Laboratorio di scienze della cittadinanza

Seventh Framework Programme
Collaborative Project
“Pathways for carbon transitions (PACT)”
G.A. n° 225503
Workpackage 4 - Transition towards post-carbon society

Task 4.1. "Driving socio-economic forces and actors, acceptability, heritage, policies”

Societal Dynamics of Energy Transition

Final Research Report

April 2010

Table of Contents

PART ONE
RESEARCH APPROACH AND MAIN FINDINGS

SECTION ONE

RESEARCH APPROACH

Chapter One

Institutional framework and report structure

1. Institutional framework

This document is the result of the research performed under task 4.1 of the collaborative project "Pathways for carbon transitions (PACT)", funded by the Seventh Framework Programme of the European Union (G.A. n° 225503). This task is part of workpackage 4 "Transition towards post-carbon societies". The project as a whole aims at outlining what a sustainable post-carbon society would look like and how we could reach it within the next 50 years. Workpackage 4 deals with this latter aspect, i.e., **transition towards post-carbon society**. WP4 is subdivided into three tasks:

- "Driving socio-economic forces and actors, acceptability, heritage, policies";
- "Risks and governance in the transition process towards post- carbon societies";
- "Young people's human capital and social capital in a post- carbon social life".

The **general objective** of task 4.1 is to understand the role of inertia forces, time lags for changes and ruptures, actors' behaviours, driving forces, in the transition process towards post carbon society. The task will also provide input to the scenario-building activities planned under Workpackage 6 and to the revision of VLEEM and POLES models that will be conducted in Workpackage 5.

Laboratory of Citizenship Sciences (LSC) is responsible for task 4.1. (and leader of workpackage 4).

Research conducted by LSC focused specifically on the **study of the societal dynamics of energy transition**, starting with the analysis of a group of experiences in Europe oriented towards eco-sustainability which, by virtue of certain specific characteristics, include significant anticipatory elements of the post-carbon society (see chap. 2).

Research results have enabled us to develop a model – called "**Sociological Predictive Operational Model on Energy Transition**" (SPROMET) – which provides a sociological interpretation of energy transition, which can be used to construct scenarios and review VLEEMS and POLES models.

This research report therefore incorporates **two different deliverables**:

– Deliverable DI4.1.2 – Report on the role of inertia forces, time lags for changes and ruptures, actors behaviours, driving forces in the transition process (first part, chap. 3, and the entire second part);
– Deliverables DI4.1.3 – Inputs for VLEEM and POLES models coming from the previous analysis (first part, chap. 4).

The report was written by Giovanni Caiati, Luciano d'Andrea, and Marco Montefalcone, with the scientific support of Gabriele Quinti and other researchers and experts.

2. Description of the research report

The report is divided into two parts, each organised in two sections.

The **first part** of the report is devoted to the **presentation of the research approach and main findings**.

As well as describing the institutional framework of the research and the structure of the report (Chapter 1), **first section** also gives an account of the main theoretical components used, methodological approaches adopted and the activities conducted during the research (Chapter 2).

The **second section** presents the most important results achieved, organised in a sociological predictive and operational model of energy transition, called SPROMET (Chapter 3), and some suggestions (Chapter 4) on the way it can be used in conjunction with inputs from the first three WPs of the PACT project (aimed at providing information on the evolution of urban structure and land use, environmentally sustainable technologies and life-styles).

The **second part** of the report details the two **societal processes** represented by the two key variables on which the SPROMET model is built.

The **third section** describes the constitutive factors of the first of the two processes - the **Technological Societal Process** - divided into enablers, namely those that promote energy transition (Chapter 5) and obstacles, those that tend to hamper it (Chapter 6).

The **fourth section** concentrates on the constitutive factors of the second of the two processes – the **Political Societal Process** – distinguishing in this case, too, between enablers (Chapter 7) and obstacles (Chapter 8).

Chapter Two

Theoretical-methodological framework and description of activities

1. The theoretical approach

Research performed by LSC under WP4 PACT Project on the anticipatory experiences of energy transition made use of a number of theoretical contributions, mostly sociological, but also from other disciplines. Some of them were independently developed by LSC during the project or as part of research done in the past by the institution.

Different theoretical steps characterising the research are described systematically in the second section of this report, dedicated to the presentation of an interpretative model of energy transition. In this chapter, therefore, rather than going into the theoretical approaches used, we shall try to **give an account of their origin**, with reference to scientific literature, so as to allow further investigation.

In particular, we will focus on what might be called the major theoretical articulations of the interpretative model used, namely the concepts of:

- energy transition;
- anticipation;
- energy transition regimes;
- agency and social structure;
- social capital;
- vectors of change;
- societal processes.

1.1. Energy transition

In the research, it was decided to use the term "**energy transition**" rather than other possible expressions (for example, "energy revolution" used mainly in political contexts) to refer to the gradual transition from societies based prevalently on the use of fossil fuels (oil, coal, natural gas) and societies based prevalently on the use of renewable energy (wind, solar, etc.) and oriented towards energy saving.

1.2. The notion of anticipation

Research was based on the identification of a series of "**anticipatory experiences**" **of energy transition**, having peculiar characteristics compared to other eco-sustainable energy initiatives.

By virtue of these characteristics, from the anticipatory experiences we were able to infer the main features that characterise or may characterise energy transition as a whole.

The concept of "anticipatory experience" is not to be understood generically but refers to the theories of "**anticipatory systems**", developed in particular by Rosen (1985, 1991) in the sphere of biology and developed, in the social context, especially by Nadin (1998, 2003). These theories, based on scientific evidence, maintain that living systems (from individual organisms to collective organisations) contain, albeit in different forms, biological and social mechanisms that can "anticipate” changes that actually occur (either in the micro-environment or in wider and more articulated areas of social life).

The presence of these "anticipatory systems" allows them to organise actions not only in "reactive" terms (reacting, that is, to a situation involving them) but also in "predictive" terms (anticipating, that is, the same situation and adopting an internal organisation or a plan of action before this situation occurs, modifying it in advance, at least in part).

In this perspective, anticipatory experiences are to be actually viewed as cases where the involved actors, interacting each other, anticipate situations and processes which will be likely typical of energy transition as a whole.

1.3. Energy transition regimes

In the proposed model, three **energy transition regimes** are identified: energy production and distribution regime; individual consumption regime; collective consumption regime.

The concept of "regime" comes from the theories of "risk regimes" put forward, in particular, by Goudsblom (1993) and developed - especially in relation to social and environmental risks - by De Swaan (1988), Quinti (1993), and Quaranta and d'Andrea (1996).

In this theory, regimes can be defined as relatively stable social forms, oriented towards turning potential "dangers" (i.e. threats partially or totally out of control, both cognitively and operationally) into "risks" (that is threats that can be managed and placed under relative control), by anticipating and reacting to them. After exceeding a certain threshold of efficiency and capacity, regimes can become "proactive", not merely managing the risks but generating new opportunities for development (social, economic, political, etc.).

In this context, energy transition regimes can be identified as more or less stable clusters of individual and collective actors, institutional or not, that can develop plans of action, activate social norms and standards and mobilise resources to encourage, manage, anticipate or direct the dynamics associated with energy transition.

1.4. Agency and social structure

Structure and **agency** are basic concepts of sociology. The first refers to bounds of social nature (behavioural patterns, norms, social rules, organisational procedures, dominant social representations, etc.) which channel and condition individuals (both in cognitive and operational terms), while the second concerns the orientation of individuals and organisations towards action, which is manifested in intentionality, plans, lifestyles or forms of social mobilisation.

Of particular importance is the evolution of the **relations between structure and agency**, examined in particular by Quaranta (1985), Giddens (1991), Beck (1992) and Archer (1995, 2008), especially the transition from "**modern society**" to the so-called "**post-modern society**".

At the heart of this transition there is a gradual reversal in the relative strengths of structure and agency, producing a progressive weakening of social structures and a parallel overall strengthening of agency. This process would explain, firstly, the crisis or profound transformations that are simultaneously affecting all the political, scientific, ethical, economic and cultural institutions of contemporary society, and, secondly, the increasing autonomy people have in choices and action, either as individuals or in organisations.

The results of this reversal may be seen in such phenomena as the increased uncertainty that characterises the lives of individuals, the increasing predominance of horizontal relational networks over hierarchical relationships, the fragmentation of lifestyles, the increased social segmentation or the acceleration of all social dynamics (institutional, technological, economic or organisational).

1.5. Social capital

Social capital theories, developed by different authors such as Granovetter (1973), Bourdieu (1986), Putnam (1994) and Coleman (1990), while differing widely, all tend to highlight – in the framework of an inversion of power relationships between structure and agency - the importance of trust-based **interpersonal relationships** and, more generally, **social networks**, in promoting social cohesion, fostering economic development and managing crisis situations.

Using further theoretical developments (d'Andrea, Declich, 1999; Quaranta, Quinti, 2005) this research refers to social capital primarily as a **factor for the integration of social structure and agency** in a given social context. The capacity of social networks to promote this integration, as well as trust, is also linked to increased **cognitive capital**, namely the overall increase in society of people able to produce knowledge and information and exchange it within social networks.

1.6. Vectors of change

During research, the **relationships between energy transition and large-scale social and cultural transformation trends** have been explored. They are also to be seen as causal factors or as expressions of the transition from modernity to post-modernity.

In the context of the research, these trends were operationalised by adopting the concept of "**vector of change**" to examine the fundamental characteristics (directionality and intensity) and facilitate understanding as transitional processes, focusing on transition from a state characterised by the dominance of certain characteristics to another in which other characteristics are dominant (Quaranta, d’Andrea, 1999).

Five vectors of change are examined in the research, on which a great amount of literature has been written. We will, therefore, indicate only the theoretical references that most influenced the theoretical approach of this research.

- The **political institutional vector** refers to the transition from forms of government centred on state structures to forms of *governance* which include a variety of non-state, national and international actors, involving increasing interaction, often unregulated, between different political and administrative levels (local, national and transnational). As regards to this vector, we can mention, in particular, Quaranta (1985, 1993), Burns and Anderson (1999), Montefalcone (1993) and Mezzana (2002).
- The **anthropological vector** concerns the transformation of some basic anthropological structures, such as those regarding the composition of human societies in ethnic, cultural or religious terms due to migration processes (Marta, D'Arca, 1995; Montefalcone, 2002; Costantini, Marta Montefalcone, 2008), changes in the demographic structure of the population (Vallin, 2004) or gender relations (Cacace 2004). In all these cases, we find a typical transition process that is incipient or has already taken place (for example, from high to low birth and mortality rates in the case of demographic transition, or from a single to a multicultural, religious or ethnic society, in the case of migration).
- The **social vector** regards changes in the dynamics of social inclusion and exclusion (Quinti, 1993; Declich, Taurelli, 1999, and Quaranta and Quinti, 2005), manifested, for example, in the weakening of traditional systems of social cohesion and strengthening of other mechanisms, the emergence of new forms of poverty and diminished importance of those typical of modernity or the loss of sustainability in the welfare system, dependent solely on state structures, and the emergence of new non-state forms of social risk management.
- The **science and technology vector** can be found in the changed relationship between science and society and the profound change in scientific research production methods (Quaranta, 1984, 2007, Latour 1987, Ziman, 2000; Nowotny, 2001; d'Andrea, 2009; Bijker, d'Andrea, 2009). Again, the vector identifies a transition process, which is divided, in turn, in many elements (from research involving just one discipline to transdisciplinary research; from mainly curiosity-driven research to problem-driven research; from a rigid separation between science and society to co-evolutionary forms in which science and society interact on different levels, etc.).
- The **globalisation of knowledge vector**, emerging from different trends of a global dimension (d'Andrea, Quaranta, Quinti, 2000; Cacace, 2003), defines a transition from a system where local knowledge is separate from global knowledge to immediate interaction between the two levels, helped

by an exponential increase in the production, collection, processing, access and exchange of knowledge at global level, thanks especially to the opportunities offered by ICTs.

1.7. Societal process

Energy transition is understood, in the proposed model, as a **"societal process"**.

That **energy transition** is a **process by nature** can be seen in the fact that it is not the mere result of intentional actions but the product of the interaction of multiple intended and unintended elements, partly attributable to action plans, but, in part, directly attributable to the cognitive level (representations, emotions, stereotypes, etc.).

The term **"societal"** has been used to highlight, in as precise and objective way as possible, the close relationship between energy transition and society as a whole and its deeper structures. This term has been preferred to "social" which is often used with ethical meanings or prescriptive intent, as in expressions like "social responsibility" or "social orientation". This distinction is also widely used in sociology (see, for example, Vermeer, 2006) and other social disciplines (see Levy, Lussault, 2003).

As will be seen below, within energy transition **two components** will be identified, represented respectively by the **Technological Societal Process** and the **Political Societal Process**.

2. The methodological approach

The research used a general methodological approach typical of the **sociology of knowledge**, which is expressed in three basic methodological choices:

- The choice of using, as an empirical basis, **existing knowledge**, produced by researchers or held by energy transition stakeholders, already available or obtainable through direct consultation with them;
- The decision to include in this empirical basis not only information on **operational phenomena** (events, facts, or actions of any kind), but also

data on **cognitive phenomena**, expressions of the orientations and intent of energy transition actors;

- The decision to **recognise the same heuristic importance** to all the phenomena identified, regardless of whether they have been identified through quantitative or qualitative information or whether they are operational or cognitive phenomena.

Within this general approach, the information gathered was compiled, as necessary, using a **variety of methodological approaches** and **processing techniques**, especially:

- **set theory** (to build clusters of homogenous phenomena in terms of fundamental characteristics);
- **graph theory** (to identify connections between phenomena or phenomena clusters);
- **semantics** (to manage findings of a linguistic nature, through semantic condensation processes or the construction of separate semantic fields);
- **systems theory** (especially to isolate the different components of the phenomena and processes analysed and to detect any functional relationships between them);
- analogical use of concepts drawn from **vector theory** (to examine phenomena and processes having directionality and intensity).

As regards the **sources** of information used, they were of two types:

- **documentary sources,** of different degrees of formalisation (scientific literature, projects, position papers, articles, websites, blogs, policy planning documents, statistical reports, research reports, etc.);
- **live sources** (the scientific community, policy makers, experts and professionals, key persons and stakeholders, etc.), consulted through in-depth interviews.

Finally, **technical tools** of two types were used:

- a **computerised grid** to analyse documentation on initiatives oriented towards eco-sustainable energy;
- a **grid** to carry out the **in-depth interviews**.

3. Description of activities

Moving from methodological approaches to **activities undertaken**, research as a whole was divided into five phases.

3.1. First phase

The **first phase** (October 2008 - January 2009) was of a preparatory nature, aimed at instituting and implementing the operational research plans.

In this phase, the research team conducted a broad review of the literature available, collected and outlined in the **preparatory studies dossier**. Based on this preliminary study, the **Operational Research Project** was drawn up (Deliverable 4.1.2).

3.2. Second phase

The **second phase** (February 2009 - June 2009) was devoted to the identification of about 270 eco-sustainable energy initiatives, defined "emerging experiences" (see chap. 3). They were identified through:

– **Expert advice**;
– Sending a "**call for experiences**" (with attached form) to **800 addresses** selected from the PACT (WP7) mailing list, which contains a list of those in Europe who, from several points of view, are currently concerned with initiatives and policies related to energy transition;
– A **web-based survey** of case study databases (Concerto, ManagEnergy, Energie-Cité, CIVITAS, etc.).

For each of the 270 "emerging" experiences, documents and reports were collected, and then stored in a **computerised database**. The list of the 270 experience is attached to this report (Annex 1).

3.3. Third phase

Based on the results of the previous phase, a **third phase** of research was developed (July 2009 - December 2009), dedicated to the study of the 270 experiences and functional to the selection, first, of **60 anticipatory experiences,** and then a smaller group of **20 experiences** for in-depth study.

Each of the 270 initiatives was therefore analysed on the basis of information collected and filed applying descriptive parameters (type of project, scope of action, size, number of people involved, etc.).

Then, using four theoretical and methodological criteria (factualness, social impact, transparency, systematicity, see chap. 3), the first group of 60 "anticipatory experiences" was identified and then the smaller group of 20 experiences was selected.

The experiences are heterogeneous in size and target area and concern 10 different European countries.

List and short description of the 20 anticipatory experiences analysed during the research

Name	**Country**	**Area**	**Description**
Barcelona	ES	Urban	The initiative focused on the mandatory introduction of solar panels for water heating in new homes. Overall population concerned: 1.5 million people.
BedZED (London)	UK	Urban	BedZED is a small district built according to environmentally sustainable criteria, impacting many areas: housing, water, waste, mobility, production of RE, materials, land use. Overall population concerned: 220 people.
Bo01 (Malmö)	SE	Urban	Built on a former industrial area, this entirely eco-sustainable district was planned through a specific "quality programme" procedure, shared by administrators and builders, which integrates social, architectural, energy and environmental aspects. Wind turbines were introduced, along with low energy standard housing and district heating. Overall population concerned: about 1,000 people.
Copenhagen	DK	Urban	The experience concerned the management of solid waste, involving three levels: reducing the volume of waste, recycling and adoption of different forms of treatment (incineration, co-generation of energy and heat). Overall population concerned: 550,000 people.
Eko Viikki (Helsinki)	FI	Urban	It is a new district designed for being ecologically sustainable from different points of view: production and consumption of energy,

List and short description of the 20 anticipatory experiences analysed during the research			
Name	**Country**	**Area**	**Description**
			construction materials, land use, water, waste, social aspects. Technologies used include: low energy houses, CHP plant, district heating, solar panels, and sustainable building materials. Overall population concerned: about 2,000 people.
Eva-Lanxmeer (Culemborg)	NL	Urban	It is a new ecological district of about 250 apartments built through a partnership between a private foundation and local authorities. Plants were introduced for the production of biogas, a district heating system, photovoltaic and solar thermal panels, passive houses. Overall population concerned: 250 dwellings.
Hammarby Sjostad (Stockholm)	SE	Urban	The initiative focused on the building a new eco-sustainable district, by adopting a range of technologies such as biogas, district heating, vacuum-based underground collection system, insulated windows; solar panels, solar cells, fuel cells. Overall population concerned: about 10,000 people.
IBA Emscher Park (Emscher Region)	DE	Urban and rural	The programme involved several municipalities in the region through the creation of 100 initiatives concerning areas such as housing renovation (focusing on energy issues), waste recycling, reclamation of polluted land, use of appropriate building materials, treated water management. Overall population concerned: 2.5 million people.
Juhnde (Lower Saxony)	DE	Rural	The initiative was aimed to change village energy consumption from fossil fuels to those derived entirely from renewable sources. To this end, a biomass plant was built for the co-generation of electricity and heat, connected to a district heating network. Overall population concerned: about 800 people.
Kalundborg	DK	Industrial	The initiative focused on the implementation of agreements among industries in the area, aimed at encouraging the reuse of industrial waste materials for production, with large savings in energy use, emissions and costs. Currently, the experience has led to the definition of 20 exchange agreements among firms.
Kirklees	UK	Urban	The experience focused on reducing fuel poverty, providing support to improve the energy efficiency of homes and also offering

List and short description of the 20 anticipatory experiences analysed during the research			
Name	**Country**	**Area**	**Description**
			additional services (subsidies, home care, advice on water services, etc.). Overall population concerned: 401,000 people.
Kristianstad	SE	Urban	The initiative was aimed at making Kristianstad Municipality a fossil fuel-free area. The solutions adopted for this purpose included the introduction of a vast network of district heating, biogas production, the adoption of an ecologically-friendly public transport system (biogas buses), investment in renewable energy, especially in the wind sector. Overall population concerned: 77,000 people.
Kronsberg (Hannover)	DE	Urban	It is a new eco-sustainable district, based on the introduction of new technologies for mobility, energy, waste and water management. Overall population concerned: about 15,000 people.
La Rochelle	FR	Urban	The experience focuses on the introduction of new organisational and technological solutions for reducing emissions (car sharing, park and ride facilities, introduction of car-free days, etc.). Overall population concerned: 160,000 people.
Lewisham (London)	UK	Urban	The programme was aimed at eradicating fuel poverty from the area, through measures of energy efficiency and production of energy from renewable sources in homes. Overall population concerned: 250,000 people.
Peccioli (Pisa)	IT	Rural	The experience focused on the regeneration and adaptation of a municipal landfill for energy production, managed by a municipal agency which includes a considerable number of shareholders. Overall population concerned: 4,936 people.
Samsø	DK	Rural	The aim of the initiative was to make an island entirely based on 'renewable energy'. Technologies used include: wind turbines, district heating, biomass CHP generators, solar thermal and thermal insulation of homes. Overall population concerned: 4,200 people.
Varese Ligure (Spezia)	IT	Rural	The initiative involved the introduction of new technologies for energy production from renewable sources (mainly wind energy, but also solar energy and hydropower). In addition to these measures, others were introduced, such as the revival of sustainable agriculture

List and short description of the 20 anticipatory experiences analysed during the research			
Name	**Country**	**Area**	**Description**
			and implementation of a home renovation programme. Overall population concerned: 2,400 people.
Vauban (Freiburg)	DE	Urban	The initiative involved the construction of a new ecological area which, in addition to EE measures and the production of RE, adopted a car-free lifestyle. Technologies used include: passive houses, low energy houses, CHP plant, district heating, PV panels, solar thermal panels. Overall population concerned: 5,300 people.
Zurich	SW	Urban	This experience has been active for many years, aimed at improving urban mobility and reducing fuel consumption and emissions, encouraging the use of public transport. Some of the features of this experience included a referendum to approve the mobility policies and a systemic approach to urban management, through networking involving different departments. Overall population concerned: 1,600,000 people.

3.4. Fourth phase

In the **fourth phase** (December 2009 - February 2010), the anticipatory experiences were studied in depth to identify **phenomena** related to the theoretical structure of the project (see paragraph 1).

For each of the experiences, a **dossier** was drafted containing reports, papers and essays, case studies and web-based material. The dossiers were analysed in-depth by means of a reading computerised grid, which led to the drafting of an analytical fact sheet for each experience. To integrate the fact sheets, in-depth interviews were carried out by handing out a semi-structured questionnaire to the **key informants** of individual experiences (mainly the promoters). All this led to the identification of 700 "de facto situations", which after a condensation process (see chap. 3) were reduced to **249 phenomena**, collected in a database (see second part of the report).

List of interviews conducted during the research	
Name	**Position**
Soren Hermansen	Director, Samsø Energy Academy, Samsø (SE)
Mikael Edelstam	Head of environment at Bo01 City of Tomorrow, Malmö (SE) Headof environmental planning at Stockholm 2004, Hammarby Waterfront, Stockholm (SE)
Sue Reddington	Executive Director and Co-Founder of BioRegional, BadZed, London (UK)
Phil Webber	Head of the Energy and Environment Department, Kirklees (UK)
Gerd Paffenholz	Bioenergiedorf Jühnde, Jühnde (DE)
Ruedi Ott	Head of mobility Planning, Zurich (CH)
Michela Marconi	Mayor, Varese Ligure, (IT)
Andreas Delleske	Member of "Forum Vauban", Vauban, Freiburg (DE)
Michael Schwarze-Rodrian	Director, Location Ruhr & Investors Service Business Development Agency Metropoleruhr GmbH, Emsher (DE)
Trevor Graham	Head of Sustainable Development Unit, Malmö (SE)
Renzo Macelloni	President, Belvedere Spa, Peccioli, Pisa (IT)
Markku Siiskonen	Director of Viikki Planning, Helsinki City Planning Department, Eko Viikki, Helsinki (FI)
Svenja Koebe	Economic and Environmental Affairs Department, City of Hannover (DE)
Peter Gibbs	Energy Manager, London Borough of Lewisham (UK)
Lennart Erfors	Project coordinator, Kristianstad Fossil Fuel Free Municipality, Kristianstad (SE)
Matthieu Graindorge	European Projects, Transport & Mobility Department, Communauté d'Agglomération de La Rochelle (FR)
Julie B. Svendsen	Environmental Department, Technical and. Environmental Administration, City of Copenhagen DK)
Marleen Kaptein	Head of Project EVA Lanxmere, EVA Foundation, Culemborg (NL)
Jørgen Christensen	JC Consult, Adviser to the Symbiosis Institute, Kalunborg (DK)
Gerhard Stry-Hipp	Head of Energy Policy at Fraunhofer ISE, Freiburg (DE)
Melania Cavelli	Professor of Territorial Energy Planning at the University of Reggio Calabria (IT)
Roberto Della Seta	PD Parliamentary Group Leader for the Senate Environment Committee (IT)
Daniela Belziti	Centre Scientifique et Technique du Bâtiment, Sophia Antipolis, Nice (FR)
René Kemp	Professor of Innovation and Sustainable Development at ICIS, Maastricht University, Maastricht (NL)
Stellan Fryxell	Project Developer of Hammarby Sjostad, Stockholm (SE)
Cinta Barrachina	Consumers and Users Organisation of Catalonia, Barcelona (ES)
Fermín Jiménez	Cap de l'Àrea d'Energia Solar en Agència d'Energia de Barcelona, Barcelona (ES)

3.5. Fifth phase

The **fifth and final phase** of the research (March-April 2010) involved carrying out the final research studies and drafting this report.

SECTION TWO

THE MAIN RESEARCH FINDINGS: THE SOCIOLOGICAL PREDICTIVE OPERATIONAL MODEL ON ENERGY TRANSITION (SPROMET)

After presenting, in the first section of the report, the theoretical and methodological approach used in the research, in the second section we will focus on the **most important findings**, both as regards the production of new knowledge on energy transition and the elaboration of scenarios for future development.

These results will be presented in a model called **Sociological Predictive Operational Model** on **Energy Transition** (SPROMET), which - as the name suggests – pursues an operational objective, namely to provide a sociological interpretation of energy transition that could form the basis for developing predictive analyses.

This section is divided into **two chapters**.

In Chapter 3, we present a static description of the model, that is, its **structure** and **components**, as they have been identified and organised during the research, in order to present the new knowledge generated through the research.

In Chapter 4, although still in a preliminary form, we look at the model from a dynamic perspective, identifying **steps that can actually lead to the implementation of the model** for the construction of energy transition future scenarios.

Chapter Three
The Sociological Predictive Operational Model on Energy Transition

This chapter describes the sociological and predictive operational model of energy transition, developed from the research carried out by the Laboratorio di Scienze della Cittadinanza as part of PACT Project WP4.

The description not only introduces and presents the **different components of the model** but also details the different theoretical and interpretative phases of the research, each characterised by the discovery of new and sometimes even surprising characteristics of energy transition.

Specifically these phases involved:

- the determination of the characteristic features of the **anticipatory experiences** of energy transition (para. 1);
- the identification of a set of **recurrent phenomena** within the anticipatory experiences, which, together with the latter, formed the empirical basis of the research (para. 2);
- the identification of a set of **constitutive factors** of energy transition, by analysing the empirical basis and transforming the recurrent phenomena in indicatory phenomena (para. 3);
- the identification of the **complex** and **nonlinear** nature of the energy transition, which emerged clearly from the study of constitutive factors and can be divided into four distinct dimensions (para. 4);
- the identification, as structural elements of energy transition, of **two societal processes –** the **Societal Technological Process** and the **Societal Political Process** - each activated and supported by a specified sub-set of constitutive factors (para. 5);
- the construction, for each constitutive factor, of a **descriptive profile** (para. 6);
- the assignment of a **weight** to each constitutive factor, according to its significance in energy transition (para. 7).

