# CONCERTO

## PLANNING AND IMPLEMENTATION PROCESS ASSESSMENT REPORT

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## TABLE OF CONTENTS

# List of Figures

## TABLE OF CONTENTS

# List of Figures

# List of Tables

## List of Boxes

## Summary

In the last two decades, sustainable development has gradually become the driver for the design and implementation of a large number of policies and activities in the European Union. Related instruments and methodologies have therefore started moving from an aggregation of individual policy approaches to an integrative approach emphasising the interactions between economic, environmental and socio-economic factors and constraints. The CONCERTO initiative can be considered a milestone in this development.

The CONCERTO initiative highlights the role and contribution of local authorities (primarily city administrations) as coordinators of integrated actions for sustainable urban development with a focus on energy issues. The key challenge for the majority of CONCERTO communities is to depart from traditional local energy policy-making approaches, mostly focussed on supporting parallel and not interconnected actions in different fields of activity (demand-side, supply-side). The CONCERTO communities address the challenge of developing and applying innovative measures and instruments to promote multiple aspects of sustainability (technological, institutional, economic, social and environmental) within an integrated methodological framework for local development. The path followed is mostly to integrate energy and sustainability criteria into common urban regeneration and urban development processes, which is the most effective way for guaranteeing the achievement of climate protection or sustainability targets at local level. This complex task is implemented differently in the various CONCERTO communities and depends strongly on general and local administrative and legislative framework conditions and project types.

The Planning and Implementation Report provides an overview and assessment of planning and implementation processes for the measures implemented within the first generation CONCERTO projects. A major endeavour of this report is to provide a systematic comparative analysis which allows communities to put side by side the outcome of their projects, to detect the reasons for success and failure and for the differing performances, to highlight successful measures and good practices and to learn from each other, thus enabling a replication of the CONCERTO approach.

# 0 INTRODUCTION

## 0.1 Introductory remarks: Why a Planning and Implementation Assessment?

Following the Brundtland Report, in the last two decades sustainable development has gradually become the driver for the design and implementation of a large number of policies and activities in the European Union. Related instruments and methodologies have therefore started moving from an aggregation of individual policy approaches to an integrative approach emphasising the interactions between economic, environmental and socio-economic factors and constraints. The CONCERTO initiative can be considered a milestone in this development.

In fact, the initiative has been launched by the European Commission (EC) as part of the research framework programme to enhance the role of cities and local authorities as driving forces towards sustainable community development. By directly supporting local authorities and fostering integration of energy related actions into a holistic approach towards sustainable development, the initiative also stresses the role of innovative implementation mechanisms as a significant success factor for such demonstration projects. This can be regarded as an alternative to traditional funding schemes and programmes usually promoting individual activities or measures mostly focussing on specific technologies and their related industries and markets.

Currently, 45 cities are participating in the CONCERTO initiative. These are located in 18 member states and populated by approximately five million people. About 500,000 inhabitants are directly - or indirectly - affected by CONCERTO activities in local communities consisting of selected neighbourhoods. Out of the 45 CONCERTO communities, the activities of the 27 first generation communities which started in 2005 are being monitored, evaluated and analysed in detail by CONCERTO Plus[1].

The main challenge for the majority of CONCERTO communities is to depart from traditional local energy policy-making approaches, mostly focussed on supporting parallel actions in different fields of activity (demand-side, supply-side). The CONCERTO Communities address the challenge of developing and applying innovative instruments and measures to promote multi-dimensional (technological, institutional, economic, social and environmental) sustainability within an integrated methodological framework for local (sustainable) development. The desired outcomes will be achieved by implementing a number of core activities. The path followed is mostly to integrate energy and sustainability criteria into urban regeneration and urban development issues. This complex task is implemented differently in the various CONCERTO communities and depends strongly on general and local administrative and legislative framework conditions and project types.

