are willing to have wind turbines or other production facilities in their neighborhoods.

This theory was really popular during the early nineties and it was originally used to explain the general reluctance about the installation of some vital city facilities such

jails, drug treatment centers, boarder babies, halfway houses, incinerators and homeless shelters. This is what Micheal Dear wrote in 1992 about nimbysm syndrome:

"If executive and legislative leaders yield to fear and suspicion, we will regress into a new feudalism. At the very moment when barriers are coming down around the world, we will find ourselves marching backward toward the imaginary safety of feudal fiefdoms defended by NIMBY walls."

(Dear, 1992. Page 288)

However several authors (Wolsink 2000, Bell, 2005; Wüstenhagen; 2007) debated about the validity of Nimby theory and nowadays this theory is considered too simplistic. In Samsø they're now discussing about installing a new off-shore park between Samsø and Aarhus and they are making efforts to find out a way to share the benefits that this park will produce both for the city and the island. The most debated topic is the location: people from Samsø would prefer to install the park closer to the Jutland and, of course, people from Aarhus are pushing and lobbying to find a spot closer to the island. Maybe the NIMBY syndrome is too simplistic but it does say something about the initial reaction to change: reluctance. An initial reluctance could turn into a strong and indomitable opposition if it is not listened by the policy-makers.

When the decision-making is carried out far from the target location, local people are very often not involved. Negotiations take place behind closed doors and decisions are taken are looked on by the target population as edicts. That's why Dear in 1992 was talking about "new feudalism".

1.2.3 Rethinking NIMBYsm

The NIMBY syndrome is someway connected with the concept of place. A commonly agreed principle is that 'place' differs from related concepts such as 'space' or 'environment' in describing physical aspects of a specific location as well as the variety of meanings and emotions associated with that location by individuals or groups (Gieryn, 2000; Tuan, 1977). However, the literature on place has been described as incoherent arising from the diversity of approaches adopted by researchers. Place

attachment has been defined as both the process of attaching oneself to a place and a product of this process (Giuliani, 2002). This product is an emotional connection with familiar location such as, neighborhood, village etc. and it concerns the individual and collective capacity of action. This attachment contributes to an individual sense of self identity. The disruption of a place impacts not only on the geographical attributes, but also on social and individual attributes. Disruption affects not only the physical aspects of places but also the social networks that are sources of support to individuals, particularly in low-income communities. The link between place and people is the people-place attachment. Taking care of a shared cherished place connects people because they have a common goal. When this fragile equilibrium is broken by the introduction of alien element such as wind turbines or electric pylons this could affect the social network as well.

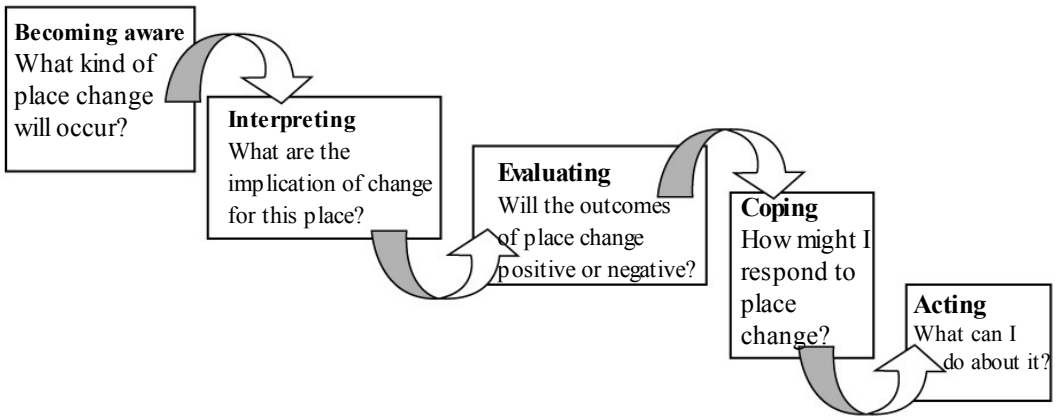

Figure 1. Stages of psychological response over time to place change.
Source: (Devine-Wright, 2009)

A recent study by Devine-Wright, (2009) suggests a different interpretation of the NIMBYsm theory. His analysis is founded both on the concept of place as identity and place as attachment. He identifies five stages of psychological response to a change see (Fig. 1) which raise different problems and emotions.

i) Becoming aware

This stage is connected with being aware of an existing problem, for example the need to find a place for a new incinerator. This problem is considered a local problem by citizens: people need the perception that solving the problem could enhance, in the future, the local welfare. Referring to a global problem (as the global warming) is counter productive.

In the context of energy projects, planning procedures may take several years before final decisions are reached, and development actually begins. In such contexts, 'knowing' or becoming aware of change is likely to be mediated by communication with trusted others and the media, and consequent upon the actions of private companies making public their proposals, typically by means of public consultations or engagement processes. People strive to make sense of change and the hope of development is communicated by media and/or policy-makers. This process is likely to involve contestation and argumentation, because the different stakeholders are taking their own interest to the negotiating table. The contestation stage is not always fair "particularly in contexts where local residents attempt to oppose development proposals instigated by large multinational companies" (Devine-Wright, 2009. Page 433), or other external powerful stakeholder.

ii) Interpretation of change

The interpretation stage is explained by Devine-Wright, by using social representations theory (Moscovici, 2000), "in which processes of anchoring and objectification explain how the unfamiliar is made familiar" (Devine-Wright, 2009. 433). Place, again, is involved in the interpretation of change. Place, understood as social milieu, is a social construction and it describes only some attributes. Place objectively differs in terms of their environmental, social and economic characteristics and these put an undoubted constraint on individuals and groups to interpret place changes (Van der Horst, 2007)

Moreover strongly attached individuals would be expected to be more involved in the changing process more than people who feel a sense of alienation or negative

attachment to that place. (Devine-Wright, 2009). During process take off the first category appear more reluctant to change, but at a later stage this attachment could turn into a strong driving force which leads to success. Vorkinn and Riese's (2001) results indicate that place attachment may actually be positively correlated with the support for an energy project when it is interpreted as place enhancing. The type of attachment is also relevant. Where the object of attachment is more social than physical (Hidalgo & Hernandez, 2001), it represent a feeling of belonging to the local community rather than personal attachment to the physical environment, interpretation about whether the project will directly enhance the local community, rather than its environmental impacts, will predominantly influence public responses. Finally, interpretation implicates the inter-realtions of places at different levels, notably the local/global dimension and arguments about climate change. Interpreting energy project when the common (global) welfare come first at locals' expense may be counterproductive. In this case the energy project is perceived as a threat because the local place must be sacrificed in order to deal with climate change. People from Samsø clearly perceive this feeling insomuch as one of the slogan is "Think local – act local".

iii) Evaluating change

In accordance with a Walker & Devine-Wright's (2008) study we can identify two different aspects of the change evaluation: about the process of decision-making and the outcomes of development (Walker & Devine-Wright, 2008). Conceiving the project in terms of mere technical procedures is likely to lead to negative affect and evaluations by those individuals who feel strongly attached to the place. Such individuals are likely to evaluate change as a threat to place identity when the projects are believed to have an immediate and negative effects on the place and the social milieu. A new technology could be considered as an alien element in a consolidated milieu. The introduction of an alien element could alter the individuals' continuity over time and individuals' familiar places. One of the ways in which this may be manifest, and yet has received insufficient research, is how disruption can alter the sensory qualities of places, adding unwelcome sights or views, smells and sounds. During an interview with a farmer on Samsø

complained about the location of one wind mill because in Spring the rotating shadow disturbs his meal. This complaint could be underrated and considered as petty and non influential if compared with the general social benefit that an RE system could bring to the whole community, but it isn't. It's not possible to satisfy every demand, need or complaint; a trade off must be found, but how? Many controversies about energy technologies rise from claims about those visual impact, this is a common characteristic of protests.

"Energy projects may threaten place-related self-efficacy if processes of decision-making, including public consultations, are believed to be exclusive, secretive or inequitable. Such threats may be especially prevalent when a place is symbolic of 'home', and when energy technologies are believed to be 'imposed' upon places by companies or state organizations without genuine public engagement."

(Devine-Wright, 2009, 434)

iv) Coping response

Threats to place identity may compromise the coping response. This stage refers to the planning phase before the target community elaborates strategies to face the problem. Coping responses involve different levels of analysis, from intra-psychic to collective (Breakwell, 1986). At the intrapersonal level, individuals may deny that change is occurring or deny the possibility of negative impacts, as a form of protection against negative consequences. Coping response may involve re-interpreting place change as individual or groups. This is supported by literature on social representation, which has identified how representations of new technologies in the media manifest 'collective symbolic coping' (Wagner, Kronberger, & Siefert, 2002) reducing the sense of threat that they may pose to society. It's also likely that a threat to a cherished place could mobilize the common sense of community identity provoking a collective action against the project.

As individuals, such actions include signing petitions, writing letters to political representatives or newspapers and engaging in collective protest. At the collective level,

this explanation is consistent with Manzo and Perkins' (2006) analysis of the role of place attachment in promoting community participation, as the authors asserted that voluntary activities on behalf of a place or community should be more commonly understood as arising from the emotional bonds between people and places. Such actions represent different forms of place protection, a way of collective action probably associated with the NIMBY concept.

v) Acting

When the previous stages have been overcome the community should be ready to be involved in the concrete project design process. (See Pellizzoni, Bobbio 2005). Several community involving techniques have been elaborated in the last 50 years to face some thorny issues such as communication between citizenship and local government about a redevelopment area, or how to solve a conflict between local people and a polluting industry, etc... These techniques are: action research, search conference, future search, European awareness scenario workshop (EASW), brainstorming, open space technology, action planning, planning for real, mutual gain approach, consensus building, citizens' juries, deliberatives polls, consensus conference, multicrieria analysis and many others.

Tecniques	Description
Action Research	Kurt Lewin, then a professor at MIT, first coined the term "**action research**" in about 1944. In his paper (1946) he described action research as "a comparative research on the conditions and effects of various forms of social action and research leading to social action" that uses "a spiral of steps, each of which is composed of a circle of planning, action, and fact-finding about the result of the action".
Search Conference	A **Search Conference's** goal is to produce an adaptive relationship between your organization and it's uncertain, changing environment. It's designed to identify a desired

	endpoint and increase the effectiveness of strategic planning by giving those actually affected by change more control over their purposes and directions. A **Search Conference** is a structured participatory process where groups of concerned and active individuals scan through turbulent environments for: 1. A desired outcome for themselves and 2. Generate a strategy for achieving it. The process emphasizes collaborative, experiential learning and community planning - 'jigsaw' puzzle solving. This is achieved through the interaction of the participants who, drawn from a relevant domain, identify, evaluate, and adapt to trends in their environment. The process allows for the creation of shared visions and initiates the deployment of those visions by creating self-managing teams responsible for working the specifics of how to make the plan happen.[2]
EASW	**The European Awareness Scenario Workshop,** also known by the acronym **EASW**, is a method which started in Denmark with the purpose of finding an agreement between the different stakeholders at local level with the aim of reaching a consensual definition of city sustainable. A EASW is built on two main activities: the development of visions and the proposed ideas. In the development visions of the participants, after a brief introductory session, working in 4 groups of interest, by reason of belonging to the same social group (citizens, administrators, etc.). During group work, participants are

[2]http://www.vaughanconsulting.com

	invited to look into the future to imagine, in relation to the topics of discussion, how to solve the problems of the city in which they live and work. Must do so taking as a point of reference scenarios, which suggests 4 possible alternatives (based on different combinations in the use of technology and organization of social life). To facilitate this, the methodology provides a set of techniques for managing the discussion and the achievement of expected results. The visions developed by each group will then be presented in a subsequent plenary session, after which, with a vote, will choose the common vision of all participants. This vision must consider in detail the solutions, pointing out to each of them the role played by technology and the organization of society. The vision emerged at the end of this session, perfected by the facilitator and group leaders in a small meeting (petit Comitè) at the end of this first set of activities, will be the basis for the next of the proposed ideas.[3]
Open Space Technology	**Open Space Technology (OST)** is an approach for hosting meetings, conferences, corporate-style retreats and community summit events, focused on a specific and important purpose or task—but beginning without any formal agenda, beyond the overall purpose or theme. Highly scalable and adaptable, OST has been used in meetings of 5 to 2,100 people. The approach is characterized by five basic mechanisms: 1. a broad, open invitation that articulates the purpose of the meeting; 2. participant chairs arranged in a circle;

[3] http://cordis.europa.eu/easw/home.html

	3. a "bulletin board" of issues and opportunities posted by participants; 4. a "marketplace" with many breakout spaces that participants move freely between, learning and contributing as they "shop" for information and ideas; 5. a "breathing" or "pulsation" pattern of flow, between plenary and small-group breakout sessions. (Owen, Harrison, 2008)
Action Planning	**Action planning** is the process that guides the day-to-day activities of an organization or project. It is the process of planning what needs to be done, when it needs to be done, by whom it needs to be done, and what resources or inputs are needed to do it. It is the process of operationalising your strategic objectives. That is why it is also called operational planning. When an action plan or an operational plan are presented as the basis for a funding proposal, or for a loan application, or to get others to buy into a process or project in some way, they are often referred to as “business plans”. (Shapiro J. 2003)
Planning for Real	**Planning for Real** events are famous for involving eye-catching three-dimensional models- though these are only a part of the whole process. Community members are involved from the beginning in deciding on a suitable venue and subject for the process. The model of a neighborhood is often made by local people themselves in order to create a sense of ownership over the process. A number of events are run depending on the number and nature of the participants. Sometimes separate events are run for specific groups, such as young people. People go on

	to use their knowledge of living in the area to make suggestions by placing cards directly onto the model. There are both ready-made cards with common suggestions (around 300) and blank cards for participants to fill in themselves. These suggestions are then prioritized in small groups on a scale of Now, Soon, or Later. These resulting priority lists form the basis for an Action Plan that decision-makers are charged with taking away, considering and implementing. Delivering the Action Plan is easier if the community is involved in delivery, monitoring and evaluation.[4]
Mutual Gain Approach	**The Mutual Gains Approach (MGA)** to negotiation is a process model, based on experimental findings and hundreds of real-world cases, that lays out four steps for negotiating better outcomes while protecting relationships and reputation. A central tenet of the model, and the robust theory that underlies it, is that a vast majority of negotiations in the real world involve parties who have more than one goal or concern in mind and more than one issue that can be addressed in the agreement they reach. The model allows parties to improve their chances of creating an agreement superior to existing alternatives. MGA is not the same as "Win-Win" (the idea that all parties must, or will, feel delighted at the end of the negotiation) and does not focus on "being nice" or "finding common ground." Rather, it emphasizes careful analysis and good process management.
Consensus Building	**Consensus building** (also called collaborative problem solving or collaboration) is essentially mediation of a conflict which involves many parties. Usually, the conflict

[4]http://www.peopleandparticipation.net/display/Methods/Planning+for+Real

	also involves multiple, complex issues. Examples of consensus building efforts include the international negotiations over limiting chlorofluorocarbons (CFCs) to protect the ozone layer, or negotiations about limiting the emission of greenhouse gasses. While consensus building is probably most often used in environmental disputes, it is applicable to many other kinds of public policy disputes as well at the community, state, and international levels. Consensus building is usually carried out by a mediator or a facilitator. Often a team of intermediaries is involved. As with a mediator of two-party disputes, the mediator of a consensus building effort moves through a series of steps. These include 1) participant identification and recruitment; 2) design of the process to be used (often involving the participants in this phase); 3) problem definition and analysis; 4) identification and evaluation of alternative solutions; 5) decision-making; 6) finalization and approval of the settlement; and 7) implementation.[5]
Citizens' Juries	A **Citizens' Jury** is a mechanism of participatory action research (PAR) that draws on the symbolism, and some of the practices, of a legal trial by jury. It generally includes three main elements: 1. The "jury" is made up of people who are usually selected "at random" from a local or national population, with the selection process open to outside scrutiny. 2. The jurors cross-question expert "witnesses" —

[5] http://www.colorado.edu/conflict/peace/treatment/consens.htm

	specialists they have called to provide different perspectives on the topic — and collectively produce a summary of their conclusions, typically in a short report. 3. The whole process is supervised by an oversight or advisory panel composed of a range of people with relevant knowledge and a possible interest in the outcome. They take no direct part in facilitating the citizens' jury. Members of this group subsequently decide whether to respond to, or act on, elements of this report. [6]
Deliberatives Polls	**Deliberative polling** combines random sampling of public opinion on a specific issue with small-group discussions. Rather than simply determining existing public opinion, a deliberative poll aims to understand what public opinion would be if the public were well-informed and had carefully discussed a particular issue. Citizens are invited by modern *kleroterion* to participate, so that a large enough sampling group will provide a relatively accurate, scientific representation of public opinion [7]
Consensus Conference	A **consensus conference** is made up of a panel of citizens who question expert witnesses on a particular topic at a public conference. Their recommendations are then circulated widely. The panel is given time to prepare before the actual conference so they can come to the topic as better informed citizens. Panel members receive a detailed information pack and attend preparatory events (usually two held at weekends). A feature of this method is that the

[6] http://www.ncl.ac.uk/peals/dialogues/juries.htm

[7] "Deliberative Polling: Toward a Better-Informed Democracy" Stanford University, Center for Deliberative Democracy

	initiative lies with the citizens- they who define what the key points of the debate will be, including the choice of questions and selection of the witnesses -they create their own final conclusions. The press and public are able to attend the main hearing. At the end of the conference, the panel produces a report outlining conclusions and recommendations that are then circulated to key-decision makers and the media. The process is usually run by an organization with no stake in the outcome to limit bias. [8]
Multicriteria Analysis	**Multi-Criteria Analysis (MCA)** is a decision-making tool developed for complex problems. In a situation where multiple criteria are involved confusion can arise if a logical, well-structured decision-making process is not followed. Another difficulty in decision making is that reaching a general consensus in a multidisciplinary team can be very difficult to achieve. By using MCA the members don't have to agree on the relative importance of the Criteria or the rankings of the alternatives. Each member enters his or her own judgements, and makes a distinct, identifiable contribution to a jointly reached conclusion. This manual is written for an audience that needs a clear, easy to follow manual that can be used in the field to implement MCA. The information is structured so that the reader is first introduced to the general concepts involved before delving into the more specific applications of Multi Criteria Analysis. The manual reviews the conceptual framework of C&I and introduces the theoretical basis of MCA, and methods such as ranking, rating and pairwise comparisons in the Analytic Hierarchy Process (AHP). It

[8] http://www.peopleandparticipation.net/display/Methods/Consensus+Conference

	provides an example of how MCA can be applied to C&I in a Forest Certification context both from a 'top-down' perspective as well as in a more 'bottom-up' context.