1. Anticipatory experiences of energy transition

As mentioned, research focused on a selected group of initiatives undertaken in Europe, centred on the introduction and dissemination of environmentally sustainable forms of energy in certain geographical areas.

The idea was to isolate and examine, among all the initiatives under consideration, those which could represent an "**anticipation**" of energy transition, namely those that had within them (thus anticipating) the **basic features** of a more complex transition to environmentally sustainable energy sources that could significantly affect all European societies. In this sense, the anticipations should be regarded as existing "parts" or "pieces" of a future post-carbon society.

To this end, a first analysis was made of about 270 eco-sustainable energy initiatives identified by collecting and studying comprehensive documentation and interviewing experts. This analysis led to the first results, namely the **construction of the concept of "anticipation"**, applied in the project, so as to separate anticipatory initiatives (which from a heuristic point of view lie "radial" to energy transition) from initiatives that did not have this anticipatory character (which, again from the heuristic point of view, are "tangential" to it).

This **concept** identifies **four basic characteristics** of anticipatory experiences:

– factualness;
– social impact;
– transparency;
– systematicity.

Factualness. Anticipatory experiences, as opposed to others, have a factual character, i.e. they involve the introduction of a new technological system (completely new or, more often, new in the local context). Experiences that do not have an anticipatory character (in heuristic terms) are those that do not include this element and which, for example, only involve aspects such as training, awareness or information.

Social impact. Again as opposed to other initiatives, anticipatory experiences have a significant social impact (determining, for example, changes in attitudes, the introduction of new rules or standards, changes in the way people or organisations use resources, changes in local production systems, changes in living and working environments, etc.). Initiatives that do not have this impact or have a very limited impact are of minor importance in terms of understanding the dynamics of energy transition.

Transparency. Anticipatory experiences also include a third element, that of transparency; they are oriented towards "self-communication”, providing readily accessible information on the results achieved, critical elements, and interaction and exchange with other initiatives. Projects that do not have this degree of transparency are isolated from the global networks of actors involved in energy transition.

Systematicity. Anticipatory experiences are also highly systematic (although this may not always be fully expressed in reality), i.e. they act simultaneously in several areas (technological, economic, social and cultural) affected by energy transition. On the other hand, initiatives that focus on only one aspect of technology or society (e.g., one sector of technology or one type of social behaviour) cannot be considered "anticipatory", at least in the meaning used here.

The **added value** of this operational definition of the concept of "anticipation" can be summarised in **four points**:

- it allowed us to use a methodological approach centred on concrete factual elements and not mere hypotheses of a cognitive nature;
- the operational concept of anticipation allowed us to select initiatives which are significant for the study of energy transition;
- it allowed us to establish a preliminary and indispensable a priori categorisation of the dynamics associated with energy transition, an essential step in setting up exploratory research on the phenomena involved;
- in a proactive perspective, the concept of anticipation can be used for the design of actions aimed at accelerating energy transition.

2. The phenomena of energy transition

The operational concept of anticipation described above was used in a **screening process** to identify, out of an initial set of about 270 energy transition-oriented initiatives, a group of 60 experiences which had a clear anticipatory nature. Of these 60 experiments, a group of 20 initiatives were selected as having a high heuristic potential, with clearer anticipatory characteristics than the others (factualness, social impact, transparency and systematic nature). This group was studied in depth, by analysing relevant documentation and carrying out a series of detailed interviews.

The 20 anticipatory experiences were analysed using two **theoretical frameworks**, developed during the early stages of research.

The first concerns the **actors** involved in energy transition, who were grouped into **three energy transition regimes**:

– the **energy production and distribution regime** (REGIME 1), which includes actors such as companies, institutions and public bodies responsible for regulating the energy sector;
– the **individual consumption regime** (REGIME 2), where the main actors are private individuals or associations;
– the **collective consumption regime** (REGIME 3), involving actors such as companies, small and medium enterprises, public service institutions (schools, hospitals, etc.) and all persons who may be considered "major energy consumers".

The **second** theoretical framework centres around three **sociological categories**, used to analyse the three energy transition regimes:

– the **"structure"**, which refers to everything affecting the action of the actors, both of a physical nature (e.g. networks and infrastructure), and of purely social nature (standards, rules, behavioural models, organisational procedures, routines, power configurations, dominant cognitive models and representations, etc.);
– the **'agency'**, which refers to the actors' aptitude for action, expressed, for example, in widespread intentionality, forms of social mobilisation or the design of projects or negotiations oriented towards the achievement of specific goals;
– the **"social capital"**, which refers to the level of social integration, expressed in aspects such as the degree of mutual trust among citizens and between citizens and public authorities, and the cognitive capital, i.e. the information, knowledge and skills contributed by local actors and the institutions in charge of developing them.

These sociological categories, applied to the analysis of the regimes, allowed us to identify empirically some **700 "de facto situations"**, among the 20 anticipations, both in "operational" terms (i.e. events, happenings or other materials and immediately visible elements), and in "cognitive" terms (i.e. cultural orientations, behavioural models, representations of reality, symbolic materials, etc.).

These 700 de facto situations (as mentioned in the first section of the report) were compared to each other so as to "**condense**" them into more **general categories**, using linguistic processes (e.g. bundling together situations that were similar, even if recorded in different linguistic forms) or elementary abstraction procedures (for example, by including situations in the same category which differed only in terms of technologies used or contingent elements typical of individual experiences).

Thus these situations were condensed into about **249 recurrent "phenomena"** in anticipatory energy transition experiences. As such, they can presumably be regarded as characteristic of energy transition as a whole.

These anticipatory phenomena and experiences in which they were found (see para. 1) formed the **empirical platform** on which research was founded.

3. The constitutive factors of energy transition

The steps described above helped, as we have seen, to identify the first **two components of the interpretative model**, namely:

– the **anticipatory experiences** of energy transition
– a series of 249 **recurrent phenomena** in energy transition.

The recurrent phenomena were analysed, using both standard logic (to identify possible cause-effect relationships), and - almost necessarily - non-standard deontic logic (to assess the intentionality of the different actors involved in energy transition). In this way, it became possible to establish links among phenomena (based on e.g. their features, the meaning given them by the consulted sources or their recurrent mutual relationships) creating clusters of phenomena referring to broader categories.

This led to the **third step** – which resulted in an immediate simplification of the complex phenomenology of energy transition - namely the identification of **43 factors** typical of energy transition, of which the 249 recurrent phenomena are indicative.

These **factors** can be defined as social configurations having a force and a directionality, producing a meaning, linked to more general trends of social and cultural change, and constitutive of energy transition.

This definition can be deepened as follows.

a. The factors are **social configurations,** since they involve, each of them in a typical way, energy transition actors and therefore they affect one or more **transition regimes**.

b. The factors have a social **force** able to produce effects on energy transition.

c. The factors have **directionality**, since they show an intrinsic orientation towards energy transition, which can either take the form of **obstacles** to overcome (and therefore the expression of existing resistance or elements of local social structure that oppose energy transition) or **enablers** (i.e., elements that facilitate energy transition, activating agency mechanisms) present locally or which, if absent, are being encouraged.

d. The factors **produce a meaning** in that they define relatively stable and recognisable contexts of meaning (such as knowledge, narratives, intentionality, representation, stereotypes, etc.) which are the object of communication, exchange, collection and processing by the actors involved. These contexts of meaning concern aspects of energy transition (e.g., technology, decision making, planning, participation, transparency, common behaviours, etc.) and, ultimately, energy transition as a whole.

e. The factors are linked to **general trends of social and cultural change**, since they are influenced by - and affect – change processes of transnational nature, such as migration, ageing population, gender relations or changes in the governance of contemporary societies.

   In particular, these trends have been operationalised and reduced to **five vectors**, namely: the political-institutional vector, the anthropological vector, the social vector, the scientific technological vector and the globalisation of knowledge vector.

- The **political-institutional vector** is expressed in the tendency towards increasingly complex governance processes, linked, for example, to an increased influence of the European Union and transnational actors (e.g., rating agencies or multinational companies), an increased influence of non-state bodies (for example, civil society organisations, businesses and, in some contexts, even forms of organised crime), the gradual change of the role of the state, changes affecting the ways in which the public administration operates (for example, the growing importance of quality) or greater local autonomy vis-à-vis the central structures of the state.

- The **anthropological vector** is expressed in the deep transformations affecting some of contemporary society’s "anthropological" structures, such as gender relations, relations between generations, division of labour between the sexes, the development and distribution of care work and social reproduction, family types or the composition of human societies in ethnic, cultural or religious terms.

- The **social vector** is centred on changes in the dynamics of social inclusion and exclusion, manifested, for example, in the weakening of social cohesion because of various types of risks (social, environmental, safety-related, etc.), the emergence of new forms of poverty or the problems of sustainability in welfare regimes.

- The **scientific and technological vector** can be seen in the changed relationship between science and society, science’s loss of authority, the emergence of new modes of production for scientific and technological research (e.g. competition in accessing research funds, growing tendency of political leaders to guide research, strong pressure for the application of research, growing demand for transparency) and, not least, in an increased significance and pervasiveness of technology in all spheres of social life, due to a rapid succession of discoveries and innovations.

- The **globalisation of knowledge vector** is especially evident in the growing capacity for production, collection, processing, access and exchange of knowledge at global level, thanks to the opportunities offered by ICTs.

Each “factor” can of course **relate to one or more “vectors” of change.**

f. Finally, the factors are constitutive of energy transition from at least four different perspectives:
   - from the most significant and meaningful perspective, they are constitutive in that their absence (in the case of obstacles) or presence (in the case of enablers) increases the objective **probability of energy transition being achieved**;
   - they can be regarded as "constitutive" also in that they refer to the **condition of practicability** (in terms of exploiting enablers or successfully dealing with obstacles) which an eco-sustainable energy initiative needs to succeed;
   - these phenomena can be considered as constitutive also in that, as mentioned above, they refer to **contexts of meaning** which anyone about to undertake a similar initiative should take into account;
   - finally, they can be regarded, at least in a broad sense, as constitutive factors in that they refer to **recurrent events** in energy transition that need to be managed.

The constitutive factors identified are listed in the following table, divided into enablers and obstacles.

The constitutive factors of energy transition divided into enablers and obstacles	
Constitutive factors	
Enablers	*Obstacles*
– Adapting technologies to social and environmental contexts – Adopting a high quality management system – Building consensus – Capacity building of citizens and of public administration staff – Capacity building of technicians and professionals – Citizens’ active participation in the energy transition – Citizens’ orientation to change	– Citizen’s resistance linked to the search for individual and family autonomy – Citizens’ poor self-reliance in using eco-sustainable technologies – Difficulty in accessing funds – Disagreement on practical solutions concerning the organisation of daily life (convenience) – Juridical and administrative difficulties – Low priority given to energy saving by public service providers – Opposition of movements and citizens

– Continuous innovation – Creating an adequate and flexible regulatory framework – Decision making – Flexible project-designing geared to complexity – Functioning of an integrated networked fund-raising system – Link between local cognitive capital and global knowledge – Other actors' orientation to change – Presence of leadership of adequate quality – Programming the political process – Public communication and awareness-raising – Self-reflexivity and applying lessons learnt – Social, cultural and economic impact – Spreading of technological responsibility – Starting up a networking system – Technical assistance and maintenance	– Poor capacity to control energy performance and system quality – Poor control over costs – Poor knowledge-management orientation – Poor socialisation of technological innovation – Prejudice towards transition energy – Presence of critical aspects and errors in project-designing – Presence of critical aspects concerning the poor competence of technicians – Resistance by political forces – Resistance due to essential needs for comfort and cleanliness – Resistance in public administration – Resistance to innovation by professionals and developers – Shortcomings in the circulation of technical, social and political information – Tensions linked to the protection of privacy and to individual and family security – Undesired effects of user selection

4. The dimensions of complexity and nonlinearity in energy transition

The analysis of the constitutive factors of energy transition led to a **fourth step**, namely a look at how the **complex and nonlinear "nature"** of energy transition is articulated.

This becomes highly significant if we consider some **recurrent and wrong representations** of energy transition, which are at times not explicit but not for that less powerful and widespread, for example:

– energy transition as a **necessary step**, part of the development of contemporary societies (as, for example, the transition during the industrial revolution);

– energy transition as merely the **product of a policy system,** that is, of programmes, investments and measures at local, national and European level.

Although there is no denying the importance of these (and other) representations, an analysis of the experiences and the constitutive factors showed that they are limited in scope and not absolute. It is certainly true that the anticipations are an expression of specific policies oriented towards energy transition. It is also true, however, that in most cases, these experiences seem to involve **projects that tend to get out of planners' hand**, going in unexpected directions and producing unexpected outcomes, sometimes for the better, sometimes for the worse, but which could never be qualified as "necessary."

In particular we can distinguish **four dimensions of complexity and nonlinearity** that seem to be **specific to energy transition**. These dimensions involve, respectively:

– pervasiveness;
– close interaction with social dynamics;
– similarity with technology transfer processes;
– centrality in the governance processes of contemporary society.

4.1. Pervasiveness of energy transition

The first dimension of the complexity and nonlinearity of energy transition is its pervasive and widespread nature, as is clear from the analysis of the empirical platform. This dimension can, in turn, be divided into three elements.

a. Energy transition **materially affects the lives of all individuals**, since we all need to keep warm, all use electrical appliances, travel, produce waste or live in a house.

b. Energy transition **concerns individuals at several levels simultaneously**: as bearers of specific lifestyles; as users of public services (such as energy); as consumers of goods and products; in public life, as citizens concerned with collective energy choices; even in the workplace, as employers, retailers or large-scale energy consumers.

c. Energy transition affects the **entire spectrum of organisations** in an area, since all consume energy, produce waste or have mobility needs.

This means that anyone who promotes initiatives to accelerate energy transition must, if they want to avoid failure, be ready to deal with a considerable number of factors, whether obstacles or enablers, **covering almost the entire range of human experience**, from political practices to the most intimate aspects of the lives of families and individuals.

4.2. The close interaction between energy transition and social dynamics

The second dimension of the complexity and nonlinearity of energy transition is the close and articulate relations that it has with **social dynamics in general**.

This occurs on **two levels**, as highlighted above.

a. At **one level**, any initiative oriented towards energy transition must take into account **short-range societal dynamics**, mainly of local significance (widespread behaviour at local level; recurrent orientations of certain actors, such as businesses, the public administration, professionals or the media; local real estate market trends, etc.). In this sense, obstacles and enablers are to be considered as the most visible expression of the friction (negative or positive) between energy transition and local short-range social dynamics.

b. At a **second level**, initiatives have to take into account **long-range societal trends**, mainly transnational in origin and perspective, previously operationalised in the five vectors of social and cultural change (see para. 3).

4.3. Energy transition as technology transfer

The third dimension of the complexity and non-linearity of energy transition is the fact that it does not merely involve the implementation of new technological equipment (a waste recycling plant or an entirely new eco-sustainable neighbourhood) to be technically adapted to a given context, but a **process of technology transfer**, which may be unevenly distributed geographically, of which no single step is purely technical but always involves social, political, economic, cultural, communicational or organisational dynamics.

All this increases the level of **uncertainty** of energy transition, in that it is not an expression of a technological project but the result of a multifaceted network of events of different types (resistance, expectations, recurrent behaviour, investment, standards, programming activities, etc.) which condition its progress, phases and direction. For this reason, energy transition - as evidenced by the anticipations examined - requires considerable social and cultural investment, equal to and probably more than technological investment.

4.4. The centrality of energy transition in governance processes

The fourth dimension is the relationship between energy transition and the **governance of contemporary societies**. Even in this specific perspective, energy transition still comes out as a highly complex and nonlinear phenomenon.

In this respect, **two elements** may be identified that characterise energy transition from the perspective of governance.

a. Energy transition **reaches deep into the political dynamics** that characterise a given social context (whether it be transnational, national or local). Energy, in fact, represents a concern of primary political importance, which has strong impacts on the forms and configurations of power. Anticipations, in particular, show how many political mechanisms are normally started by initiatives (even small scale ones) aimed at eco-sustainable energy, such as those concerning consensus building, decision making, public communication of political motivations and objectives pursued, local and national legislative production, political leadership training and rotation, the many forms of people's participation in decisions, not to mention the questions regarding funds.

b. Energy transition **has a broad effect on political dynamics**. In fact, it affects almost **all public policy areas**, starting, of course, with energy and environment, and then economic development policies, agricultural, planning, transport, science and technology, and health policies. This means that, in more or less relevant and direct ways, any event moving in the direction of energy transition requires sophisticated levels of coordination among the many actors involved in governance and mobilises a wide range of interests that are likely to produce conflicts, tension, controversy and resistance.

5. The articulation of energy transition in two societal processes

The identification of four specific dimensions of the complexity and nonlinearity of energy transition summarised in the previous paragraph allows to grasp some other features of the energy transition.

Firstly, it should be pointed out that, **together**, the four dimensions mentioned above highlight that energy transition is not, nor can it be considered, a simple summation of projects, measures or policies and their results. Rather, **energy transition is to be understood as a process**, i.e. a network of changes that interact together and with the specific social and environmental context in which they develop, produced by the action, intentional or not, of a multiplicity of different actors and the intended or unintended effects of such actions.

In particular, the **first two dimensions** of the complexity and nonlinearity of energy transition - relating respectively to its pervasiveness and its link with the major trends of social and cultural change – provide another piece of information, namely that if **energy transition is a process, it is a societal process** (in the meaning already discussed in Chap. 2) because it:

– influences and is generally influenced by the structure and forces of change operating within the different social contexts in which it occurs;
– influences and is generally influenced by changes of a global and transnational nature.

More specific indications are provided by the **last two dimensions** of the complexity and nonlinearity of energy transition, which allow us to see the **energy transition as made up of two main components**.

a. The **first component** is given by the nature of energy transition as a **process of technology transfer**, centred on the introduction (identification, planning, activation, management, use, maintenance, etc.) of eco-sustainable energy technologies within a particular national or local context. In the framework of this model, this first component will be defined "**Technological Societal Process**".

b. The **second component** of energy transition is given by its nature as a **political process** that involves potentially all dynamics of a political nature (local, national, transnational), such as decision-making, adoption of standards, fund raising and management, or power relations between political and administrative levels. In the framework of this model, this second component is defined “**Political Societal Process**”.

The importance of these two processes is further emphasised by the fact that the **43 constitutive factors** of energy transition tend, in fact, to be distributed comprehensively and with almost no overlap among the two societal processes.

Based on the foregoing, therefore, the model can be organised according to the following algorithm:

– energy transition constitutes a **combination of two variables**, represented respectively by the Technological Societal Process and the Political Societal Process**;**
– the importance of each of the two processes lies in the existence of a number of **constitutive factors**, relating to them, with positive (enablers) or negative (obstacles) directionality as regards energy transition;
– the overall dimension (and actual presence in a given local or national context) of the constitutive factors is shown by the existence of a series of **phenomena functioning as indicators** relating specifically to them.

The following table **lists the constitutive factors** identified, divided into enablers and obstacles.

The constitutive factors of energy transition divided into the two societal processes	
Constitutive factors	
Technological societal process	Political societal process
Enablers 1. Adapting technologies to social and environmental contexts 2. Capacity building of technicians and professionals 3. Link between local cognitive capital and global knowledge 4. Technical assistance and maintenance 5. Flexible project-designing geared to complexity 6. Spreading of technological responsibility	*Enablers* 1. Presence of leadership of adequate quality 2. Programming the political process 3. Citizens’ orientation to change 4. Other actors’ orientation to change 5. Citizens’ active participation in the energy transition 6. Building consensus 7. Public communication and awareness-raising 8. Starting up a networking system

7. Continuous innovation	9. Capacity building of citizens and of public administration staff 10. Creating an adequate and flexible regulatory framework 11. Functioning of an integrated networked fund-raising system 12. Decision making 13. Adopting a high quality management system 14. Self-reflexivity and applying lessons learnt 15. Social, cultural and economic impact
Obstacles 1. Resistance to innovation by professionals and developers 2. Citizen's resistance linked to the search for individual and family autonomy 3. Disagreement on practical solutions concerning the organisation of daily life (convenience) 4. Tensions linked to the protection of privacy and to individual and family security 5. Resistance due to essential needs for comfort and cleanliness 6. Prejudice towards transition energy 7. Poor socialisation of technological innovation 8. Presence of critical aspects and errors in project-designing 9. Presence of critical aspects concerning the poor competence of technicians 10. Poor knowledge-management orientation	*Obstacles* 1. Resistance in public administration 2. Resistance by political forces 3. Opposition of movements and citizens 4. Juridical and administrative difficulties 5. Poor control over costs 6. Difficulty in accessing funds 7. Undesired effects of user selection 8. Poor capacity to control energy performance and system quality 9. Shortcomings in the circulation of technical, social and political information 10. Citizens' poor self-reliance in using eco-sustainable technologies 11. Low priority given to energy saving by public service providers

6. Constitutive factor descriptors

Taking into account all that has been said in the preceding paragraphs, we can establish for each constitutive element a **descriptive profile**, constructed on the basis of four descriptors (see chap. 4).

a. Societal Process

The first descriptor is represented by a reference to one of two societal processes, which would give us:

– constitutive factors of the **technological societal process**;
– constitutive factors of the **political societal process**.

b. Directionality

Within this first broad distinction, there is another, namely factor directionality:

– if the factor goes in the direction of energy transition, it is considered an **enabler**;
– if the factor goes in a direction opposed to energy transition, it is considered an **obstacle**.

c. Regimes

The third descriptor is made up of the **actors** involved in the single factor. As mentioned, these actors have been grouped into **three** energy transition **regimes**, so we have:

– factors affecting the **energy production and distribution regime** (REGIME 1);
– factors affecting the **individual consumption regime** (REGIME 2);
– factors affecting the **collective consumption regime** (REGIME 3)..

Each factor can obviously affect one or more energy transition regimes at the same time.

d. Vectors

A final descriptive element of the factor is the relationship with the **major trends of social and cultural change** in contemporary societies, which, as we have seen, have been operationalised in 5 vectors of change. We therefore have:

– factors that interact with the **political-institutional vector**;
– factors that interact with the **anthropological vector**;
– factors that interact with the **social vector**;
– factors that interact with the **science and technology vector**;
– factors that interact with the **globalisation of knowledge vector**.

Each factor can regard one or more vectors of change.

7. The weight of the constitutive factors

To build future scenarios, the next step to be taken in the development of the energy transition interpretative model is an assessment of the **significance** of individual constitutive factors to energy transition as a whole (although significance may vary in local contexts or in individual programmes aimed at eco-sustainable energy).

To answer this need, the energy transition model being presented **estimates the significance** of each individual factor (relative to others) by **assigning a weight**, depending on a dichotomous opposition between **factors of great and little significance**.

A weight was assigned to individual constitutive factors using a procedure involving an evaluation (inevitably intuitive to some degree) founded, albeit non-deterministically, on three criteria:

– the criterion of **intensity**, measured according to the alarm or the attention aroused by the factor in single anticipatory experiences;
– the criterion of **diffusion**, based on the presence of the factor in analysed anticipations (the higher the number of anticipations in which the factor has been observed the more widespread it is considered);
– the criterion of **resilience**, or the factor's permanence over time, evaluated on the basis of the nature of its interaction with major vectors of change.

Summary Diagrams

DIAGRAM 1
RESEARCH PHASES

Identification of about 270 eco-sustainable initiatives

↓

Identification and selection of a group of 60 anticipatory experiences

↓

Identification and study of a group of 20 highly significant anticipatory experiences

↓

Identification of 700 de facto situations within the anticipatory experiences examined

↓

Determination of 249 phenomena functioning as indicators

↓

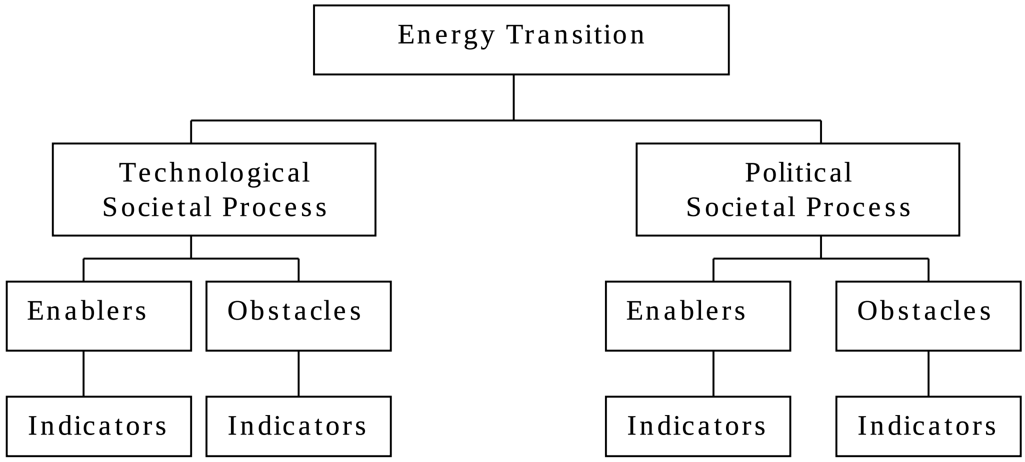
Determination of 43 constitutive factors of energy transition

↓

Identification of the Technological Societal Process and the Political Societal Process as articulations of energy transition

DIAGRAM 2

SPROMET MODEL COMPONENTS



Chapter Four

Suggestions on using the model for predictive purposes

1. Potential of the model for predictive purposes

The energy transition model presented in the previous chapter was developed to achieve two objectives:

– the first objective was to provide a **sociological interpretation** of energy transition, in order to understand its fundamental characteristics and main dynamics (an interpretation which, when used in a pro-active perspective, can also be useful in the design and management of eco-sustainable energy interventions);
– the second aim was to input elements useful for the **development of VLEEM and POLES models** (WP5) and the construction of energy transition scenarios (WP6).

Here, we concentrate on the second objective, giving some general guidelines on **how to use the proposed interpretative model**, for predictive purposes also.

In particular, attention focuses on two lines of development:

– use of the model to identify the **conditions of practicability** of energy transition;
– use of the model to identify **possible situations** in which energy transition can occur.

2. Conditions of practicability of energy transition

As a first step, the proposed interpretative model can be used to define the conditions of energy transition practicability.

To this end, we can start from the 43 constitutive factors, for which - as said above – a **descriptive profile** can be developed. This profile is based on the four descriptors and on an assessment about the significance of the factor with respect to the energy transition (see chap. 3).