Indeed, a successful implementation of local sustainable energy plans is strongly influenced by factors related to the planning and implementation processes themselves - including the commitment of local community leaders - and the choice of accompanying activities such as the dissemination of information, the use of appropriate communication tools, awareness raising, participation of relevant decision makers and other market actors, involvement of user groups, but also by cultural and organisational factors.

[1]In fact, in 2006 one of the initially participating 27 communities has left the programme and project

The Planning and Implementation Report provides an overview and assessment of planning and implementation processes and procedures for the measures implemented within the first generation CONCERTO projects. The evaluation of project implementation is paramount for understanding outcomes and therefore it complements and reinforces the importance and relevance of an outcome evaluation. Thus, whilst an evaluation of results tells what impact a programme/policy has, evaluating the implementation enables to put this outcome data in the proper contextual background. In fact, without knowing exactly what has been implemented and why, it is difficult to assess the impact of measures or show causal linkages between project activities and outcomes. Moreover, the analysis of these procedures is fundamental, because only if the impacts of policies and policy instruments are known from the beginning, can policy learning take place, and undesired developments can be changed or corrected at an early stage in the implementation process. This process evaluation adds value and transparency to policy-making and can help to improve, to justify and to explain success and failures of given measures and policies[2]. In fact, the report aims at identifying factors affecting the outcome of the projects and delineates common patterns. Although planning mechanisms are also analysed and comparatively assessed, the major focus of the report is on the processes of implementation adopted by the 27 first generation CONCERTO communities.

A major endeavour is therefore to provide a systematic and integrated analysis. As a result, this should allow communities/regions to compare the outcome of their projects, to detect the reasons for success and failure and for the differing performances, to highlight successful measures and good practices and to learn from each other and to cooperate. The appraisal is preceded by an analysis and assessment of the relevant institutional, political, cultural, organisational, financial and legal contexts.

The report draws also evidence from the preliminary outcomes of the ***technical monitoring*** and ***socio-economic assessment*** that have been conducted in parallel and are still ongoing. The latter analyses the quality, social impacts, added value and risks associated with the energy services provided by each of the 27 CONCERTO communities.

The ***Planning and Implementation Report*** offers preparatory work for the analysis of the CONCERTO measures and their impacts that will be described in a separate policy recommendations publication. This will provide *analyses and impact assessments of policies and measures adopted by each of the 27 CONCERTO communities* i*n order to extract the most important common messages and lessons learned.*

## 0.2 Structure of the report

The report has been prepared in close co-operation with the communities involved in the projects, in order to make it as useful as possible as an input to the overall CONCERTO evaluation. Experts from the CONCERTO communities participated in a thematic workshop held in Brussels on October 12, 2009 where the main features of the assessment report, methodological approaches and responses were presented, followed by a broader discussion of the overall progress in the selected six assessment areas and generation of preliminary lessons learnt. Drafts for the various planning and implementation analysis tools, especially the

[2] In the policy evaluation literature it is customary to distinguish between evaluating whether a policy intervention has been effective (summative evaluation), and how and why it has worked or not (formative evaluation). See among others: Government Chiefs Social Research Office, Prime Minister Strategy Unit, The Magenta Book. Guidance Notes for Policy Evaluation Analysis, July 2003, London.

*Planning & Implementation Process Diagrams and assessment tables* were fine-tuned and agreed upon.

The **Planning and Implementation Report** is structured as follows:

**Chapter 1** focuses on the methodological framework and the chosen set of criteria and tools for analysing sustainable development challenges and solutions planned and implemented in CONCERTO communities to achieve the stated goals. The chapter explains the context and scope of the evaluation, provides definitions of research questions and gives details about the approach and followed steps for assessing the progress in implementing the CONCERTO thematic areas in the various communities.