Table 1

1.2.4 Deliberative Democracy

"Deliberative Democracy" (Pellizzoni 2005) refers to a process based on public debate among free and equal individuals who legitimize this process. "Deliberation", in this case, means "dialogue" or "debate" leading to "decision". Political deliberation differs from other forms of deliberation, such as the scientific deliberation, because is strictly connected with community binding decision. These decisions concern all those facilities strictly connected with vital needs such: waste management, hospitals, roads, electric pylons etc.

In the eighties and nineties a new consideration of democracy founded on public debate and in contraat with the BAU democratic paradigm, which tended to focus on elitism and aggregation started to develop. The expression "Deliberative Democracy" is supposed to have appeared for the first time in an essay written by the American social scientist called Joseph Bessette in 1980. The origin of this theory may date farther back. Some researchers refer this theory to Jhon Rawls and Jürgen Habermans, while others go as far back as John Stuart Mill, Jean-Jacques Rousseau or even Aristotle and the Athenian Democracy. (Pellizzoni 2005). In this sens "the idea of deliberative democracy and its practical application are old as the same democracy" (Elster 1998). This modern interpretation of an antique concept as Democracy comes from a state of institutional crises and BAU democracy. Political scientists have been debating this crisis for over 30 years. Some were already debating about democracy forms already during the 20 years after the Second World War when they started questioning about the western party system. The origin of this crisis usually lies embedded in a growing need to gain access to material and symbolic resources and in the inability of the present

democratic system to fulfill this need: this growth is associated with the break-up of a social order based on authority (control) and status (reliability) and with the politicization of personal life.

Democracies are tripping over their own success. Some scientists have talked about legitimization crisis and overload crisis (Held 1996, page 337). The internal conflicts arise in the context of a broader pluralism; new subjects included in the democratic system are now challenging the same system.

During the early seventies the social movements were lobbing for social reform in a deliberative sense. They achieved the opposite result. There are several reasons for this debacle: the violent opposition of the movement to institutions, the fiscal crises to support a growing welfare state, the post-fordism in the industrial organization. The Eighties Tatcher-Regan rationale brought in elitism, technocracy and neo liberalism (see Pellizzoni 2005).

The rise of Deliberative Democracy could be interpreted as a response to the growing unease generated by this *"post-democratic"* paradigm.(Mastropaolo 2001, p 1620).

Deliberative Democracy is also connected with the "Associative Democracy". The focus here is on the effort by society to fulfill a need by mean of self managed organizations. Associations replace the traditional parties, becoming the connection between government and society and they adopt an increasing role in the economic regulation. In some way they are consistent with the post-democratic individualism, because they supplant the state intervention.

Deliberative Democracy aim at recreating a space for active citizenship, involving people in the decision-making and breaking through some of the barriers between decision-makers and citizens.

1.3 Conclusions

Deliberative Democracy represents the most likely alternative to a top down decision-making. The usual public administration decision- making only involves few key actors. The debate is usually carried out by bilateral meeting that aim at setting up action strategies involving these few key actors. Afterward the deliberation is announced and is likely to lead to conflicts because citizens are only asked to take or leave an off-the-shelf decision: this decision is considered as a threat because is not supposed to take into account people relevant interests, but elitist interests. At that point, the decision-maker is likely attacked on many sides and his only defense is to lay down the unavoidability of the project pleading with juridical and economical strict argument.

This decision process could be declined into three stages: Decide, Announce Defend (DAD). It is, evidently, an inefficient an costly method, likely causing institutional depriving of authority and exposing the decision-maker to easy critics from citizenship expertise.

DAD and NIMBY are connected with a third syndrome called NIMO (Not In My Office). It's concerning the bureaucratic apparatus and its natural inclination to wash its hands. This bureaucratic system is perfectly consistent with the top-down decision-making and it's unsuited for the deliberative process. The unbiased and scientific bureaucratic approach implies the belief that a technical defense supported by scientific outcomes neutralizes people strong temperament. However citizen expertise is gradually increasing and they are more able to involve experts to defend their points.

2. Case Overview

The aim of this chapter is to outline a few key elements that led to the accomplishment of the Samsø project. The paragraph related to the island is useful to understand the current situation from a demographic and economic point of view. Once the object of our research has been described I will introduce two other elements, Danish Energy Policy and the Danish cooperative system. To put it in metaphoric terms, together they formed the fertile soil from which the transition from a traditional economy to a "green" economy grew.

2.1 Geography

Samsø stands in the middle of Denmark, it is located 15 km far from the Zealand and 20 km far from the Jutland.

Figure 2.1

There are 22 villages spread over the whole island. They radiate out from the biggest village Tranebjerg, which is situated in the middle south. The northernmost village is Nørdby which lies beyond the Kanhave Canal. The landscape is quite grate studded with pumpkins and corn fields. Sometimes the beaches are protected by a pine wood which lends an almost Mediterranean feel to parts of the coast.

Figure 2.2

2.2 History

During the Viking Age Samsø was a traffic junction on the sea commercial route to Jutland on one side and to Zealand on to the other and the starting point for voyages of exploration to all corners of the world.

On Samsø, no less than eight locations containing the words *snekke* (warship) have been registered, for instance *Snekkehøj* (*Snekke* Hill) near to the Kanhave Canal. The numerous snekke names suggest that a large naval fleet had its base on Samsø, and that the island was part of the national defense system and most of all th Aarhus' defense rearguard.

Stavns Fjord was big enough to host warships. The island stands in a strategic position; from it you can control the mainland coast and the waters that lead to Aarhus, one of the most important cities in the Viking age. The Kanhave Canal was built to allow quick passage through the island to Aarhus bay in a short time The warships were pulled across the land, and they probably functioned as an advance defense of Aarhus.

At that time a small settlement was situated on the south of the Stavns Fjord. The village supported itself by fishing and animal husbandry. The workshops produced forged clench nails and woven sails for ships. Imported goods, including items from Norway and Ireland, reflect the foreign contacts. (Jeppesen J. 2005)

2.3 Demography

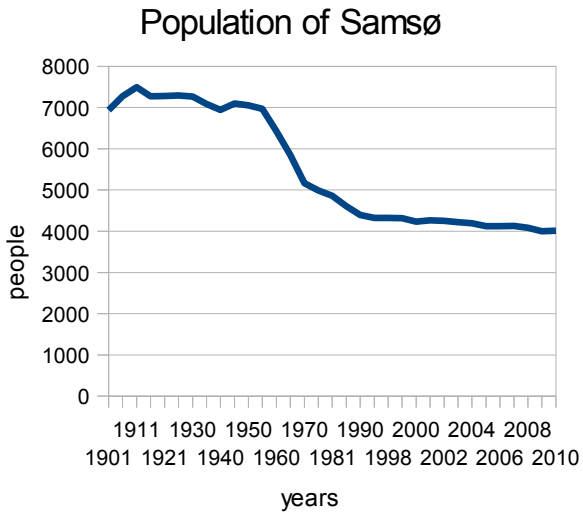

Figure 2.3

Data Source: Statistik Banken DK

In 1997 the population of Samsø was 4,366 inhabitants (Statistik Banken DK) and a gradual increase was forecast: 4,400 inhabitants in 2003. However the population in 2003 was 4,197. Figure 2.4 shows more in detail how the population has changed in the last two years. In July 2010 the island had 3,968 inhabitants.

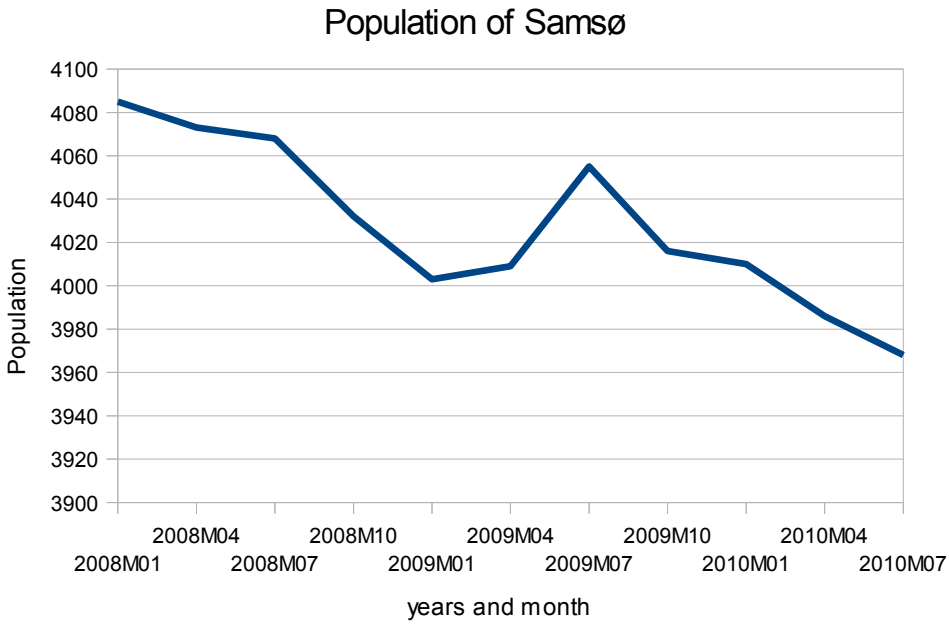

Figure 2.4

Data Source: Statistik Banken DK

The first demographic shock happened between the fifties and sixties due to the urbanization that interested Denmark (like the rest of Europe) in that period. After that the population decreased slightly: as on other small islands no education is available after secondary school (age 15-16), so all the young population moves to Aarhus or Copenhagen and they generally do not move back to the island.

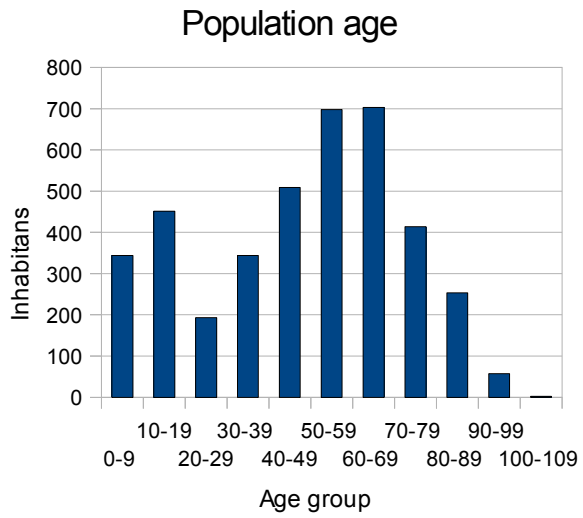

Figure 2.5

Data source: Statistik Banken DK

In Figure 2.5 the inhabitants are divided into age groups. The range 50-109 represent 53.6% compared to 36.13% in the rest of Denmark.

There are 2,021 women on the island and they represent the 50.93% of the population. In Denmark as a whole women represent 50.43% of the population. This slight difference in gender distribution could be due to the high number of older people on the island: generally women's life expectancy is higher than men's.

2.4 Economic Outlook

The economy on Samsø is mainly based on agriculture and tourism (Jørgensen 2007). In 1999/2000 a slaughter house owned by Danish Crown, an international food producer with production and sales across the world, closed down and around 70[9] people lost their jobs. This was a big shock for the local economy not only in terms of occupation but also in terms of uncertainty about the future. The Danish Crown was considered a mainstay of the Danish traditional economy (see paragraph 2.6), its closure had serious repercussions on the social fabric of the island.

[9]Source Statistik Banken

More in general I've analysed the economic trends matching them with occupation and income data.

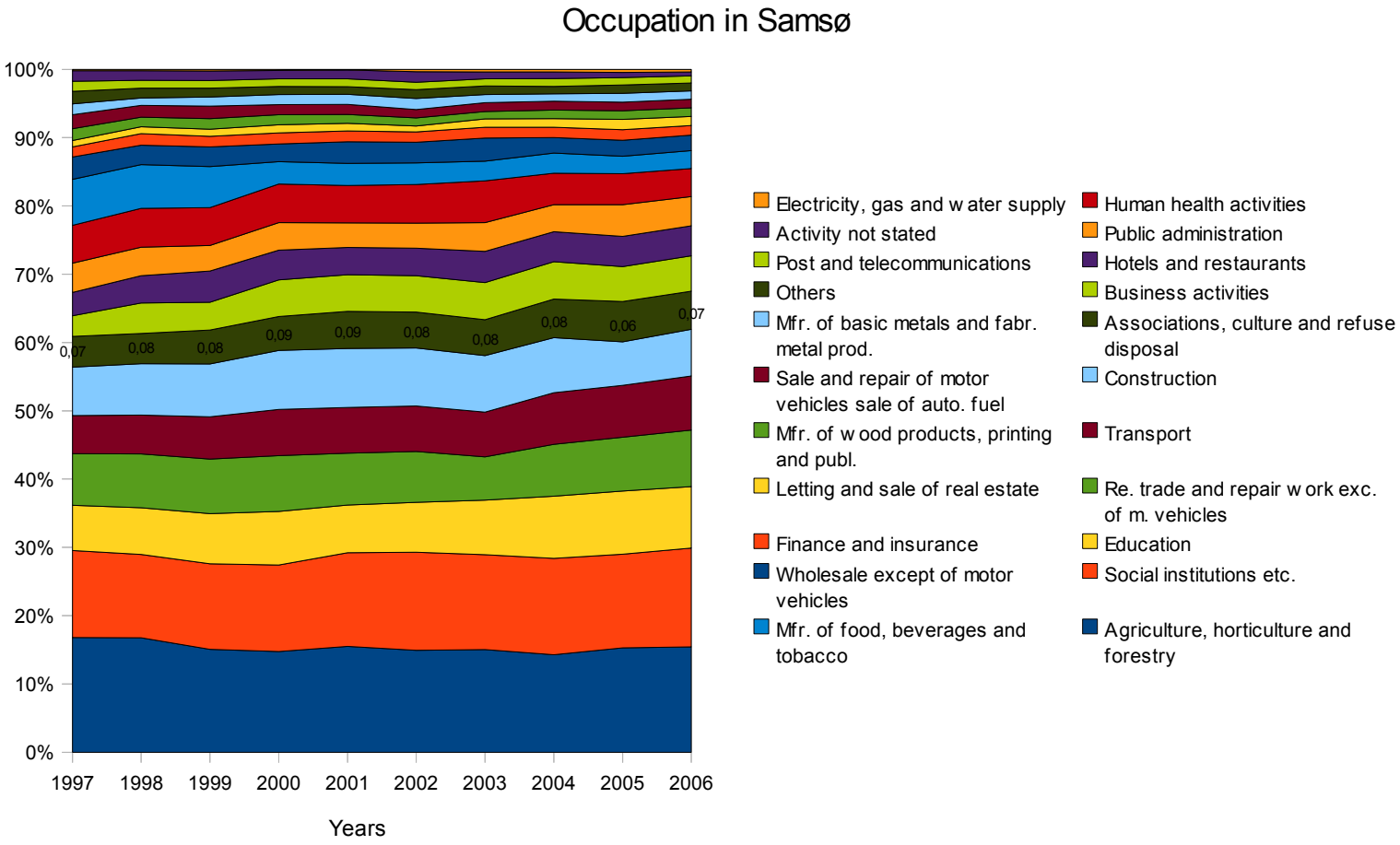

Figure 2.6

Data source: Statistik Banken DK

Sector	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
109 Agriculture, horticulture and forestry	339	340	313	297	312	302	291	263	280	293
8539 Social institutions etc.	257	247	261	255	276	291	269	260	251	275
8000 Education	134	139	153	158	140	148	155	168	170	171
5200 Re. trade and repair work exc. of m. vehicles	152	160	166	165	153	151	123	140	144	157
6009 Transport	113	115	129	136	135	135	127	139	139	151
4500 Construction	143	153	161	174	174	172	160	149	117	130
9009 Associations, culture and refuse disposal	91	90	103	100	109	106	102	104	108	106
7209 Business activities	61	90	85	108	108	108	105	101	94	98
5500 Hotels and restaurants	69	81	95	88	80	82	89	81	81	84
7500 Public administration	86	85	78	81	73	74	81	73	85	81
8519 Human health activities	112	115	115	114	110	115	119	85	83	78
1509 Mfr. of food, beverages and tobacco	136	130	125	66	65	64	56	54	47	50
5100 Wholesale except of motor vehicles	66	58	60	52	64	61	65	42	43	43
6509 Finance and insurance	30	34	32	33	32	31	31	28	28	27
7009 Letting and sale of real estate	19	21	22	24	22	17	24	23	28	25
2009 Mfr. of wood products, printing and publ.	35	28	32	29	26	24	21	23	23	24
5000 Sale and repair of motor vehicles sale of auto. fuel	41	35	38	30	30	25	25	24	23	24
2709 Mfr. of basic metals and fabr. metal prod.	32	22	28	30	30	33	23	20	24	23
9999 Others	37	29	27	24	22	26	24	20	22	22
6400 Post and telecommunications	30	24	23	22	23	22	20	21	20	20
9800 Activity not stated	31	28	29	25	26	31	20	18	14	11
4009 Electricity, gas and water supply	4	4	5	3	2	7	7	7	8	7
9999 TOT	**2018**	**2028**	**2080**	**2014**	**2012**	**2025**	**1937**	**1843**	**1832**	**1900**

Table 2.1

Data source: Statistik Banken DK

The highlighted line in Table 2.1 refers to occupational trends in the Food and Beverage sector, the category in which the Danish Crown's workers are included. The number of employees on the island has decreased slightly since 1997, as illustrated in Figure 2.7. However the population is also decreasing. The ratio of Employees topopulation is constant as illustrated in Figure 2.8.