This elements can be put in a (computerised) matrix or “string” detailing the descriptors and the weight attributed to each factor. The structure of the matrix could be the following:

1. NAME OF FACTOR										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T/P	E/O	X	X	X	X	X	X	X	X	High/Low

where:

- "Process" refers to the **societal process** to which the factor refers (T = technological societal process; P = political societal process);
- "Direction" refers to the **direction** that the factor takes as regards energy transition (E = Enabler; O = Obstacle);
- the next three boxes - marked with an "X" (presence) – refers to the **actors** primarily affected by the factor grouped into three "regimes" (R1 = production and distribution regime; R2 = individual consumption regime, R3 = collective consumption regime);
- the next five boxes refer to interactions - marked with an "X" (presence) – of the factor with **social and cultural change vectors** (V1 = political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector);
- the last box refers to the **weight** attributed to the factor as regards energy transition (High = high significance, Low = low significance).

This matrix allows us to group factors in different ways (for example, the regimes they involve, the vectors with which they interact, etc.).

For the purposes of an analysis of the conditions of energy transition practicability, however, the most significant grouping is based on the **weight criterion**.

Actually, following the logic of the model, we know that:

a. energy transition occurs necessarily through two processes, namely the technological societal process and the political societal process;
b. each process consists of a series of factors (enablers and obstacles);
c. each factor has greater or lesser significance.

Using this reasoning, we can define the optimal situation for energy transition as that characterised by the absence of or full control over all obstacles and the presence and full exploitation of all enabling factors.

This is obviously an "**ideal situation**", to be used as a yardstick for an overall assessment of the practicability of energy transition, for which it is possible to identify situations that are more or less desirable.

In the following tables, therefore, the factors are distributed according to this criterion, presented, firstly, by the process they refer to (tables 1 and 2) and then by their significance (tables 3 and 4).

Table 1 – Constitutive factors of the technological societal process

Factors of high significance	**Factors of low significance**
Enablers TE1 Adapting technologies to social and environmental contexts TE3 Link between local cognitive capital and global knowledge TE4 Technical assistance and maintenance TE5 Flexible project-designing geared to complexity TE6 Spreading of technological responsibility	*Enablers* TE2 Capacity building of technicians and professionals TE7 Continuous innovation
Obstacles TO2 Citizen's resistance linked to the search for individual and family autonomy TO3 Disagreement on practical solutions concerning the organisation of daily life (convenience) TO5 Resistance due to essential needs for comfort and cleanliness TO7 Poor socialisation of technological innovation TO8 Presence of critical aspects and errors in project-designing	*Obstacles* TO1 Resistance to innovation by professionals and developers TO4 Tensions linked to the protection of privacy and to individual and family security TO6 Prejudice towards transition energy TO9 Presence of critical aspects concerning the poor competence of technicians TO10 Poor knowledge-management orientation

Table 2 - Constitutive factors of the political societal process

Factors of high significance	**Factors of low significance**
Enablers PE1 Presence of leadership of adequate quality PE2 Programming the political process PE3 Citizens' orientation to change PE5 Citizens' active participation in the energy transition PE6 Building consensus	*Enablers* PE4 Other actors' orientation to change PE8 Starting up a networking system PE10 Creating an adequate and flexible regulatory framework PE12 Decision making PE13 Adopting a high quality management system

PE7 Public communication and awareness-raising PE9 Capacity building of citizens and of public administration staff PE11 Functioning of an integrated networked fund-raising system PE15 Social, cultural and economic impact	PE14 Self-reflexivity and applying lessons learnt
Obstacles PO1 Resistance in public administration PO5 Poor control over costs PO7 Undesired effects of user selection PO9 Shortcomings in the circulation of technical, social and political information PO10 Citizens' poor self-reliance in using eco-sustainable technologies	*Obstacles* PO2 Resistance by political forces PO3 Opposition of movements and citizens PO4 Juridical and administrative difficulties PO6 Difficulty in accessing funds PO8 Poor capacity to control energy performance and system quality PO11 Low priority given to energy saving by public service providers

Table 3 – Constitutive factors of high significance

Enablers	**Obstacles**
TE1 Adapting technologies to social and environmental contexts TE3 Link between local cognitive capital and global knowledge TE4 Technical assistance and maintenance TE5 Flexible project-designing geared to complexity TE6 Spreading of technological responsibility PE1 Presence of leadership of adequate quality PE2 Programming the political process PE3 Citizens' orientation to change PE5 Citizens' active participation in the energy transition PE6 Building consensus PE7 Public communication and awareness-raising PE9 Capacity building of citizens and of public administration staff PE11 Functioning of an integrated networked fund-raising system PE15 Social, cultural and economic impact	TO2 Citizen's resistance linked to the search for individual and family autonomy TO3 Disagreement on practical solutions concerning the organisation of daily life (convenience) TO5 Resistance due to essential needs for comfort and cleanliness TO7 Poor socialisation of TO8 technological innovation TO8 Presence of critical aspects and errors in project-designing PO1 Resistance in public administration PO5 Poor control over costs PO7 Undesired effects of user selection PO9 Shortcomings in the circulation of technical, social and political information PO10 Citizens' poor self-reliance in using eco-sustainable technologies

Table 4 - Constitutive factors of low significance

Enablers	Obstacles
TE2 Capacity building of technicians and professionals TE7 Continuous innovation PE4 Other actors' orientation to change PE8 Starting up a networking system PE10 Creating an adequate and flexible regulatory framework PE12 Decision making PE13 Adopting a high quality management system PE14 Self-reflexivity and applying lessons learnt	TO1 Resistance to innovation by professionals and developers TO4 Tensions linked to the protection of privacy and to individual and family security TO6 Prejudice towards transition energy TO9 Presence of critical aspects concerning the poor competence of technicians TO10 Poor knowledge-management orientation PO2 Resistance by political forces PO3 Opposition of movements and citizens PO4 Juridical and administrative difficulties PO6 Difficulty in accessing funds PO8 Poor capacity to control energy performance and system quality PO11 Low priority given to energy saving by public service providers

Bearing in mind these distributions, at least two **practicality situations** can be defined: one that is **optimal** (tables 1 and 2), in which all enablers are present and all obstacles are either absent, countered or fully controlled, and the other **satisfactory**, in which the most significant enablers and obstacles are at least present or absent respectively (Table 3).

These two practicability situations can be represented using a "back-casting" procedure (where the predictive process starts with the identification of an optimal situation or one that is considered desirable).

3. Possible situations for energy transition

The model, as mentioned, can also be used as a basis, not only to define an "ideal situation" of energy transition practicability but also to identify **possible situations** (both in general and in different local contexts) in which it can take place.

3.1. Four typical situations

As regards this second objective, following the logic of the model, we know that:

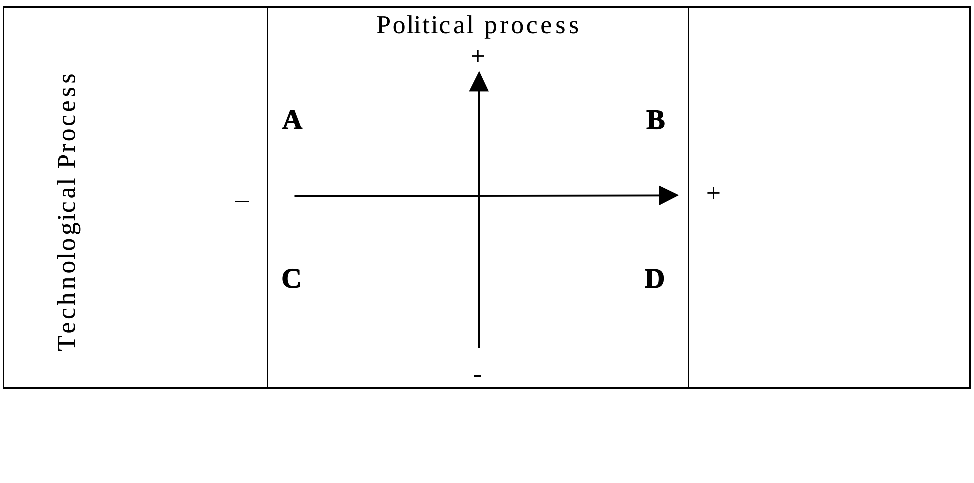
a. energy transition occurs necessarily through two processes, namely the technological societal process and the political societal process;
b. although they interact, these two processes may have a different relative weight;
c. energy transition (and the initiatives to promote it) can, in different contexts, take on different forms, depending on the prevalence of one process over another.

Using this reasoning, we can distinguish, in theory, four different limit situations:

– one in which the two processes both have the utmost intensity;
– one in which the technological process has the greatest intensity and the political process is minimal;
– one in which the political process has the greatest intensity and the technological process is minimal;
– one in which both processes have the little intensity.

The intensity degree of a process can be primarily assessed on the basis of the number of enablers which are present and exploited and the number of obstacles which are identified and put under control.

All this can be represented in a Cartesian plane, as shown in the figure below.



Box C. The most critical situation is obviously the one in **C**, where both processes are weak or even zero. In these cases, activation of energy transition is unlikely or very slow and will probably encounter strong social or technological obstacles.

Box B. The most positive situation is **B**, in which both processes are intense. This should be the case of large-scale programmes, which operate simultaneously in different fields (for example, energy saving, recycling waste, district heating, etc.), introducing a variety of technologies and whose aims have great social impact.

Box A. The typical situation, box **A**, includes programmes that intervene very little in terms of technology and a lot as regards political or social aspects (new rules, new standards, change in widespread behaviour, etc.). These are cases which, under a certain level of technological commitment, risk being of minor significance in that they do not sufficiently activate the transfer of technology (essential for effective energy transition).

Box D. The typical situation, box **D**, finally, is characteristic of initiatives that focus on introducing new technology and are not or only slightly oriented towards processes of a political nature. In this situation, the risk is that of adopting a highly technocratic approach, which does not take into consideration the social effects – which are pervasive – linked to the spread of new eco-sustainable energy technologies. Under a certain level of political commitment, even technical objectives are unlikely to be achieved. The new technologies introduced may not work, for example, because they are opposed by the population, because there is no market for them, because they do not activate the necessary organisational mechanisms which allow them to work, because they are not adopted and socialized by the very people who should promote them, and so on.

3.1. Further elaborations

Further elaborations will be made on the basis of first WPs of the PACT Project, aimed at providing predictive elements on the evolution of urban structure and land use, environmentally sustainable technologies and life-styles, following further lines of analysis.

For example, attention can be focused on **which technologies** require the activation of a strong political process and which do not. In this way, by building scenarios that identify technologies that will be most widespread in the future, it would also be possible to understand which of these require an intense political process, which an intense technological process and which require the simultaneous activation of the two processes at a high level of intensity.

Similarly, other elaborations could be made by considering the actors to be involved, operationally subdivided into **three energy transition regimes** (R1, R2 and R3), verifying, for example, which actors are activated in cases lying within different frameworks and which intensity of mobilisation can be seen or predicted, hypothetically, connecting the behaviour of the regimes with the types of technology introduced or with the evolution of lifestyles.

Similarly, elements of a predictive nature could also be derived from the analysis of the relations between the two societal processes and trends in the urban and territorial structure.

This will obviously be done considering all the results produced in the next phases of the PACT Project.

PART TWO
THE TWO SOCIETAL PROCESSES OF THE ENERGY TRANSITION

The second part of the report is devoted to the presentation of the constitutive factors of the two societal processes into which energy transition has been articulated.

The **Technological Societal Process** is detailed in the third section, while the **Political Societal Process** is detailed in the fourth section. Each section in turn, is divided into two chapters detailing, respectively, the enablers, namely factors that promote the societal process, and the obstacles, namely those that oppose it.

Each factor is briefly described in a fact sheet, divided into three parts:

- "**Rationale**", which introduces the factor, providing information about its role in energy transition;
- "**Description**", which gives information about the factor observed in the 20 examined anticipatory experiences;
- "**Indicators**", which lists the indicatory phenomena related to the factor recorded in the research, each marked with an identification code.

At the bottom of the sheet, there is a table listing the descriptors and the weight of the factor (see Chap. 4).

SECTION THREE

THE TECHNOLOGICAL SOCIETAL PROCESS

At the heart of energy transition there is undoubtedly a shift from a system of energy technologies based on fossil fuels to one where energy from renewable energy sources is predominant and which achieves levels of efficiency and energy savings significantly higher than at present.

This transition, however, should not be seen as a mere technological process. As already pointed out (see Chap. 3), energy transition is more like a general process of technology transfer, in which each technical step requires action or has organisational, economic, social and cultural implications, often decisive in promoting or, conversely, severely restricting or even preventing the deployment of new technological solutions.

The elements that come into play are therefore very different, including social or organisational aspects closely related to the operation of the technologies introduced (technical support and maintenance, training for technicians and professionals, resistance from some of the stakeholders materially responsible for their introduction) and aspects that are seemingly less closely related but equally decisive for the spread of environmentally sustainable technology solutions, such social acceptance, adaptation to local contexts and especially concrete absorption in the daily lives of individuals and families.

In sum, technology is undoubtedly a driving force in energy transition. However, this is only because it is transferable and is actually transferred, becoming an integral part of the social, economic and cultural context in which it is introduced. Outside this framework, there is the risk that new technology may be an element of separation and conflict or isolated from the dynamics of innovation and transformation that affect society as a whole.

Overall, for the **Technological Societal Process**, **17 constitutive factors** have been isolated, of which 7 enablers and 10 obstacles.

The **enablers** are:

TE1. Adapting technologies to social and environmental contexts

TE2. Capacity building of technicians and professionals

TE3. Link between local cognitive capital and global knowledge
TE4. Technical assistance and maintenance
TE5. Flexible project-designing geared to complexity
TE6. Spreading of technological responsibility
TE7. Continuous innovation

The **obstacles** identified are:

TO1. Resistance to innovation by professionals and developers
TO2. Citizen's resistance linked to the search for individual and family autonomy
TO3. Disagreement on practical solutions concerning the organisation of daily life (convenience)
TO4. Tensions linked to the protection of privacy and to individual and family security
TO5. Resistance due to essential needs for comfort and cleanliness
TO6. Prejudice towards transition energy
TO7. Poor socialisation of technological innovation
TO8. Presence of critical aspects and errors in project-designing
TO9. Presence of critical aspects concerning the poor competence of technicians
TO10. Poor knowledge-management orientation

Chapter Five
Enablers

FACTOR TE1

Adapting technologies to social and environmental contexts

Rationale

In any technology transfer process, one of the main critical points is the problem of making the new technology compatible with the social and environmental context concerned. A technology is rarely perfectly compatible with the local context straight away. Varying degrees of adaptation occur in any case, either by those transferring the technology or by those using it.

As regards complex technological systems, such as those connected to energy production, distribution and saving, the question of compatibility is fundamental. It is a matter of **adapting these systems to the set of characteristics of the territory** concerned, be they physical or human characteristics, such as environmental conditions, the prevalent architectural elements, urban arrangement, and the features of the social organisation and production system.

That is why **ADAPTING TECHNOLOGIES TO SOCIAL AND ENVIRONMENTAL CONTEXTS** is a powerful enabling factor because it makes their use possible and facilitates acceptance on the part of the professionals and technicians involved, and of the population as a whole.

Description

The experiences examined offer several examples of strategies geared to adapting new technologies.

In one of the experiences analysed, solar panel technology – normally used in single family homes – was adapted in order **to make it compatible with a very densely populated urban context** characterised by condominiums. One example is that of adopting particular solar panels which could be installed horizontally on roofs (instead of vertically, as is normally the case) or with only a slight inclination, in order to minimise visual impact on the existing building's appearance.

In other cases, when selecting the technologies to be used, it was decided to privilege those that could **make the most of local production potential**. This was the case, for instance, with projects envisaging district heating systems powered by local agricultural by-products (such as straw) or by products easily available locally (e.g. wood chip burners), with the dual effect of sustaining the local economy and cutting transport costs of combustibles.

Finally, some experiences focused on introducing wind technology by **making the most of a centuries-old local tradition of windmills**.

This factor is very important in triggering socio-technological process and, on the whole, reflects a more general aptitude – also found in other sectors – of creating a closer link of scientific and technological research with the territory's economic and social development.

Indicators

TE1.1 Adapting the technology to production sectors and to local resources

TE1.2 Adapting the technology to the urban context

TE1.3 Adopting technologies already present in local traditions

TE1.4 Adopting technologies that can make use of local environmental factors

TE1.5 Using technologies that can make the most of the architectural characteristics of existing buildings

TE1: ADAPTING TECHNOLOGIES TO SOCIAL AND ENVIRONMENTAL CONTEXTS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	E	X				X	X	X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TE2

Capacity building of technicians and professionals

Rationale

Within the socio-technological process, a key role is **played by the various professionals involved**: not only architects, planners and engineers, but also technical staff such as electricians and plumbers who are the first to be involved in the installation and maintenance of new machinery. Ensuring the adequate preparation of these people in using the new technologies transferred is evidently important for a successful transition towards a post-carbon society.

Hence the importance of **CAPACITY BUILDING OF TECHNICIANS AND PROFESSIONALS** as an enabling factor, not just to enhance these people's skills, but also to train new professionals who can make full use of the potential of the technologies concerned.

Description

Analysis of the anticipatory experiences led to identifying various examples of successful capacity building geared – depending on the situation – to architects (e.g. on designing solar panels and photovoltaic systems to be installed inside buildings), plumbing technicians (e.g. in setting up district heating systems) or electricians (e.g. in installing solar collectors, photovoltaic panels or small wind turbines).

In several cases, the promoters introduced new professional roles such as "**green planners**" and "**sustainability operators**" in firms, "**energy advisers**" and "**mobility managers**".

In one of the initiatives, the local energy agency prepared a whole set of technical documents (including such things as a guide to **drafting eco-sustainable projects** and a manual for **inspecting and evaluating** installations) for a broad range of operators concerned.

This factor can play a key role, above all, if grasped in its broadest sense of scaling-up the initiatives geared to spreading eco-sustainable energy technologies, and is combined with broader transformation processes such as the adoption of institutional strategies for creating technological projects more attentive to the valorisation of local human capital, the production of a stock of technical knowledge at a global level and attention to the more immediately applicable aspects of research activity.

Indicators

TE2.1 Training for local technicians

TE2.2 Training for architects and engineers

TE2.3 Enhancing the technical competences of the sector's firms

TE2.4 Creating new specific professional profiles

TE2.5 Adopting guidelines on the installation, use and evaluation of technologies

TE2.6 Establishing places and promoting initiatives aimed at allowing different professionals to share knowledge

TE2: CAPACITY BUILDING OF TECHNICIANS AND PROFESSIONALS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	E	X						X	X	low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TE3

Link between local cognitive capital and global knowledge

Rationale

Starting up an energy transition process necessarily means making use of a **vast body of scientific and technical knowledge which is not usually readily available locally**. Moreover, global knowledge on sustainability is not enough. It is nurtured by **bottom-up knowledge building** within a process involving local administrations as well as research institutes and other organisations in the territory.

Hence the importance of the enabler called **LINK BETWEEN LOCAL COGNITIVE CAPITAL AND GLOBAL KNOWLEDGE**. This constitutive factor ensures that local knowledge is not wasted and, at the same time, that there is no risk of using global knowledge in a mechanical way that turns out to be ineffective.

Description

A propensity to harmoniously link local knowledge with global knowledge was found in several initiatives. In many cases, this need was met by project promoters by establishing – already at the outset – **cooperation with universities and research centres**, and this enabled them to obtain advanced scientific knowledge for advice, opinions and evaluations geared to such things as **project-designing or testing the energy efficiency of new plant and equipment**.

Still with a view to establishing links between the local and global sphere, some projects led to specific programmes geared to formalising and capitalising on the **lessons learnt** during the project itself or in other initiatives, particularly in the field of sustainable architecture. These programmes took the form of a forum in which the various stakeholders (national government, local administration, architects associations, developers, etc.) could discuss the outcomes of the various experimental actions implemented in constructing sustainable buildings and housing estates.

Although not playing a key role in itself, this factor is still important – especially when viewed within the context of an overall transformation of the global dynamics of knowledge and the current changes in the way scientific and technological research is produced and valorised.

Indicators

TE3.1 Access to local cognitive capital in designing and managing activities

TE3.2 Institutional learning on the basis of one's own and others' experience

TE3.3 Creation and participation in international networks involving eco-sustainable experiences

TE3.4 Establishment of new disciplinary specialisation pertaining to eco-sustainable experiences

TE3: Link between local cognitive capital and global knowledge										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	E	X			X			X	X	high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TE4

Technical assistance and maintenance

Rationale

With energy technologies, every innovation involves forms of technology transfer affecting all the buildings in the territory to varying degrees (private homes, condominiums, public buildings, industrial plants, etc.).

This very transferable nature of energy technologies highlights the importance of **developing a widespread network of TECHNICAL ASSISTANCE AND MAINTENANCE** as an enabling factor involving a broad range of people in order to guarantee such things as timely action in case of breakdowns, adequate availability throughout the day of personnel for checking equipment, the immediate availability of spare parts and the proper prevention of possible factors that could jeopardise plant and equipment as well as citizens' own safety.

This is an important aspect in view of the fact that spreading new technologies often precedes the creation of a suitable assistance and maintenance network. Although this may be acceptable in the case of technologies with low social and economic impact, it is particularly dangerous in the case of complex technological systems concerning whole communities.

Description

One strategy adopted by some promoters (particularly by local administrations) to provide adequate technical assistance to plant and equipment is to set up **energy advice centres**, independently of the energy technology providing firms, in order to provide advice to citizens on what to do at home with regard to insulation, energy saving, and energy and heat production from renewable sources. This advice is often geared to guiding citizens within the complex picture of state and regional tax incentives.

In other cases, the projects proactively tried to promote **assistance services** to firms, public utilities or local authorities in planning their own strategies for increasing energy efficiency or for producing clean energy.

In the cases examined, there was also a propensity to set up **preventive maintenance systems** in order save time and costs in bringing broken-down equipment back into operation.

Indicators

TE4.1 Access to networks of professionals for technical assistance

TE4.2 Presence of over-the-counter services for assistance and advice

TE4.3 Start-up of maintenance services

TE4.4 Acknowledgement of the priority of prevention in maintenance

TE4: TECHNICAL ASSISTANCE AND MAINTENANCE										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	E	X	X	X		X	X	X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TE5

Flexible project-designing geared to complexity

Rationale

One of the indications emerging from the analysis of eco-sustainable projects is that, in order for technologies of high social impact – including energy ones – to be socially accepted and to work effectively, they must be conceived and, above all, transferred bearing in mind the growing complexity characterising contemporary societies.

There are various factors contributing to this trend towards social complexity. The most prominent of these include increased **social differentiation** (in cultural, demographic and economic terms, but increasingly nurtured by a diversification of people's personal choices and lifestyles), the strengthening and spreading – among citizens – of the **legitimate expectation** of seeing their own needs fulfilled in the relationship with service providers (e.g., comfort, cleanliness or individual autonomy), as well as the presence in society of **some broad emerging transformation dynamics** (linked to such things as international migrations, an ageing population or changes in family structure).

All this highlights the importance of **FLEXIBLE PROJECT-DESIGNING GEARED TO COMPLEXITY** as the enabler of energy transition. Project-designing that **can thus rapidly adapt** to the different needs of citizens and of different social groups.

Description

The experiences analysed offer some indications on how this kind of project-designing can be achieved.

In this regard, it is interesting to note the various actions geared to coming to terms with some phenomena emerging in the territory and society as a whole. For instance, many initiatives aimed at building eco-sustainable neighbourhoods that can house **social groups and families with different needs** (young couples, low-income and high-income families, immigrants, etc.) by offering a balanced mix of housing including free-hold properties, rented accommodation and council tenancies. Some of them were planned also with a view to prevent **urban sprawling**.

Some projects envisaged building homes to meet the needs, for example, of Islamic residents, the elderly with physical problems and the disabled. In other cases, "modulable" and flexible homes were designed which could be modified on the residents' request.

Some initiatives particularly paid attention to **citizens' expectations** (comfort, convenience, security, etc.). Examples of this are the various initiatives which introduced an urban traffic arrangement which could combine needs for mobility with those of comfort (elimination of noise) and road safety (especially for children).

It is also worth mentioning the many actions which adopted a **holistic approach** by developing project-designing methods that can consider all the variables concerned (quality of materials used, eating habits, refuse management, water use, ways of producing energy from renewable sources, energy saving in homes, mobility and transportation, etc.). Some promoters followed another path: that of "reducing complexity" by adopting such things as **already tried and tested technologies** produced on an industrial scale in order to minimise maintenance problems and repair costs in case of breakdown.

Indicators	TE5.1	Project-designing attentive to different social classes
	TE5.2	Project-designing sensitive to urban structure
	TE5.3	Project-designing taking beneficiary families' lifestyles and characteristics into account
	TE5.4	Project-designing attentive to cultural diversity
	TE5.5	Project-designing attentive to needs for comfort and cleanliness
	TE5.6	Project-designing sensitive to daily-life organisation (convenience)
	TE5.7	Project-designing attentive to aesthetic pleasure
	TE5.8	Project-designing attentive to individual and family autonomy
	TE5. 9	Project-designing considering the need for security
	TE5.10	A holistic approach to project-designing
	TE5.11	Project-designing attentive to long-term economic dynamics
	TE5.12	Inclusion of energy performance as a project-designing parameter

TE5.13 Ad-hoc technological project-designing for large-scale consumers

TE5: FLEXIBLE PROJECT-DESIGNING GEARED TO COMPLEXITY										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	E	X				X	X	X	X	high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TE6

Spreading of technological responsibility

Rationale

The sustainability of energy transition programmes **does not depend solely on public authorities or specialised personnel**. There are indeed many subjects and sectors of society involved, either because they have a role in technology transfer processes (including the user's role) or because they are stakeholders (economic, political, environmental protection, etc.) concerning the new technology introduced or the abandoning of the old one.

In this regard, the energy transition process cannot be viewed other than as a **social undertaking** in which everyone (technicians, builders, public service heads, civil society organisations, users, etc.) can express their own "**technological responsibility**", that is, they can play their own part in facilitating the emergence of a post-carbon society.

The **SPREADING OF TECHNOLOGICAL RESPONSIBILITY** is thus a constitutive factor of the energy transition process. This is not an abstract or ideological matter. If we view energy transition only as a purely technological or political question with only a few actors involved, then many of the functions (economic, organisational, political, relational, cultural and so on) necessary for implementing this transition cannot be catered to by anyone, with the risk that the projects and experiments carried out will remain **one-off experiences** for a long time.

Description

Examples of the taking on of technological responsibility were found when analysing the anticipatory experiences.

A significant aspect, for example, was the **proactive attitude of citizens in promoting, sustaining and implementing programmes geared to sustainability** (such as, when defining and introducing new plans for mobility or in designing and implementing new procedures for differentiated refuse collection) as well as, in some cases, their direct economic involvement in supporting the adoption of new technologies.

Similar cases were found (in some projects, and overcoming the initial resistance) also with **engineers and architects**, who autonomously took on specific responsibilities such as in searching for new technical solutions, in spreading eco-sustainable technologies in the local market or in guaranteeing the validity and safety of new technologies for the general public.

Technological responsibility is undoubtedly something that must be grasped within a broader change of **relations between science and society**, and the search for new and **more effective forms of governance** of contemporary societies.