**Chapter 2** provides a review of the contextual factors, i.e. relevant institutional, political, cultural, organisational, financial and legal contexts. The following factors are analysed and comparatively assessed:

- local and regional context (background characteristics)
- relevant institutional, political, cultural, organisational, financial and legal frameworks;
- technological and non-technological planning and implementation barriers;
- attitudes, contributions and levels of participation of relevant stakeholders, including the general public.

**Chapter 3** deals with the characteristics of the planning and implementation processes. It shortly analyses the stated goals, identifies divergences from original planning, problems and corrective actions taken during the planning and (early) implementation stage to reach the aimed objectives. This step is followed by the analogous analysis of the characteristics of the advanced implementation processes whereby innovative technological, institutional, social and economic solutions are documented and mapped.

**Chapter 4** provides a comparative assessment (including benchmark and gap analysis) and delineates critical factors for success. It summarises whether, and if so why, the outcomes differed from the one foreseen in the original plans and how effective the activities were in achieving the aimed objectives and why. The causes of the differences and gaps as well as methods and practices that make it possible for the "good practice" communities to achieve their high performance levels are analysed in detail.

The comparative analysis of the implemented measures is broken down into three broad categories corresponding to clusters of projects. These are: Cluster 1- New urban development; Cluster 2- Large-scale renovation measures and improvements in urban areas and Cluster 3-Measures in towns and rural areas. The assessment carried out for all three clusters relies on the following six broad assessment areas: 1) Performance requirements for buildings that are more ambitious than present building codes; 2) High degree of integration of renewables in buildings; 3) Polygeneration and cascade of resources; 4) Community energy management systems/ effective approach to technical monitoring; 5) Commitment of stakeholders; 6) Integration of sustainability criteria / socio-economic accompanying activities. The evaluation is performed in each of the assessment areas by using different criteria belonging to the technical dimension, administrative/institutional dimensions and outreach/replication potential. Finally, a comprehensive, separate analysis of the planning and implementation process for the socio-economic (SE) accompanying measures is presented.

**Chapter 5** illustrates the lessons learnt and a number of good practice examples. It also outlines the key remaining challenges facing the CONCERTO communities and priority areas

requiring action, thus setting the stage for the recommendations to be addressed in the Policy Recommendations Publication.

**The annex** provides synopses, planning and implementation process diagrams and matrices, which illustrate the consolidated findings from all 27 CONCERTO communities.

# 1 METHOD - Framework for the assessment

## 1.1 Introductory remarks

This chapter describes the integrated methodological framework and the chosen set of criteria and methodological tools for analysing sustainable development challenges and solutions planned and implemented in CONCERTO communities to achieve the stated goals.

The main questions asked as part of the planning and implementation evaluation included:

I. What are the critical components/activities of the project?
II. How do these components connect to the goals and intended outcomes for the projects?
III. What aspects of the implementation process are facilitating success or acting as hindrances for the projects?
IV. Why did some communities do better?

The analytical steps connected with the systematic answers to those questions can be subdivided into four phases which developed iteratively. These phases consisted in:

(i) understanding CONCERTO communities' systems and their challenges,
(ii) characterising, categorising and classifying innovative solutions and their implementation procedures / designing an integrated methodological framework.
(iii) Analysing barriers and drivers
(iv) Comparing, analysing, benchmarking and undertaking a gap analysis and fine-tuning with the communities