Figure 2.7

Data source: Statistik Banken DK

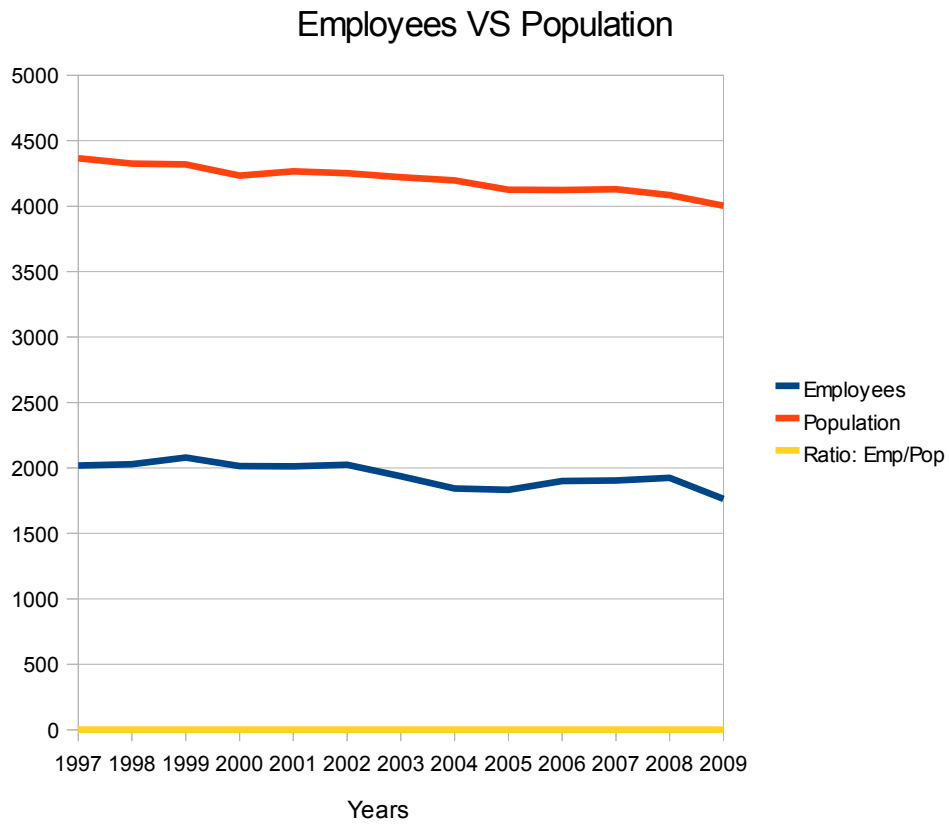

Figure 2.8

Data source: Statistik Banken DK

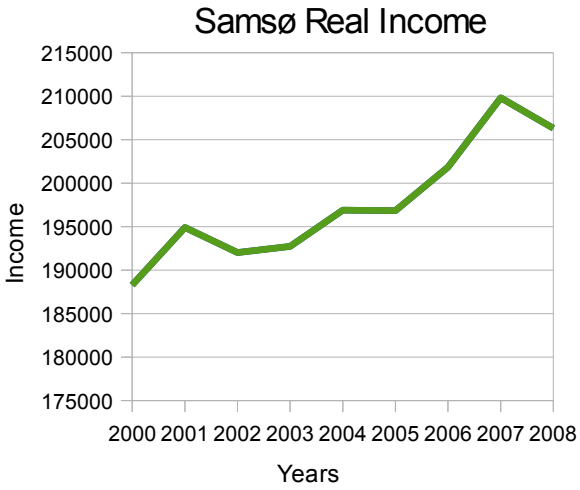

Figure 2.9

Data source: Statistik Banken DK

Moreover in the same period the personal real income (DKK) on the island markedly improved as shown in Graph 6. One possible explanation, also according to Mette Løkke the coordinator of the Samsø Development Office, is that, after the transition from a traditional economy to a RE based economy, people essentially updated their skills, for example using modern materials that guarantee houses energy efficiency and this evidently has had a beneficial effect on their incomes, because the value of their craftsmanship is now higher. The transition brought new knowledge to the people on Samsø not to mention the financial benefit deriving from the cooperative management of the wind turbines (see Chapter 3).

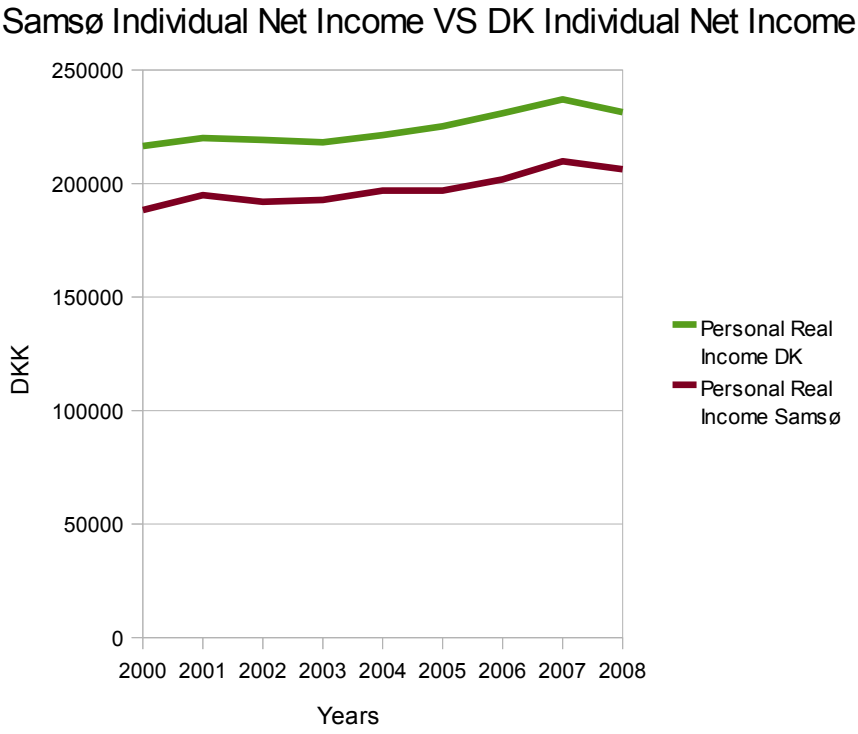

Figure 2.10

Data source: Statistik Banken DK

Figure 2.10 shows both Danish Individual Net Income and Samsø Individual Net Income. The two trends are almost parallel: the island's income is around 12% lower than the rest of Denmark but it has almost the same shape as the general one. This suggests that the local economy followed Denmarks's positive trend until the 2007 crises and afterwards the general negative trend. It is not possible to attribute this result to the RE transition due to the lack of statistical evidence, but we will discuss this in the 5th chapter.

2.5 Renewable energy policy in Denmark

Renewable energy in Denmark has a long history and the improvements over recent decades are the result of a long process which started in the 19th century. The first pioneering work was done by Poul la Cour at Askov Folkes High School in the 1890s (Meyer 2004). La Cour developed and built a wind turbine for electricity production

with a rotor diameter of 22 m incorporating the gear box. He even tested a number of rotor profiles in wind tunnels and provided energy storage based on hydrogen produced by electrolysis of water. The hydrogen was subsequently used for lighting purposes. He deserves the credit of initiating modern wind power development including hydrogen as an energy vector based on renewable energy sources (RES).

> *The concepts and technologies developed by La Cour provided a basis for wind electrification in Denmark during the first two decades of the 20th century. In 1918, 120 rural wind power stations were established with rated turbine powers between 20 and 35 kW, yielding a total installed wind capacity of about 3 MW compared to a total Danish electricity capacity of about 80 MW. With the typical capacity factors of that time, this corresponds to around 3 % coverage by wind of the Danish electricity demand in 1918. Even today only three nations have exceeded this coverage by wind.* (Meyer 2004)

During the following 4 decades several wind projects were installed and tested in Denmark and in Germany, the UK and the US. This period culminated in the 200 kW Gedser Mill in Denmark, in operation from 1959 to 1967. The operation was very successful, and the Gedser Mill became the mother of modern Danish wind turbines in the 1970s, characterized by three blades on a horizontal axis in an upwind position.
The 1970s were the petrol crisis years. Denmark, like all OECD countries, was mainly importer and the whole electric system in Denmark as in other countries, was based on oil consumption: in that period more than 90% of of all Danish energy supply was imported oil, making the country especially vulnerable to the jump in prices and to the insecure supply situation in the Middle East. This triggered a new phase of official energy planning in Denmark: as a consequence Denmark launched an active energy policy to ensure the security of supply and enable Denmark to reduce its dependency on imported oil.

2.5.1 Nuclear in Denmark

The oil crisis generated a lively debate about the energy policy not only in Denmark but also in the rest of Europe. For the first time the European Countries were facing the energetic problem, in all its complexity. The centre of this debate was occupied, in Denmark, by nuclear power. The official energy policy was aimed at the introduction of nuclear power as soon as possible in the Danish electricity system. This view was supported by a clear political majority in the Danish parliament, and it was an essential element in the first official energy plan from the spring of 1976. However in the Autumn of the same year a group of energy experts from Danish universities (Blegaa et al., 1976) published *''Outline of Alternative Danish Energy Plan"*, an alternative plan based on an higher contribution of RES.

Soon after the oil crisis a number of initiatives were taken to promote RES and especially wind power in the Danish energy system. In 1975 a committee set up by the Danish Academy of Technical Sciences (ATV) published a report proposing a broad wind energy program in Denmark. During the second half of 1970s several small and medium sized firms started to produce small scale wind turbines (typically 22 kW of rated capacity) to be installed in households. Moreover a wind power program for the development of large-scale electricity-producing wind turbines was implemented in 1977, jointly sponsored by the national government and Danish utilities. This was the beginning of the modern phase of Danish wind energy use. In the meantime opposition to the nuclear power arose also in Denmark. During the 1970s the No Nuke movement was led by two NGOs, the Organization against Nuclear Power (OOA) and the Organization for Renewable Energy (OVE). These two organization soon became skilled and professional focusing their criticism on the safety of nuclear power. They have often been accused by nuclear power supporters of planning to overthrow democracy in Denmark and sending Danish society back to the Stone Age (Meyer, 2004).

The history of nuclear power in Denmark ended in 1985 when the Danish parliament decided that nuclear power should not be an element of Danish energy supply. It should be noted that this was one year before the Chernobyl accident. The decision was influenced by several factors, but there is no doubt that the alliance between

independent university experts and competent NGOs in connection with broad information campaigns on alternative possibilities was one of the factors.

2.5.2 The Danish energy reform

Since 1990, the overall goal of Danish energy policy it to commit to greenhouse gases reduction and to develop sustainable energy to mitigate the effects of climate change. Two energy plans have been published in this period (Danish Energy Ministry, 1990; Danish Ministry of Environment and Energy, 1996). These policies aim at developing RES and implementing electricity generation based on RE, having as primary focus wind and biofuels. (Meyer 2003). The target was to reach the 12-14% of primary energy produced by biofuels and wind by 2005 and 35% coverage by 2030.

Wind power has played an important role in these plans the specific target was to reach around 1,500 MW by 2005 and 5,500 MW by 2030 covering 10% and up to 50% of Danish electricity consumption respectively in 2005 and 2030. The 2030 target included 4,000 MW offshore wind installed.

The 2005 target was reached and exceeded by a significant amount in 2003. At the end of the same year the installed wind power capacity consisted of 3,112 MW and wind energy was estimated to cover around the 19% in 2003. In 2009 the capacity is 3,479 MW mainly due to the installation of new offshore wind farms as shown in figure 2.11. The red line illustrates the total amount of wind turbines which decreased in the last 10 years even thought the installed MW capacity increased.

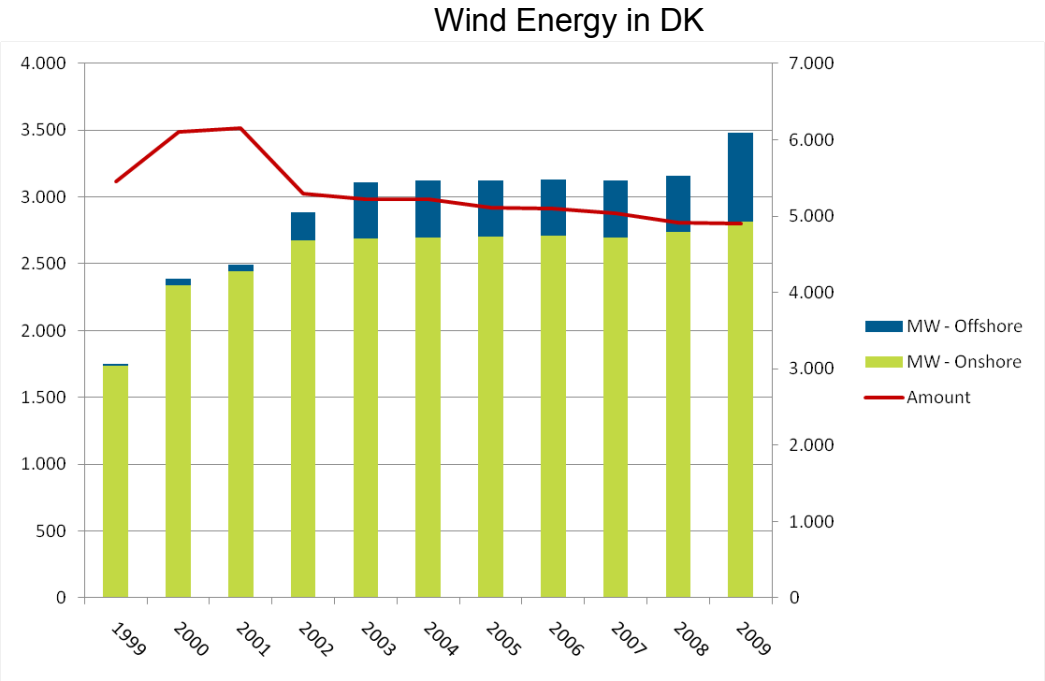

Figure 2.11

Data source: www.windpower.org

The Danish strategy for wind energy promotions combined different elements.

1 long-term government support for research, development and demonstration;

1. national tests and certification of wind turbines;
2. government-sponsored wind energy resource surveys (wind atlases);
3. feed-in tariffs and regulations;
4. investment subsidies;
5. government energy planning and targets;
6. local ownership of wind turbines and careful selection of sites.

2.5.3 Key political actors and The Svend Auken's role in the Danish energetic policy

This paragraph will focus on the key political actors that through action or inaction influenced the Danish energy policy.

In Denmark there are four party coalitions with views on energy policy: the “Left including the Red-Green Alliance and the Socialist People's Party); the “Center-Left” (the Social Democratic Party and Social Liberal Party); the “Center-Right” (the Liberal Party and Conservative Party); and the “Right” (the Danish People's Party). These 4 coalitions could be divided again in two groups where the “Left” and the “Centre-Left” constitute an overall pro-RES block in parliament and the “Centre-Right” and the “Right” parties who tend to support the energy *status quo*. There are still some differences between “Left” and “Centre-Left” and “Right” and “Center- Right” but this is not the best place to debate them. In 1993 the Social Democrat won the election and returned to political power. The Energy and Environment Ministry was assigned to Svend Auken, the Social Democrat's leader and he soon became the new Dansih environment champion. He was a strong supporter and a combative advocate for renewable energy technologies and sustainable development during his nine-year term of office (1993-2001), also known provocatively as “ the Auken regime”. The energy plan of 1996, “Energy 21” included more than 100 initiatives designed to reduce CO_2 emissions. New efforts were made to create market incentives for biomass and wind generation. The role of wind generated electricity increased dramatically: during the Auken term wind power production increased from approximately 5 per cent to 15 per cent (William M. Lafferty, 2003). In 1996, power companies accepted to expand their wind-power capacity by a further 900 MW by 2005. Once again, in 1998, mild political pressure forced the power companies to agree to install a further 750 MW of offshore wind parks by 2008 as so-called demonstration projects, thus allowing for allocation of public funds. The competition called in 1997 between 5 islands communities to create the first self-sufficient island (Samsø was among the 5) was part of Energy 21 plan. The “Auken regime” clearly enhanced the RES share in the Danish energetic system.