Indicators

TE6.1 Divulgation and commercialisation of technologies by architects and engineers

TE6.2 Citizens' economic commitment in adopting new technologies

TE6.3 Citizens' adoption of ecologically sustainable technological solutions (differentiated refuse collection, urban transportation plans, etc.)

TE6.4 Increasing eco-sustainable behaviour

TE6: SPREADING OF TECHNOLOGICAL RESPONSIBILITY										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	E	X	X	X	X	X		X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TE7

Continuous innovation

Rationale

In the field of post-carbon technologies there is a **continuous improvement of energy performance** of equipment (insulation, solar panels, photovoltaic panels, wind turbines, etc.). However, this does not mean, per se, that it will accelerate energy transition, which is not only facilitated by new inventions but especially by a widespread and continuous process of dissemination, adaptation and development of new technological approaches in the various local and national contexts.

In this sense, an intelligent and realistic action of **continuous innovation** – through such things as regular updating of one's own operative procedures, the development of medium- and long-term technological renovation strategies or the implementation of experimental programmes to improve the technology adopted or the ways it is marketed, used or managed – must be grasped as a **necessary condition for success** of energy transition programmes.

Description

Many examples of continuous innovation were found in the experiences examined, in sectors like refuse disposal management (e.g., by using robots or underground automatic separation systems for differentiated refuse collection) the use of sustainable materials, the experimentation of biofuels, the construction of wind turbines for single family homes, heat insulation techniques or improvement of technologies for electricity and heat production.

Continuous innovation is also facilitated by more general trends in the way scientific and technological research is produced and by the consolidation of a broad set of global knowledge regarding eco-sustainable energy easily available to all.

Indicators

TE7.1 Developing environmental technologies on the basis of research results

TE7.2 Investing routinely in technological updating

TE7.3 Implementing pilot studies to experiment innovative technologies

TE7.4 Making the most of opportunities offered by ICT for innovation in the ecological sustainability field

TE7.5 Adopting new technical solutions

TE7: CONTINUOUS INNOVATION										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	E	X						X	X	low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

Chapter Six

Obstacles

FACTOR TO1

Resistance to innovation by professionals and developers

Rationale

One of the most significant and, in some respects, more paradoxical aspects emerging from the analysis of projects geared to eco-sustainability is that the greatest resistance to energy transition often comes from the very people entrusted with implementing them, and namely **professionals, technicians and developers**.

The introduction of post-carbon technologies necessarily conflicts with consolidated **work habits** (e.g., of architects, engineers, planners and other technical people) which are difficult to give up and that the people concerned often do not wish to give up, as well as with the **interests** of developers who are reluctant to invest when the return on their investment is not immediately clear or certain. This **RESISTANCE TO INNOVATION BY PROFESSIONALS AND DEVELOPERS** is thus an obstacle to starting up a socio-technological process and can lead to such things as: slowdowns in implementing initiatives, conflicts with promoters, a reduction of the more ambitious aspects of the interventions from an energy and social standpoint.

Description

In the research, widespread prejudice was found among professionals regarding the **real effectiveness of thermal solar panels in energy saving**. Further resistance was due to difficulties in including solar panels in one's projects, which were difficult to integrate in the aesthetic and functional aspects of the buildings. In still other cases, the scientific community of architects had negative views on projects for building eco-sustainable housing estates.

As regards developers, their resistance was often due to the fact that they could not gain any benefit from introducing eco-sustainable energy systems in view of the installation costs, which were either covered by public subsidies directly granted to house buyers themselves or had to be included in the price of the home (thereby increasing the risk of the investment made). More generally, developers showed a certain difficulty in accepting or adapting to new standards (with regard to parking lots, spaces, materials, heating systems, etc.) imposed on them in the construction of eco-sustainable buildings and housing estates.

In one of the cases examined, there was such developer resistance to these standards – in that specific situation concerning homes tailored to the needs of Islamic families and thus with a particular space arrangement – that, in the end, it was not possible to complete the whole project. Finally, in other cases, after their initial strong participation, the builders showed a gradual loss of commitment in supporting the more innovative aspects in the project as regards environmental and energy matters.

Indicators

TO1.1 No confidence in renewable energy production technologies

TO1.2 Architects and engineers' reluctance and hostility

TO1.3 Builders' scant interest in energy saving

TO1.4 Builder's scepticism regarding established energy goals

TO1.5 Builders' resistance due to low profitability of eco-sustainable projects

TO1.6 Builders' poor attention to social aspects

TO1.7 Builders' resistance to technological solutions accommodating cultural diversity

TO1.8 Builders' gradual loss of commitment during the project as regards the highly innovative nature of eco-sustainable projects

TO1: RESISTANCE TO INNOVATION BY PROFESSIONALS AND DEVELOPERS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O	X							X	low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO2

Citizens' resistance linked to the search for individual and family autonomy

Rationale

The study found **great resistance to innovation** on the part of the people concerned, above all, when it meant changing **lifestyles** or when it was perceived as something limiting their **individual or family autonomy** (consumption decisions, use of space outside and inside the home, behaviours linked to home ventilation, etc.).

CITIZENS' RESISTANCE LINKED TO THE SEARCH FOR INDIVIDUAL AND FAMILY AUTONOMY is an obstacle found, above all, when adopting behaviours that differ from the ones expected by those promoting the use of eco-sustainable technologies. These behaviours sometimes undermine the very introduction of new energy solutions.

Description

Examples of this kind of resistance were found in the case of **residents of neighbourhoods with low environmental impact** who were exposed to broad awareness-raising programmes on energy saving. These people showed behaviours such as increasing the use of electrical appliances and standby devices in the home, purchasing and using bigger cars with a higher fuel consumption, or by increasing the number of flights paid, at times, with money saved by reducing energy consumption. These behaviours must be interpreted as the expression of a strong trend towards autonomy, especially in view of the fact that they were widely found among people long exposed to awareness-raising initiatives regarding energy saving. Moreover, it must be noted that, in some cases, the increase in energy costs deriving from these behaviours was even higher than the saving obtained by the introduction of new energy technologies.

More explicit resistance was found in initiatives envisaging the shift to district heating or condominium central heating, where users who were used to their own independent heating system refused to connect to the new system.

These phenomena undoubtedly indicate broader and widespread processes of growth of individual subjectivity which, in turn, affect relations between science, technology and society.

Indicators

TO2.1 Tendency to maintain high energy consumption also in families exposed to intense awareness-raising campaigns on energy saving

TO2.2 Energy saving obtained through new technological solutions undermined by the beneficiaries' increasing use of consumer goods

TO2.3 Children and teenagers' tendency to waste electricity

TO2.4 Inhabitants' resistance to using condominium installations

TO2: Citizens' resistance linked to the search for individual and family autonomy										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O		X			X	X	X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO3

Disagreement on practical solutions concerning the organisation of daily life (convenience)

Rationale

The shift to a post-carbon society is linked not only to the introduction of new technologies, but also to the emergence of a **different organisation of daily life** more geared to energy saving and to cutting consumption.

In particular, as regards **mobility and housing**, solutions such as living without a car, drastically reducing trips outside one's neighbourhood, promoting mixed home/office buildings and supporting collectivist organisational forms were widely adopted by the promoters of the anticipatory experiences analysed in the study.

These very attempts are linked to the obstacle entitled **DISAGREEMENT ON PRACTICAL SOLUTIONS CONCERNING THE ORGANISATION OF DAILY LIFE (CONVENIENCE).** Citizens cannot give up **convenience** – meant as the need to solve problems of scheduling their activities and, more generally, to save time and immediately access, with no prior notice, all the goods and services making up daily life.

Description

The phenomena found in the project include protests against the **low number of parking lots, the attempts made to get round the restrictions on car use**, the **re-conversion** of mixed home/office buildings to **simple dwellings** on the part of owners, phenomena of "**leaving one's neighbourhood**" either to go to big supermarkets and shopping centres (by car) or to spend one's free time.

This obstacle is linked to the increased value people place on convenience in all aspects of social life.

Indicators

- TO3.1 Resistance to restrictions on automobile use
- TO3.2 Residents' tendency to spend their free time in other neighbourhoods for lack of opportunities
- TO3.3 Conflict of interest between the introduction of new technologies and other needs of large-scale users

TO3.4 Disagreement on the purchase and use of mixed home/office buildings

TO3: DISAGREEMENT ON PRACTICAL SOLUTIONS CONCERNING THE ORGANISATION OF DAILY LIFE (CONVENIENCE)										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O		X	X		X	X	X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO4

Tensions linked to the protection of privacy and to individual and family security

Rationale

Energy transition, as found in the **anticipatory experiences**, also comes about through widespread innovation envisaging the dissemination of new technologies **directly in people's homes**.

However, this kind of change risks creating **TENSIONS LINKED TO THE PROTECTION OF PRIVACY AND TO INDIVIDUAL AND FAMILY SECURITY**. To meet this need, users sometimes **act contrary to expectations** thereby considerably reducing the positive impacts derived from the use of sustainable technologies.

Description

The study found how some residents tried to guarantee their own **privacy** by putting up **curtains in windows of passive homes**, thereby reducing energy efficiency. Tensions linked to privacy were also found in eco-sustainable urban-planning initiatives which tended to favour a density of housing perceived by many residents as a limitation of their own privacy. Some technologies introduced were replaced because they were perceived – or actually were – dangerous to people's health.

This obstacle, like the previous ones, expresses people's more general concern for privacy and health (which is an emerging trait in contemporary societies), which also comes across in people's relationship with scientific and technological innovation.

Indicators

TO4.1 Inefficient use of technology for privacy reasons

TO4.2 Housing density perceived as a disadvantage

TO4.3 Risks to health linked to the technology used

TO4: TENSIONS LINKED TO THE PROTECTION OF PRIVACY AND TO INDIVIDUAL AND FAMILY SECURITY										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O		X			X		X		low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO5

Resistance due to essential needs for comfort and cleanliness

Rationale

The shift to the post-carbon society will certainly lead to important **changes in citizens' "habitat**", at various levels: within urban spaces, mobility, private homes, work places and public services.

Changes in people's living environment are not always fully accepted, though. At times, they are resisted, especially because people believe they affect (and they often do) the **standards of comfort and cleanliness they are used to** – standards they themselves consider as essential needs and thus hardly negotiable, even when vital issues are at stake such as energy saving or the reduction of greenhouse gas emissions. This **RESISTANCE DUE TO ESSENTIAL NEEDS FOR COMFORT AND CLEANLINESS** are thus an obstacle to the transition to a post-carbon society.

Description

It is possible to cite **various examples** of how needs for comfort and cleanliness are **dominant** for people compared to eco-sustainability goals.

It was found how, in some cases, people used the special areas in a passive home that are dedicated to indoor and outdoor temperature compensation as normal rooms, thereby wasting heat and energy.

In other cases, for reasons of cleanliness, people replaced their water-saving lavatories with more traditional ones. Finally, in various surveys conducted among inhabitants of new eco-sustainable neighbourhoods, the residents' decision to move there was firstly based on aspects of comfort and only secondarily on environmental aspects.

Despite being often neglected, this hindering factor may carry significant weight in the success of initiatives geared to energy transition.

Indicators

TO5.1 Inefficient use of technology for comfort reasons

TO5.2 Substitution of technology by users because it is considered inadequate

TO5.3 Priority of comfort over environmental aspects in people's decision-making

TO5: RESISTANCE DUE TO ESSENTIAL NEEDS FOR COMFORT AND CLEANLINESS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O		X			X	X	X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO6

Prejudice towards energy transition

Rationale

One of the main difficulties in shifting to an eco-sustainable society is **overcoming the inertia of social dynamics** that are deeply linked to **carbon-based** energy production.

This inertia comes across in the **PREJUDICE TOWARDS ENERGY TRANSITION,** especially as regards its actual implementation (because it may be considered too expensive and complicated) and usefulness (many eco-sustainable technologies are widely considered to be inefficient and even harmful).

The presence of this prejudice, as one can easily imagine, is a great obstacle on the road to widespread social acceptance of post-carbon technologies.

Description

Prejudice towards eco-sustainable technologies was found in several anticipatory experiences.

These prejudices (without going into how valid they may be) include: the idea that energy saving deriving from using solar panels does not compensate the energy needed to produce them in the first place; the idea that solar panels are unsuitable for urban contexts; fears concerning energy production from refuse; the belief that windmills are dangerous for birds.

Further difficulties are linked to people's **resistance to invest in equipment for the production of renewable energy**, certainly linked to poor knowledge of the subject (such as the legal and fiscal aspects), but also to the idea that investing in these technologies is complicated and risky.

In some cases, paradoxically, there were even users' excessive expectations regarding the performance of solar panels installed in their own homes (particularly as regards very ecologically-friendly panels).

Indicators

TO6.1 Media dissemination of a negative image of innovative experiences

TO6.2 Presence of stereotyping and prejudice regarding eco-sustainable technologies

TO6.3 Poor knowledge of the advantages of new technologies

TO6.4 Cognitive type resistance to investing in energy efficiency on the part of citizens

TO6.5 Excessive user expectations regarding technology use

TO6: PREJUDICE TOWARDS ENERGY TRANSITION										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O		X	X				X		low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO7

Poor socialisation of technological innovation

Rationale

The transition to a post-carbon society risks slowing down if some necessary social mechanisms enabling the "**socialisation of eco-sustainable technologies**" are not activated. That is, if these technologies are not fully absorbed at the local level in terms of the capacity of use, management, maintenance, repair and, if necessary, modification and change.

It is in this light that the obstacle of **POOR SOCIALISATION OF TECHNOLOGICAL INNOVATION** must be interpreted. A non-"socialised" technology (and there are many cases of this, such as in the field of international cooperation for development) remains alien to the local context and produces dependency effects (e.g., with respect to foreign or multinational firms not present locally, technicians coming from outside or materials and tools that must be brought in from outside the local sphere).

Description

The study found some signs of a **poor socialisation of technological innovation**.

These include such things as the absence, discontinuity or poor accessibility of technical assistance and maintenance services, the inadequate availability of installers for the new equipment introduced, and the poor quality of locally available technology supplies.

Indicators

- TO7.1 Absence of technicians and networks of professionals for installation and maintenance purposes
- TO7.2 Low economic appeal of the maintenance field
- TO7.3 Poor quality of technology supplies
- TO7.4 Lack of continuity in technical assistance services
- TO7.5 Lack of specific services for starting up or facilitating the maintenance of installations for collective consumers
- TO7.6 Lack of guarantees and assurance in the adoption of post-carbon technologies

TO7.7 Dependence for technology used from abroad

TO7.8 Limited interests for eco-sustainable experiences by some key players

TO7: POOR SOCIALISATION OF TECHNOLOGICAL INNOVATION										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O	X	X	X	X			X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO8

Presence of critical aspects and errors in project-designing

Rationale

Another obstacle which can weigh heavily on energy transition processes is the **PRESENCE OF CRITICAL ASPECTS AND ERRORS IN PROJECT-DESIGNING** concerning eco-sustainable plant and equipment.

This phenomenon concerns technologies themselves as much as the way they are transferred to new social, economic and environmental contexts.

This obstacle may, at least in general terms, be ascribed to many different factors such as the objective difficulty in designing the technologies introduced, the project-designers' lack of specific grounding, the way some aspects of technology transfer are underestimated, the haste in which some projects were designed and implemented or the difficult political context they were conceived and developed in.

Description

The project-designing difficulties and errors found in the study are of various kinds.

The following were recorded, in particular: problems in assessing the weight of **citizens' and users' expectations** with regard to such things as comfort, practicality, privacy or security; **mistakes in forecasting** some important trends (e.g., demographic trends in the area); critical aspects found when **introducing the technology** in the local architectural, environmental, social and economic context; **project-designing** errors (the wrong technological solutions; mistakes in project scaling; calculation errors in evaluating the effects of using certain construction materials on energy saving, etc.).

This phenomenon involves various more general dynamics linked to the management of science and technology, and to large scale social and cultural transformations found in all contemporary societies.

Indicators

TO8.1 Lack of project-designing in relation to comfort

TO8.2 Lack of project-designing in relation to the comfort of the elderly and of the disabled

TO8.3 Lack of project-designing in relation to citizens' needs to organise their daily life (convenience)

TO8.4	Lack of project-designing in relation to aesthetic pleasure
TO8.5	Lack of project-designing in relation to privacy
TO8.6	Lack of project-designing in relation to security
TO8.7	Demographic forecasting errors in the project-designing of new eco-sustainable housing estates
TO8.8	Errors in energy saving calculations
TO8.9	Errors in technological development forecasts
TO8.10	Instability of technological decisions over time
TO8.11	Lack of project-designing in relation to project scaling down
TO8.12	Inadequacy of the technological solutions adopted
TO8.13	Errors due to the excessive haste in project-designing
TO8.14	Non-implementation of part of the innovations envisaged in project-designing
TO8.15	Use of inadequate calculus methods and materials for solar panel installation
TO8.16	Unfavourable environmental elements for energy saving projects
TO8.17	Existing architectural elements unfavourable to energy saving projects
TO8.18	Presence of urban structure elements unfavourable to the inclusion of passive houses

TO8: PRESENCE OF CRITICAL ASPECTS AND ERRORS IN PROJECT-DESIGNING										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O	X				X	X	X	X	high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO9

Presence of critical aspects concerning the poor competence of technicians

Rationale

The decision to adopt new generation energy technologies that break with the developmental continuity of previous technologies also means a "**leap forward**" **in the preparation of the technical personnel** who will then have to physically run them. In many cases, it is a question of setting aside a whole stock of theoretical and practical knowledge, of operational schemes and even professional habits in order to take on completely new ones.

This does not always happen, or it may come about slowly, incompletely or intermittently. The **PRESENCE OF CRITICAL ASPECTS CONCERNING THE POOR COMPETENCE OF TECHNICIANS** is an obstacle which may create different kinds of problems that may jeopardise the success of projects geared to energy eco-sustainability and slow down the whole transition process towards more efficient and clean energy.

Description

The projects examined all concerned experiences of excellence and so there were very few situations of poor competence on the part of technical staff.

However, some aspects can still be mentioned, such as: not using local personnel in the installation and maintenance of wind turbines owing to their lack of proper training; the failure of a project component envisaging the creation of a fleet of electric cars for local administration staff, owing to a lack of specifically trained local technicians; poor knowledge of construction techniques for low energy homes on the part of engineers and technicians of the construction firms involved; the lack of jurists with grounding in dealing with environmental legislation; the poor training of locally available plumbers in operating on district heating systems.

Indicators

TO9.1 The technical staff's lack of knowledge and experience

TO9.2 The lack of availability of professionals linked to the new technologies introduced

TO9.3 Poor competence of staff responsible for the maintenance of the new energy technologies

TO9: PRESENCE OF CRITICAL ASPECTS CONCERNING THE POOR COMPETENCE OF TECHNICIANS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O	X						X		low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR TO10

Poor knowledge-management orientation

Rationale

During the research, it became apparent how more advanced experience in the energy field can spearhead the energy transition, at a local level as much as a global one (see the ability to make the most of lessons learnt, PE3).

However, this can only take place to the extent that the promoters of the innovative projects **show an interest** in valorising the knowledge gained, also to the advantage of others.

Unfortunately, this is not always the case. A **POOR KNOWLEDGE-MANAGEMENT ORIENTATION** is an obstacle that arises when eco-sustainable project managers seem to have a low aptitude and substantial incapacity to preserve, organise and interpret the knowledge gained and to share it with others.

Description

This poor orientation to knowledge management may come about in various ways.

One particularly significant indication is the lack of development – on the part of project promoters – of **specific actions geared to knowledge building and sharing** (e.g., taking part in international networks, organising moments of internal or public reflection on the project, drafting evaluation reports and documents, establishing stable relations with other project promoters, etc.).

Another indication is the absence of **networks or moments of exchange and common reflection** among the various actors involved in the project (public administration representatives, professionals, builders, etc.) as well as the lack of communication channels between the various administrative levels involved (so that the experiences achieved at a local level do not resonate at a national one).

Indicators

TO10.1 Builders' reluctance to take part in training programmes and initiatives

TO10.2 Lack of competence exchanges and sharing between different professionals

TO10.3 Lack of transfer of knowledge and technologies of eco-sustainable initiatives in the national context

TO10.4 Lack of actions aimed at cumulating and transferring knowledge pertaining to technical and administrative skills

TO10: Poor knowledge-management orientation										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
T	O	X	X						X	low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

SECTION FOUR

THE POLITICAL SOCIETAL PROCESS

In energy transition, politics is certainly no less important than technology.

How important politics is, in fact, can be easily understand. Energy transition involves all citizens, affects consolidated interests, challenges entrenched decision making and administrative routines, requires local, national and international investment which, without exaggeration, is huge, has profound economic impacts and is able to activate widespread and continuous forms of collective mobilisation.

Bearing this in mind, it is difficult to imagine that energy transition can develop without political decisions being taken at the right time, in the right way and in the right direction, involving key stakeholders, anticipating and interpreting demands from different economic and social sectors, keeping public attention focused on issues of eco-sustainability when it begins to wane, managing the conflicts that inevitably arise and facilitating public and private investment in energy transition.

Just as the technological process cannot be reduced to a mere matter of technical choices, neither can the political process be reduced to only a set of more or less effective policies.

As we have said, it is a societal process that goes far beyond the single action of institutions and the range of individual programmes. It concerns, more generally, deep social and economic pressures, which cannot be handled by the usual decision-making mechanisms. New forms of governance need to be developed which are more articulated, flexible, inclusive and sophisticated.

Overall, **26 constitutive factors referring to the Political Societal Process** have been identified, of which 15 enablers and 11 obstacles.

The **enablers** are:

PE1. Presence of leadership of adequate quality

PE2. Programming the political process

PE3. Citizens' orientation to change

PE4. Other actors' orientation to change
PE5. Citizens' active participation in the energy transition
PE6. Building consensus
PE7. Public communication and awareness-raising
PE8. Starting up a networking system
PE9. Capacity building of citizens and of public administration staff
PE10. Creating an adequate and flexible regulatory framework
PE11. Functioning of an integrated networked fund-raising system
PE12. Decision making
PE13. Adopting a high quality management system
PE14. Self-reflexivity and applying lessons learnt
PE15. Social, cultural and economic impact

The **obstacles** are:

PO1. Resistance in public administration
PO2. Resistance by political forces
PO3. Opposition of movements and citizens
PO4. Juridical and administrative difficulties
PO5. Poor control over costs
PO6. Difficulty in accessing funds
PO7. Undesired effects of user selection
PO8. Poor capacity to control energy performance and system quality
PO9. Shortcomings in the circulation of technical, social and political information
PO10. Citizens' poor self-reliance in using eco-sustainable technologies
PO11. Low priority given to energy saving by public service providers

Chapter Seven
Enablers

FACTOR PE1

Presence of leadership of adequate quality

Rationale

Implementing initiatives geared to eco-sustainability is a **complex undertaking** – in some respects because they have technical, political and social implications which are complex, widespread and only partly predictable, and also because management practices have not yet been completely consolidated (it is not by chance that most initiatives implemented in this field are still of an experimental or demonstrative kind).

For this very reason, the **PRESENCE OF LEADERSHIP OF ADEQUATE QUALITY** is generally an important factor in implementing public policies within those geared to sustaining and accelerating the energy transition.

Description

The field study showed how this factor can have different features. Firstly, since they are experiences of high technological content, the **technical capacity** of leaders becomes particularly important. In general, managers of the initiatives examined had a solid disciplinary grounding and, in some cases, had already implemented projects geared to eco-sustainability. At times, in carrying out their tasks, they are flanked by a **network of trusted professionals** who have different specialisations. Another important element is managers' **mobilisation and convocation capacity**. Some of them, for example, as well as having technical skills, also have charismatic leadership qualities that can gather consensus around an initiative. A third element emerging from the analysis of the projects is the **continuity of project leadership commitment**, sometimes even after the project is completed; this commitment reflects a more general inclination to "militancy" in the field of ecological responsibility (it must be said, in this regard, that some projects examined are led by managers who had, in the past, also been activists in environmental organisations).

These traits define a kind of leadership (such as a non-routine one focused on commitment and personal motivation, and based on a far-ranging "vision" of the environmental issue) which is still fairly unusual in public administrations.

Indicators

PE1.1 High technical competence of leaders

PE1.2 The promoters' continuity of commitment, also after completing the activities

PE1.3 Charismatic qualities of leaders

PE1 PRESENCE OF LEADERSHIP OF ADEQUATE QUALITY										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X			X	X		X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE2

Programming the political process

Rationale

As already said in the first part of this report, the transition towards a post-carbon society does not only mean introducing new technologies, but also tends to come about where there is a **political-societal process** enabling these very technologies to spread and take root in people's lives and habits, and to adapt to the various local contexts.

The projects examined, however, suggest that the political-societal process is never a spontaneous phenomenon but requires adequate **programming** through specific management practices. **PROGRAMMING THE POLITICAL PROCESS** is one of the constitutive factors enabling energy transition.

Description

Some of the practices of **programming the political process** were identified during the analysis. One finding, in this regard, is the promoters' propensity to adopt forms of "**open" programming** that can change over time depending on how the experience develops. After a pioneer phase (sometimes also ideologically oriented and normally aimed at very ambitious goals), some initiatives were deeply reprogrammed thereby entering a more "realistic" phase which allowed them, for example, to come to terms with the actual market dynamics, to establish intermediate goals enabling them to trace, step by step, more concrete transition paths or to better arrange the available resources according to priorities. Another important element is the adoption of **explicit methodological approaches** (approaches based on a constant link between action in the territory and research activities; strongly pragmatic problem-solving activities, even if not devoid of a general strategic orientation, etc.). In some cases, more than one approach was used, depending on needs (e.g., adopting a top-down approach when promoting demonstrative projects, and a bottom-up approach when implementing actions of great social impact). An important element emerging from the analysis is the presence, upstream, of **clearly defined general political orientations** which help, for example, to identify the priority social groups to be sustained, the behavioural models to privilege or the long-term goals to be pursued.

Programming the political process undoubtedly links up with a more general **transformation of public policy management mechanisms**, also with a view to governing the rapid changes (migration processes, ageing processes, changing dynamics of poverty and social exclusion, etc.) taking place in contemporary societies.

Indicators

PE2.1 Open programming

PE2.2 Access to different professional skills in policymaking

PE2.3 Adopting a system of general explicit policy orientations

PE2.4 Adopting specific methodological approaches

PE2.5 Attention to the international debate on environmental sustainability

PE2.6 Planning projects based on demographic and social forecasts

PE2. PROGRAMMING THE POLITICAL PROCESS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X			X	X	X		X	high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE3

Citizens’ orientation to change

Rationale

Eco-sustainable projects, by nature, have not only technical or merely organisational implications but also economic, political and social ones not always easy to handle – especially in difficult or penalising social contexts.

That is why one enabler that can have significant weight – above all, with initiatives extensively involving the population – is **CITIZENS’ ORIENTATION TO CHANGE**, a factor which could create a favourable social environment for energy transition and that can come about in **concrete and proactive ways**.