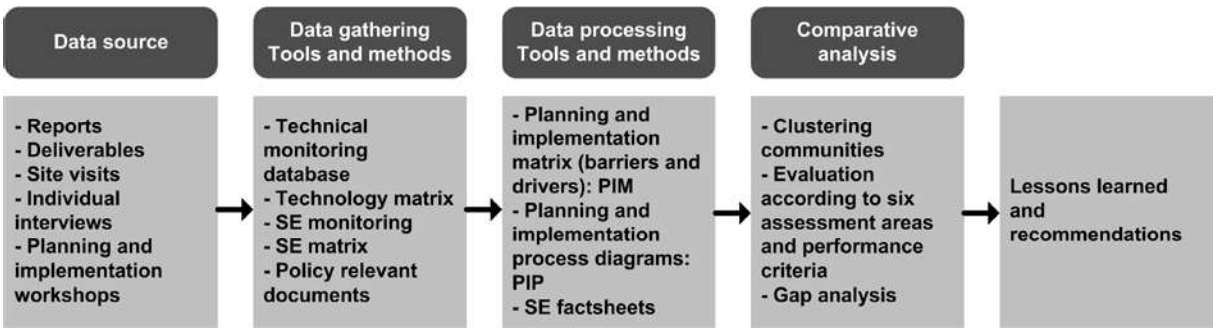



Figure 1: Methodological framework

## 1.2 The framework for the evaluation, definitions of the objectives and research questions

The initial two work phases have taken place at the same time as the setting up of the CONCERTO Plus database[3] and a baseline development. Steps iii and iv have required setting up a specific framework for evaluation.

The chosen methodology for the planning and implementation assessment is integrative and interdisciplinary. It borrows elements of formative evaluation theory, theory of change approach and system analysis in order to understand CONCERTO communities systems and their challenges[4]. Urban fabric and technological subsystems have been analysed together with socio-economic dynamics and institutional frameworks.

Elements from system analysis and ex-ante evaluation have allowed the characterisation, the categorisation and the development of innovative planning and implementation procedures for reaching the CONCERTO targets and sustainable development paths.

**Analytical steps in designing an integrated methodological framework**

The methodology corresponding to the phases (iii) and (iv) above has relied on various steps, some of which have followed logically and chronologically. These can be summarised as:

a) Definition of research questions;
b) Setting of evaluation criteria for the objectives, rules and procedures in the design and planning stage;
c) Analysis of the alignment of the targets with the CONCERTO vision (degree of ambition of the general and specific objectives);
d) Monitoring of the achievement of the stated objectives;
e) Monitoring of divergences from original planning;
f) Detection and analysis of the encountered barriers;
g) Analysis of the planning and implementation process for all 27 communities;
h) Clustering of communities;
i) Benchmarking and assessing;
j) Comparative analysis.

Thus, the evaluation of the planning and implementation of CONCERTO measures has been made based on criteria that have required:

[3] CONCERTO Plus database is an online tool used to collect monitored data from CONCERTO projects (http://tmdb.concertoplus.eu/)

[4] There is a vast literature on evaluation theory and issues. For a comparative view of various approaches, see: Rogers. P.J., Petrosino, A., Huebner, T.A., and Hacsi, T.A. (2000), *New Directions for Evaluation: Program Theory in Evaluation: Challenges and Opportunities*, San Francisco, Jossey Bass Publishers; Rossi, P.H., Freeman, H.E. and Lipsey, M.W., (1999), Evaluation: A systematic Approach, 6th Edition, Thousand Oaks, California, Sage Publications. and Greene, J.C., Benjamin. L, and Goodyear, L. (2001), 'The Merits of Mixing Methods in Evaluation', *Evaluation*, 7, 1, 25-44.

- Evaluation of process (*information included in the projects' contracts*, *indicators, deliverables, reports*)
- Evaluation in terms of general/specific goals - Has the implemented measure had an impact on $CO_2$ reduction? Has it contributed to increase the share of RES considerably? Has the stated target in constructing eco-buildings been reached?, etc. (*indicators, analyses, reports, interviews*)
- Evaluation of preliminary outcomes (*indicators, deliverables, reports, workshops*)

Additionally, a framework for benchmarking was created. However, there have been a number of difficulties in carrying out a systematic comparative analysis. These include:

a) Different size and demographics of the communities. Many decision and implementation aspects and responsibilities are connected to the size of a community. For example, some approaches (district heating supplied by renewable energy) cannot simply be transferred from a large densely populated city to a small scattered town;
b) The data basis for performing comparisons is not available in all cases;
c) Incomparability due to different ways of measuring performance, structuring and presenting information;
d) In spite of CONCERTO setting standards and templates for calculation of baseline and indicators, the interpretation of certain definitions can vary considerably between different communities or countries;
e) Different legislation and extent to which the principle of subsidiarity is applicable. This has an influence on the organisational structure of the municipalities, capacities and division of tasks and procedures[5];
f) Time lags/differences in implementation stages within projects/ communities.