In 2001 after almost a decade of Social Democratic rule, a new government composed by Liberal and Conservative parties with the support of the right wing, took office. The new Prime Minister was Anders Fogh Rasmussen. The new government soon marked out a discontinuity with the previous government as regards energy policy. Many cutbacks and priority shifts were made in both environmental and energy policies. Fiscal support was reduced in behalf of market-based solutions. Environmental

Assessment Institute (EAI) was founded with the aim of promoting RES, under the direction of the controversial political scientist Bjørn Lomborg. The main mission of the EAI is to "get the most environmental benefit out of the invested money" and it questions the legitimacy of the notion of climate change[10]. RES development in the early Rasmussen's government came to an impasse. In 2004 under pressure from "Left" and the "Center-Left", the Rasmussen cabinet agreed on a new deal for RES. The construction of the two offshore wind farms that was cancelled after 2001 election was resumed. It's also probably true that environmental concerns among voters was still widespread and wind turbines and other environmental technologies represented a rapidly growing market. Published in January 2007, the Fogh Rasmussen government's new Energy Strategy 2025, the Energy Agreement 2008 and 2009 gave new hopes for renewables .

2.5.4 Danish Energy policy in 2009

This paragraph is a summarized version of the Danish Energy Report 2009. The data items reported have clearly a political function, so I considered it necessary to "clean" these data and to re-organize the contents.

i) The Government's vision and Danish climate and energy policy goals

1) The vision
Complete fossil fuel independence

2) Internationally binding targets

30% renewable energy in final energy consumption by 2020,

10% renewable energy in transport

20% reduction relative to 2005 in non-ETS greenhouse gas emissions by 2020

21% reduction relative to 1990 (Kyoto) in the greenhouse gas emissions covered byt he European Emissions Trading Scheme (ETS) on average in the period 2008-2012.

[10]Bjørn Lomborg is the author of the controversial *"The Skeptical Environmentalist"* which argues that claims on overpopulation, declining energy resources, deforestation, species loss, water shortages, certain aspects of global warming, and a variety of other global environmental issues are unsupported by analysis of the relevant data.

National targets

20% renewable energy in gross energy consumption by 2011

Annual energy savings of 1.5% of the final energy consumption for 2006

4% reduction relative to 2006 in gross energy consumption by 2020

ii) The Government's green-growth initiatives

- The *energy agreement* from February 2008 entails expansion with more renewable energy. For example through better framework conditions and higher subsidies. The agreement also sets up ambitious goals for energy savings.

- The *tax reform* lowers the tax on work and makes it more expensive to consume and produce goods that are harmful to the environment, climate and human health. Taxes on energy, climate and transport will be increased by DKK 8 billion in total. All in all, with this reform Denmark has taken a determined step toward a more intelligent and green tax system, which reduces CO_2 emissions and gross energy consumption, and also promotes renewable energy.
- *Subsidies for energy renovation of buildings and stricter requirements for the energy performance of buildings* A total of DKK 1.5 billion has been allocated for renovation and construction work, including energy savings in permanent residences. The objective of the pool is to create more jobs in the building and construction sector; make for a general improvement of the building stock; and underpin the energy agreement's objectives as well as the strategy for reducing energy consumption in buildings (see overleaf).
- In continuation of the Energy Agreement, in April 2009 the government presented a *strategy for reducing energy consumption* in new buildings. The strategy proposes tightening the requirements by 25% in 2010 and by 57% in 2015. The district heating factor means that energy consumption in new buildings overall is reduced by 50%.
- The *agreement on a green transport policy* from January 2009 is a long-term, coherent plan investing in a green transport system with increased mobility and reduced CO_2 emissions from the transport sector. There is agreement that a

number of general areas of initiative will contribute to fulfilling these objectives in the long term, including a significant boost to the railways, road pricing and new sustainable technologies. Up to 2020, more than DKK 150 billion will be invested, primarily in public transport.

- *Green Growth* is a series of initiatives that combines a high level of nature and environmental protection with modern and competitive agricultural production. The overall package of instruments is to reduce greenhouse gas emissions from agriculture, establish a better aquatic environment and more, new natural habitats, while at the same time creating better conditions for growth in the agricultural sector.
- Over the next three years, *EKF* (a state-owned enterprise operated on business terms, offering export credit financing to Danish businesses) will be able to offer export loans totalling DKK 20 billion to Danish exporters, e.g. within the climate and green-tech sectors.
- *New technologies:* In 2010, total public support to research development and demonstration of new energy technologies will be DKK 1 billion. Furthermore, during globalisation negotiations this autumn, the government will discuss the opportunities for establishing an innovation programme. The objective of this programme will be to promote the development and demonstration of end-to-end solutions for plus-energy building.

iii) European Collaboration

Energy resources represent the central element in the global-security policy. The Russo-Ukrainian gas conflict has brought the energy resource problem back into the public eye. The European energy independence stands in the first position of the European energy policy agenda. (Westphal 2006). This is also one of the reasons Denmark has set ambitious targets for renewable energy and energy savings. Up to 2025, the government has committed to reducing the use of fossil fuels by at least 15% relative to 2007. The projection by the Danish Energy Agency shows that with the initiatives already agreed, it is possible to achieve this target sooner. The projection also shows that Denmark will

meet the energy agreement's sub target for a share of 20% renewable energy by 2011, and that energy consumption will be reduced. The same initiatives to meet these energy-policy goals, also contribute significantly to reach Denmark's Kyoto target of a 21% reduction in greenhouse gases by 2012.

The European Commission's Second Strategic Energy Review was submitted in November 2008. In this document there are some key elements that involve directly the Danish economy:

- Kriegers Flak[11] in the Baltic Sea;
- a new gas pipeline from Norway via Denmark to Poland;
- a North Sea electricity grid;
- and the Baltic Interconnection Plan.

The projects could be of interest to Denmark because they will increase the security of supply for Denmark and the Baltic Sea region. They will also provide opportunities for exporting Danish energy technologies.

Nordic energy collaboration - an international success story

The Nordic energy collaboration clearly shows how working together makes it possible for countries to benefit from each other's strengths. In the Nordic countries for example, cheap hydro energy from Norway and Sweden helps ensure a stable electricity supply in Denmark in situations where Danish electricity consumption is greater than normal electricity production. The water resources improve the opportunities for, and the cost effectiveness of incorporating an increasing amount of wind power in the Nordic electricity system. These collaborative efforts save the Nordic countries from large investments in national back-up systems. The government will continue to support the further expansion of the infrastructure of overseas cables, as the foundation for the success of Nordic energy collaboration.

[11]It consist in a project of a huge offshore wind farm located in the Baltic Sea between Sweden and Germany, 30 km south of the Swedish city of Trelleborg. The estimated annual production is approximately 2.6 TWh. This corresponds to the domestic electric energy demand of more than 500,000 homes.

iv) Energy saving

The energy policy agreement sets out ambitious goals for energy-saving initiatives. Total annual energy savings must be raised to 1.5% of the final energy consumption for 2006 (10.3 PJ per year), which corresponds to the combined energy consumption of about 110,000 homes. Furthermore, Denmark must reduce gross energy consumption by 4% by 2020 relative to 2006. At the same time, it has been decided that the energy-savings requirements of energy companies will be increased by about 85% from 2010, and that the requirements for the energy performance of buildings will be tightened by at least 25% in 2010, 2015 and in 2020.

v) Renewable energy

With the energy agreement in 2008 the Danish Government set the goal of reaching the fossil fuel independence in 2050. The first step is a share of 20% renewables in gross energy consumption by 2011 and at least 30% in final energy consumption by 2020, as stipulated in the EU climate and energy package.

Wind turbines

In 2009 the Energy Report stated a wind energy capacity of 3,150MW in total, of which 423MW are offshore wind turbines. Recently Horns Rev 2 Offshore Wind Farm with a capacity of 209MW, had been connected to the grid in late 2009 and Rødsand 2 with a capacity of 207MW, had been connected in early 2010.

Biomass

Biomass, which is straw, firewood, wood chips from forestry etc., is an important contributor to renewables' share of energy consumption. Biomass, including biodegradable waste, today comprises almost three-quarters of renewables in energy consumption. The 2009 report stated that the biomass used in Denmark is

approximately half of all potential biomass resources. The chance to improve this use is to exploit new resources such as energy crops and see weeds. However the most part of biomass consist in pellets and they are mainly imported.

Waste

The waste that cannot be recycled is used for heating production. Waste today supplies approximately 20% of Danish district heating production and approximately 6% of Danish electricity production. On 17 June 2008 the government amended the electricity Supply Act, so that waste incineration by power plants is now exempted from "non-profit" regulation, which otherwise until recently applied to all waste incineration. This act should enhance the coal substitution with waste and open a new market. Nevertheless the dangers to health provoked by waste incineration are source of debate in Denmark as well.

Biogas

The government aim at expanding the use of biogas significantly. The energy agreement in 2008 settled a higher price and with this framework the Danish Energy Agency estimated that biogas production would have tripled from 4 PJ in 2008 to 12 PJ by 2020. The main goal is to use the 40% of farm livestock manure in 2020 so that they are now installing new plants and expand the old ones.

Electric cars

Electric and hydrogen cars will be exempt from tax up to 2012. Then in the period 2012-2015 the car tax will be lower to enhance the presence of electric and hydrogen cars on Danish roads.

Biofuels

In March 2009, the government presented a bill to the Danish Parliament (Folketinget) on a total annual sale of at least 5.75% biofuels etc. for land-based transport by 2012, to be implemented as an order in the oil sector. In conjunction with the promotion of electric cars, the bill will contribute to fulfilment of the EU commitment toward 10% renewable energy in the transport sector by 2020. It will also help meet Denmark's Kyoto commitment.

District heating

District heating represents one of the peculiar characteristics of the Danish green-growth policy. The aim consist in shifting from individual heating to district heating that, as we will see in the chapter 3, is an initiative with socio-economic benefit. The Danish Minister for Climate and Energy has therefore asked all Danish municipalities to give priority to proposals for projects that will examine the possibilities for converting parts of municipalities' energy supply from individual natural-gas solutions to district heating. The use of large heat pumps in district heating supply is another initiative which the government is currently looking into.

Geothermal energy

Geothermal energy is already being exploited at certain locations in Denmark. For example, geothermal energy is being exploited on Amager, near Copenhagen, where a plant is delivering heating corresponding to the consumption of 4,600 households. The companies with permission to exploit the geothermal energy in the Greater Copenhagen Area calculated the geothermal reserves at more than 60,000PJ in January 2009. For comparison, total Danish energy consumption was 863PJ in 2007. The reserves can therefore meet an estimated 30-50% of district heating production in the Greater Copenhagen Area for several thousand years.

Exploiting geothermal heat for district heating will primarily be relevant in the required shift away from dependency on natural gas in the district-heating system.

The Ministry of Climate and Energy is working on a report on geothermal energy which is to address the key questions of the national geothermal potential, economy, barriers etc.

Energy infrastructures

In March 2009 the EU agreed that 80% of all households in the EU should have smart electricity meters installed by 2020, if this would be cost-effective. In autumn 2008, the government presented a report which concluded that the economy and household finances are still not ready for a national replacement of electricity meters. However, in the long term it could be financially and economically wise to encourage the use of smart metering in step with phasing in more renewable energy.

It must be ensured that the electricity system is as flexible and efficient as possible by exploiting intelligent interaction between supply and consumption. The electricity grid must be flexible in relation to phasing in more renewable energy.

New Great Belt connection

From 2010, a new electricity cable across the Great Belt will wire Funen and Jutland to Zealand. This will enhance the competition in the electricity market and costs of operating the Danish electricity system will be reduced. This in turn will lower electricity prices and make for better security of supply.

2.6 The Danish cooperative system

The cooperative systems share few characteristics about their membership, decision making and sharing dividend as defined by ICA (International Co-operative Alliance)[12]:

(i) Membership is open and voluntary.

(ii) There is democratic control, usually on the basis of one man, one vote.

[12] www.coop.org/ica

(iii) Interest on share capital is limited.

(iv) There is equitable distribution of any surplus, usually in proportion to transaction with or work done in the society.

(v) Cooperatives devote some part of their surpluses to education.

(vi)Cooperatives cooperate among themselves.

Thus the cooperative process is basically an interaction between: (a) cooperatively committed members, (b) cooperative values inherited from the past and expressed in principles, (c) practical cooperative structures, also inherited from the past, and (d) the institutional environment where cooperatives operate.

The co-operative movement in Scandinavia has a strong tradition and the Danish cooperative movement (*Andelsbevægelsen*) has been particularly influential.

In particular the Danish movement grew strong when cooperative dairies were established from 1882. They were soon followed by other agricultural sector cooperatives like fodder purchase association in 1883, cooperative of slaughter house in 1887 and finally in 1914 was established a Cooperative Bank with branches in provincial towns. The cooperative system soon became "*the way of organizing all common practical matters among the Danish rural population." (*Jarka Chloupkova, 2003). Furthermore, right from the beginning, *Andelsbevægelsen* was closely linked to a peasant political movement centered around the farmers' party (*Venstre*)[13], and to rural cultural movements, such as the free church, free school, and folk high school movements. Unlike other European experiences the origin of the Danish cooperative movement didn't harbour rebellion feelings, as, for example in Italy where the first cooperative were ruled by liberals and Mazzinian supporters aiming at workers' emancipation; in Denmark the process at the base of all these peasants' association had been a bottom-up process led by entrepreneurs in the local rural communities. Such people constituted closed circles of "dedicated Souls" (2003), they met regularly and

[13]Full name Venstre, Danmarks Liberale Parti (Left, Liberal Party of Denmark), is the largest political party in Denmark. The party currently governs in coalition with the Conservative People's Party, with support from the Danish People's Party. The party's leader is Anders Fogh Rasmussen and the current Danish Prime Minister.

they knew and trusted each other, and they soon got to organizing local and regional operative associations, composed of highly trusted leading board members. These consisted of agricultural as well as cultural associations, forming stable and long-lasting networks with significant overlaps of members.

"Hence, valuable social capital was created bottom-up, enhancing economic growth and the general educational standards of the rural population in an extraordinary process of self-organization"
(Jarka Chloupkova, 2003).

In particular, the Danish cooperative dairies traditionally are a good example of efficient and democratic self organization, the biggest and most famous one is the Danish Crown that owes its existence to the cooperative movement.
Before 1882, each farmer used to produce his own butter and sell it himself in the nearby town market or he had to rely on food traders who canvassed the country. This process was inefficient and costly because the distribution process wasn't rational. Moreover farmers were price-takers because they couldn't lobby for a better price. From 1882 they could rely on a cooperative which was able to fix a higher price and to ensure the purchase. An increasing number of Danish farmers started delivering all their milk to their own cooperative dairy, except for the amount they used at home. They bound themselves to be individually responsible for any debts that might be incurred, and if the dairy made any profit, it was divided among the members proportionally to the amount of milk each of them had delivered, thus securing an important capitalistic incentive for the farmers. In this way they created a joint liability system in which they were sharing the risk of economic downturn and establishing a *"multi-functional "glue" in the local community, facilitating all kinds of self-organized activities"* (2003). The cooperative dairies became an immediate success. The quality of the butter increased. It became possible to standardize output and thus demand higher prices. Technical improvements upgraded both the quality and the quantity of the butter. And soon cooperative dairy butter surpassed the celebrated "Estate Butter" for which Denmark had been famous.

Consequently, the number of cooperative dairies increased rapidly from 1 in 1882 to about 700 in 1890, including one third of all Danish milk producers.

In this contest farmers self-organized folk high schools and agricultural schools had been established to enhance and improve milk production and dairying.

The social control mechanism of the members of a cooperative guaranteed that none of the neighbours would cheat. The members of a cooperative were part of the same associational network and they had to trust each other to make the system working.

A typical way of establishing a dairy cooperative was that a group of trustworthy and highly respected farmers in a locality got together and borrowed the necessary capital from a savings bank. All the work in the dairy cooperative was performed with an unlimited liability. The original funds for construction purposes were repaid in installments, while the working capital was supplied by a guarantee paid by each member. When the original loan was repaid, a new loan was taken from the bank at the same rate of interest. The financial resources obtained were handed over to the original members who all alike proceeded to repay the new loan. Savings banks were thus directly interested in the development of the dairy cooperatives. The cooperative dairies were governed in a democratic way. In most dairies, each member had one vote, irrespective of the number of cows he possessed. The members themselves elected the board of their association, including a dairy manager, who was expected to be an expert in his field. Local cooperatives were united into a central national confederation, which aimed at developing the dairy production industry through exhibitions, conferences, and collection of materials. The constitutional articles of a local dairy cooperative always obliged members to bring all their milk to the cooperative dairy, with the exception of milk needed for household use. Such contracts between the farmers and the dairy were made for a fixed period, usually ten or fifteen years. Heavy fines were imposed on anyone breaking this rule. Furthermore, the articles contained strict but, as ever, commonly agreed-upon rules relating to proper feeding of the cows, sanitary milking, etc., thus hindering free-riding and the formation of exclusive, negative social capital.