Description

Examples of citizens’ active mobilisation were often found in the experiences examined. Sometimes, this positive orientation is favoured by some specific circumstances such as the strong presence of highly educated people among the beneficiaries (normally more sensitive to eco-environmental issues) or of a tradition of local environmentalist mobilisation. In other cases, the emergence of a positive attitude to change is **brought about by the project itself**, such as by getting citizens to become co-owners of the new technological plant and equipment (thereby encouraging a widespread feeling of project ownership among the population). A comforting finding, above all with regard to the future, is that almost all the promoters of the initiatives examined found a significant and generalised **growth in people’s awareness** of eco-sustainability issues over the last few years.

The key point is that those involved in promoting eco-sustainable initiatives have to know these dynamics and to know how to effectively **identify and involve** the more active social actors, bringing them over “to their side”, so to speak.

This means, especially on the part of public administrations, having a **capacity to interpret** the reality which constitutes one of the foundation elements of the **institutional transition** currently underway in all advanced societies.

Indicators

PE3.1 Citizens attentive to the economic advantages of the energy transition

PE3.2 Previous experience of environmental commitment on the part of civil society

PE3.3 Greater chance of involving ecologically sensitive people (women, highly educated people)

PE3.4 Sense of ownership by citizens and firms of initiatives aimed at the post-carbon society.

PE3 CITIZENS' ORIENTATION TO CHANGE										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E		X		X					high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE4

Other actors' orientation to change

Rationale

Besides citizens' orientation to change (PE3), the willingness to do so of **other actors** directly or indirectly involved in promoting and implementing the project is also crucial, such as local politicians, public administrations, technical personnel and construction firms.

One could think that these actors, because they are directly involved, must necessarily show a propensity to change. However, the experiences examined show how this may not always be true and how, paradoxically, it is among these very actors that there is often a tendency to maintain the status quo (see PO1, PO2 and TO1, for example). For this reason, **OTHER ACTORS' ORIENTATION TO CHANGE** must be considered as an enabling factor in the political-societal process.

Description

As with citizens' orientation to change (PE3), here, too, a tendency to mobilise may be due to **various reasons**. One of these is, obviously, the prospect of obtaining **economic benefits** (such as with construction firms) or of having **commercial and image benefits** (as with firms supplying and installing the new technologies introduced). Another decidedly important aspect is the creation of a **"strong" and convincing vision** which the different actors can identify with, of the possibility of establishing a post-carbon society, as well as the **determination and will of local political forces** to support the project by putting forward their own credibility with respect to the electorate.

Indicators

- PE4.1 High motivation of the actors involved in implementing the eco-sustainable projects
- PE4.2 Involving small-scale builders in eco-sustainable initiatives
- PE4.3 Perceiving the novelty and opportunities of eco-sustainable architecture
- PE4.4 Creating a common vision for the various local actors involved in the energy transition
- PE4.5 Stakeholder perception of the economic and commercial advantages of producing renewable energy

PE4.6 A prevailing environmentalist orientation of the political forces of local administration

PE4.7 The view of eco-sustainable projects as laboratories energy transition

PE4.8 The view of energy transition as “within reach” of eco-sustainable project promoters

PE4.9 A political will to promote experiences of sustainability

PE4 OTHER ACTORS’ ORIENTATION TO CHANGE										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X		X	X					low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE5

Citizens’ active participation in the energy transition

Rationale

Citizens’ participation in public policies has been a constant theme of political reflection for many decades in all advanced societies and is a key point in the **institutional transition** from “government”, i.e., from forms of government focusing on the public actor’s action, to more detailed forms of “governance” based on the participation of many social actors, including citizens. However, it is without doubt that, even today, the creation of spaces for participation is often viewed – above all, by many public administrations – as an unnecessary factor producing “complication”, because it extends times, because it brings too many actors into play with very different ideas among them or because it triggers processes whose outcomes are not very predictable and thus difficult to control by political leaders.

The eco-sustainable projects examined in the study **seem to move in the opposite direction** with respect to this orientation, by acknowledging that **CITIZENS’ ACTIVE PARTICIPATION IN THE ENERGY TRANSITION** is an **enabling factor** and not an obstacle. Almost all of them were implemented by using structures and procedures to make the **participation** of stakeholders, various social actors and citizens **concretely possible** in the overall energy transition. Since the experiences examined were all successful, the participation mechanisms generally turned out to be very effective.

Description

There are many examples of participative practices. One certainly widespread tendency is that of triggering forms of **co-decision with citizens during the planning stage**, by using different instruments such as setting up work groups, a standing consultation forum or focus groups in the various neighbourhoods. The study also found autonomous **forms of lobbying** with local authorities in order to adopt sustainability measures on the part of organised groups of users, associations of residents of the new eco-sustainable housing estates or environmentalist NGOs. In other cases, the **citizens, organised in co-building groups, participated in the technical designing** of their own home, of the new energy systems to be fitted in their homes or of the solutions to be adopted at the neighbourhood level (such as in regulating the use of private automobiles). Participation also takes on other forms such as citizens’ **co-financing** of the project (e.g., of waste management plants, solar panel or district heating systems), by setting up cooperatives or joint stock companies, or the taking on of **specific**

responsibilities in its implementation (as is the case with NGOs and neighbourhood associations involved in training and awareness-raising initiatives on the use of new technologies or in parking lot management).

This widespread citizen commitment in planning, project-designing and implementing actions has another important effect of greater orientation of projects towards the needs of **weak subjects** or **specific social categories**, such as youth, immigrants or the elderly.

Indicators

PE5.1 Citizens' active participation in decision-making and planning

PE5.2 Citizens' activation of initiatives for involving other citizens in eco-sustainable projects and particularly weak subjects

PE5.3 Citizens' lobbying geared to promoting the project and steering project-designing

PE5.4 Involving, on a voluntary basis, public service providers (schools, hospitals, etc.) in the experimental adoption of new technologies

PE5.5 Co-project-designing with users of the eco-sustainable interventions to be taken

PE5.6 Citizens' participation in financing the initiatives geared to environmental sustainability

PE5.7 Citizens' Implementation of autonomous eco-sustainable initiatives

PE5.8 Using civil society actors in implementing training and awareness-raising actions geared to citizens

PE5 Citizens' active participation in the energy transition										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X	X		X	X	X			high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE6

Building consensus

Rationale

It is difficult for projects geared to eco-sustainability – like all those that sustain technology transfer processes – not to give rise to resistance, opposition, conflict or discontent, sometimes even with just cause, on the part of specific actors, stakeholders or sections of the population. The projects, more often than not, affect consolidated interests, modify widespread behaviours, influence territorial organisation, change power arrangements at the local level or have significant effects on economic structure and production systems.

Indeed, for their high social, political and economic impact, it is almost impossible to implement projects of this kind without the firm and active support of people or of the individual actors concerned.

This leads one to think how **BUILDING CONSENSUS**, especially in the future, is a **key aspect** in the transition to eco-sustainable energy. Not by chance, this aspect appears to be particularly taken care of in the successful experiences examined.

Description

The main practices fielded regarding this constitutive factor focus on **negotiation mechanisms** activated at various levels. In the early stages, the negotiation actions mainly sees the **institutional actors** involved (local authorities, public financing agencies, electricity boards, decision-making bodies and committees) and later **firms called upon to implement the project** (construction firms, plant and equipment firms, consulting firms, etc.). Later still, the negotiation process tends to extend to **beneficiaries**, involving users, civil society associations, economic lobbies and the general population.

The tools used differ considerably depending on the circumstances, including such things as the creation of **consultancy networks** between construction firms, local authorities and promoters, the implementation of **public initiatives of consultation**, the opening up of **talks** between project promoters and the various stakeholders or the creation of **workshops and informal meetings**. A widespread approach to facilitate the building of consensus is to carry out **demonstrative actions and pilot studies** (such as building a first group of passive houses to show the general public or installing solar panels on public buildings of great visibility such as post offices or sports centres) to persuade decision-makers, financers or potential users not just of the positive impact of new technologies on the environment, but also of the benefits that citizens themselves can gain from their introduction (in terms of things such as the reduction of management costs or an increase in the quality of life). The various kinds of demonstrative actions are thus determinant also to overcome prejudice and stereotyping with regard to new technologies (TO6)

Indicators

PE6.1 Consulting with local stakeholders to build consensus

PE6.2 Informal negotiation activities

PE6.3 Negotiation among various institutional stakeholders

PE6.4 Negotiation activities conducted by civil society bodies (NGOs, CBOs, professional associations, etc.)

PE6.5 Demonstrative actions geared to individual users

PE6.6 Demonstrative actions geared to decision-makers

PE6.7 Demonstrative actions geared to large-scale users (schools, sports centres, health services, firms, etc.)

PE6.8 Actions geared to conflict-resolution between promoters and communities regarding the introduction of new technologies

PE6 BUILDING CONSENSUS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X	X	X	X					high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE7

Public communication and awareness-raising

Rationale

The gradual abandonment of carbon-based energy sources, besides being a technological challenge, touches some **deep structures of society** and spurs all social actors in some way – from institutions to individual citizens – to review their own behaviours and to change their way or relating to reality.

It is a prospect of change which, in order to be appropriately handled and guided, calls for high levels of awareness, a high degree of circulation of clear and reliable information, and the formation of new shared meanings.

In all this, **PUBLIC COMMUNICATION AND AWARENESS-RAISING** plays a key role, both in the broader sphere of public communication and mass communication, and also as regards communication micro-dynamics that develop at the grass roots level.

Description

In view of the importance of this enabler, it should come as no surprise that communication circuits and networks, at various levels, tend to develop around eco-sustainable initiatives, owing to the actions of promoters and other stakeholders. These circuits and networks are based on various **communication tools** (web TV channels, online newsletters, exhibitions, expositions, guided visits to technological sites, press campaigns, door-to-door communication, etc.) and are characterised by **differentiated language forms** (from technical ones to the more dissemination ones, from those more linked to daily communication practice to those of greater symbolic impact).

All this leads one to think that communication will play a decisive role to make the transition towards a post-carbon society socially manageable. This factor lies within a more general trend of giving increasing weight to communication in the construction and implementation of **public policies**, especially when they have to do with important **scientific and technological** decisions.

Indicators

PE7.1 Information and communication actions of NGOs

PE7.2 Visibility of post-carbon initiatives with the national and international media

PE7.3 Presence of forms of communication among citizens

PE7.4 Creating institutions dealing with public communication

PE7.5 Promoting general awareness-raising and divulgation activities for eco-sustainable initiatives (expositions on technologies, guided visits)

PE7.6 Communication activities on specific aspects of eco-sustainable projects (norms and standards, technological options, use of new technologies)

PE7.7 Producing symbolic representations to communicate the project meaning better

PE7 PUBLIC COMMUNICATION AND AWARENESS-RAISING										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X	X	X	X					high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE8

Starting up a networking system

Rationale

Highly innovative projects, such as the ones geared to introducing forms of eco-sustainable energy, seem to require great commitment on the part of promoters in establishing relations – even very intense ones – with the great many actors directly or indirectly involved (such as various levels of public administration, networks of experts and professionals, construction firms, citizens and other stakeholders, etc.). This commitment appears useful and, at times, even indispensable, not only to facilitate decision-making and activate institutional and operative structures of the project, but also more generally to give greater **political legitimacy** and **scientific authority** to the new approaches one aims to adopt, also making reference to consolidated knowledge and experience at the global level.

For this reason, many of the experiences analysed are characterised by the **START-UP OF A NETWORKING SYSTEM**, an action more or less extended and institutionalised which often develops throughout the implementation of the initiative.

Description

This constitutive factor takes on different forms and moves in various directions. For example, to give strength to their own decisions, some municipalities join **international networks** of local bodies involved in promoting renewable energy. In other cases, **informal networks of residents** are started up to favour project management or **networks of different local bodies involved** (e.g., those lying within the metropolitan area concerned) in order to favour more effective coordination in dealing with common problems and to exchange more effective solutions. In still other cases, informal networks were created at the citizen level, including **all the subjects who had always been involved in energy renewal themes**; these subjects include professionals, academics and environmentalists. This networking activity sometimes has an institutional character (in the form of consultation panels, work groups or coordination committees) to make discussion between all the subjects concerned possible (local bodies, local electricity boards, consumers, construction firms, researchers, technicians, professional associations, etc.) in order to orient decision-making, prevent conflict and overcome organisational and technical problems that can arise from time to time.

The tendency to accompany policies with intense networking activity, both in the local and international sphere, reflects a more general process of

institutional transition (driving towards broader and more complex forms of coordination in public policy management), but also expresses a strong drive towards a **globalisation of knowledge**, not only of a technical or scientific nature, but also concerning the promotion, management and evaluation of public policies (in this case, in the energy field).

Indicators

PE8.1 Joining international movements of local authorities on sustainable development

PE8.2 Creating communication networks of residents in eco-sustainable neighbourhoods

PE8.3 Creating networks of local bodies in the territory

PE8.4 Creating an institutionalised network of subjects involved in the implementation of eco-sustainable projects

PE8.5 Existence of informal networks on energy

PE8.6 Participating in European and international programmes

PE8.7 Creation of enterprises' networks for adopting eco-sustainable measures

PE8.8 Joining international movements of local authorities on sustainable development

PE8 STARTING UP A NETWORKING SYSTEM										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X	X		X				X	low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE9

Capacity-building of citizens and of public administration personnel

Rationale

Learning to use new technologies is not at all a straightforward and automatic process for organisations and individuals. This is all the more true when technologies have great social and economic impact and need the creation of new **organisational set-ups**, the dissemination of new **operative practices** and even the emergence of new **models of individual behaviour** in order to work properly.

In the research, it was noted that most of the eco-sustainable project promoters tried to meet this need, above all, through the **CAPACITY BUILDING OF CITIZENS AND OF PUBLIC ADMINISTRATION PERSONNEL**.

Description

The target and contents of these actions varies a great deal according to the kind of project implemented. For example, in the case of actions focusing on a broad dissemination of new heating systems among the population, there were always **training activities** (seminars, meetings, dissemination of manuals, etc) for **residents** on the use of new equipment, energy saving and the adoption of more environmentally compatible lifestyles. In some cases, these specific activities were accompanied by more general actions of **environmental education** (such as courses for children of the neighbourhood's schools). The capacity-building initiatives were put forward and implemented not by the promoters but autonomously by **organised groups of citizens**. Almost all the actions focusing on the construction of new eco-sustainable neighbourhoods also envisaged the creation of a **centre for information, training and assistance** easily accessible to residents. There were also actions geared to **specific groups of citizens** (such as linguistic minorities). A great many capacity-building activities were also aimed at **local public administration personnel** in order to improve their technical skills so that they could be of greater support to the community.

This intense use of capacity building lies within broader changes found also in sectors other than environmental ones, above all, the **tendency of public administrations** to improve their own action by focusing on **human capital**, and **users' tendency** to take on an active role in **scientific and technological innovation processes**.

Indicators

PE9.1 Citizens gathering information and documentation on post-carbon technologies

PE9.2 User training activities on the efficient use of ecological and energy saving equipment

PE9.3 Creating an information agency for residents and big consumers

PE9.4 Training exponents of linguistic minorities

PE9.5 Initiatives for presenting new technologies to citizens

PE9.6 Organising training seminars for local administration personnel

PE9.7 Citizens' peer education regarding technology use

PE9 CAPACITY-BUILDING OF CITIZENS AND OF PUBLIC ADMINISTRATION PERSONNEL										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X	X		X	X		X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE10

Creating an adequate and flexible regulatory framework

Rationale

One particularly important aspect emerging from the analysis of the more advanced experiences of energy eco-sustainability concerns **laws, standards and regulations**. The speed of technological change, the need to activate increasingly more adequate forms of energy management, and the constant change of the relations between the various actors involved in energy transition seem today to be moving towards models of normative regulation that, unlike the more traditionally widespread ones, are flexible, adaptable to different circumstances and situations, easily modifiable over time, but not for this reason being less effective, rigorous and binding.

CREATING AN ADEQUATE AND FLEXIBLE REGULATORY FRAMEWORK is thus an important enabling factor, not just to sustain the new energy policies, but also to prevent disputes, conflict, interpretational problems and administrative and bureaucratic setbacks.

Description

In view of these needs, the eco-sustainable project promoters seemed to react by focusing on clusters of detailed legislation in which, alongside very clear and binding general principles and norms, forms of regulations are produced which are more sensitive to changes and more flexible in their implementation, as **reference standards** that can be improved over time, **simplified administrative procedures**, instruments for **coordinating the norms produced** by the various levels of government or quicker and adaptable **norm updating mechanisms**. While, on the one hand, the experiences examined showed the importance of **imposing rigorous measures**, above all as regards aspects like energy consumption, construction criteria for new housing or greenhouse gas emissions, on the other, they showed how it is equally important to adopt a **problem-solving approach** which makes the inclusion of these very restrictions feasible, thereby meeting the needs of the various actors concerned.

These trends seem to reflect a broader need to provide public policies with legislation enabling them to come to terms with the growing complexity and speed of change characterising contemporary societies.

Indicators

PE10.1 Producing national and local laws on environmental issues

PE10.2 Simplifying administrative procedures and bureaucracy

PE10.3 Adopting energy efficiency standards at the local level

PE10.4 Adopting a progressive taxation system for energy consumption and waste production for families and firms

PE10.5 Adopting a problem-solving approach in applying the norms

PE10.6 Providing continuous updating of norms

PE10.7 Rigorously applying norms on the adoption of post-carbon technologies

PE10.8 Legally obliging the adoption of post-carbon technologies

PE10.9 Efficiently using existing norms

PE10 CREATING AN ADEQUATE AND FLEXIBLE REGULATORY FRAMEWORK										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X			X					low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE11

Functioning of an integrated networked fund-raising system

Rationale

All eco-sustainable project promoters must face the problem of how to mobilise the necessary investments to start the projects. Normally, the individual municipalities – which are among the main eco-sustainable project promoters – especially resort to **outside funding**, national or European, enabling them to cope with the additional costs not covered by their own funds or by turning to the market.

However, this model is so far sustainable only because the very advanced experiences in this field are still few and spatially limited in Europe. If we reason in terms of a hoped for increase in scale and thus a strong dissemination of this type of action in the territory, the question of initial investment costs can take on more significant proportions.

In this scaling-up prospect, an enabling factor that is becoming important is the **FUNCTIONING OF AN INTEGRATED AND NETWORKED FUND-RAISING SYSTEM**, that is, a system which integrates the **different funding sources** and involves a **vast array of actors** (public organisations, energy agencies, firms, individual families, etc.) in fund-raising activities, also making them responsible for their actions.

Description

This constitutive factor is concretely achieved in different ways such as by: exploiting fund-raising opportunities offered by big events (trade fairs, sports and cultural events, etc.); activating investment programmes at municipal level and specifically geared to the project; taking advantage of existing energy sector deregulation policies; adapting the project in order to access funds destined for other uses (e.g., funds for technological research and development); promoting policies geared to encouraging the private sector to invest on certain aspects of the project; grasping and exploiting the various funding opportunities offered by the European Union.

Here, too, there is a tendency which, in the eco-environmental field, appears to be at a particularly advanced stage, but is also found in other spheres requiring great public investment in technology and infrastructure – investments which no government and no local body especially can guarantee on its own.

Indicators

PE11.1 Access to European funds

PE11.2 Capacity to exploit big events as an opportunity to launch new eco-sustainable projects

PE11.3 Capacity to exploit energy sector deregulation

PE11.4 Funding from local and national public bodies

PE11.5 Funding from the private sector

PE11.6 Investments of families for the production of renewable energy and energy saving

PE11.7 Participation in national or international competitions

PE11.8 Using a funding mix

PE11.9 Using municipal administration properties

PE11.10 Grants and subsidies geared to families in order to spread eco-sustainable technologies

PE11.11 Using funds for research and development

PE11 FUNCTIONING OF AN INTEGRATED NETWORKED FUND-RAISING SYSTEM										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X	X	X	X					high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE12

Decision-making

Rationale

One finding that seems to emerge from the cases examined is that the projects and policies favouring energy transition always have a **high degree of complexity in decision-making**. This is due to several reasons: because they affect a great many vested interests; because they act on several administrative levels; because they involve a broad array of actors; because they call for detailed forms of funding; because they necessarily introduce new legislative constraints.

To handle this high degree of complexity, a crucial factor is **DECISION-MAKING**. In some of the anticipatory experiences examined, the promoters devised management models favouring **more effective decision-making**.

Description

The most common **decision-making** strategies envisage concentrating the **entire responsibility of energy policy management on just one organisation** (creating an ad-hoc agency that is independent of other administrative bodies) and **creating a political-institutional post** (e.g., a municipal councillor) that acts as the sole referent for all the actors concerned. The idea is to keep control of decision-making and to avoid delays, conflict of responsibilities or misalignment among the various decision-makers.

These are decisions which, especially when grasped with a view to the scaling-up of eco-sustainability policies, can pave the way to new forms of **institutional transition**, also in sectors other than the eco-environmental and energy one.

Indicators

PE12.1 Setting up a specific agency for handling complex projects

PE12.2 Creating specific political institutions supporting eco-sustainable projects

PE12 DECISION-MAKING										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X			X					low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE13

Adopting a high quality management system

Rationale

Guaranteeing **HIGH QUALITY MANAGEMENT** is **almost always a crucial factor** for the success of energy transition initiatives. This appears all the more important when considering how most of them – depending on the technological, organisational or political innovations they are trying to introduce – normally have to face new problems and that there is **little already consolidated knowledge and few proven models** to cope with them.

Description

The anticipatory experiences examined offer a vast, and not necessarily comprehensive, array of **tools and approaches** geared to maintaining high quality management. One recurrent strategy is to strengthen and extend the **monitoring and evaluation** of actions underway and to systematically adopt forms of **certification** of both technological installations and of the installing firms themselves. Moreover, various projects create their own quality system starting from a **"holistic" approach to evaluation** which takes all the variables involved into account (not just eco-environmental ones, but also economic, social and cultural ones) as well as all the "dimensions" (local, national and international) which come into play. Another aspect which is considered important in quality control is the fielding of tools geared to the systematic gathering and interpretation of **information** on the action and on its impacts (such as those concerning energy efficiency of the equipment installed, the price trends of the various energy sources used and produced, the degree of user satisfaction or the development of energy consumption).

Indicators

PE13.1 Using statistical analysis of energy consumption

PE13.2 Adopting a holistic approach to evaluation

PE13.3 Conducting ex-ante checks of projects envisaging the installation of eco-sustainable technologies

PE13.4 Monitoring and evaluating eco-sustainable projects

PE13.5 Certifying the firms installing eco-sustainable technologies

PE13.6 Certifying the quality of eco-sustainable technology installation

PE13.7 Checking heating prices

PE13.8 Creating benchmarking systems

PE13.9 Using energy efficiency control systems

PE13. ADOPTING A HIGH QUALITY MANAGEMENT SYSTEM										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X			X					low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE14

Self-reflexivity and applying lessons learnt

Rationale

The anticipatory experiences – most of which, as already said, have a clear experimental and demonstrative character – may be fully appreciated in their value and objective significance if they are grasped not only for their direct impacts (often very limited), but especially for their potential and actual contribution – in terms of approaches, ideas, solutions, practices, strategies, etc. – to the more general process of energy transition.

It must be said, however, that shifting from a "demonstrative project" dimension to that of large-scale actions – and thus turning the transformative potential of individual projects into real widespread practices – is not and cannot be considered a spontaneous or automatic shift. For promoters, it means having **SELF-REFLEXIVITY AND APPLYING THE LESSONS LEARNT**, that is, greater ability to interpret the actions implemented, an **ability to learn** from ones successes and failures and from other people's successes and failures (see also TE3 and TE10 for the technological aspects), as well as a propensity to **disseminate** significant, reliable and transparent **information** on the project, even if this may mean exposing oneself to risk of criticism.

Description

In the anticipatory experiences analysed in the study, the capacity for self-reflexivity and for applying lessons learnt is very marked. Some actions, for example, were conceived from the outset as characterised by a **gradual scaling-up process** enabling a shift from one dimension to a bigger one by screening the best solutions in order to reproduce them in the next stage. Another practice used was to glean a **series of reference standards** from the experimental projects implemented (such as construction standards, management standards, reference values regarding emissions and energy efficiency) to apply on a broader scale: neighbourhood, town or national level. There was also a strong commitment in turning the experiences into **success stories and best practices** to disseminate (the internet plays an important role in this regard), as well as in **exchanging experiences, information and practices** among eco-sustainable project promoters, by creating associations and networks linking all those working in this field.

This phenomenon links up with a more general orientation geared to improving the way public administrations and political leaders design and develop public policies – an orientation that is certainly favoured by a strong globalisation of knowledge even in the energy sector.

Indicators

PE14.1 Actions geared to long-term project sustainability

PE14.2 Establishing new standards based on the results of the more advanced projects

PE14.3 Disseminating success stories

PE14.4 Upscaling the project to a broader area

PE14.5 Establishing new operational procedures based on innovative experiences

PE14 SELF-REFLEXIVITY AND APPLYING LESSONS LEARNT										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E	X			X				X	low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PE15

Social, cultural and economic impact

Rationale

As repeatedly stressed, acting on energy supply always has more or less important effects on all spheres of life of a community (production system, family life, free-time management, mobility, etc.).

In this regard, knowing how to **predict and orient**, but also how to consciously **exploit, manage** and, if necessary, **prevent** these effects is an important enabling factor for project success – both as regards its implementation and outcomes. Also because, in starting up post-carbon projects, there is often a more immediate local "stake" than the one of global sustainability, and namely that of favouring the **development of the territory** and to combat phenomena like **fuel poverty, social exclusion** and the **brain drain**. With reference to this, **SOCIAL, CULTURAL AND ECONOMIC IMPACT** may be considered a constitutive factor of the political-societal process of energy transition.

Description

The nature and dimension of the impacts varies considerably according to the characteristics and contents of the actions implemented. The impacts mostly recorded include those of an **economic nature** (creating new jobs, increasing the value of the homes concerned by the project, creating or strengthening the economic sectors linked to the environment). However, even **social impacts** are important (reducing poverty and, in particular, fuel poverty, increasing social cohesion, better conditions of life of disadvantaged people) as are, more rarely, **cultural ones** (for example, a revitalisation of the neighbourhood's cultural life).

Indicators

PE15.1 Broadening the social classes benefiting from technology

PE15.2 Broadening the market in sectors directly or indirectly connected to eco-sustainable technologies

PE15.3 Job creation

PE15.4 Project impact on the disabled and the elderly

PE15.5 Impact on fuel poverty

PE15.6 Increased appeal of the neighbourhood as a recreational place for citizens

PE15.7 Increased social cohesion

PE15.8 Improvement in quality of life

PE15.9 Improvement in cultural life

PE15.10 Economic benefits to residents

PE15 SOCIAL, CULTURAL AND ECONOMIC IMPACT										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	E		X	X		X	X	X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

Chapter Eight
Obstacles

FACTOR PO1

Resistance in public administration

Rationale

Almost always of an innovative nature, energy transition initiatives can only partly be managed through already consolidated routines and procedures. Most of the time, they require the identification of new organisational solutions and new operative practices which, however, create **situations of uncertainty** among people involved in project implementation.