**Achievement of the stated objectives and related issues**

CONCERTO Plus has defined assessment criteria addressing both objectives (planning phase) and preliminary outcomes. In dealing with the objectives, we first investigated how strong the linkage with the CONCERTO vision is, but also whether they were realistic and time bound[6]. Accordingly, the following questions were addressed (see Chapter 3.3):

a) How strategic and focused the objectives were;
b) Whether they were in line with the CONCERTO context and vision;
c) Whether they were critical to community success;
d) Whether the project/community was on track compared with the planned goals;
e) Which characteristics of the project implementation process have facilitated or hindered project goals (including the behaviour of the relevant stakeholders).

[5] For example, there might be room for improvement in the process of issuing permits, but it is constrained by the procedure required by national laws.

[6] Ideally, objectives should be SMART (specific, measurable, achievable, realistic and time-bound). Conversely, smart outcome should be specific – i.e. related to specific objectives about what should be achieved; Measurable – i.e. in a format that can actually be quantified; Achievable – i.e. capable of being achieved within a reasonable time scale, whilst at the same time ensuring that the maximum advantage is gained; Realistic – i.e. within the resources available; and Time limited – setting out by when the expected outputs would be achieved.

These questions have been basic to understand, from multiple perspectives, to what extent projects look and act as the ones originally planned. The basic question was whether the divergences between planning and actual implementation made sense for the goals of the project and what additional changes have been necessary and how the project worked afterwards. This appraisal was also linked with the hypothetical question whether a markedly ambitious agenda/objective setting could be responsible for delays or difficulties during the implementation stage. These issues have been systematised and discussed with the relevant project coordinators, community representatives and selected stakeholders during site visits and ad hoc workshops. To that extent, a structured list of questions among which some regarded the financial, technical, regulatory/legislative barriers has been prepared (see Box 1). The enquiry has then focused on progress towards objectives, tasks worked on and achievements made with reference to planned objectives.

**Box 1: Main questions and issues addressed in the Planning and Implementation sessions/workshops in 2008/2009**

- Is the project/community on track compared to the objectives set originally?
- What are the key challenges facing the communities in this area?
- Are there divergences from the project work programme? If so, which corrective actions have been taken?
- How has the project changed over the years in comparison to original planning?
    - Did the objectives change?
    - Did the planned measure need to be adjusted to a changed situation?
- Which barriers did the communities encounter during the implementation of the project?
    - financial
    - technical
    - low acceptance at community/district level
    - regulatory/legislative
    - others
- Which solutions did the communities adopt to overcome them?
- Has the attitude of the involved stakeholders changed over time?
- How have the inhabitants of the CONCERTO districts been involved in the implementation of the various CONCERTO measures?
- Identify three key things that were done right and should be continued.
- Identify things that were done wrong and should be avoided / improved upon in the future.

**Methods and tools supporting the collection and processing of information/findings**

Various methods to collect data have been screened and put to use. Amongst these were questionnaires, interviews during site visits, ad-hoc workshops, face-to-face interviews, examination of deliverables and reports and/or direct observations. After each site visit, the collected data and information have then been sorted out, controlled for quality, and normalised before they could be analysed. For the comparative analysis, matrices have been prepared to categorise and illustrate information about performance collected from visiting experts and projects documents. For the analysis of the causes, different tools have been used, such as qualitative data matrices, relations' diagrams, cause-and-effect diagram. Very often, it was not possible to find and collect quantitative data and relevant documents. In these cases instead of first determining a performance gap between communities, we have relied on qualitative explanations why the communities did better.