As mentioned, the Danish farmers soon found it necessary to carry cooperation a step further, in a dynamic proliferating process that was initially inspired by the success of the dairy cooperatives. For example, it now became urgent to control the distribution of

their produce in England, which was the chief market for many Danish agricultural products. Danish farmers managed this in a characteristically independent way by forming a distributive and selling agency. As cooperation was not confined only to the selling of farm products and buying of merchandise and farm supplies, the improvement – or supportive – societies emerged, such as cooperative fertilizer plants and canning factories. Another example was the maintenance of cow and swine improvement and breeding societies and seed-testing organizations. The breeding of cattle, horses, swine, and sheep was promoted by cooperative societies. The main purpose of these societies was to improve the breeding of farm animals by keeping accounting systems of the quantity of milk produced per cow, its content of butter fat, as well as the relative cost of maintenance. The first central society was established in 1895. In 1913, there were 592 such societies, all of which received some subsidy from the state. Almost every need of the farmer was supplied through one or more organizations of this kind. In addition, there were societies for accident insurance against, e.g., hail and other storms, fire, and for the insurance of livestock. So we see that in rural Denmark, during the second part of the 19th century, network cooperation spread to include nation-wide cooperation. Consequently, about 1890, the Danish state – however obstructive it had behaved towards these peasant initiatives – reluctantly had to admit the national economic importance of the cooperatives. At this time, a valuable stock of social capital had been established among Danish peasants, kept alive by circles of energetic local and regional peasant entrepreneurs and institutionalized in the constitutional articles of the cooperative association, as well as in more informal traditions of generalized trust, civic participation, and democracy.

The Dansih cooperative tradition played an important role in the transition. As will be discussed in the next chapter both the district-heating and wind turbine ownership consist in a mixed and complex scheme composed of private and cooperative, municipality and private farmers; these two elements coexist on Samsø and are probably part of the success of this pioneering transition.

3. Samsø the Energy Island

3.2 Introduction

The description of the Samsø energy system encompasses not only technical issues such as wind mills or heating districts, but a social-energy complex embedded in the island's everyday life. In 1997 the Energy and Environment Minister Svend Auken held a competition to find the Danish self-sufficient island. (Jørgensen, 2007) The idea behind this competition was to show the feasibility of the use of available technology to build a self-sustained island. Why an island? The reason is that it is easy to measure because of its nature. The Municipality, the Farmers' Union and the Business Council all applied for the competition, and they won it. The point was to achieve complete independence from fossil fuel in ten years using available technology; this goal was reached already in 2003 (Jørgensen, 2007). The Samsø Energy Company was the NGO created to manage the initial stages of the project: they made a master plan in order to find out what resources were available and which system could be implemented and last but not least to inform the public about the energy agenda. They organized several open meetings in order to involve people in the project and explain to them the advantages of the transition to an RE based economy. Such meetings represented the main goal of the Company: it was not easy to convince farmers to invest money in RE and to inform people about RE. In this sense the Danish cooperative culture played a really important role in creating general agreement about the to-do list.(See chapter 2).

Samsø is the pioneer project that Svend Auken had in mind when he and his ministry released the "energy 21" plan. According to that plan, the proactive action of the Samsø Energy Company, first and the Samsø Energy Academy later, was focused on three

main sectors: Heating, Electricity and Transport. Let's see in more detail how this integrated system works.

3.3 Electricity

All the electricity produced on the island comes from renewable sources and the island is totally self-sufficient. The average consumption is about 29,000 MWh (105 TJ). (Jørgensen, 2007) The NRGi (earlier ARKE), the Danish national energy company, deals with the distribution of the electricity on Samsø: the island is connected with the national grid by sea cables from Jutland to a transformer station near Vadstrup, in the centre of the island.

3.3.1 Land-Based Wind Turbines

The master plan estimated a total production capacity of 11 (Jørgensen, 2007) MW in order to make Samsø self-sufficient.

The municipality voted a special dispensation in order to raise the height of the turbines from 70 meters to 77 meters. This meant that fewer, larger windmills could be erected across 3 clusters, resulting in 11 1 -MW of total power. The first turbine was erected and on-line in 2000. Now the 11 land-based wind turbines produce electricity equivalent to 100 percent of the island's own consumption. One land wind turbine produces enough electricity to power 600 households (Jørgensen, 2007). The energy so produced goes into the grid owned and managed by Danish consumers; when the wind doesn't blow, the island “borrows” electricity from the mainland.

3.3.2 The ownership scheme

To ease the implementation and secure broad public support, the energy island project also proposed, in conjunction with the National Wind Turbine Association, an ownership scheme which would give all island citizens the chance to invest in the forthcoming wind turbines. This scheme was adopted and implemented by the organization running the existing shareholders wind turbines, “Samsø Wind Energy”.

The association started in 1983 with two so-called “blacksmith wind turbines” and the pioneers from these first experiments later replaced these early models with larger, more efficient wind turbines. The ownership scheme was based on the idea of reserving shares for the general public. The owners of the wind turbine sites agreed to allocate the sites necessary to meet the general public demand for shares. At the same time, these landowners and future wind turbine owners signed an agreement to establish a fund to further other forms of renewable energy.

In 2009 about 450 shareholders owned 2 of the eleven turbines; the rest are owned by local farmers. The 2 “blacksmith wind turbines” don't exist anymore but, in their place, 10 household windmills provided in 2009 669 MWh electricity to the net . These small-scale turbines must be considered a private investment so are not to be included in the previous open share scheme.

3.3.3 The economic outlook

Each wind turbine costs about 6 million DKK (about 800,000 EUR) including the grid connection and the foundation. The payback period could be a controversial issue because of the discount rate we choose. I have calculated the Net Present Value with a 3.5 discount rate, the normal discount rate used for business calculations. Here below you can find the not discounted cash flow.

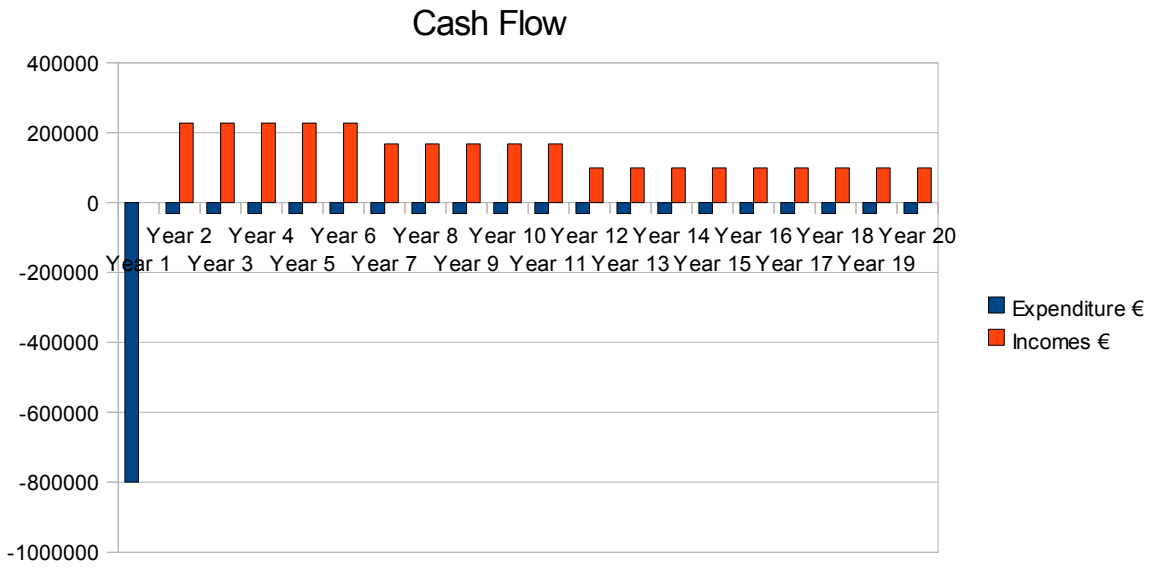

Figure 3.1

The blue bars represent the expenditure year by year; in the first year we can see the initial cost and in the following years the yearly maintenance and running costs[14].

The costs are calculated by multiplying the average production by the fee. The electricity production prices are regulated by a ten year fixed price agreement which is the same for all the 11 land-based turbines.

The agreement secures a price of 0.43 DKK per KW/h produced (about 6 € cents) for ten years. Moreover, for the first 12,000 full load running hours[15] (circa 5 years) of the ten year period, we must add a 0.17 DKK extra charge : for this period the secured price was 0.60 DKK per KW/h (about 8 € cents). Now the ten year period is almost over and the shareholders are bargaining an open market price with the NRGi which should be around 0.35 – 0.40 DKK.

In 2009 the 11 turbines produced combined energy of 26,943 MWh, that means 2,450 MWh a piece.

If we consider that each turbine has 1 MW power and in one year there are about 8766 hours then we can assume a full load energy of 8,766 MWh a piece(1 x 8,766).

[14] http://www.samsovind.dk/Files/Generalforsamlinger/regnskab%20for%202008.pdf

[15] 12,000 x 1 MW = 12,000 MWh
actual is about 2300 Mwh
12,000/2,300 = 5,2 years

Nevertheless the real production is 2,450 MWh so a land-based turbine works at about 26% of its full capacity.

Here below you can find the discounted cash flow; this is useful for cumulative cash flow calculation in order to graph the payback time.

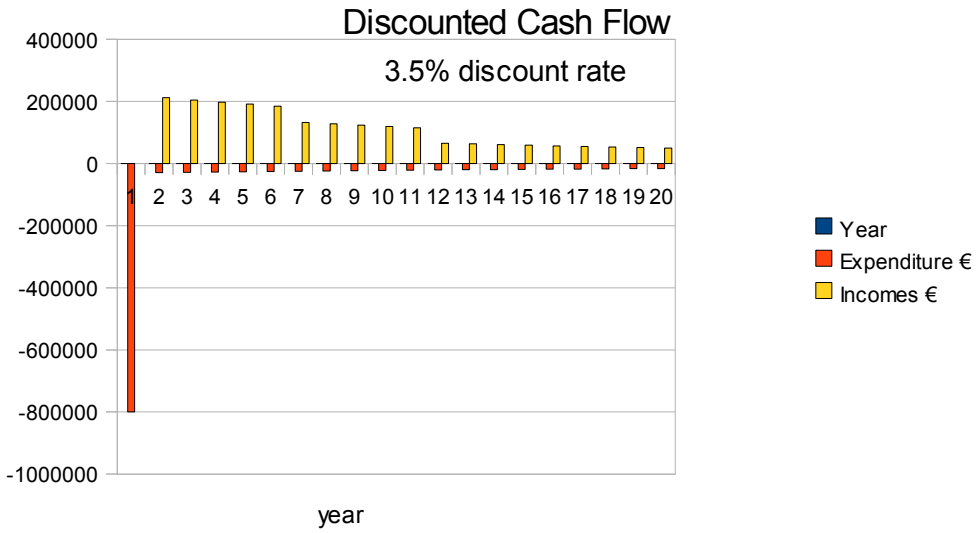

Figure 3.2

This graph is different from the previous one: the worth of future expenditures and future incomes is not the same as the current one. 1000 € in 2 years doesn't have the same value as 1000€ today. Finally we have the Payback time.

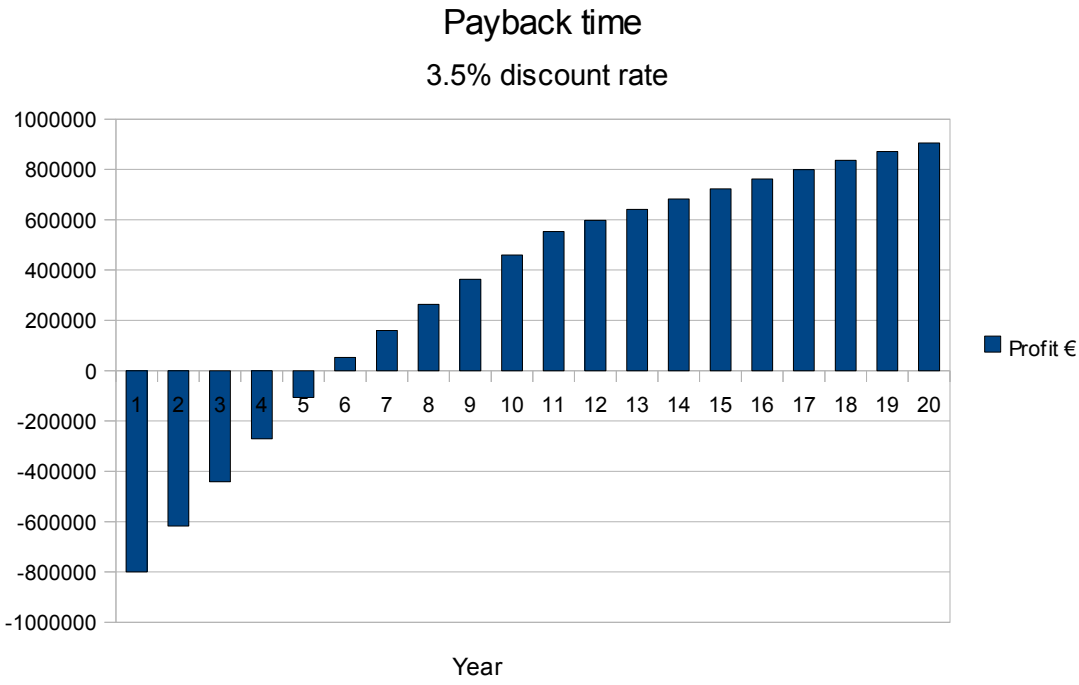

Figure 3.3

The payback time is in the 6th year.

The guaranteed lifespan of a wind turbine is 20 years, but the gears, the engine and other rotating parts have to be upgraded every ten years.

Is also likely true that the costs could raise more than this model foresees with the obsolescence of the mechanical part, but the 20 years lifespan is not elapsed yet so we don't know.

I also calculated the investment payback time using the Danish social discount rate, 6%. See how it changes.

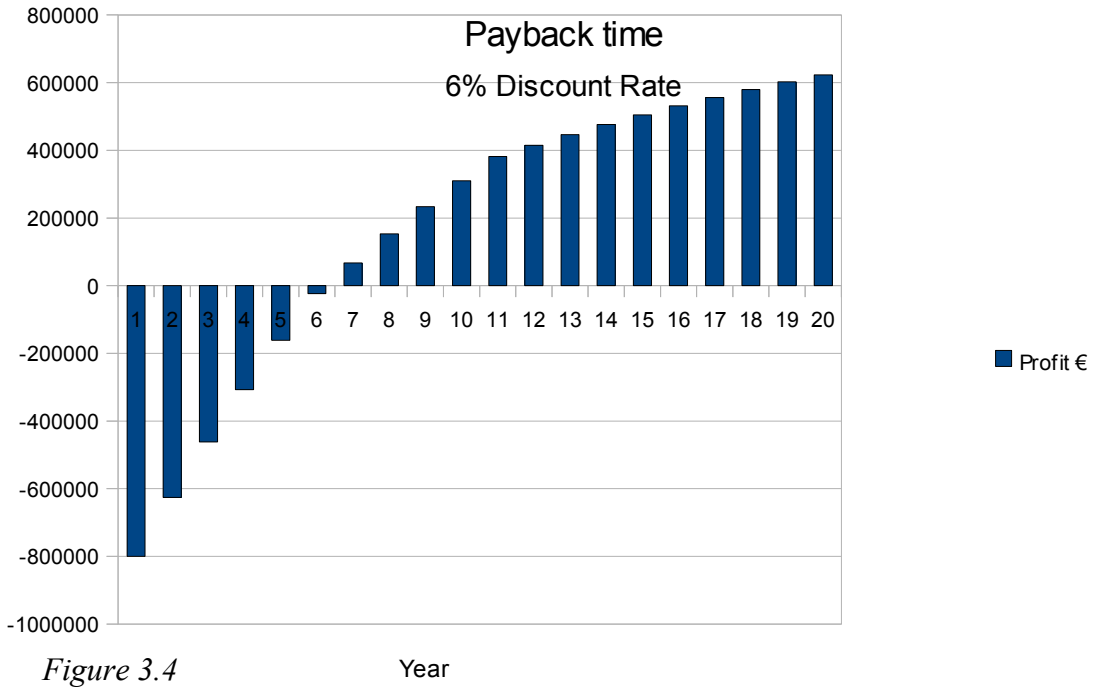

Figure 3.4

In this case the payback year is the 7th.

3.3.4 Offshore Wind Turbines

In 1998 RE cars (and ferryboats) were not available on the market. As I said in the introduction to this chapter, the three main sectors the competition focused on were heating, transportation and energy. The main goal was to implement these 3 sectors using market available technologies. The RE-island master plan therefore suggested that this energy supply could be offset with offshore wind turbines. The Plan counted 15 wind turbines rated at 1.5 MW (a turbine size available in 1998) in order to compensate the transport sector CO_2 emissions. The Samsø Commercial Council, Samsø Farmers' Association, Samsø Municipality, Samsø Energy and Environment Office joined forces and founded the Samsø Offshore Wind Co. These main local actors founded the Company to ensure the project concessions to Samsø and to allow local partners to invest in ownership of the offshore wind turbines. The former Samsø Energy Company was the bedrock of the Samsø Offshore Wind Co. The Danish Energy Authority funded the preliminary sea-floor studies and an operative office was established to deal with the

tenders. In the same years wind turbine technology evolved dramatically, so that by 2002 2.3 MW wind turbines were available. In that period these turbines were the largest in the world. The Samsø Offshore Wind Co, decided for this solution and 10 2.3 MW turbines were erected 3.5 km south of Samsø along the Paludan Flak reef. They have been placed in a single straight row running north-south.