This favours the emergence of **resistance in public administrations running the project**. This resistance can, at times, turn into actual **conflict** between individual operators or between various operative units concerned. **RESISTANCE INSIDE PUBLIC ADMINISTRATION** may lead to setbacks, delays, a worsening of the technical quality of the project, waste of money and other resources, up to the temporary or permanent interruption of the activities concerned.

Description

Conflict and resistance can concern **specific aspects**, even if not marginal ones, such as establishing the energy consumption parameters to apply to new constructions or introducing meters in homes in order to assess the actual energy consumption of individual families. In other cases, instead, resistance concerns the very **general framework of the project**. A significant example, in this regard, is an initiative in which the municipal officials responsible for territorial planning showed great resistance to the introduction of passive houses, envisaged by the project, thereby coming into conflict with local civil society organisations which were instead decidedly in favour of their introduction.

Indicators

PO1.1 Conflicts between public administration departments and bodies

PO1.2 Resistance of local administration officials and technicians to the introduction of new technologies

PO1 RESISTANCE IN PUBLIC ADMINISTRATION										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X			X		X	X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO2

Resistance by political forces

Rationale

Introducing forms of eco-sustainable energy is a **politically sensible decision** since it affects widespread interests and lies within a political debate of transnational nature which has been going on for some time now with ever-increasing intensity.

It is thus fairly obvious that the attitude of political forces is normally strong in the decision to conduct a certain action and how to implement it. The analysis carried out highlights how this **attitude is often not at all positive but can sometimes actually jeopardise project outcomes**. Resistance of political forces are thus one of the obstacles to starting up the political-societal process of energy transition.

Description

A typical case of resistance of political forces is what is seen following **changes in the government in local administrations** in which the new administration questions the eco-sustainable projects started up by the previous administration, thereby causing – at best – setbacks in implementing the activities started up or a situation of uncertainty that may be protracted over time. In other cases, the political forces – perhaps for fear of losing consensus among the electorate – show a **certain tendency to avoid "hard" but necessary decisions** and oppose the introduction of binding measures or, when they do have the power, they make existing ones only of a general kind (e.g., the restrictive provisions on using automobiles). There is also a certain attitude on the part of political forces to avoid resorting to **participative approaches** and **forms of self-governance** of citizens (perhaps because they limit the sphere of action of political parties) or to be suspicious of **innovations not directly promoted by the administration**.

Indicators

- PO2.1 Discontinuity of energy policies due to changes in local government
- PO2.2 Closure of administration to innovation promoted by citizens
- PO2.3 Ideological conflicts inside the town council
- PO2.4 Politicians' opposition to forms of citizen self-governance
- PO2.5 Politicians' opposition to using participative approaches

PO2.6 Politicians' cognitive resistance to the legitimacy of making post-carbon solutions compulsory

PO2.7 Politicians' resistance to the possibility of introducing new technologies

PO2 RESISTANCE BY POLITICAL FORCES										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X			X					low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO3

Opposition of movements and citizens

Rationale

One of the main obstacles to implementing eco-sustainable initiatives is the **lack of citizens' consensus** on this. It must also be said that the presence of a certain degree of opposition – above all, in its early phases or project-designing or implementation – should be considered a typical phenomenon, seeing that these initiatives tend to affect the whole population. Of course, when the **OPPOSITION OF MOVEMENTS AND CITIZENS** takes on a more structured, widespread and systematic character, it can lead to very serious problems and even **jeopardise the whole project itself**.

Description

Forms of opposition of movements and citizens were found in many anticipatory experiences examined, despite the fact that they are experiences whose excellence is widely acknowledged. In some cases, the opposition concerned the **initiative *per se*** (and thus to the very introduction of new technologies) or the **way it was designed**. It must be noted, in this regard, how some types of technology have been the object of negative representations favouring the emergence of widespread resistance. For example, wind turbines are considered noisy and an eyesore, biogas plants noisy and smelly, and solar panel systems eyesores and not very efficient. Not infrequently, and sometimes paradoxically, it is the **environmentalist movements** themselves that oppose the project (such as when it envisages the construction of new buildings and infrastructure that these movements deem unnecessary). In some cases, citizen opposition arises out of the fear of being forced to make **investments** which, in the citizens' view, could be avoided. In the case of a project to increase insulation in private homes, for example, there was great opposition by owners who had rented out their house to others and therefore did not want to spend money on something they would not benefit from directly.

Indicators

PO3.1 Citizens' disagreement on eco-sustainable projects

PO3.2 Lack of interest for solar energy

PO3.3 Opposition of environmentalist movements to eco-sustainable projects

PO3.4 Private sector resistance to investing in energy efficiency

PO3 OPPOSITION OF MOVEMENTS AND CITIZENS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X	X		X			X		low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO4

Juridical and administrative difficulties

Rationale

Technology transfer experiences – and eco-sustainable technologies are no exception – almost always involve the introduction of new laws, rules and procedures which often create friction and sometimes actually **conflict** with existing ones or with already consolidated **informal operative schemes**. **JURIDICAL AND ADMINISTRATIVE DIFFICULTIES** are an obstacle which, if not properly handled, can have more or less serious **negative effects** on the project and on its results.

Description

The juridical and administrative difficulties include **controversies on the interpretation of existing legislation** (often not designed for projects of great complexity such as those linked to energy transition). In one of the cases analysed, for example, there were tensions between public administration bodies over the attribution of responsibilities on the maintenance of the new technologies introduced, while in another case there were uncertainties over the inclusion of "environmental" clauses in tendered contracts to construction firms (some considered these clauses legitimate while others did not). Other difficulties arise owing to the **overlap of national, regional and local laws**, which are sometimes not homogeneous with one another (e.g., as regards the ratio between parking spaces and residents, the way of installing low energy systems in homes or criteria for establishing urban development plans), with contradictory effects (such as the impossibility of applying a standard, not because it has not been defined, but because more than one have been established by various administrative levels). There were also more specific difficulties such as problems in guaranteeing **control over the application of new laws** (also owing to a lack of resources) or the difficulty in **identifying legal and administrative procedures that can make the new standards to be introduced actually binding** (and thus really effective).

Indicators

PO4.1 Complexity of bureaucratic procedures

PO4.2 Controversies on the interpretation of existing laws

PO4.3 Poor control over the application of norms

PO4.4 Poor effect of non-binding programmes

PO4.5 Overlap of legislative sources and regulations at the national, regional and local level

PO4 JURIDICAL AND ADMINISTRATIVE DIFFICULTIES										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X			X					low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO5

Poor control over costs

Rationale

Programmes geared to energy transition normally have different cost structures than those of traditional projects. Compared to the latter, **investment costs are normally higher**, as are plant maintenance costs; energy production costs – still talking in general terms – instead **tend to be lower** because they do not depend on oil or other non-renewable sources, whose market value is open to great fluctuations. These cost dynamics, however, are not always easy to control – at least when using only the usual operative tools. **POOR CONTROL OVER COSTS** may thus be considered one of the obstacles to energy transition.

Description

Some of the anticipatory experiences examined in the study found not a few problems in this regard. The most frequent is the **difficulty in coping with the high initial investment costs** – a difficulty deriving not just from objective factors, but also from the poor capacity to forecast amortisation periods with some degree of certainty (since they are innovative technologies with a still limited market). The risk that many operators note is that these costs end up by falling almost completely on public actors, where – to make an acceleration of energy transition processes possible – the necessary investments should come directly from private investors, within a market dynamic. On the other hand, even the solutions often adopted of **placing the initial investment costs on the shoulders of users** is not always effective. In the absence of incentives for buyers, selling low energy houses at a higher price (5-10% more, and sometimes as much as 20-30% higher) has led to prolonging the sale and consequently to delaying the initial investment amortisation period. Even the decision of some governments to tax (or not to exempt from tax) post-carbon solutions (such as biofuels) is a disincentive. One must consider how the issue can have considerable social impacts since the **poorest families**, owing to the scant cover of initial investment, cannot access eco-compatible technologies and find themselves, in the end, exposed to fluctuations in non-renewable energy prices.

Indicators

PO5.1 Increasing costs to sustain energy efficiency initiatives

PO5.2 High maintenance costs of eco-sustainable technologies

PO5.3 High costs of eco-sustainable technology plants and production

PO5.4 Similar tax rates of post-carbon and traditional technologies

PO5.5 Poor families' difficulty in accessing post-carbon technologies

PO5.6 Difficulties due to market price fluctuation

PO5 Poor control over costs										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X	X	X	X		X			high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO6

Difficulty in accessing funds

Rationale

As well as problems connected to cost control difficulties (PO5), another obstacle which seems to significantly affect energy transition processes is the **DIFFICULTY IN ACCESSING FUNDS**.

Because of the high initial investment costs, eco-sustainable projects cannot completely turn to the market (clients, users, private investors) and try to raise additional funds by **resorting to public funding** and the **credit sector**, or by benefiting from **incentives** for spreading post-carbon energy by national or local governments. This kind of solution has great limitations, however, mainly in the future, when the number of initiatives will likely be destined to increase and the competitiveness in accessing public funds will probably be higher.

Description

The study showed how some projects receive little contribution from **national and local funds usable for project implementation**, also due to legislative constraints (such as those preventing local bodies from increasing local taxes beyond an established limit) or expenditure limitation mechanisms (such as the suppression of funds destined for council housing). Access to funding is also negatively affected by other elements such as **uncertainty on procedures** to be followed to obtain financing (often not clearly defined, not completely transparent or subject to change during the process), the **diffidence of credit institutions** towards technologically innovative projects or **delays in providing** already granted funds (above all, owing to obsolete bureaucratic procedures not specifically designed for eco-sustainable energy projects).

Indicators

PO6.1 Difficulty in accessing the credit market

PO6.2 Uncertainty on using funds to support the dissemination of eco-sustainable technologies

PO6.3 Insufficiency of subsidies and incentives

PO6.4 Delay in providing funds

PO6.5 Little availability of funds for innovation

PO6 DIFFICULTY IN ACCESSING FUNDS										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X			X					low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO7

Undesired effects of user selection

Rationale

Since they significantly affect many spheres of a community's life, the projects geared to sustaining and accelerating the energy transition have, at least potentially, a high social, cultural and economic impact.

At times, owing to mechanisms independent of the project or errors in planning policies for promoting eco-sustainable energy sources, besides the desired effects there may also be other effects which can create a real obstacle to energy transition, especially if grasped with a view to up-scaling. These include **UNDESIRED EFFECTS OF USER SELECTION** that constitute an obstacle which, if not properly dealt with, can lead to excluding entire sections of the population from post-carbon technology transfer processes.

Description

One effect found in some of the anticipatory experiences studied was, for example, that of (involuntarily) **selecting citizens and potential users according to their purchasing power**. Low polluting technologies cost more and so, without any subsidies or effective incentives, they risk being inaccessible to low income families and, at times, even to middle class families. Because of this, some new eco-sustainable neighbourhoods, for example, have thought of attracting mainly families with a decidedly higher income, thereby becoming social "eco-enclaves", so to speak. This phenomenon may also be facilitated by **involuntary selection mechanisms** paradoxically stemming from citizens and users' demands for **active participation in eco-sustainable project planning**. For example, it was found that the participative approaches adopted sometimes tend to keep certain social subjects away, like the elderly or disabled, thereby planning the project without considering these subjects' needs. Similarly, cases were also noted of immigrants not being included in decision-making owing to language barriers not adequately taken into account by project promoters.

Indicators

PO7.1 Involuntary selection mechanisms in accessing eco-sustainable technologies

PO7.2 Involuntary selection mechanisms with regard to particular social subjects (the elderly, immigrants, etc.) in participating in eco-sustainable project planning

PO7 UNDESIRED EFFECTS OF USER SELECTION										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X	X		X	X	X			high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO8

Poor capacity to control energy performance and system quality

Rationale

Although not in a widespread manner, the anticipatory experiences examined showed some important **problems regarding energy performance** and the new systems introduced.

The **POOR CAPACITY TO CONTROL ENERGY PERFORMANCE AND SYSTEM QUALITY** is a non-marginal obstacle, considering that energy transition success also depends on the ability to record and show the environmental and economic advantages of the new eco-sustainable solutions, even in the middle- and long-term (the time spans in which these advantages tend to become more substantial and tangible, even for users).

Description

More than to strictly technical difficulties, this obstacle stems especially from **organisational or cost factors** which lead to **not adopting the necessary measurement tools** (such as for measuring the additional hot water produced by solar energy systems installed in support of traditional heating systems) – something which prevents users themselves from understanding just how much they are saving, and technicians from evaluating whether the systems are working properly. Difficulties were also found in **quality control of plant and equipment**, still for organisational and cost reasons. This problem, in particular, was found not in relation to individual systems but in installations – such as in passive houses or other kinds of low energy homes – based on the simultaneous use of different eco-sustainable technologies.

Indicators

PO8.1 Lack of energy performance control systems for the equipment

PO8.2 Difficulties in carrying out quality control of low energy buildings

PO8 POOR CAPACITY TO CONTROL ENERGY PERFORMANCE AND SYSTEM QUALITY										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X			X					low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO9

Shortcomings in the circulation of technical, social and political information

Rationale

Any technological transfer calls for the development of a broad and efficient communication network involving operators, stakeholders and, especially, users. The lack of information or the dissemination of imprecise, incomplete or even wrong information can have different impacts, but all potentially serious ones, such as technical errors or the spreading of users' diffidence towards the new technology introduced. **SHORTCOMINGS IN THE CIRCULATION OF TECHNICAL, SOCIAL AND POLITICAL INFORMATION** are thus an obstacle to the political-societal process of energy transition.

Description

Shortcomings in information circulation were also found in some of the anticipatory experiences examined (which, it is recalled, are all experiences of excellence in technology transfer management). In some cases, **users were not informed** of the existence of the new technology, the benefits it could give, the way it worked or the care to be taken when using it. This phenomenon concerned, for example, condominium administrators of buildings in which solar energy systems were to be installed, the potential residents of low energy houses, but also firms, hotels and public bodies such as schools and postal organisations involved in heating system restructuring projects. Communication problems were also found in **relations between the actors directly involved in project implementation** (e.g., between different administrations or between administrators, construction firms and technical personnel), as well as in relations between **project team and beneficiaries** (in these cases, for language and cultural reasons especially).

Indicators

PO9.1 Users' scant information on the existence and workings of the new technologies introduced

PO9.2 Poor communication between actors involved in implementing eco-sustainable projects

PO9.3 Language difficulties in communication with beneficiaries

PO9 SHORTCOMINGS IN THE CIRCULATION OF TECHNICAL, SOCIAL AND POLITICAL INFORMATION										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X	X		X	X		X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO10

Citizens' poor self-reliance in using eco-sustainable technologies

Rationale

Also owing to shortcomings in communication (see PO9), citizens often face certain problems in the everyday handling of new technologies, showing **low levels of autonomy**. **CITIZENS' POOR SELF-RELIANCE IN USING ECO-SUSTAINABLE TECHNOLOGIES** comes about essentially when people are asked to take particular care in using technology.

Description

A recurrent problem with this obstacle, for example, is the general **difficulty users have in "learning to use" passive houses** – a difficulty that was also found when they were given specific aids and manuals. In particular, similar problems of the lack of users' autonomy were found with the introduction of technologies like ventilation systems in low energy homes, waste recycling management, water recycling equipment, routine solar panel maintenance, also due to the non-activation of proper training and capacity-building measures on the part of project heads (PE9).

One of the consequences of this state of affairs is that people find it difficult to make the new technology "their own", above all because they continue to depend on technical personnel also in carrying out the simplest running and maintenance operations (such as closing the taps of hot water produced by district heating systems).

Indicators

PO10.1 Residents' difficulty in "learning to use" passive homes

PO10.2 Users' lack of knowledge of the functioning and ways of using eco-sustainable technologies

PO10.3 Difficulty in handling new technologies in case of emergency

PO10.4 Users' incomprehension of their role in the routine maintenance of eco-sustainable equipment

PO10 CITIZENS’ POOR SELF-RELIANCE IN USING ECO-SUSTAINABLE TECHNOLOGIES										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X	X		X			X		high

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

FACTOR PO11

Low priority given to energy saving by public service providers

Rationale

Another obstacle concerning the political-societal process is the **LOW PRIORITY GIVEN TO ENERGY SAVING BY PUBLIC SERVICE PROVIDERS** (in particular, schools, hospitals, post offices, etc.).

Indeed, public service providers tend to **focus on their core activities** (didactics, care-giving, postal services, etc.), concentrating their efforts and investments on them rather than on achieving energy saving goals, perceived as not linked to the organisation's mission. This tendency appears to be more marked in contexts where service providers' degree of economic autonomy (such as the individual school or post office) is greater and, obviously, increases further when there are cuts in public spending.

Description

This is still a marginal phenomenon, but can gain increasing weight within the broader horizon of energy transition. In this regard, one should consider how public service providers are often indicated as actors that could act as **engines** in spreading new energy technologies (it is not by chance that they are sometimes the first to get involved in demonstration projects). Their resistance to invest in eco-sustainable energy is thus a **"bad sign"** even for the population. Moreover, one should not overlook the fact that one of the sectors in which energy eco-sustainability is promoted is with **"large-scale consumers"**, including public service providers. Their poor mobilisation can thus lead to considerable setbacks on the road to a post-carbon society.

Indicators

PO11.1 Scant mobilisation and interest regarding the adoption of post

PO11.2 Public service providers' investments in activities connected to their own mission at the expense of investments geared to introducing eco- sustainable technologies

PE11 Low priority given to energy saving by public service providers										
Process	**Direction**	**R1**	**R2**	**R3**	**V1**	**V2**	**V3**	**V4**	**V5**	**Weight**
P	O	X		X	X		X			low

T = technological societal process; P = political societal process; E = enabler; O = obstacle; R1 = production and distribution regime; R2 = individual consump-tion regime, R3 = collective consumption regime; V1= political institutional vector; V2 = anthropological vector; V3 = social vector; V4 = scientific and technological vector; V5 = globalisation of knowledge vector; X = presence; high = high significance, low = low significance

Bibliography

Archer M., (1995), *Realist Social Theory: The Morphogenetic Approach*, Cambridge University Press, Cambridge, UK

Archer M., (2008), *Being Human: The Problem of Agency*, Cambridge University Press, Cambridge, UK

Arkitema (no date), "Samsø: A Role Model in Self-sufficiency", *Sustainable City,* http://sustainablecities.dk/en/city-projects/cases/samsoe-a-role-model-in-self-sufficiency

Arkitema (no date), *The Samsø Energy Academy* http://www.arkitema.com/Laering+Learning/Projekter/SamsoeEnergiakademi.aspx

Bagaeen S.G. (2006), "Redeveloping Former Military Sites: Competitiveness. Urban Sustainability and Public Participation", *Cities*, 23(5)

Baldassarri C. (2007), "La discarica delle belle cose", *Discarica*, 25 novembre

Bartik H., Herzog S. (2009), "Demographic Challenges for Urban Mobility and Public Space", Paper presented at *REAL CORP 2009 Cities 3.0 – Smart, Sustainable, Integrative. Strategies, Concepts and Technologies for Planning the Urban Future*, 14th International Conference on Urban Planning, Regional Development and Information Society, 22-25 April, Centre de Disseny de Stiges

Baumgartner F.R., Jones B.D. (1993), *Agendas and Instability in American Politics*, The University of Chicago Press, Chicago

Beck U. (1986), *Risikogesellschaft. Auf dem Weg in eine andere Moderne,* Suhrkamp, Frankfurt am Main

Beck U. (2007), *Weltrisikogesellschaft,* Suhrkamp, Frankfurt am Main

Beck U., (1992), *Risk Society: Towards a New Modernity,* Sage Publications, London

Beermann J. (2009), *100% Renewable Energy Regions in Europe,* MA thesis, Free University Berlin, Dept. Of Social And Political Science, Environmental Policy Research Centre
http://seacourse.dk/wiki/library

Best Practice Programme (2001), *BedZED – Beddington Zero Energy Development, Sutton*, General Information Report 89

Bewonersvereniging EVA-Lanxmeer, *Website*
http://www.bel-lanxmeer.nl/

Bijker W., d'Andrea L., (eds.) (2009), *Handbook on the Socialisation of Scientific and Technological Research*, River Press Group, Rome

BioRegional Development Group (2000), *BedZED Total Energy Strategy Including Green Transport Plan,* BioRegional Development Group, Wallington, Surrey http://www.bioregional.com/news-views/publications/

BioRegional Development Group (2004), BedZED Resident Satisfaction Survey http://www.bioregional.com/files/publications/BedZEDSurveyReport.pdf

BioRegional Development Group (2008), *What Makes an Eco-town? A Report from BioRegional and CABE Inspired by the Eco-towns Challenge Panel,* BioRegional Development Group, Wallington, Surrey
http://www.bioregional.com/news-views/publications/

BioRegional Development Group, (2009), *BedZED Seven Years on. The Impact of the UK's Best Known Eco-village and its Residents*, BioRegional Development Group, Wallington, Surrey
http://www.bioregional.com/news-views/publications/

Bolt C.M. (2008), "Straight forward - energy efficiency .....works", *7th ManagEnergy Annual Conference*, 29-31 January, Brussels

Bourdieu P., (1986), "The Forms of Capital", Richardson J.G. (ed), *Handbook of Theory and Research in the Sociology of Education*, Greenwald Press, New York

Bourgeois C., Guilleminot J., Scheer C., Sykora J. (2009), "Decentralization of Waste Water Systems", ATHENS European Week, *European Water and Sanitation Services vs Sustainable Development*

Brandt K. (2006), "Hannover Kronsberg - Rainwater Management Concept", Forum International Urbistique 2006, *Développement urbain durable, Gestion des ressources et Services urbains*, Lausanne

Brick K. (2008), *Follow Up of Environmental Impact in Hammarby Sjöstad: Sickla Udde, Sickla Kaj, Lugnet and Proppen*, Report Summary, Grontmij AB

Brogren M., Green A. (2003), "Hammarby Sjöstad Interdisciplinary Case Study of the Integration of Photovoltaics in a New Ecologically Sustainable Residential Area in Stockholm", *Solar Energy Materials & Solar Cells*, 75

Brohmann B., Fritsche U., Hünecke K. (2006), Case 6: *Bioenergy Village Jühnde*, Create Acceptance
http://www.createacceptance.net/fileadmin/create-acceptance/user/docs/CASE_6.pdf

Burns T., Andersen S., (1996), "The European Union and the Erosion of Parliamentary Democracy: A Study of Post-Parliamentary Governance", Andersen S., Eliassen K.A. (eds.), *European Union. How Democratic is It?* Sage Publications, London

Burt G. (2007), "Why Are we Surprised at Surprises? Integrating Disruption Theory and System Analysis with the Scenario Methodology to Help Identify Disruptions And Discontinuities", *Technological Forecasting and Social Change*, 74

Bylund J.R. (2005), *Sustaining the Experiment: Hammarby Sjöstad and Ecological Adaptation*

C40 Cities, “Copenhagen's Waste Plan 2008: Copenhagen Puts Only 3% of Waste into Landfill”, *Best Practices, Waste, C40 Cities Website* http://www.c40cities.org/bestpractices/waste/copenhagen_landfill.jsp

CABE (no date), *Hammarby Sjöstad – Stockholm Sweden* http://www.cabe.org.uk/case-studies/hammarby-sjostad

Cacace M. (2003), Glocalization. Research Study and Policy Recommendations, The Glocal Forum-World Bank Institute, Rome

Cacace M. (2004), *Femminismo e generazioni*, Baldini Castoldi Dalai, Milano

Cardiff University, Welsh School of Architecture, *Case Study: City of Zurich* http://www.cardiff.ac.uk/archi/programmes/cost8/case/transport/switzerland-zurich.PDF

Cardiff University, Welsh School of Architecture, *Case Study: Sustainable Housing Estate Eva-Lanxmeer* http://www.cardiff.ac.uk/archi/programmes/cost8/case/watersewerage/netherlands-sustainablehousing.html

Cardiff University, Welsh School of Architecture, *Case Study: Viikki Eco Neighbourhood Blocks* http://www.cardiff.ac.uk/archi/programmes/cost8/case/holistic/viikki.html

Carlsson-Kanyama A. et al. (2003), *Images of Everyday Life in the Future Sustainable City: Experiences of Back-Casting with Stakeholders in Five European Cities*, Integration Report of WP4 in the ToolSust Project (Deliverable No 19), December 8

Cavelli C. M. (2004), *Ecocittà.. Strategie territoriali delle Nazioni Unite nell’era della globalizzazione*, Gangemi Editore, Roma

Cecelski E. (2000), The Role of Women in Sustainable Energy Development, Subcontractor Report, National Renewable Energy Laboratory (NREL)

CEPHEUS (2005), *Climate Neutral Passive House Estate in Hannover-Kronsberg: Construction and Measurement Results*, PEP Project Information No. 1

Cerfontaine C. (2007), “The Vauben District in Freiburg in Breisgau: Living in a Holiday Destination”, *PTI*, September/October

Ceudech A. (2007), “L’integrazione tra governo della mobilità e governo delle trasformazioni urbane”, *TeMA*, 0(0)

Château B. (2002), "Une vision à long terme de la maîtrise de l’énergie en Europe", *Les cahiers de Global Chance*, 16, Novembre

Château B. (2004), *Energy and Future Life-Styles*, Presentation at the International Conference for Renewable Energies Bonn 2004, EC Side Event, 2 June, Bonn

Chatto C., Fouch T., Rackey J. (2006), *Trend Setting Urban Eco-Villages: Making Urban-Eco the Norm*

Christensen J. (2007), *The Industrial Symbiosis at Kalundborg, Denmark, a Short Description*

Christensen J. (2009), *The Industrial Symbiosis at Kalundborg, Denmark*

Churchman A. (1999), "Disentangling the Concept of Density", *Journal of Planning Literature,* 13(4)

Cialdini R., Reno R., Kallgren C. (1990), "A Focus Theory of Normative Conduct: Recycling the Concept of Norms to Littering in Public Places", *Journal of Personality and Social Psychology,* 58

City of Hannover (2004), *Hannover Kronsberg Handbook Planning and Realisation* http://connectedcities.eu/downloads/showcases/kronsberg_hannover_handbook.pdf

City of Helsinki, Ministry of the Environment (2005), *Eko-Viikki. Aims, Implementation and Results*, Dark Oy, Vantaa
http://www.hel.fi/static/ksv/julkaisut/eco-viikki_en.pdf

City of Malmö (2007), *Documentation from the Conference Sustainable City Development 2007*
http://www.malmo.se/English/Sustainable-City-Development/PDF-archive/pagefiles/scd07_doc_final_lq.pdf

City of Malmö (2009), *Environmental Programme for the City of Malmö 2009-2020*
http://www.malmo.se/sustainablecity

City of Malmö (2009), *Guide Western Harbour*
http://www.malmo.se/sustainablecity

City of Malmo, Sustainable City Development,
http://www.malmo.se/sustainablecity

CIVITAS (2004), *Application Form CIVITAS Award: New Mobility Culture Leadership: Communauté d'Agglomération de La Rochelle*

CIVITAS (2008), *Application Form I CIVITAS Award: "Cities and Mobility: Change is possible", Communauté d'Agglomération de La Rochelle*