The opportunity offered by the site visits has been used to acquire structured information about barriers and drivers, progress towards objectives, deviations from the project work

programme and corrective actions taken as well as to identify the nature and the reason for problems arising during the implementation.

In fact, in 2008-2009 during the annual project site visits, regional site visits and occasional workshops CONCERTO Plus has carried out special sessions to support the communities in their planning and implementation processes and in identifying barriers and solutions for how to overcome them. These sessions have, among other issues, concentrated on success factors and how to overcome barriers to success, considering the local and regional contexts as well as the key roles of the stakeholders involved.

The methodology for processing the information has been based on a number of theoretical assumptions and practical steps and relies on a number of specific, targeted tools. In fact, CONCERTO Plus has developed tools to support the processing of findings/results within the monitoring and assessment exercise. These are:

- The *planning and implementation interviews* that generate information about barriers and drivers concerning the planning and implementation process in the communities. Output: basic information for the planning and implementation assessment.
- The *technology / barrier and drivers matrix* which supports the analysis of technology related barriers and drivers. Output: basic input for the planning and implementation assessment and technology related policy recommendations.
- The *technical monitoring database* that provides information for the analysis of building type related barriers and drivers in the communities. Output: basic information for building type and building performance related policy recommendations.
- The *socio-economic matrix*, which supports the analysis of SE accompanying activities and SE-indicators encompassing varying conditions and performances in the communities. Output: basic input for planning and implementation assessment and policy recommendations to improve the integration of social, economic and ecological aspects (sustainability).
- The *Planning and Implementation Process (PIP)-Diagram*, which describes the process of decision, planning, implementing and operating the CONCERTO measures. Output: information for the planning and implementation assessment, especially concerning organisational/institutional barriers, and for related policy recommendations.

Central for this report are the *Planning and Implementation Process (PIP)-Diagrams* and the P*lanning and Implementation Matrix*.

The former has been central to understand, from multiple perspectives, what happened with the projects, not so much concerning the question how they have been implemented, but more concerning the reasons why and by whom particular decisions have been made along the way (see Chapter 3, p.51).

The latter has been created and updated on a regular basis by CONCERTO Plus experts gathering information either through direct contact with the communities or during site visits. One element of the matrix is the reference to the so called "renewable energy country attractiveness index" by Ernst & Young which has been used as a yardstick for the quality of favourable conditions for sustainable measures of the participating countries and provides a ranking for national RES energy markets and infrastructures[7]. The rankings are dependent in

[7] Ernst & Young produce quarterly reports on the attractiveness of 17 national renewable energy markets as a guide to potential future investment. The latest quarterly report considered by the matrix is the issue 22 of August 2009

part on the size of the domestic energy market, indicating the opportunities available to producers.

## 1.3 Available data, monitoring, benchmarks and CONCERTO indicators

The achievement of the set CONCERTO targets requires an interactive process, a holistic approach and inputs from a regional as well as a European level perspective and from different disciplines and approaches. It also calls for stakeholder commitment, sustained financial backing and good governance. In fact, the implementation of the CONCERTO projects is influenced by changes in socio-cultural, economic and environmental conditions of a country. Different countries/regions share some common features but there is still a high number of differences. This implies a need for differences in procedures and forms of implementation and monitoring to better adapt to local socio-economic and environmental conditions.

Ideally, the whole process should be monitored by verifiable key indicators. Indicators should cover information on different technical-environmental aspects, socio-cultural and economic aspects. Supplementary information on institutional capability and project management efficiency on mitigation of adverse impacts and enhancement of beneficial impacts are also important factors.

The CONCERTO indicators (see Box 2 below) try to encompass variation in environmental conditions, socio-economic and political changes. Although the CONCERTO programme has required the projects adopting their own indicators, not all projects have provided up to now these quantitative data. The measurement mostly regards technical measures and some socio-economic activities.