In 2003 with the installation of the offshore wind turbine Samsø became the first renewable energy island: not only can they produce their own energy, but they also sell the surplus to the National Energy Company and the energy produced by the offshore wind turbines offsets energy consumption in the transport sector.

3.3.5 The Ownership scheme

The offshore turbines ownership scheme is a little bit more complex than the land-based one and this complexity will affect the discount rate choice in the following paragraph.

The Municipality of Samsø funded 5 of the turbines, 3 are owned by big private investors and there are 2 cooperative ones owned by the "Paludan Flak Ltd" (local shareholders) and the "Difko I" (mixed local and danish shareholders).

3.3.6 The Economic Outlook

The production cost per kWh is lower for larger wind turbines but the initial cost of placement is much higher than for land-based wind turbines. The cost per piece is 24 million DKK (3.2 millions EUR, approximately 4 times land windmill). Let's see the cost in another way: the land-based turbines cost about 6 million DKK (800,000 EUR) per installed MW. The offshore turbines cost 10.4 million DKK (1,4 million EUR) per installed MW. On the other hand offshore turbines have 2 unquestionable advantages: the impact on the landscape is lower and, most important, the wind conditions on the sea are much better. The land-based turbines have generated 2,300 MWh per installed MW capacity, while the offshore turbines produced 3,500 Mwh per installed MW

capacity. In 2009 the average production was 8,100 MWh per piece, therefore a combined production of 81,050[16].

Let's now see the payback time using first the 3.5% discount rate and then 6% as seen before. In this case the raw figures are referenced with a research by Tanja Groth. [17]

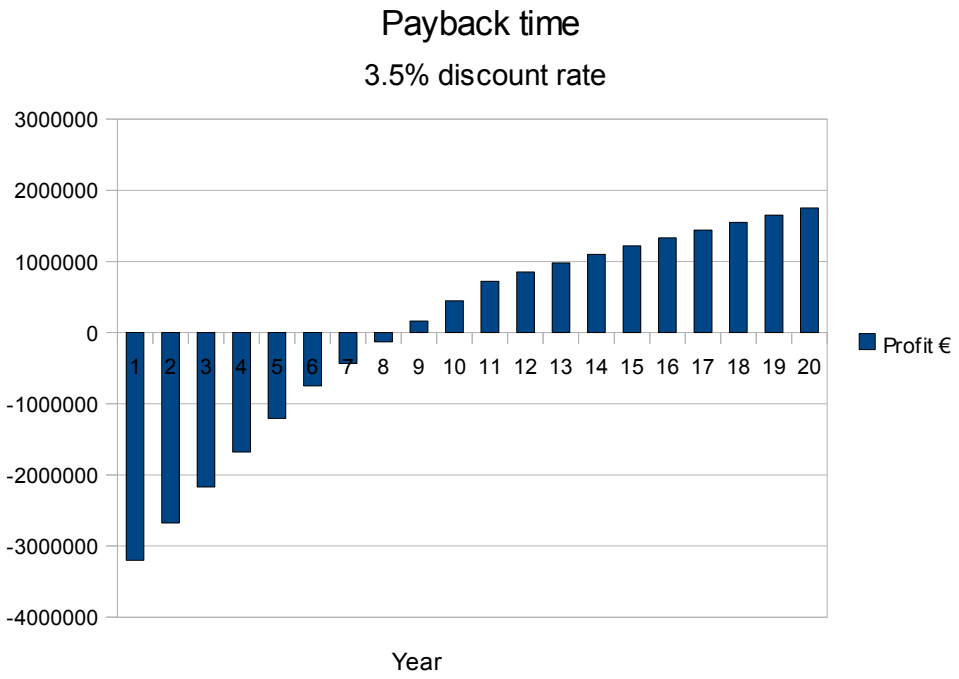

Figure 3.5

The payback time is the 9th year.

[16] Figures provided by Samsø Offshore Wind Co.
[17] http://seacourse.dk/wiki/NPV

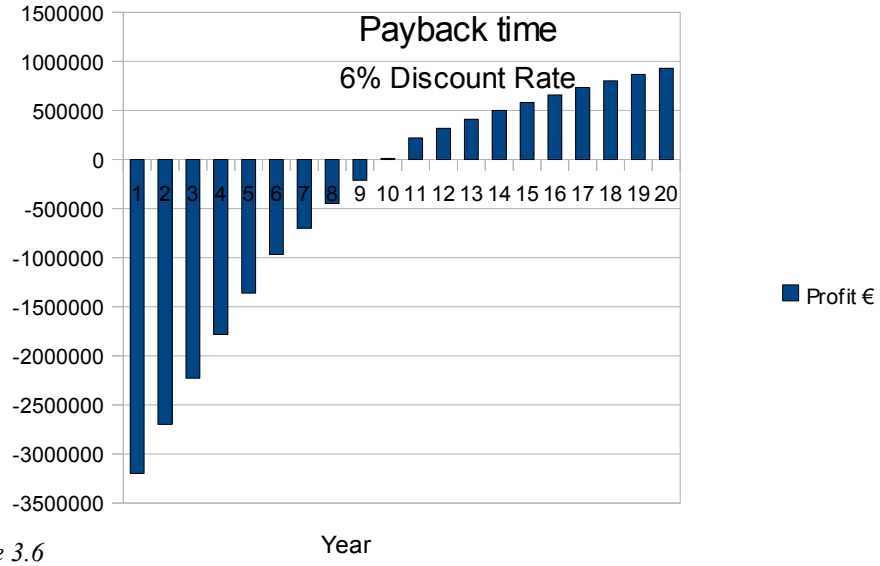

Figure 3.6

With the 6% social discount rate, the payback time is the 11th year.

3.3.7 PV Cells

Unlike other countries, Denmark developed no public support scheme for the implementation of PV systems, so that the incentives system for PV cells is quite inadequate. The political framework nowadays prefers to provide incentives for big heating plants that burn pellet and wood chips, as on Samsø. Anyway the price of PV is going down slightly (10% less every year) and it can be economically worthwhile for people who consume large amounts of energy; for example PV are used as an alternative investment to a bank account. For example households which use heat pumps need a lot of energy and they invest money on the PV cells. Nevertheless the payback time is about 18 years on 20-25 years lifespan!

3.3.8 Saving Electricity

Converting electrically heated houses to other heating systems has been the primary focus in the RE island project's efforts to save electricity. These efforts aimed to reduce electricity consumption by replacing old electric heaters. The Danish state subsidized conversion to other heating systems. Most of the subsidies have been used to convert

from electricity to biomass, solar energy or a combination of these. Moreover national and local campaigns promoted other electricity saving options, like low energy, long-lasting bulbs, energy efficient appliances, and improving consumption habits. A national allocation of funds to save electricity made many of these campaigns possible, and the RE-island projects used the national guidelines set up for these funds in their efforts to reach the electricity conservation targets.

3.4 Heating

The island of Samsø is composed of 22 small villages homogeneously spread over the island. 70% of the heating is supplied by 4 heating cores called heating districts.

The heating district idea is not a new development in Danish politics. The Danish Heating Association has existed since 1957 and it was founded with the aim of organising Danish district heating companies; facilitate cooperation between the companies and lobby for their interests with the authorities and other organisations.

The oldest heating district on the Island is in Tranebjerg (the main village) and it was built in 1994.

So what's new? The Samsø heating districts are special because they burn straw and wood chips and not oil. It has been calculated that 1 l ???of diesel is equivalent to 3 kg of straw; so as Søren Hermansen said, during the first visits I went on to one of these districts, looking at the huge straw warehouse:

"There's a lot of oil down here!"

It is quite easy to sign up your own house to the district heating system before the system is constructed. The consumer pays 80 DDK, (10 EUR) as a registration fee when she/he signs the contract.

At the beginning of the project, the municipal council opted for voluntary arrangements for all existing houses. They were free to accept or decline to connect their own plant to the centralized system. Only new buildings built in areas with existing or planned district heating are compelled to connect to the system.

The municipal council on Samsø guaranteed the mortgage loans that finance the district heating stations. Straw and wood chip are produced and provided to heating stations by local farmers.

Let's focus a little bit more on the 4 districts.

3.4.1Tranebjerg

As disclosed previously the T. district heating station was built in 1994, therefore a few years before the Samsø green transition. It consists of a straw-fired boiler which provides heat to 400 costumers, 90% of the heating in Tranbjerg. The station is owned by the NRGi (formerly ARKE) and the initial investment was 26.3 mill DKK (3.4 mill EUR). This project didn't get any subsidies from the Government.

In 1992, a few active citizens in T. asked ARKE to re-establish a derelict district heating system. These citizens took part in the project until the new district heating station opened in 1994.

3.4.2 Nordby-Mårup

It's is probably the most interesting heating district on the island because it was designed to combine two different renewable sources: wood chip and sun.

We could briefly describe this district as follows: a main building which contains a wood chip burner and a warehouse, on the field just in front of that building are placed several solar heating panels. The array of solar panels works as a supplementary source of heat especially during summer. The energy company NRGi owns and operates the plant. According to the original master plan, this plant was to be the last to be built. But a local group of citizens managed to accelerate the project and finish it five years before the final deadline.

History

1998

After a citizens meeting, a local work group asks the energy company NRGi to design a district heating plant. Meanwhile the work group walks from door to

door to talk to the potential consumers, and the group is highly active in all respects.

1999

NRGi submits the first project proposal end of November 1999.

2000

After negotiations — with the national authority (the Danish Energy Agency, da: Energistyrelsen), the municipality, and the Samso Energy Company — the energy company NRGi submits its second revised proposal in October 2000.

2001

The municipality pre-approves the proposal, then the Danish Energy Agency approves. The municipality gives its final approval under the following conditions: that all municipal buildings connect to the distribution net, that at least 70% of all houses with their own central heating agree to connect, that all new buildings are obliged to connect, and that the owner tries to utilize local energy crops such as elephant grass. Start-up of wood chip boiler in November.

2002

Start-up of solar array in April.

3.4.3 Onsbjerg

The district heating station is located in the south western part of Onsbjerg and supplies about 80 houses and institutions with the heat from straw. The plant opened in 2003 and the heat is produced by burning shredded straw delivered by Kremmer Jensen ApS, the owners of the plant. The initial costs were about 8.54 milliond DKK (1.1 million EUR), paid in part with a grant of 3 million DKK (0.4 million EUR) from the Danish Energy Authority.

The board of the Onsbjerg district heating system consists of five members from "Kremmer Jensen ApS", two members selected by the consumers and one island

council member. Changes in the heating prices have to be approved by the municipal council. At the moment the price for district heating in Onsbjerg is the lowest on the island, on the same level as the price in Ballen/Brundby.

Originally, Onsbjerg was planned to be one of seven villages supplied by district heat from surplus heat from the ferries docking in Kolby Kås and Saelvig on the west coast of Samsø. 37% of the heat demand was envisaged covered by the ferries, while the remaining heat demand was envisaged covered by the ferries, while the remaining heat demand was to be delivered by biogas from a thermophile system fed with biological trash and wood chips. This project was dropped in 2000 because the 52 million DKK (6.8 million EUR) in capital cost could be not raised.

Instead a group consisting of citizens from Onsbjerg, a local enterpreneur and "Samsø Energy Company" decided to work on a smaller district heating station for the village based on a straw-fired boiler. In 2002 the group was ready to sign the contracts with consumers.

3.4.4 Ballen-Brundby

This heating district is located between Brundby and Ballen and it was opened in 2004. The heat is produced by burning shredded straw. The owners of the district are the citizens of these 2 villages (the consumers) and they are associated in a limited liability company. The capital costs were 16.2 million DKK (2.1 million EUR). The project received a 2.5 mill DKK (0.3 mill EUR) grant from the Danish Energy Authority. This was the last grant given in Denmark to fund this kind of project; national subsidies funding stopped in 2001. 232 houses and institutions are connected with this system and this number will probably increase to 290 in the coming years.

Originally the district should supply energy to Ørby and Parmelille as well. In 1998 a working group of local people was selected during an open meeting and in 1999 the group asked NRGI to establish a heating district for the four villages. Calculations soon showed that this was not possible because Ørby and Parmelille are too far away so the loss of heating during transfer would be really high. After a few years of bargaining between the stubborn group of citizens and the NRGi finally struck a deal. The NRGi

gave up trying to find an acceptable economic model which included only the villages of Ballen and Brundby. Nowadays the consumers enjoy heat prices similar to those in Onsbjerg the cheapest on the island; 1.800 DKK (234 EUR) a year for the fixed annual payment and about 500 DKK (65 EUR) per MWh, it has based on a cooperative model. In 2004 "Brundby-Ballen District Heating Cooperative" initiated construction and the district heating plant opened in 2005. The board of the cooperative association includes 6 district heat consumers elected at an annual general meeting, and one committee member elected by the municipal council. The heating price is approved by the municipal council, and a local administrative office is responsible for daily administration. The plant itself is operated by Kremmer Jensen ApS. This company has previous experience from the operation of their private district heating plant in Onsbjerg. Both plants use the same type of boiler. The committee finds this solution both practical and most likely cheaper than hiring part-time staff.

3.4.5 Besser and other villages

Finally, an attempt has been made to establish the last of the four planned district heating system sfor the villages Besser, Langemark, Torup and Østerby, but the attempt has not been successful. Some of the citizens were not interested in the project. Others had made private investments in biomass installations and other renewable energy systems..

3.4.6 Solar Panels

70% of heating supply on the island is provided by district heating and 30% is provided by household installations, mainly solar panels, wood burners, straw burners, pellet burners, and heat pumps. Moreover they combine different technologies for example solar panels for the summertime and wood burners for the wintertime. Ten years ago they used to have financial support from the government for solar panel installation to produce hot water and heating. So there are now around 250 plants installed on the island. In that period 25% of the entire cost was financed by the

government so that the payback time was around 10-12 years compared to an average lifespan of 20-25 years. As a result a lot of people invested in solar systems and still do. Anyway people who invest in solar systems or PV often have the money to finance the entire project. Otherwise, if you have to ask for a loan, the company that installs the plants often have their own financing programs for the customers and the interest rate is often better than one you can get from a bank.

3.5 The Samsø Energy Academy

The Academy is the latest stage in a long process which started in 1997 with the Samsø Energy and Environment Office. This office was founded with the explicit aim of promoting RE and counseling citizens who wanted to install their own RE.The Samsø Energy Company was founded in 1998 with the main objective of carrying out the master plan, especially wind turbines and district heating. These two organizations organized campaigns and open meetings, from the very start of the RE-island project. This meant that joint meetings often gave both a technical and a more general version of a specific project proposal. This helped ensure that the island citizens could participate actively in the preliminary process entailed by new RE-island projects, for example joining citizens' groups and working with district heating projects.

By the end of 2005, both the heating district and wind turbines were up and running, not to mention a large number of private RE projects. The goal of 100% self-sufficiency with RE was achieved and in this same period the RE-island organizations were reorganized.

The Samsø Energy Company was shut down in 2005, as the larger heating and wind power projects were implemented. The two employees continued their work for the RE-island project with the realization of the "Samsø Energy Academy". In the same period the Samsø Energy Agency was also founded.. This entity is financed partly with EU funds. The rest of the Agency funding comes from the Danish Enterprise and Construction Authority and the Samsø Offshore Wind. Co. The main aim of the Agency is consultancy about energy island project.

The “Samsø Energy Academy” was ready for occupancy in fall 2006. It now houses the RE organizations Samsø Energy Agency, Energy Service Denmark and the Samsø Energy and Environment Office, the latter still being an active participant in local RE arrangements.

Academy funding is much more complex. It's an NGO as so it needs to rely on different donors. They have funds from the EU, national government, regional government and the municipality. Building has be financed by Samsø Kommune, the EU, Realdania, Midt, Obbekjerfunden, Rheinzink and Jyske Bank. The Academy building is conceived as a Viking longhouse and the whole structure is energy self-sufficient. The energy is produced by PV panels connected to the grid, the air system is regulated by a computer that opens and closes windows located on the top of roof, so no conditioning system. The structure including floors, pylons and beams is made of prefabricated wooden sections. The insulation system is newspapers and even the toilet flush is sustainable: it reuses rain water! There are no rooms in the Academy: it consists of a big open space with few sliding doors and two mezzanines. There are three main distinct areas: the kitchen, the office and the meeting area.

The Academy promotes RE awareness during its lectures, workshops, conferences and exhibitions. This service costs 6000 DKK a day and the customers, rather the visitors, are a varied bunch: school groups, , associations, companies, private individuals etc.

Meals prepared by Søren Hermansen's mother are noy included in the entrance fee.

The Energy Academy also operates a school service which prepares educational material for groups from all over the world. It is hard to define their way of teaching be it by way of lectures, open meetings, group games, interviews or plays directed by an educator. In the first part of the “lecture” the participants watch a video about the Energy Island. Then the educator or the director, Søren Hermansen, makes his speech which we could easily define as a real play. The scholars or students are normally enthralled by their way of talking about energy, people and local involvement. After this the participants are divided into groups and they have to build a wind mill with pipe-cleaners. Each group nominates its own speaker who has to present and to “sell” their own project to the other participants. Then students are asked to introduce

themselves to the class, or to the other participants Each person is called on to introduce himself/herself when hit by a shot from an air gun: when you feel the wind in your hair and your clothes it means that it is your turn. The “lecture” ends with question time. The participants can write their question on big sheets placed on the ground and the director or the educator answer orally. Then all the sheets are posted up on the wall.