Cohen M., Murphy J. (eds.) (2001), *Exploring Sustainable Consumption: Environmental Policy and the Social Sciences*, Elsevier Science, Amsterdam

Coleman J.S. (1990), *Foundations of Social Theory*, Harvard University Press, Cambridge, MA

COMMERCE (Creating Optimal Mobility Measures to Enable Reduced Commuter Emissions) (2008), "Pan-European Workplace Mobility Plan Awards 2008", presented at *ECOMM*, 4-6 June, London

Communauté d'Agglomération de La Rochelle (2008), Application Form Civitas Award: New Mobility Culture Leadership, Civitas Award 2008
http://www.civitas-initiative.org/docs1/CIVITAS_Award_2004_nondemonstration_city_La_Rochelle.pdf

Communauté d'Agglomération de La Rochelle, "Le Plan de Déplacements Urbains (PDU)", *Communauté d'Agglomération de La Rochelle website*
http://www.agglo-larochelle.fr

Copenhagen Municipality (2010), Application for European Green Capital from Copenhagen, European Commission, European Green Capital
http://ec.europa.eu/environment/europeangreencapital/docs/cities/2010-2011/copenhagen_application.pdf

Costantini G., Marta F., Montefalcone M. (2008), *Migrations et Retour, Ressources pour le Développement*, Organisation Internationale pour les Migrations (OIM), Rome

Criqui P. (2001), *POLES Prospective Outlook on Long-term Energy Systems*, Institut d'Economie et de Politique de l'Energie

d'Andrea L., Quaranta G., Quinti G. (2000), *Il ritorno della città. La base urbana della globalizzazione*, Officina Edizioni, Roma

d'Andrea L. (2009), "A Different Interpretation of Science-society Relations: The Socialization of Scientific and Technological Research", *JCOM*, 8(3)

d'Andrea L., Declich A. (1999), "Civil Society, Social Capital and Conflicts Research Outcomes", Contribution at the Workshop on *Depletion and Restoration of Social Capital in Post-conflict Societies*, Amalfi, May 21-22, organised by CERFE and The World Bank

d'Andrea L., Quaranta G. (1996), *Civil Society and Risk. Contribution for a General Theory*, Paper presented at Workshop CERFE-Amsterdam School of Social Research, February 26, Amsterdam (It. version: "Soggetti e rischi sociali. Contributo per una teoria generale", *Democrazia Diretta*, 3, 1995)

d'Andrea L., Quaranta G., Quinti G. (2005), *Manuale sui processi di socializzazione della ricerca scientifica e tecnologica*, Cerfe, Roma

De Swaan A., (1988) *In Care of the State*, Oxford University Press, Oxford

de Vries B.J.M. (2006), "Scenarios: guidance for an uncertain and complex world? in Costanza R., Graumlich L., Steffen W. (eds.), *Sustainability or Collapse? An Integrated History and Future of People on Earth (IHOPE)*, 96th Dahlem Workshop, MIT Press, Boston

Declich G., Taurelli S. (1999), *Femmes et risques socialux dans la zone mètropolitaine de Dakar*, ASDO/World Bank, Rome

Delai N. (2009), *Rifiuti & Sviluppo. Il caso virtuoso del sistema Peccioli*, FrancoAngeli, Milano

Design Commission for Wales, *Hammarby Sjöstad – Stockholm Sweden* http://dcfw.org/casestudies/view/hammarby_sjostad/

Dietz T., Ostrom E., Stern P.C. (2003), "The struggle to govern the commons", *Science,* 302

Dittmar H (1999), "The Role of Self-Image in Excessive Buying: a Social-Psychological Perspective", Benson A.L. (ed.), *I Shop, Therefore I Am – Compulsive Buying and the Search for Self*, Jason Aronson, Northvale, NJ

Dreborg K.H. (1996), "Essence of Backcasting", *Futures*, 28(9)

Droege P. (2006), "The Renewable City: Dawn of an Urban Revolution", *Bulletin of Science, Technology & Society*, 26(2)

Duic N, Krajacic G, Carvalho MG. (2004), "RenewIslands Methodology for Sustainable Energy and Resource Planning for Islands", *Renewable and Sustainable Energy Reviews*, 12

EAUE (no data), *SURBAN - database on sustainable urban development in Europe* http://www.eaue.de/winuwd/default.htm

Edelstam M. (2007), *Hammarby. Conception, Birth, Lesson Learned*, London http://www.buildingcentretrust.org/xplorer/pdf/hammarby/3_Mikael_Edelstam.pdf

Elliott R., Wattanasuwan K.(1998), "Brands as resources for the symbolic construction of identity", *International Journal of Advertisin,* 172

Enerdata (2005), *Etude pour une prospective énergétique concernant la France*, Rapport final, 01-02

Energiakademi (2006), *Samsø Energy Academy Factsheet* http://www.energiakademiet.dk/

Energie Cites, ADEME (2008), *Guidebook of Sustainable Neighbourhoods in Europe*, http://www.energie-cites.org/-Publications-2008-

Energie-Cités, City of Helsinki, Solpros (2000), *Bioclimatism Helsinki Finland*

Energiestadt (2008), *Energiestadt-Bericht Stadt Zürich*

Energigas Sverige (no date), *The Biogas Plants in Kristianstad*, http://gasbilen.eu/upload/files/publikationer/rapporter/case%20studies/the%20biogas%20plants%20in%20kristianstad.pdf

Engberg L.A., Svane Ö. (2007), "Compromise, Failure or Necessity", *Sustainable Urban Areas*, Internationale Conference, Rotterdam, 25-28 June

EPA (no date), *International Brownfields Case Study: Emscer Park, Germany* http://www.epa.gov/brownfields/partners/emscher.html

Erfors L. (2008), "Fossil Fuel Free Kristianstad", *7th ManagEnergy Annual Conference*, 29-31 January, Brussels

Etzioni A. (1968), *The Active Society. A Theory of Societal and Political Processes*, Free Press, New York

EU (no date), *ManagEnergy website. Case Studies*
http://www.managenergy.net/casestudies.html

European Commission, "La Rochelle", Civitas Cities, *CIVITAS*
http://www.civitas-initiative.org/city_sheet.phtml?id=7&lan=en

European Commission, *CIVITAS*
http://www.civitas-initiative.org/

European Commission, Intelligent Energy (2007), "The City of Zurich", *City Instruments,*
http://www.city-instruments.eu/en-zurich.html

Evans R., Guy S., Marvin S. (1999), Making a Difference: Sociology of Scientific Knowledge and Urban Energy Policies, *Science Technology Human Values, 24(1)*

Geels F.W., (2005), "Processes and Patterns in Transitions and System Innovations: Refining the Co-Evolutionary Multi-Level Perspective", *Technological Forecasting and Social Change*, 72

Geurs K., van Wee B. (2004), "Backasting as a Tool for Sustainable Transport Policy Makng: the Environmentally Sustainable Transport Study in the Netherlands", *EJTIR*, 4(1)

Gibbs D.C. (1999), "Sustainable Cities in Europe", *European Urban and Regional Studies*, 6(3)

Giddens A., (1985) *Modernity and Self-identity: Self and Society in the Late Modern Age*, Sage Publications, London

Giddens, A. (1991), *Modernity and Self-Identity*, Polity Press, Cambridge

GlashusEtt (2007), *Hammarby Sjöstad - a unique environmental project in Stockholm*
http://www.hammarbysjostad.se/inenglish/pdf/HS_miljo_bok_eng_ny.pdf

GlashusEtt Hammarby Sjöstad (2008), *Hammarby Sjöstad – A New City District with Emphasis on Water and Ecology*
http://www.hammarbysjostad.se

Görg M. (2007), "Hannover – Kronsberg un modéle à vivre un modéle à suivre", *2nd IMAGINE Seminar*, 27-29 November
http://www.energy-cities.eu/IMG/pdf/imagine_sem2007_hanover_kronsberg_mgeorg.pdf

Goudsblom J., (1993) *Fire and Civilization*, Penguin Book, London

Granovetter M., (1973), "The Strength of Weak Ties", *American Journal of Sociology*, 78

Greenberg Quinlan Rosner Research (2009), *Women's Survey on Energy & the Environment*

Groth T. (2009), *Socioeconomic Evaluation of the Ballen-Brundby District Healting Plan*, MSC Thesis

Hajer M.A. (1997), *The Politics of Environmental Discourse: Ecological Modernization and the Policy Process*, Clarendon, Oxford

Hamacher T., Biberacher M., VLEEM Consortium (2003), *The VLEEM Back-casting Approach: A Sketch of the Methodology*, Max-Planck-Institut für Plasmaphysik, Garching

Henshel R. L. (1982), "Sociology and Social Forecasting", *Annual Review of Sociology*, 8

Higgins T. (1987), "Self-discrepancy: A Theory Relating Self to Affect", *Psychological Review* 94

Holmberg J. (1998) "Backcasting: A Natural Step in Operationalising Sustainable Development", *Greener Management International* 23

Holtz G., Brughach M., Pahl-Wostl C. (2008), "Specifying "Regime" - A Framework for Defining and Describing Regimes in Transition Research", *Technological Forecasting & Social Change*, 75

Husaunndee A., Roudil N. (2007), *La politique énergétique de Barcelone – L'ordonnance solaire*, PREBAT – Comparaison international Bâtiment et Energie

ICLEI (2007), "The better floorlamps of the City of Zurich, Switzerland", in Öko-Institut e.V., ICLEI, *Costs and Benefits of Green Public Procurement in Europe*, Final Report

IdeA knowledge (2005), *Beacon Case Study Sustainable Energy London Borough of Lewisham*

IdeA knowledge (2005), *Increasing Access to Affordable Warmth for its Tenants: Case Study London Borough of Lewisham*

IdeA knowledge (2006), *Consultation and Communication Case Study*

IdeA knowledge (2006), *Partnership Working for Affordable Sustainable Energy in Housing*

IEA Bioenergy (no date), *The First Bioenergy Village in Jühnde/Germany. Energy Self Sufficiency with Biogas*
http://www.iea-biogas.net/casestudiestask.htm

IEA Bioenergy Task 37, *The First Bioenergy Village in Jühnde, Germany*, http://www.iea-biogas.net/casestudiestask.htm

Industrial Symbiosis Institute (2008), *New Technologies and Innovation through Industrial Symbiosis*
http://www.symbiosis.dk/media/7940/symbiosis%20paper%20presentation.pdf

Jackson T. (2005), *Motivating Sustainable Consumption. A Review of Evidence on Consumer Behaviour and Behavioural Change*, a report to the Sustainable Development Research Network, Centre for Environmental Strategy University of Surrey, University of Surrey, Guildford

Jakobsen I. (2009), *The Road to Renewables: A Case Study of Wind Energy, Local Ownership and Social Acceptance at Samsø,* MSc thesis, University of Oslo and University of Aalborg
http://seacourse.dk/wiki/library

Kahn H., Wiener A.J. (1967), *The Year 2000: a Framework for Speculation on the Next Thirty-Three Years*, The Macmillan Company, New York

Kajantie M. (2004), “Residents Mostly Pleased – But Public Services Could Be Closer”, *Quarterly*

Kajantie M. (2004), *The Inhabitant Survey in Eko-Viikki*, Helsinki, City of Helsinki Urban Facts, Study Reports
http://www.eukn.org/binaries/finland/bulk/research/2006/7/summary_ekoviikki.pdf

Kaptein M. (1999), *Sustainability: A Matter of People*, Presentation text, Vauban

Kinzig, A.P. et al. (2006), “Resilience and Regime Shifts: Assessing Cascading Effects”, *Ecology and Society*, 11(1)

Kirklees Council (2010), *Kirklees Warm Zone – case study*
http://www.kirklees.gov.uk/community/environment/green/pdf/WZCaseStudyWithJanuaryFigures.pdf

Kirklees Council, “Environmental Policy”, *Kirklees Council Website*
http://www.kirklees.gov.uk/you-kmc/kmc-policies/environmentpolicies.shtml

Kitous A. (2006), *POLES Model. Prospective Outlook on Long-term Energy Systems - A World Energy Model*, Enerdata, 9th February

Krause A., Sayani A. (2006), “Planning Sustainable Communities: Case Studies Kronsberg, Germany”, Tsenkova S. (ed.)

Kriesi H., Jegen M. (2001), “The Swiss Energy Policy Elite: The Actor Constellation of a Policy Domain in Transition”, *European Journal of Political Research,* 39

Kristianstad Municipality, *Kristianstad Fossil Fuel Free Municipality*
http://www.kristianstad.se/upload/Sprak/dokument/1%20Fossil%20Fuel%20Free%20Programme%204%20page%202007%20june.pdf

Latour B., (1987), *Science in Action*, Harvard University Press, Cambridge, MA

Lazarus N. (2003), *Beddington Zero (Fossil) Energy Development Toolkit for Carbon Neutral Developments*, BioRegional Development Group, Wallington, Surrey
http://www.bioregional.com/news-views/publications/

Lévy J., Lussault M. (Eds.) (2003), *Dictionnaire de la géographie et de l'espace des sociétés*, Belin, Paris

Lewisham (2003), *Draft - Affordable Warmth Strategy*

Lewisham (2005), *Affordable Warmth Strategy*

Lewisham (no date), Municipal Journal awards 2009 Energy Efficiency Achievement http://www.localgov.co.uk/

Limner B. (2008), *Kronsberg, Hannover (a Case Study of an Ecologically Focused Suburb)*, Example Paper, Cornell University

London Energy Partnership (2006), *Towards Zero Carbon Developments – Supportive Information to Boroughs*

Lundgren M., Torstensson K., Tapper J., Carlstedt J. (2004), *Photovoltaics in Architecture - Lessons Learned in PV Nord*, Final Report

Macelloni R., *Da un'emergenza ambientale un modello di sviluppo economico designato "Sistema Peccioli"*
http://www.coe.int/t/dgap/localdemocracy/Programmes_Democratic_Stability/IMC/Peccioli_Documents/Peccioli_Macelloni_en.pdf

Marta F., D'Arca R. (1995), *Etude sur les facteurs sociologiques liés aux processus migratoires dans le bassin de la Méditerranée*, CERFE-ILO, Rome

McCormick, K. (2005), "Sustainable Bioenergy Systems: Experiences from Sweden", Proceedings of *the Asia Pacific Roundtable on Sustainable Consumption and Production*, 10-12 October, Melbourne

McDonough W. (1992), "The Hannover Principles. Design for Sustainability", prepared for *EXPO 2000. The World's Fair*, Hannover

Melia S. (2006), *On the Road to Sustainability. Transport and Carfree Living in Frieburg*, Report for W.H.O. Healthy Cities Collaborating Centre

Melia S. (2007), "Carfree Development and the Paradox of Intensification", *40th Universities Transport Study Group Conference*, January

Mezzana D. (2002), "Towards Overcoming the Crisis of the State?", *European Synthesis*, 1

MINERGIE (2004), *Dichiarazione d'intenti MINERGIE 2008. Un contributo allo sviluppo sostenibile*
http://www.minergie.ch

MINERGIE (2007), *Rapport d'activité 2007*
http://www.minergie.ch

MINERGIE (2008), *L'abitazione MINERGIE. Manuale di aiuto alla progettazione*
http://www.minergie.ch

MINERGIE (2008), *Lo standard MINERGIE per gli edifici. Informazioni per la committenza*

MiniWatt.it Project, *Sunny Woods. Un palazzo residenziale a basso consumo energetico*

Mitta I. (2006), "A Renewable Islan Life", *REFOCUS*, November/December

Mönninghoff H. (2006), *Kronsberg, Hannover: Components of a Factor 10 Strategy*

Montefalcone M. (1993), "Politiche comunitarie e cittadinanza. Il ruolo della cittadinanza attiva nel processo di sviluppo europeo. Traccia per la discussione", *XIII Giornata nazionale dei diritti dei cittadini*, Roma, 16 luglio

Montefalcone M. (2002), *Ricerca-azione sugli immigrati qualificati e l'integrazione professionale. Memoria scientifica*, LSC, Roma

Murray Y. (2003), "London calling the ecozone", *The Poste.ie*, February 23

NABU (no date), *Urban Ecology Projects in Europe – Visions for Oslo?* www2.arkitektur.no/files/file46226_urban_ecology.pdf

Nadin M. (1998), *The Civilization of Illiteracy*, Dresden University Press, Dresden

Nadin M. (2003), *Anticipation. The End is Where we Start from*, Lars Müller Publishers, Baden

Nowotny H (et al.) (2001), Re-*thinking Science. Knowledge and the Public in the Age of Uncertainty*, Polity Press, Cambridge, UK

Ölander F., Thøgersen J. (1995), "Understanding Consumer Behaviour as Prerequisite for Environmental Protection", *Journal of Consumer Policy*, 18

Ott R. (2006), *Zurich's Transport Planning for Quality of Living* http://www.unil.ch/webdav/site/ouvdd/shared/Colloque%202006/Communications/Mobilite/Bonnes%20pratiques/R.%20Ott.pdf

Ott R. (2009), "Mobility is Culture. A Contribution to the Overall Quality of Life", *11th IMPACTS International Conference*, 3-6 June, Berlin

Paris A., Pujol T., Vela J. (2006), *Ordenanza Solar Térmica de Barcellona. Valoraciòn y balance de su applicaciòn*, Intelligent Energy Europe

Pellow D.N. (1999), "Framing Emerging Environmental Movement Tactics: Mobilizing Consensus, Demobilizing Conflict", *Sociological Forum*, Vol. 14(4)

Penelope_Bacchus (no date), *Model Municipal Ordinance Regulating Solar Systems* http://www.energie-cites.org/db/catalonia1_569_en.pdf

Permaculture Council for Europe (2008), *Report from the 9th European Permaculture Convergence*, Hostetin centre, Czech Republic, June 18th-23rd

Persson B. (ed.) (2005), *Sustainable City of Tomorrow. Bo01 – Experiences of a Swedish Housing Exposition*, Forskningsrådet Formas, Stockholm

Pierotti P., Preiti A., Fantacone S. (2003), *L' utopia possibile: come Peccioli ha trasformato un'emergenza ambientale in un modello di sviluppo e di buon governo*, Plus, Pisa

Poldermans C. (2006), *Sustainable Urban Development: The Case of Hammarby Sjöstad*

Procura + (2005), *Energy and Resource Efficiency in Building, Construction and Management – City of Zürich, Switzerland*

Procura+ (no date), *Case study: Varese Ligure Towards 100% Renewable*

Puig J. (2008), "Barcelona and the Power of Solar Ordinance: Political Will, Capacity Building and People's Participation", Chapter 19, *Urban Energy Transition*, Elsevier

Putnam R. (1994), Making Democracy Work: Civic Traditions in Modern Italy, Princeton University Press, Princeton

PV upscale (2007), *Kirklees Council Solar PV Projects* http://www.pvupscale.org/IMG/pdf/Kirklees.pdf

Quaranta G, d'Andrea L. (1996), *Civil Society and Risk. Contribution for a General Theory*, paper presented at the CERFE/SSSU/Amsterdam School of Social Research workshop, Amsterdam

Quaranta G, d'Andrea L. (1999), "Urbanization and Civil Society: Proposal for an Interpretative Scheme, in FRHS, *Research Community for the Habitat Agenda*, CERFE, Rome

Quaranta G. (1984), "Resistance to Technology Transfer: Remarks on Cultural Dynamics", Aziz U.A., Hoong Y., Poh L.C., *Technology, Culture and Development*, IPT, Kuala Lumpur

Quaranta G. (1985), *L'era dello sviluppo*, Franco Angeli, Milano

Quaranta G. (1993), "L'ordine democratico e la fine del monopolio dei partiti sulla politica", Ambrogetti A., *Aldo Moro e la* c*risi della forma-partito*, Edizioni Scientifiche Italiane, Napoli

Quaranta G. (2007), "Knowledge, Responsibility and Culture: Food for Thought on Science Communication", *JCOM*, 6(4)

Quaranta G., Quinti G. (2005), *Esclusione sociale e povertà*, CERFE, Rome

Quinti G. (1993), *Etude sur les indicateurs d'exclusion sociale*, CERFE-Commission des Communautés Européennes, Rome

Quist J. (2007), *Backasting for a Sustainable Future: The Impact After Ten Years*, Eburon Academic Publishers, Delft

Raven R.P.J.M., Heiskanen E., Lovio R., Hodson M. (2007), "Local Negotiation and Alignment of Expectations and Transfer of Lessons in Niche Development Trajectories:

Meta Analysis of 22 New Energy Projects in Europe", Workshop on *Innovation, Institutions and Path Dependency*, April, 15-18, Zürich

Razzanelli M. (2007), "Quando la discarica è oro", *Italia Rifiuti*, 24 maggio

Richardson G., Eich S., (2008), "Is England's Warm Front Programme Going to Improve the Country's Health?", *Indoor and Built Environment*, 17

Rip A., Kemp R. (1998), "Technological Change", Rayner S., Malone E.L., *Human Choice and Climate Change - An International Assessment*, 2, Batelle Press, Washington DC

Robinson D.K.R. (2008), "Complexity Scenarios For Emerging Techno-Science: Addressing Strategy-Context Fit By Prospecting Level Dynamics of Governance", *Third International Seville Seminar on Future-Oriented Technology Analysis: Impacts and implications for policy and decision-making*, Seville, 16-17 October

Robinson J (1990) "Futures Under Glass: A Recipe for People who Hate to Predict", *Futures*, 22

Rohracher H. (2008), "Energy Systems in Transition: contributions from Social Sciences", *International Journal of Environmental Technology and Management* 9(2/3)

Röling W., van Timmeren A. (2005), "Introducing Urban Agriculture Related Concepts In The Built Environment: The Park Of The 21st Century", Paper award, *The 2005 World Sustainable Building Conference*, Tokyo

Rosen R. (1985), *Anticipatory Systems*. Pergamon Press, Oxford

Rosen R. (1991), *Life Itself: A Comprehensive Inquiry into the Nature, Origin, and Fabrication of Life*, Columbia University Press, New York

Rotmans J., Kemp R., van Asselt M. (2001), "More Evolution than Revolution: Transition Management in Public Policy", *Foresight. The Journal of Futures Studies, Strategic Thinking and Policy*, 2(1)

Rumming K. (2006), *Sustainable Urban Development. The Ecologically Exemplary New Settlement of Hannover-Kronsberg*
http://www.energie-cites.org/IMG/pdf/kronsberg_sustainable_urban_dvt.pdf

Saastamoinen M. (2009), *Case Study 18: Samsø - Renewable Energy Island Programme*, Project Changing Behaviour
http://www.energychange.info/downloads/doc_download/337-cbcase18denmarksamsoe

Sabatier P.A. (1993), "Advocacy-Koalitionen, Policy-Wandel und Policy-Lernen: Eine Alternativezur Phasenheuristik", Héritier A. (ed.), PVS-*Sonderheft, Policy-analyse, Kritik und Neuorientierung*, Westdeutscher Verlag, Opladen

Sabatier P.A. (1998), "The Advocacy Coalition Framework: Revisions and Relevance for Europe", *Journal of European Public Policy* 5(1)

Sajeva M., Masera M. (2006), “A Strategic Approach to Risk Governance of Critical Infrastructures“, *International Journal of Critical Infrastructures*, 2(4)

Samsø Energy Academy (2007), *Renewable Energy Island* http://www.energiakademiet.dk/

Satterthwaite D.(2009), The Implications of Population Growth and Urbanization for Climate Change, *Environment and Urbanization*

Schaefer B. (2006), *Case 16: Barcelona Solar Ordinance*, Create Acceptance http://www.createacceptance.net/fileadmin/create-acceptance/user/docs/CASE_16.pdf

Scharpf F.W. (1997), *Games Real Actors Play: Actor-Centered Institutionalism in PolicyResearch*. Westview Press, Boulder, CO

Scheurer J. (2002), *Urban Ecology, Innovations in Housing Policy and the Future of Cities: Towards Sustainability in Neighbourhood Communities*, Unpublished Doctoral Thesis, Institute for Sustainability and Technology Policy, Murdoch University

Schwartz P. (1996), *The Art of the Long View: Planning for the Future in an Uncertain World*, Currency Doubleday, New York

Schwartz, M., Thompson M. (1990), *Divided We Stand: Redefining Politics, Technology and Social Choice.* Harvester Wheatsheaf and University of Pennsylvania Press, London and Philadelphia

Scotford A.M. (1995), *Realist Social Theory: The Morphogenetic Approach*, Cambridge University Press, Cambridge

Shirley-Smith C., Butler D. (2008), “Water Management at BedZED: Some Lessons”, *Engineering Sustainability*, 161(ES2)

Shove E. (2003), *Comfort, Cleanliness and Convenience*, Berg, Oxford-New York

Shove, E., Warde A. (1997), “Noticing Inconspicuous Consumption”, Paper presented to the European Science Foundation TERM programme workshop on *Consumption, Everyday Life and Sustainability*, April, Lancaster

SIBart Project (2003), *Living in Kronsberg. The Kronsberg Handbook*

Skanska (2008), *Eko-Viikki, Finland*, Case Study 38 http://skanska-sustainability-case-studies.com/pdfs/39/39_Eko_v001.pdf

Smith A., Stirling A., Berkhout F. (2004), "The Governance of Sustainable Socio-technical Transitions", *Research Policy*, 34

Soper K., Thomas L. (no date), *Alternative Edonism: A Theory and Politics of Consumption*, project fact sheet
http://www.consume.bbk.ac.uk/research/soper.html

Spaargaren G, van Vliet B. (2000), “Lifestyle, Consumption and the Environment: The Ecological Modernisation of Domestic Consumption”, *Society and Natural Resources*, 9

Sperling C. (2002), *Sustainable Urban District Freiburg-Vauban*, Dubai International Award for Best Practices to Improve the Living Environment

Sperling C. (2008), “Freiburg-Vauben. From Military Area to Model District”, *CABE Urban Design Summer School*, 22-25 June, Newcastle

Spoerri A. (2002), “Mobility Consulting Services as a Transport Sub-Policy in Zurich”, *European Conference on Mobility Management*, 15-17 May, Gent

Stenekes N., Colebatch H.K., Waite D., Ashbolt N.J. (2006), “Risk and Governance in Water Recycling: Public Acceptance Revisited”, *Science Technology Human Values*, 31(2)

Stern P.C. (2000), “Toward a Coherent Theory of Environmentally Significant Behaviour”, *Journal of Social Issues*, 56(3)

Stichting EVA, *EVA Lanxmeer Informative Website*
http://www.eva-lanxmeer.nl/

Sustainable Cities (no date), *Copenhagen: Waste-to-Energy-Plants*
http://sustainablecities.dk/en/city-projects/cases/copenhagen-waste-to-energy-plants

Sustainable Cities (no date), *Emscher Park: From Dereliction to Scenic Landscape*
http://sustainablecities.dk/en/city-projects/cases/emscher-park-from-dereliction-to-scenic-landscapes

Sustainable Cities (no date), *Kalundborg: Industrial Symbiosis - Waste makes resource*
http://sustainablecities.dk/en/city-projects/cases/kalundborg-industrial-symbiosis-waste-makes-resource