I decided to mention this unusual way of teaching because this is one of the main activities of the Academy and it says more than many pages about how they see things and how they look upon the Energy Island and their future.

Under the Academy’s umbrella there are many companies. In the office, besides a director, an educator, a project manager and an accountant there are representatives of some small companies that deal with house efficiency, PV panels, solar panels, biogas and they use the Academy as a resonance chamber for their networking.

The Academy isn't a school, a university or a consulting company; it's all three at the same time. At present they are starting a new project called Academy 2.0 and they are now briefing and brain storming to focus on the future of the Academy. It's a thought process that involves leadership geometries and their own peculiar know-how. In my opinion the main crux is to decide whether to became an educational institution, a private business company or both and in this case which part must prevail? What's their role in the future of the island? And what do people expect from them? They still don't know but the survey (Which survey???) will help us and maybe them to clarify some of these points or at least one: what do people expect form the future of the island. For its part the Academy is now promoting and counseling island citizens about the new project, sea weed and cradle to cradle. During my stay I attended an open meeting about seaweed, I think that experience deserves a few words. Around 50 people attended this event at the Academy which on these occasions turns into a Greek Academy or into a Forum, in other words the meeting point for all the citizens of the island. During the first part we tasted some algae-based dishes and a Biologist showed us a sample of the most common seaweeds present on the island's beaches. Afterwards two researchers from Aarhus University lectured on Biology : prokaryotic cells, eukaryotic cells, mitosis and all detailed information about how they reproduce, eat and live. The speech

was supported by a slide show of pictures taken with a microscope. Then one of the most famous Danish algae researchers who lives on the island, defended??? his lecture describing in minute detail all the local species. The last intervention was by a guy who has fed exclusively on seaweed for a long time , and he explained how to cook all the different kinds of seaweed from all over the world.

4. Survey analysis

This chapter introduces the results of a survey carried out during my period on the island. The survey consists of eight questions (see Appendix I) divided into two conceptual sections: the first three questions are past-oriented and focus on people participation in the decision-making process, the last five aim at investigating people's expectations for the future as regards demographics, the economy and RE. The energy island process is now a reality. What is of utmost interest now is to face future obstacles and to understand if an alternative economy based on alternative energy can still be part of the solution of future problems, so that's why my survey, and let's say my entire research is oriented towards the future.

The survey was published in the Samsø Posten over a few days and people were asked to fill in the form they found in the newspaper and to drop it in a mail box situated in one of the two supermarkets on the island called Netto. Several reasons led me to choose this unusual way of carrying out a survey. The first reason was how the island's population is distributed: there are 22 villages spread over the island, autonomous but interconnected with a main town where most social and economic activities take place, Tranenbjerg. The only place on Tranenbjerg where people gather from all over the island is Netto. The second reason is that I wouldn't have felt comfortable conducting a traditional survey, asking people in the middle of the street to fill in a form, bacause this is not at all in the spirit of island life. Moreover, considering that many inhabitants are farmers, it would be complicated to chase trucks in the countryside asking them to fill in a form. So I tried to figure out the best way to reach as many people as possible and not seem too intrusive. The solution was the Samsø Posten. The Danes are among the best newspaper readers (along with the Norwegians) in Europe and everybody keeps abreast of what is happening on the island by reading the Posten. The result was that 27 people responded to my survey. This is not a great sample and probably these people

are biased because the respondents are RE-oriented but I think it's worth revealing the outcome anyway.

4.1 Outcome

a) Were you involved in the decision-making processes as regards Samsø's transformation into a sustainable energy island? (Hereinafter SEI)

2 Not at all

3 Partly

4 To a greater extent

5 Fully

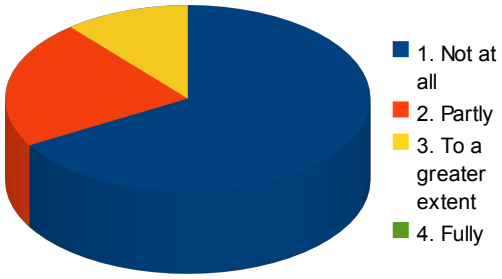

Figure 4.1

33% of respondents declare that they were involved in the decision-making process, partly or to a greater extent. This first outcome could be quite controversial if we consider that a proportion of the inhabitants changed during the last 13 years (See chapter 2) and the island has seen frequent migrations. However this kind of project is unlikely to involve most of the population, because of logistical obstacles, disinterest, lack of confidence, laziness, etc... Even if 66% of the inhabitants declare they were not involved it doesn't mean that they hadn't been informed about the project.

b) Are you interested in participating in the decision-making process concerning future sustainable energy projects?

Yes

No

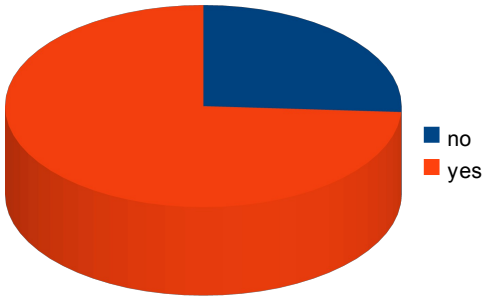

Figure 4.2

Here 74% declare that they want to be involved in decision-making concerning the future energy projects. It could be useful to remark that these are many more than those who declared they were involved in the past. One interpretation is that, given the success of the 1997-2003 transition, people trust RE more.

c) Are there aspects of SEI you disagree with?

Yes No

(If yes; please choose amongst the following factors)

3) *land-based windmills*

4) off-shore windmills

5) solar cells/the solar cells plant in the Northern part of the island

6) district heating

7) finance solutions

8) ownership

9) waste treatment

10) the whole idea about alternative energies

11) none of the above

12) other (specify) _____

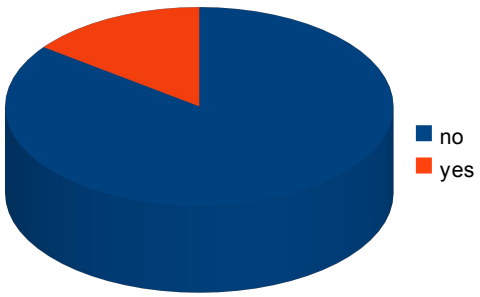

Figure 4.3

This is one of the most interesting outcomes. 85% declare that there are no aspects of Samsø Energy Island that they disagree with. This is a first important result that probably proves that the objections (See NIMBYism in the first Chapter) to the modification of the physical, social and cultural milieu have been overcome. In other words people generally accept these new elements which are by now intrinsic to the island's life and culture; Samsø is no longer the vacation island but the Energy Island. It should be also remarked that the response is biased because of the small size of the sample.

d) If you could decide; what should a new sustainable energy project deal with? (Choose one or more answers)

- *Transport*
- *Biogas*
- *Fuel*
- *Solar thermal collector*
- *Solar cells*
- *Additional windmills*
- *Waste treatment*
- *Other (specify)*_____

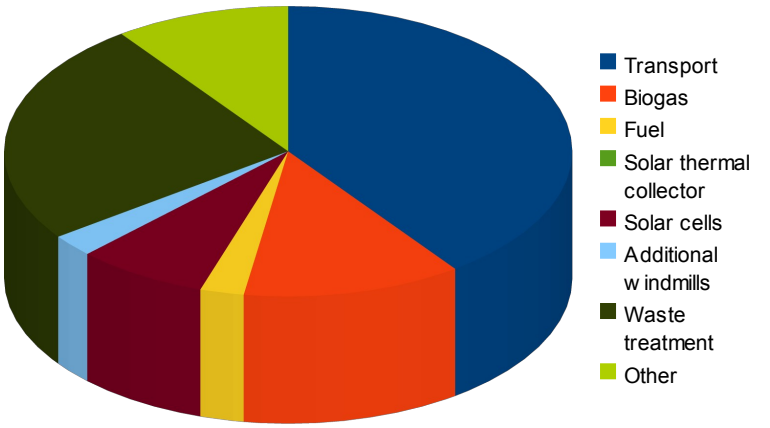

Figure 4.4

Question D is the first one about the future. Transport biogas, and waste treatment account for 77.5% of the preferences. The Transport sector is the only goal that is not implemented directly by the 1997-2003 project. The Svend Auken competition, as discussed in chapter 3, focused on three main points: electricity, heating and transport. In that period cost-effective alternatives to the traditional internal combustion engine, such as electric or hybrid cars, were not readily available. As a result the off-shore turbine project was aimed at offsetting $C0_2$ emissions from transport. Therefore transport remains, in a certain way, an unsolved problem which can now be faced and biogases may be a part of the solution. On the other hand , surprisingly, a waste

treatment plan on the island still doesn't exist: solid waste is dumped and organic waste disposal is entrusted to the individual .

People have the perception of what should be improved and they are aware of the limits of the project.

e) With regard to energy, in which direction do you expect Samsø's future development to go?

- *No further development as regards energy-projects*
- *An increase in wind-energy*
- *An increase in energy produced by solar cells*
- *An increase in energy produced by solar thermal collectors*
- *An increase in energy produced by biomass*
- *A return to traditional energy-sources*
- Other (specify)_____

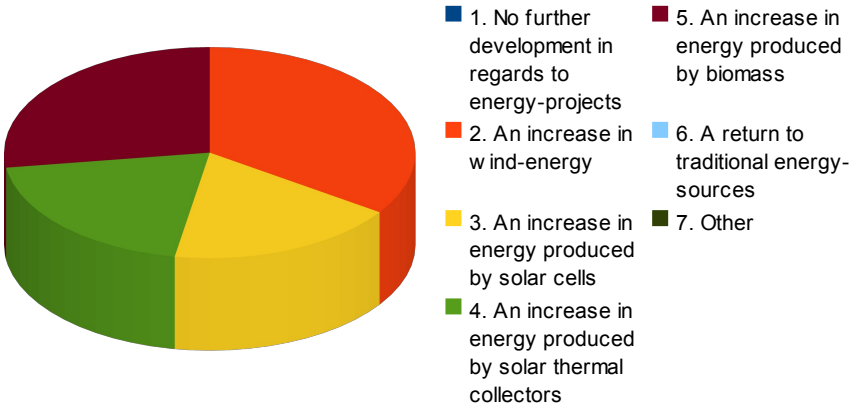

Figure 4.5

It's quite interesting that nobody ticked on answers number one and number six. It could mean two things: that there are no more doubts about the use of alternative energy sources, or that the transition process is by now up and running and it's too hard to stop.

But in this specific case I would rather choose the first option. The other relevant result is that 34.5% of people expect an increase in wind-energy. To this end Samsø and Aarhus municipalities are planning to install a new offshore park in the sea between the city and the island.

f) How do you expect the economy of the island to develop?

(vii) An increase in the tourist sector

(viii) An increase in the agricultural sector

(ix) The Energy-academy will contribute to the economy

(x) An increase in the green economy

(xi) An economic drawback

(xii) An increase in a sector not mentioned (specify) _____

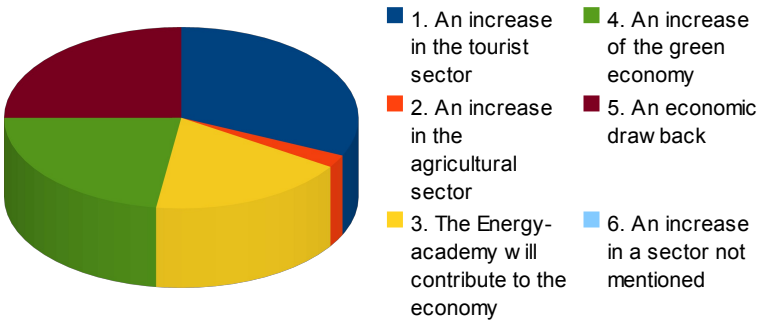

Figure 4.6

40% of the preferences are linked to the energy island project, the green economy and the Energy Academy. Despite the fact that the job market didn't change radically after the green transition, the respondents are quite hopeful about alternative energy and the Academy. The tourist sector will probably maintain its importance in the island economy. Moreover this is not completely disconnected with the energy island project because the number of energy tourists interested in environmental issues is increasing and I'm not referring only to the institutional visitors to the Academy. The global economic recession brings a note of mistrust also to Samsø as is shown by 25% of people who forecast an economic downturn.

g) Do you think that the current RE development process:

1. *will make the island more attractive for economic activities*
2. *will hinder other economic opportunities*
3. *will cause a decline in the island economy*
4. *other (specify)* _____

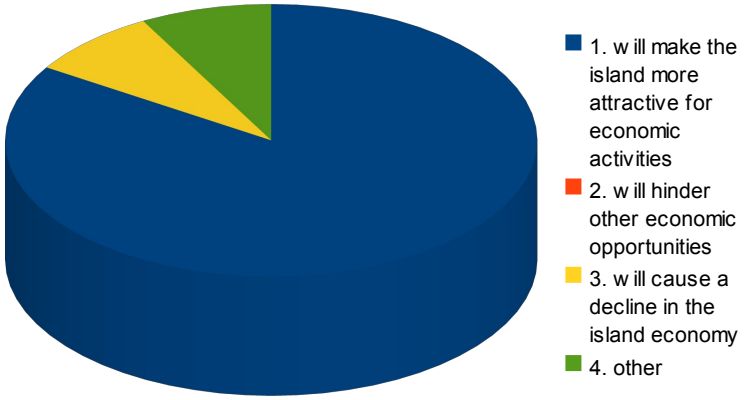

Figure 4.7

78% of the respondents reveal a marked preference for the first answer. The common perception is that a transition from a traditional economy to an RE-based economy will bring new opportunities and new economic activities to the island.

h) Concerning the population of the island

1. *The population will increase*
2. *The population will decrease*
3. *The population will remain stable*
4. *Life expectancy rate increase*
5. *The island will be more attractive for young people*
6. *Other (specify)*_____

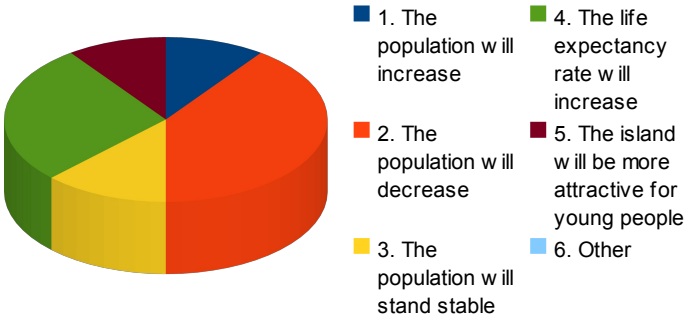

Figure 4.8

The last question is about the demographic perception of the future. This is one of the biggest and most controversial issues now being debated on the island. The 1997-2003 transition was designed by the key actors and probably perceived by the population as a "New Deal" for Samsø , and in many ways it was. I think that this project also aimed at attracting young people from the rest of Denmark; obviously there is no future without the young generation. Nevertheless the population is steadily aging and this is a big concern for the future of the island.

4.2 Conclusions

Even though the responses come from a small sample and the respondents are probably biased, the outcome of this survey is generally RE-oriented. People declare that they still trust RE and they expect more RE on the island. It seems that they expect the future to be closely connected with RE development and this is true in many areas including energy tourism and institutional visitors to the Academy. They are really aware of the project's limits and they agree on future improvements such as waste treatment. This proves the effectiveness of the communication strategy during the 1997-2003 project. It is also likely, considering the success of the project, that more people will be involved in a future RE project. On the other hand they have expressed some concerns about the demographic future of the island. Apparently this is not connected with RE but an institution such as the Academy could attract young people.

Appendix I: Questionnaire

a) Var du involveret i beslutningsprocesserne omkring Samsøs transformation til Vedvarende Energi Ø?

- ☐ Overhovedet ikke
- ☐ delvist
- ☐ en god del
- ☐ fuldstændigt

b) Er du interesseret i at deltage i beslutningsprocesserne omkring fremtidige vedvarende energi projekter

- ☐ ja
- ☐ nej

c) Er der noget i det nuværende VEØ projekt du ikke bryder dig om?