Sustainable Development Select Committee (2009), *Overview & Scrutiny. Local Warming: Increasing Home. Insulation in Lewisham: a scrutinity review*

Svane Ö. (2008), “Situations of Opportunity – Hammarby Sjöstad and Stockholm City’s Process of Environmental Management”, *Corporate Social Responsibility and Environmental Management*, 15

Svensson I., Kim B. (2004) *Wittchen Aesthetics of PV building integration*, Final Report

The Ashden Awards for Sustainable Energy (2009), *2009 UK Ashden Awards Case Study. Kirklees Council*
http://www.ashdenawards.org/files/reports/Kirklees_case_study_2009_final_map.pdf

Tom Chance (2009), Towards sustainable residential communities; the Beddington Zero Energy Development (BedZED) and beyond, *Environment and Urbanization*

Tsenkova S. (ed.) (2006), *Places And People: Planning New Communities*, Cities, Policy & Planning research series, Faculty of Environmental Design, University of Calgary, Calgary, Canada
http://www.ucalgary.ca/cities/Places_and_People/Planning%20New%20Communities.pdf

Tvrdon M., Faltin J., Bremere I. (2009), *Experience and Lessons Learned from Western Europe and from Cee Countries On Best Practice Examples of Energy Savings in Buildings*, Intense Intelligent Energy

Twinn C. (2003), “BedZED”, *The Arup Journal*, 1

Vallin J. (2004), “De la mondialisation de la transition au retour des incertitudes (1940–2000),” Caselli G., Vallin J., Wunsch G. (eds.), *Demographie: analyse et synthèse.* Volume V, *Histoire du peuplement et prévisions.* Paris: Institut National d’Etudes Démographiques

van ’t Klooster S.A., van Asselt M.B.A. (2006), “Practising the Scenario-axes Technique”, *Futures,* 38

van Timmeren A. (2007), “Urban Sustainability Through Decentralisation and Interconnection of Energy, Waste and Water Related Solutions: Case EVA Lanxmeer, Culemborg (The Netherlands)”, Horner M., Hardcastle C., Price A., Bebbington J. (Eds), *International Conference on Whole Life Urban Sustainability and its Assessment*, Glasgow

van Timmeren A., Kaptein M., Sidler D. (2007), “Sustainable Urban Decentralization: Case EVA Lanxmeer, Culemborg (The Netherlands)”, ENHR 2007 International Conference *‘Sustainable Urban Areas’*, Rotterdam, 25-28 June

van Timmeren A., Röling W., Kaptein M. (2004) “Sustainable Implant and EVA Centre, Culemborg; a hub for Sustainable Development”, Plea2004 - *The 21th Conference on Passive and Low Energy Architecture*, Eindhoven, The Netherlands, 19-22 September

van Timmeren A., Tawil M. (2006) “Integration of Living Machine and Biogas plant Case EVA Centre Lanxmeer”, Plea2006 - *The 23rd Conference on Passive and Low Energy Architecture*, Geneva, Switzerland, 6-8 September

Varese Ligure Municipality, *Dichiarazione ambientale 2005–2008* http://www.comune.vareseligure.sp.it/doc/DichiarazioneAmbientale.pdf

Vermeer H.J. (2006), *Luhmann’s ‘Social System’ Theory: Preliminary Fragments for a Theory of Translation*, Frank and Timme, Berlin

Vestbro D.U. (2005), *Conflicting perspectives in the development of Hammarby Sjöstad, Stockholm*
http://www.infra.kth.se/bba/HamSjostad.pdf

VLEEM Consortium (2005), *VLEEM 2 Final Report*, 25 May

Wächter C. (2000), “Empowering Women: Feminist Perspective on Sustainable Development”, Proceedings of the *International Summer Academy on Technology Studies: Strategies of a Sustainable Product Policy*, July 9-15, Deutschlandsberg,

Walker B. et al. (2006), “A Handful of Heuristics and Some Propositions for Understanding Resilience”, *Social-Ecological Systems, Ecology and Society* 11(1)

Warm Zones Ltd (2009), Warm *Zones cic. Annual Review 2008 – 2009* http://www.warmzones.co.uk/

Wasser M. (2005), "Everyday Walking Culture in Zurich", Paper presented at *Walk21-VI "Everyday Walking Culture", the 6th International Conference on Walking in the 21st Century*, September 22-23, Zurich

Weaver P, Jansen L, Van Grootveld G, van Spiegel E., Vergragt P. (2000), *Sustainable Technology Developmen*t, Greenleaf Publishers, Sheffield UK

Young O.R., Berkhout F. et al (2006), "The Globalization of Socio-ecological Systems: An Agenda for Scientific Research", *Global Environmental Change*, 16

Young W. (2000), *Shopping, Cooking and Eating in the United Kingdom*, Final Report, SusHouse Project, UMIST, Manchester UK

Ziman J. (2000), *Real Science. What it is, and what it Means*, Cambridge University Press, Cambridge, UK

Annex 1
List of "emerging experiences"

The 275 emerging experiences analysed during the research, have been categorised in 19 different types. The types are listed below, while the experiences are listed in the next pages.

- **New Sustainable District**
- **Sustainable Rural Community**
- **Sustainable District Refurbishment**
- **Sustainable Industrial Area**
- **Building Insulation**
- **Building RE Production** (i.e. Solar Thermal Panel, PV Panel, Biomass Boiler, Micro-cogeneration)
- **Sustainable Buildins** (i.e. Low Energy Houses, Passive Houses)
- **Sustainable Standard for Building**
- **Building Energy Saving** (i.e. Energy Efficient Devices, Electronic controllable thermostatic valves, Energy checks, Web-based tools for distant reading of consumes, Energy Performance Certificates)
- **RE Plant** (i.e. Wind, Geothermal, Solar, Biomass, Hydro, Biogas)
- **Renewable heat** (i.e. District Heating, District Cooling, CHP Plants)
- **Waste to Energy**
- **Green Elettricity Procurement**
- **Low Energy Street Lighting**
- **PT Infrastructures** (i.e. Metro, Tram, Train, Cycle Lanes and Track, Bus Lanes, Grass rail tracks)
- **PT Organisation** (i.e. Speed Reduction, Car Free Area, PT information systems, Integrated pricing system, Parking Management, Intermodal Connection Management, E-ticketing, Restricted Car Use, Bus On Demand, Toll Ring, Pedestrian Area)
- **Green PT** (i.e. Biogas Bus, Electric Vehicles, Hybrid bus, Car Sharing, Bike Sharing, RE for train/tram/metro, Low Impact Waterbuses)
- **Travel Optimisation** (i.e. Company mobility Plan, Schools Mobility Plan, Sustainable Urban Goods Logistics, Car pooling, Individual Travel Advice)
- **Urban Densification**

List of the 275 “emerging experiences” analysed during the research

COD	Place	Country	Type
EXP001	Feldkirch	Austria	RE Plant: Biomass
EXP002	Fronius	Austria	RE Plant: Biomass
EXP003	Graz	Austria	Building Energy Saving
EXP004	Graz	Austria	PT Organisation, Green PT, PT Infrastructure
EXP005	Graz	Austria	RE Plant: Solar; Renewable Heat
EXP006	Lienz	Austria	Renewable Heat
EXP007	Mödling	Austria	Sustainable District Refurbishment
EXP008	Salzburg (Lehen)	Austria	Sustainable District Refurbishment
EXP009	Upper Austria	Austria	RE Plant: Hydro; Building RE Production
EXP010	Vienna	Austria	RE Plant: Wind
EXP011	Vienna	Austria	Sustainable Standard for Building
EXP012	Weiz Gleisdorf	Austria	Building RE Production, RE Plant: Solar
EXP013	Antwerp	Belgium	PT Infrastructure
EXP014	Brecht	Belgium	RE Plant: Biogas
EXP015	Bruxelles	Belgium	RE Plant: Solar; Biomass; District Refurbishment
EXP016	Gent	Belgium	PT Infrastructure, Green PT, PT Organisation
EXP017	Rousse	Bulgaria	Renewable Heat
EXP018	Sofia	Bulgaria	RE pruduction in building: Biomass Heating Boiler
EXP019	Sofia (Oborishte)	Bulgaria	Sustainable District Refurbishment
EXP020	Brno	Czech Republic	Travel Optimisation; PT infrastructure
EXP021	Jind_ich_v Hradec	Czech Republic	Renewable Heat
EXP022	Zlin (Louky)	Czech Republic	Sustanaible District Refurbishment
EXP023	Znojmo	Czech Republic	Travel Optimisation; PT Organisation
EXP024	Aalborg	Denmark	PT Organisation, Green PT
EXP025	Aalborg	Denmark	PT plant: Biogas; Renewable Heat
EXP026	Aalborg	Denmark	Sustainable District Refurbishment
EXP027	Aarhus	Denmark	Sustainable Urban Goods Logistics
EXP028	Ballerup	Denmark	Renewable Heat
EXP029	Copenaghen	Denmark	PT Infrastructures; PT Organisation; Green PT
EXP030	Copenaghen	Denmark	PT plant: Wind, Solar
EXP031	Copenaghen	Denmark	Sustainable Urban Goods Logistics
EXP032	Copenaghen	Denmark	Waste to Energy, Renewable Heat
EXP033	Copenaghen (Vesterbro)	Denmark	Sustainable District Refurbishment
EXP034	Egedal	Denmark	Sustainable Buildings

COD	Place	Country	Type
EXP035	Hillerød	Denmark	New Sustainable District
EXP036	Kalundborg	Denmark	Sustainable Industrial Area
EXP037	Løgstør e Ringkøbing	Denmark	RE Plant: Wind
EXP038	Mäbjerg	Denmark	RE Plant: Biogas
EXP039	Samsø	Denmark	Sustainable Rural Community
EXP040	Helsingborg and Helsingør	Denmark/Sweden	RE Plant: Wind; Building RE Production; Sustainable Building
EXP041	Tallin	Estonia	PT Organisation
EXP042	Central Finland	Finland	PT Plant: Biogas
EXP043	Forssa	Finland	RE Plant: Biomass
EXP044	Helsinki (Eko Viikki)	Finland	New Sustainable District
EXP045	Kotka	Finland	PT plant: Wind
EXP046	Pori	Finland	PT Plant: Wind
EXP047	Vörå	Finland	Renewable Heat
EXP048	Autun	France	Building RE Production
EXP049	Besancon	France	PT Plant: Biogas
EXP050	Bourg-en-Bresse	France	Building RE Production
EXP051	Dole	France	Renewable Heat
EXP052	Dunkerque	France	RE Plant: Wind
EXP053	Echirolles	France	Renewable Heat, Building RE Production
EXP054	Grenoble	France	PT Infrastructure, PT Organisation, Travel Optimisation
EXP055	Grenoble	France	Renewable Heat
EXP056	Grenoble (ZAC de Bonne)	France	New Sustainable District
EXP057	La Rochelle	France	PT Organisation, PT Infrastructure, Green PT, Sustainable Urban Goods Logistics
EXP058	Lille	France	Low Energy Street Lighting
EXP059	Lille	France	PT Organisation; Green PT
EXP060	Lyon	France	New Sustainable District
EXP061	Nantes	France	PT Organisation, PT Infrastructure, Green PT
EXP062	Nantes	France	RE Plant: Solar, Biomass
EXP063	Nantes	France	Sustainable Standard for Building
EXP064	Nantes	France	Waste to Energy, Renewable Heat
EXP065	Paris	France	New Sustainable District
EXP066	Rennes (La Courrouze)	France	New Sustainable District
EXP067	Toulouse	France	Green PT; PT Organisation
EXP068	Aachen	Germany	Sustainable Industrial Area, RE Plant: Wind

COD	Place	Country	Type
EXP069	Baviera	Germany	RE Plant: Biomass
EXP070	Berlin - Solar Roof	Germany	Building RE Production
EXP071	Bremen	Germany	PT Organisation; Green PT; Travel Optimisation
EXP072	Cottbus	Germany	RE Plant: Hydro
EXP073	Dresden	Germany	PT Infrastructures, PT Organisation, Green PT,
EXP074	Emscher	Germany	Sustaibable Industrial Area
EXP075	Erding	Germany	RE Plant: Geothermal, Renewable Heat
EXP076	Erlangen	Germany	PT Infrastructures
EXP077	Freiburg	Germany	PT Infrastructures; Urban Densification, PT Organisation
EXP078	Freiburg	Germany	RE Plant: Solar; Biomass; Renewable Heat
EXP079	Freiburg (Rieselfeld)	Germany	New Sustainable District
EXP080	Freiburg (Vauban)	Germany	New Sustainable District
EXP081	Freiburg (Weingarten)	Germany	Sustainable District Refurbishment
EXP082	Friedrichshafen	Germany	Renewable Heat, Building RE Production
EXP083	Geislingen	Germany	Building Energy Saving
EXP084	Gelsenkirchen	Germany	RE Plant: Solar; Building RE Production
EXP085	Hamburg	Germany	Building RE Production; Building Insulation, Sustainable Standard for building, Building Energy Saving
EXP086	Hamburg	Germany	PT Infrastructures; PT Organisation; Urban Densification
EXP087	Hamburg	Germany	RE Plant: Wind, Biomass, Solar; Renewable Heat
EXP088	Hannover (Kronsberg)	Germany	New Sustainable District
EXP089	Heidelberg	Germany	Building RE Production;
EXP090	Heidelberg	Germany	RE Plant: Solar, Hydro, Biomass; Renewable Heat
EXP091	Juhnde	Germany	Sustainable Rural Community
EXP092	Karlsruhe	Germany	Green PT
EXP093	Leipzig	Germany	PT Infrastructures
EXP094	Leipzig	Germany	Travel Optimisation
EXP095	Munster	Germany	Building RE Production; Building Insulation
EXP096	Munster	Germany	Green PT, PT Organisation, Urban Densification
EXP097	Munster	Germany	RE Plant: Biogas, Wind, Hydro; Renewable Heat

COD	Place	Country	Type
EXP098	Neckarsulm	Germany	RE Plant: Solar, Biomass; Renewable Heat; Building RE Production
EXP099	Neckarsulm	Germany	Renewable Heat
EXP100	Prenzlau	Germany	RE Plant: Geothermal
EXP101	Saarbrucken	Germany	RE Plant: Solar, Hydro, Biomass. Building RE Production
EXP102	Stoccarda	Germany	Travel Optimisation
EXP103	Stuttgart (Ostfildern)	Germany	New Sustainable District
EXP104	Tübingen (Südstadt)	Germany	New Sustainable District
EXP105	Ulm	Germany	RE Plant: Solar; Renewable Heat
EXP106	Ulm (Sonnenfeld)	Germany	New Sustainable District
EXP107	Wittstock	Germany	Building Energy Saving
EXP108	Kalamata	Greece	Sustainable Buildings
EXP109	Larissa	Greece	PT Organisation
EXP110	Thessalonica	Greece	Waste to Energy
EXP111	Budapest (Obuda)	Hungary	Sustainable District Refurbishment
EXP112	Debrecen	Hungary	PT Organisation, Green PT, Travel Optimisation
EXP113	Cork	Ireland	PT Organisation
EXP114	Cork	Ireland	RE Plant: Geothermal, biofuel; Waste to Energy; Renewable Heat
EXP115	Dundalk	Ireland	Sustainable District Refurbishment
EXP116	North Tipperary	Ireland	Sustainable District Refurbishment; Sustainable Buildings
EXP117	Templederry	Ireland	RE Plant: Wind
EXP118	Tralee	Ireland	RE Plant: Wind
EXP119	Alessandria	Italy	New Sustainable District; Sustainable District Refurbishment
EXP120	Alto Adige	Italy	Renewable Heat
EXP121	Alto Adige	Italy	Sustainable Standard for building
EXP122	Asiago	Italy	RE Plant: Biomass; Renewable Heat
EXP123	Bologna	Italy	Building Energy Saving
EXP124	Bologna	Italy	RE Plant: Geothermal, Wind, Biomass; Renewable Heat
EXP125	Brescia	Italy	Green PT; PT Organisation
EXP126	Enna	Italy	PT Plant: Biomass
EXP127	Faenza	Italy	Sustainable Buildings
EXP128	Ferrara	Italy	RE Plant: Geothermal
EXP129	Firenze	Italy	PT Organisation
EXP130	Modena	Italy	Building Energy Saving

COD	Place	Country	Type
EXP131	Modena	Italy	Green PT, PT Organisation, PT Infrastructures
EXP132	Monza	Italy	Green PT, PT Organisation
EXP133	Peccioli	Italy	Waste to Energy; Renewable Heat
EXP134	Perugia	Italy	PT Organisation, Travel Optimisation
EXP135	Piacenza	Italy	PT Organisation
EXP136	Podenzana	Italy	Low Energy Street Lighting
EXP137	Provincia di Chieti	Italy	Building RE Production
EXP138	Provincia di Milano	Italy	Sustainable Standard for building
EXP139	Roma	Italy	Building RE Production
EXP140	Roma	Italy	Green PT, PT Organisation,
EXP141	Torino	Italy	Travel Optimisation, PT Organisation
EXP142	Torino (Arquata)	Italy	Sustainable District Refurbishment
EXP143	Varese Ligure	Italy	RE Plant: Wind; Building RE Production
EXP144	Venezia	Italy	PT Organisation, Green PT
EXP145	Iecava	Latvia	Renewable Heat
EXP146	Tukums	Latvia	Low Energy Street Lighting
EXP147	Ignalina	Lithuania	Renewable Heat
EXP148	Kaunas	Lithuania	Green PT
EXP149	Oslo	Norway	Building Insulation
EXP150	Oslo	Norway	PT Organisation; Urban Densification; Green PT
EXP151	Oslo	Norway	Waste to Energy; Renewable Heat
EXP152	Stavanger	Norway	Green PT; Travel Optimisation
EXP153	Trondheim	Norway	Green PT; PT Infrastructures
EXP154	Trondheim	Norway	RE Plant: Biomass, Solar; Renewable Heat, Waste to Energy
EXP155	Trondheim	Norway	Sustainable Building, Building RE Production
EXP156	Gdynia	Poland	PT Organisation
EXP157	Jelenia Gora	Poland	RE Plant: Biomass
EXP158	Kepice	Poland	RE Plant: Biomass
EXP159	Luban	Poland	RE Plant: Biomass
EXP160	Podhale	Poland	Renewable Heat
EXP161	Przechlewo	Poland	RE Plant: Biomass
EXP162	S_ubice	Poland	Building Energy Saving
EXP163	Szczecinek	Poland	Green PT; PT Organisation
EXP164	Kraków	Poland	Green PT; PT Organisation
EXP165	Coimbra	Portugal	Green PT; PT Organisation
EXP166	Mortagua	Portugal	RE Plant: Biomass

COD	Place	Country	Type
EXP167	Ponte de Lima	Portugal	Building Energy Saving
EXP168	Portinho da Costa	Portugal	Renewable Heat; RE Plant: Hydro
EXP169	Vila Nova de Gaia	Portugal	Low Energy Street Lighting
EXP170	Vila Real	Portugal	Building Energy Saving
EXP171	Brasov	Romania	Low Energy Street Lighting
EXP172	Bucarest	Romania	PT Organisation; Green PT
EXP173	Craiova	Romania	Green PT; Travel Optimisation; PT Organisation
EXP174	Ploiesti	Romania	PT Infrastructures, Green PT, PT Organisation
EXP175	Suceava	Romania	Green PT, PT Organisation
EXP176	Neslu_a	Slovakia	Building RE Production
EXP177	Jenice	Slovenia	Building Insulation, Building RE Production
EXP178	Ljubljana	Slovenia	Green PT, PT Organisation, Travel Optimisation
EXP179	Zagorje	Slovenia	Renewable Heat
EXP180	Barcellona	Spain	Sustainable Standard for building
EXP181	Bilbao	Spain	Waste to Energy
EXP182	Burgos	Spain	Green PT; PT Organisation; Travel Optimisation
EXP183	Cerdanyola del Vallès	Spain	New Sustainable District
EXP184	Granada	Spain	PT Organisation
EXP185	La Ribera	Spain	Waste to Energy
EXP186	Murcia	Spain	Sustainable Buildings
EXP187	Ponferrada	Spain	Green PT; PT Infrastructures
EXP188	San Sebastian	Spain	Green PT; PT Organisation; Travel Optimisation; PT Infrastructures
EXP189	Tona	Spain	Building RE Production
EXP190	Tona	Spain	Low Energy Street Lighting, Green Elettricity Procurement
EXP191	Tortosa	Spain	RE Plant: Wind
EXP192	Tudela	Spain	New Sustainable District
EXP193	Tudela	Spain	RE Plant: Wind, Solar
EXP194	Viladecans	Spain	New Sustainable District
EXP195	Vitoria - Gasteiz	Spain	Green PT; PT Organisation; Travel Optimisation; PT Infrastructures
EXP196	Zaragoza	Spain	Sustainable Standard for Building
EXP197	Falkenberg	Sweden	Building RE Production, Re Plant: Wind
EXP198	Goteborg	Sweden	Travel Optimisation; PT Organisation
EXP199	Jämtland County	Sweden	Building RE Production
EXP200	Katrinefors	Sweden	RE Plant: Biomass

COD	Place	Country	Type
	Kraftvärme		
EXP201	Kristianstad	Sweden	Renewable Heat, RE Plant: Wind, Biogas, Biomass
EXP202	Kunglav	Sweden	RE Plant: Solar, Biomass; Renewable Heat
EXP203	Linköping	Sweden	Green PT
EXP204	Linköping	Sweden	Waste to Energy
EXP205	Lund	Sweden	PT Organisation
EXP206	Lund	Sweden	RE Plant: Geothermal, Biomass; Renewable Heat
EXP207	Malmö (Bo01)	Sweden	New Sustainable District
EXP208	Mölndal - RAM	Sweden	Travel Optimisation
EXP209	Region Västra Götaland	Sweden	RE Plant: Biomass
EXP210	Region Västra Götaland	Sweden	Sustainable Buildings, Building Insulation
EXP211	Region Västra Götaland	Sweden	Waste to Energy
EXP212	Stockholm (Hammarby Sjöstad)	Sweden	New Sustainable District
EXP213	Uppsala	Sweden	RE Plant: Wind, Hydro, Biomass; Building RE Production
EXP214	Vasteras	Sweden	Waste to Energy
EXP215	Vaxjo	Sweden	Sustainable buildings, Building RE Production, Building Energy Saving
EXP216	Vaxjo	Sweden	Waste to Energy
EXP217	Ginevra	Switzerland	Renewable Heat
EXP218	Ginevra	Switzerland	Travel Optimisation
EXP219	Losanna	Switzerland	PT Organisation
EXP220	Losanna	Switzerland	RE Plant: Solar
EXP221	Neuchâtel	Switzerland	Urban Densification
EXP222	Zurich	Switzerland	PT Infrastructures, PT Organisation, Green PT, Travel Optimisation
EXP223	Almere	The Netherland	RE Plant: Biomass; Renewable Heat
EXP224	Almere	The Netherland	Sustainable Buildings
EXP225	Delft	The Netherland	PT Organisation
EXP226	Delft	The Netherland	Sustainable District Refurbishment
EXP227	Groningen	The Netherland	PT Infrastructures, PT Organisation
EXP228	Groningen	The Netherland	Travel Optimisation
EXP229	Heerlen	The Netherland	Renewable Heat
EXP230	Province of Drenthe	The Netherland	Green Elettricity Procurement
EXP231	Tilburg	The Netherland	Waste to Energy

COD	Place	Country	Type
EXP232	Zoetermeer (de Boomgaard)	The Netherland	New Sustainable District
EXP233	Zoetermeer (Oosterheem)	The Netherland	New Sustainable District
EXP234	Amsterdam (Westerpark)	The Netherlands	New Sustainable District
EXP235	Apeldoorn	The Netherlands	Building RE Production
EXP236	Apeldoorn (Ecofactory)	The Netherlands	Sustainable Industrial Area, RE Plant: Wind
EXP237	Arnehem (Immerloo)	The Netherlands	Renewable Heat; Building Insulation
EXP238	Culemborg (Eva Lanxmeer)	The Netherlands	New Sustainable District
EXP239	Eindhoven	The Netherlands	Renewable Heat
EXP240	Province of Twente	The Netherlands	Travel Optimisation
EXP241	Rotterdam	The Netherlands	PT Infrastructures; PT Organisation; Green PT
EXP242	The Hague	The Netherlands	Travel Optimisation
EXP243	Utrecht (Leijdsche Rijn)	The Netherlands	New Sustainable District
EXP244	Armagh	United Kingdom	RE Plant: Biogas
EXP245	Bath	United Kingdom	Green PT; Travel Optimisation; PT Organisation
EXP246	Belfast	United Kingdom	Building RE Production
EXP247	Bridgend	United Kingdom	PT Organisation
EXP248	Brighton & Hove	United Kingdom	Travel Optimisation; Green PT; PT Organisation
EXP249	Bristol	United Kingdom	RE Plant: Solar, Biomass, Wind; Renewable Heat
EXP250	Bristol	United Kingdom	Sustainable Buildings, Building Insulation
EXP251	Bristol	United Kingdom	Travel Optimisation; PT Organisation
EXP252	Cornwell	United Kingdom	Building Insulation, Building RE Production
EXP253	Dyfi Valley	United Kingdom	RE Plant: Hydro, Wind, Solar, Biomass. Building RE Production
EXP254	Kirklees	United Kingdom	Building Insulation, Building RE Production
EXP255	Leeds	United Kingdom	Building RE Production, Building Energy Saving
EXP256	Leicester	United Kingdom	Sustainable Standard for Buildings, Energy Efficiency in Buildings
EXP257	London (BedZed)	United Kingdom	New Sustainable District
EXP258	London Borough of Lambeth	United Kingdom	Sustainable District Refurbishment

COD	Place	Country	Type
EXP259	London Borough of Lewisham	United Kingdom	Building Insulation; Building RE Production; Renewable Heat
EXP260	Manchester	United Kingdom	Renewable Heat
EXP261	Marches	United Kingdom	Building Energy Saving, Sustainable Standard for Buildings
EXP262	Milton Keynes	United Kingdom	Sustaianble Buildings
EXP263	Newcastle	United Kingdom	Travel Optimisation
EXP264	Northern Ireland	United Kingdom	Building Insulation, Building RE Production
EXP265	Norwich	United Kingdom	PT Organisation; Travel Optimisation; Green PT
EXP266	Nottingham	United Kingdom	PT Organisation; Travel Optimisation
EXP267	Nottinghamshire	United Kingdom	Building Energy Saving, Building RE Production
EXP268	Preston	United Kingdom	PT Organisation; Travel Optimisation; PT infrastructures
EXP269	Southhampton	United Kingdom	Renewable Heat
EXP270	Sustrans	United Kingdom	PT Infrastructures
EXP271	Wales (Powys)	United Kingdom	Building RE Production
EXP272	Watford	United Kingdom	Building Insulation
EXP273	Winchester	United Kingdom	Green PT; PT Organisation
EXP274	Woking	United Kingdom	Building Insulation; Building RE Production
EXP275	Woking	United Kingdom	RE Plant: Solar