- ☐ ja
- ☐ nej

(Hvis ja; vælg et eller flere svar)

- ☐ de landbaserede vindmøller
- ☐ hav vindmøllerne
- ☐ solfanger/flis anlægget på nordøen
- ☐ de halmfyrede fjernvarme anlæg
- ☐ finansieringen
- ☐ ejerforholdene

- ☐ processen med de mange møder og folkelig deltagelse
- ☐ hele ideen omkring vedvarende energi
- ☐ ingen af ovenstående
- ☐ andet (specificer) _____

d) Hvis du kunne bestemme, hvad skulle et nyt vedvarende energi projekt handle om? (Vælg et svar)

- ☐ transport
- ☐ biogas
- ☐ brændsel celler - brint
- ☐ solfangere
- ☐ solceller
- ☐ flere vindmøller
- ☐ affaldsbehandling
- ☐ andet (specificer) _____

e) Hvordan forventer du øens fremtidige energiudvikling vil se ud? (Vælg et eller flere svar)

- ☐ et stop i udviklingen af energiprojekter
- ☐ en stigning i vindmølle energi
- ☐ en stigning i energi produceret af celler
- ☐ en stigning i energi produceret af solfangere
- ☐ en stigning af energi produceret fra biomasse
- ☐ en tilbagevenden til traditionelle energiformer
- ☐ andet (specificer) _____

f) Hvordan forventer du øens fremtidige økonomiske udvikling kommer til at se ud? (Vælg et svar)

- ☐ en stigning i turistsektoren
- ☐ en stigning i landbrugssektoren
- ☐ Energiakademiet bidrager til at øens økonomi
- ☐ en stigning i den grønne økonomi
- ☐ en økonomisk tilbagegang
- ☐ en stigning i en anden sektor (specificer)

_____

g) Mener du, at VEØ projektet vil: (Vælg et eller flere svar)

- ☐ gøre øen mere attraktiv for økonomiske investeringer
- ☐ hindre den økonomiske udvikling
- ☐ sinke den økonomiske udvikling
- ☐ andet (specificer) _____

h) Omkring øens befolkningstal: (Vælg et eller flere svar)

- ☐ øens befolkningstal vil stige
- ☐ øens befolkningstal vil falde
- ☐ øens befolkningstal vil være stabilt
- ☐ gennemsnitsalderen på øen vil stige
- ☐ øen bliver mere attraktiv for unge
- ☐ andet (specificer) _____

Appendix II: Results

a) Where you involved in the decision-making processes in regards to Samsø's transformation into a sustainable energy island? (Hereinafter SEI)

		%
1. Not at all	18	66,67
2. Partly	6	22,22
3. To a greater extent	3	11,11
4. Fully	0	0

b) Are you interested in participating in the decision-making process concerning future sustainable energy-projects?

		%
no	7	25,93
yes	20	74,07

c) Are there elements in regards to the SEI you disagree upon?

N.	%	
no	23	85,19
yes	4	14,81

c) (If yes; please choose amongst the following factors)

1. landbased windmills
2. off-shore windmills
3. solar cells/the solar cells plant in the Northern part of the island
4. district heating
5. finance solutions
6. ownership
7. waste treatment
8. the whole idea about alternative energies
9. none of the above
10. other (specify) _____

d) If you could decide; what should a new sustainable energy project concern? (Choose one or more answer)

		%
Transport	16	40
Biogas	5	12,5
Fuel	1	2,5
Solar thermal collector	0	0
Solar cells	3	7,5
Additional windmills	1	2,5
Waste treatment	10	25
Other	4	10

e) In regards to energy, in which direction do you expect Samsø's future development will go?

		%
1. No further development in regards to energy-projects	0	0
2. An increase in wind-energy	19	34,55
3. An increase in energy produced by solar cells	10	18,18
4. An increase in energy produced by solar thermal collectors	11	20
5. An increase in energy produced by biomass	15	27,27
6. A return to traditional energy-sources	0	0
7. Other	0	0

f) How do you expect the future economic condition of the island will be?

		%
1. An increase in the tourist sector	14	31,82
2. An increase in the agricultural sector	1	2,27
3. The Energy-academy will contribute to the economy	8	18,18
4. An increase of the green economy	10	22,73
5. An economic drawback	11	25
6. An increase in a sector not mentioned	0	0

g) Do you think that the current RE development process:

		%
1. will make the island more attractive for economic activities	21	77,78
2. will hinder other economic opportunities	0	0
3. will cause a decline in the island economy	2	7,41
4. other	2	7,41

h) Concerning the population of the island

		%
1. The population will increase	4	10
2. The population will decrease	16	40
3. The population will stand stable	5	12,5
4. The life expectancy rate will increase	11	27,5
5. The island will be more attractive for young people	4	10
6. Other	0	0

5. Conclusions

"The past is the toolbox to fix the future"

S. Hermansen

This last chapter will describe how the NIMBY syndrome has been overcome on Samsø. This aspect is probably the most interesting point to examine in the entire transition process that led to the Energy Island.

It's worthwhile to note some environment-friendly initiatives that had been taken before the 1997-2003 transition: small household windmills had already been installed in the eighties, some farms had switched to organic production in the late seventies and a waste-free island had been envisaged before 1997.[18] Nevertheless all of these were small-scale experiments which weren't integrated in an overall plan. As has been discussed previously (see chapter 2), the slaughterhouse shut-down was perceived by the Island's inhabitants as a real catastrophe; it was the main private company on the island and when it closed-down 70 people lost their jobs. As S. Hermansen remarked *"it was not just 100[19] people out of work but it also affected families and social relations"*. Another way to describe this event is that the local community experienced globalization for the first time: Danish Crown acted as a corporation which decided not to keep the factory on the island because it was not cost-efficient anymore. That's not apparently unusual but for the island it was. They understood they couldn't stop this development but they had to find a way to survive.

So in this perspective, what is left on the island? The island itself, the land. The oldest way to exploit land is agriculture, the modern way is energy, so they decided to look back to their tradition, agriculture, to solve a "future" problem. This "green" know-

[18] It is still in the pipeline because the island still doesn't have a waste treatment plan.

[19] Søren Hermansen says 100 people but from my dates I've obtained "only" 70 people. He refers to satellite industries as well.

how, garnered from agricultural tradition and previous environmentalist experiments, was summoned to design an integrated plan that included, energy, heating and transport. The key actors were a small cluster of people including S. Hermansen, an engineer who designed the master plan, the chairman of the Samsø trade association and a few farmers who foresaw the business potential of the project.

This handful of people and Søren Hermansen, started to inform the population with the aim of sounding out general interest in the project. At the beginning people were quite sceptical and Søren argues that people were influenced by what the neighbours, or the other members of the community thought about the project.

Open meetings in this phase played a really important role in getting people involved in the process; the main goal of these meetings was to find a new role for the community in this transitional phase. During the "slaughterhouse" period everything was clear, everybody was aware of his or her role in the old pre-globalized Samsø. After a new phase started and the traditional roles were under discussion . On the other hand promoters urged people "to think positive" showing them that a new phase could be better, or as good as the old days, or just different.

In this context the Danish cooperative tradition played an important role. Cooperatives are heavy structures where decision-making is long and tortuous because many people are involved in reaching agreement, but at the same time they give some guarantees.[20] In this sense people from Samsø felt more comfortable using familiar tools, such as cooperatives, and sharing the risks with other people. Thinking in a cooperative way means that you are not alone when facing a problem but you are sharing the same experience with other people. Moreover the associates are directly responsible for what is deliberated but in return they are sure the service will be delivered. It's maybe useful to remark that the promoters of the projects are all from Samsø and completely integrated in the community; in some cases they are part of the Samsø elite, like the chairman of the Samsø trade association (now retired). Moreover they reproduced one century later exactly the same scheme of the earlier coops in Denmark (see paragraph 2.6). They are aware and proud of their farming origins and they know exactly how to communicate with the community and which emotions to appeal to. They know how to

[20] We should not forget that the Danish Cooperative system springs from the experience of the conservative agricultural party (see chapter 2).

make people understand and to make them aware of the problem because they all, promoters and the "target" community, agree on one point: land is something we must respect and this respect comes from our farming background.

Probably an external intervention in this phase, for example Government officers, would have been unsuccessful. Why? Because they would have decided on a wrong communication strategy based on Global Warming, Antarctic meltdown and other challenges which are too big and too detached from the target community. Communication was based instead on an easy slogan: "think local – act local". This perspective is closer to the needs and feelings of a small local community, because it is based on the same feelings which produce NIMBYism, namely place attachment, but re-oriented towards different goals..

On the other hand Svend Auken's futuristic environmental and energetic policy offered a chance to emerge from the crisis engendered by the closure of the slaughterhouse and the promoters were far-sighted enough to grab this opportunity. Søren Hermansen declared during an interview that they felt the government was really close to the community in that tough moment. They had a direct contact with the Energy and Environment Department and they felt supported, Hermansen said:

"they liked us (speaking about the Energy Ministry) and it's very good to work when you feel supported and there is a positive atmosphere".

They worked together with the Ministry officers during all the planning phase and that was really important for the local community because they didn't feel abandoned; the effect was that people started to think positive again and they decided to try this "New Deal" for Samsø.

At this point it could be useful to show a scheme that summarizes the transition's genesis.

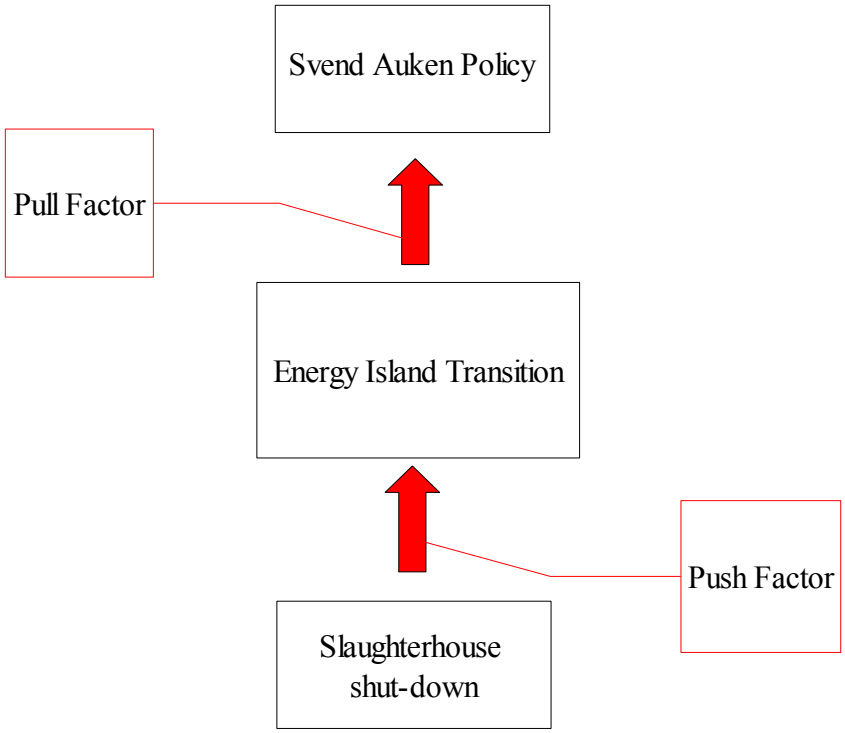

Figure 5.1

In my analysis I have identified two forces that drove the island toward the energetic transition: a push and a pull factor. The Slaughterhouse shut-down represents the push factor; an internal force that pushed out the community to find a solution through a collective action. This leading factor is necessary for the scope (the Energy Island Transition) but not enough because they could have undertaken a different path. The Svend Auken Policy and the competition offered at the right time a concrete chance. I named this external force pull factor: the community had been pulled over this specific direction instead of other solutions.

NIMBYsm problem has been influenced by these two factors as well. The Government role was not oppressive: they just led the transition and they respected the community will. On the other side promoters acted not only for their personal interest but in the sense to improve the whole community welfare they were part of. In a deal not everyone get the same benefit but everyone improve his or her starting position. I mean

that probably in this transition a new elite emerged: for example the windmill land owners got the best benefit and external investors came to the island but with this private and public ownership mix all people who believed in the project got some benefits. As discussed in chapter three, the ownership was an open scheme which allowed everyone to get in the project. Cooperatives guarantee a fair and equitable distribution of incomes and partially prevent the access of speculators in the project. It's also likely true that it would be unfair and disastrous to close completely the access to big private investors, however they decided for a equitable balance between private and public, free market and social economy; as a result of a mature social-democracy.

During a conference in Copenhagen about renewable energy, that I attended, Søren Hermansen explained this experience of public-private economy showing two hula hoops to everyone presents there. He said that the hula hoops represented two different way to conceive economy, market economy and what he called social economy.

In this perspective social economy is the economy of the commons: services, infrastructures, facilities and everything we share with the other members of our community. It's quite hard to give a market value to these services that are normally investigated by welfare economy and by the fundamental contribution of Elinor Ostrom. (Ostrom, 1990) For my thesis purpose is sufficient to remark that sometimes this two different economies overlap, sometime they don't. In Samsø's case this overlap should be investigated through the peculiar ownership scheme adopted. As we've seen previously (see chapter 3) the ownership scheme is a mix of market economy and social economy due to the coexistence of private stakeholders and public stakeholders joined in cooperative. This overlap guarantees incomes for private investors and quality of life. In a market perspective "life quality" would be just considered a positive externality (spillover). In this vision, "life quality" is the social economic goal, as is profit for market economy. Samsø's success results from the enhancement of local capabilities (social, economic and environmental) while external capabilities would expose local economies to the weaknesses of the global economy. Hermansen argues *"we don't really need cheap things from China or American Soap Operas, we can watch them if we have time. What we need is to look back to our real values"*. This is not a self-righteous argument, but more the point of view of a far-sighted entrepreneur who is

trying to enhance local capabilities to keep the whole community afloat in tumultuous ocean of the international market. Therefore in this perspective the quality of life is conceived as a trade-off between economic rules and a pleasant place to live, an alternative answer to competition. The original purpose of the economy is to improve the lives of people, that's the reason why I decided to talk about "quality of life".

5.1 Labour Marketsocial economy

Probably the most critical issue of the transition is job creation. I tried to investigate this theme in chapter three but it's quite hard to find the answer in statistical data. Søren Hermansen argues that during district heating and wind mills building phase they had been created around 30 new jobs. However I think that the real contribution to labour market is a new know-how. Craftsmen improved their know-how in houses construction, carpentry, heating installation etc. Craftsmen are now skilled in the use of modern materials and energy efficient techniques but they didn't change their original job. The result is a qualitative improvement that can't be shown in statistical data which are quantitative for their own nature.

Moreover the Academy offers some advisory services to improve house efficiency and, as discussed in chapter 3, several specialists work there at this scope. During one of my interview with S. Hermansen, he talks about *"a new good atmosphere"* which positively influenced the island economy. The island became a big attractive for "energy tourism" and the Academy hosts many institutional guests and meetings, recently they hosted the Irish Prime minister and a convention with the European Small-island organization.

5.2 What's the lesson?

I don't think we should consider Samsø as a model to follow but rather as a lesson from sensible farmers. A model abstracts and generalizes a real world situation. In this perspective we should look for a blueprint to reproduce the same situation elsewhere. We should standardize the phases that have led to success with the aim of creating many other Samsøs all over the world. That's crazy. We'd rather draw out some theoretical

teachings from their experience, in particular from their successful communication strategy. “Think local - act local” summarizes succinctly the Samsø Energy Island experience. In this sense they faced globalization by looking inside and back to their own history. I acknowledge that this is in radical contrast with the idea of the global village. Hermansen argues, and I agree with him, that the idea of the global village is a tricky idea that persuades people to face big challenges such as climate change from the wrong point of view. I will try to explain this concept. Climate Change is an “all inclusive expression” that refers to thousands of smaller localized situations: wrong choices, speculation, local elites, harmful factories, livestock farming, oil drilling, aerosols and many others. If we look at Climate Change from this perspective we can just hope for a divine intervention to save us from disaster. Another way to consider Climate Change is to look at our place and how it is changing, or degrading and try to improve our quality of life by being aware of local potential and limits. So from this point of view what happened on Samsø is a real revolution because they decided to forget the aspects of the problem that is out of their control, became aware again of their potential and finally decided their own future autonomously. The point is that everyone should act and think local and then share the experience with other people, otherwise you take yourself out of the system and you are back again in the tricky perspective of the global village where problems are out-of-focus, because everything is perceived as virtual. This is also the global financial perspective and I argue that social economy and market economy are two modern ways that refers to the old dichotomy between economy and finance, the real economy and the nominal economy. This perspective is tricky because this is an elitist point of view: it is the point of view of a multinational chairman and I don't think this is the only way to understand what is going on around us.

Communication was efficient it because pointed out those elements that were easily understandable by the community: work and quality of life. In this way they solved, from the inside, a big scale problem that involves production all around the world: outsourcing.

There are many elements which led to success: a peculiar production system based on agriculture and tourism, a cohesive community, supportive institutional background, a

consolidated cooperative system and a handful of people who acted as an avant-garde informing the rest of the community about the solution for a local economic shock. Economic shocks are cyclic everywhere in the world, but rarely bring about real change. Howver on Samsø the factors that have been mentioned above came together to bring about a unique case. Therefore the lesson is more theoretical than practical and is a new way to read and interpret change, progress, development and globalization, or whatever you prefer to call time that goes by.

In my analysis I have identified two forces that drove the island towards energy transition: a push and a pull factor. The slaughterhouse shut-down represents the push factor; an internal force that pushed the community to find a solution through collective action. This factor was needed to reach the end goal (the Energy Island Transition). The Svend Auken Policy and the competition offered at the right time a concrete opportunity. I named this external force, the pull factor: the community had been pulled in this specific direction even though other feasible paths could have been followed.

NIMBYsm has been influenced by these two factors as well. The Government role was not oppressive: they just led the transition and they respected the community's will. On the other hand promoters acted not only in their own personal interest but to improve community welfare. In the deal not everyone get the same benefit but everyone improved his or her starting position. I mean that probably in this transition a new elite emerged: for example the windmill land owners got most benefit and external investors came to the island but with this mix of private and public ownership everyone who believed in the project got some benefit. As discussed in chapter three, the ownership was an open scheme which allowed everyone to be involved in the project. Cooperatives guarantee a fair and equitable distribution of incomes and partially prevent the access of speculators to the project. It's also probably true that it would be unfair or disastrous to completely close access to big private investors. However the stakeholders decided for an equitable balance between private and public, free market and social economy as happens in a mature social-democracy.

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