**Box 2: CONCERTO Indicators (as set by DG-TREN)**

1. Increase in % of renewable energy in electricity consumption of CONCERTO area
2. Increase in % of renewable energy in heating / cooling consumption of CONCERTO area
3-a. Reduction in electricity consumption per $m^2$ of each building type (efficiency measures)
3-b. Reduction in final heating / cooling energy consumption per $m^2$ of each building type (efficiency measures)
4. Overall reduction in conventional energy consumption in the CONCERTO area (sum of efficiency gains and renewables in supply): primary energy savings
5. Costs, subsidies (if any) and prices per kWh of each form of renewable electricity consumed, including any variations with the season or the time of the day
6. Costs, subsidies (if any) and prices per kWh of each form of renewable heating and cooling consumed, including any variations with the season or the time of the day
7. $m^2$ of new high performing eco-buildings constructed (linked with cost indicator)
8. $m^2$ of refurbished high performing eco-buildings constructed (linked with cost indicator)
9. MW of new renewable electricity generators commissioned (linked with cost indicator)
10. MW of new renewable heating / cooling commissioned (linked with cost indicator)

11. Quantitative and qualitative data on RES and EE policy implementation by local community administrations

12. Quantitative and qualitative data on householders with changed attitudes towards RES and EE

13. Project specific deliverables (e.g. numbers and types of persons trained or influenced)

14. Details of long term CONCERTO community energy management and monitoring systems, which will continue to operate after the end of the project

15. Actual climate data for each CONCERTO community (e.g. heating degree days, etc.)

CONCERTO indicators can be classified into the following categories: energy, ecology, economics, technical properties, social and general framework:

- Energy: 1, 2, 3, 4, 14
- Ecology: 3
- Economics: 5, 6, 7, 8, 9, 10
- Technical properties: 7, 8, 9, 10
- Social: 11, 12, 13
- General framework: 10, 15

**The technical monitoring framework**

As illustrated in Figure 2, the main target of the technical monitoring activities is to provide data allowing to perform an impact assessment of CONCERTO measures as well as an energy performance assessment of the CONCERTO communities. Impact assessment consists in quantifying the impact of CONCERTO activities in terms of absolute figures by using the indicators 7, 8, 9 and 10 and in terms of energy performance improvements by using the indicators 1, 2, 3-a, 3-b and 4 (see **Box 1**).

The only way to support planning and implementation process assessment with information from technical monitoring is to compare the indicators representing the quantity of measures (absolute figures) actually implemented with the initial targets. In practice, this consists in calculating the total gross floor area of buildings and the heating/electric/cooling capacity of energy plants which have been actually built and/or installed during the project life-time and compare these figures with the initial targets. The divergence between these figures is an indicator of how difficult it was to implement the planned measures. For buildings, additional data describing the measures implemented have also been collected ("quality" indicators)

- average U-values for the different construction elements (planned initially and actually implemented);
- list of renovation measures planned initially and actually implemented for the different building renovation projects.

Theoretically, it would be also possible to compare the expected energy performance of buildings, plants and communities with the actual figures generated through energy use monitoring activities (metering). Buildings, plants or CONCERTO areas which were planned to reach high-energy performance levels and in practice show bad performance were definitely confronted with different barriers during the implementation phase (reluctance of building developer to stick to the energy performance targets, problems of quality insurance on construction site, end-user behaviour, etc). In practice, however, this analysis cannot be carried out in a systematic way because there is no common methodology allowing for isolating the different effects influencing the actual energy performance of buildings, plants or communities. This work can be done in single cases and only for buildings and plants (not

at community level), but it always requires specific research and is often characterised by high uncertainties because many parameters cannot be metered. Plausible hypotheses will be formulated and summarised for some selected examples of buildings and plants in the report "Overall energy performance of the 26 communities" due in 2010.

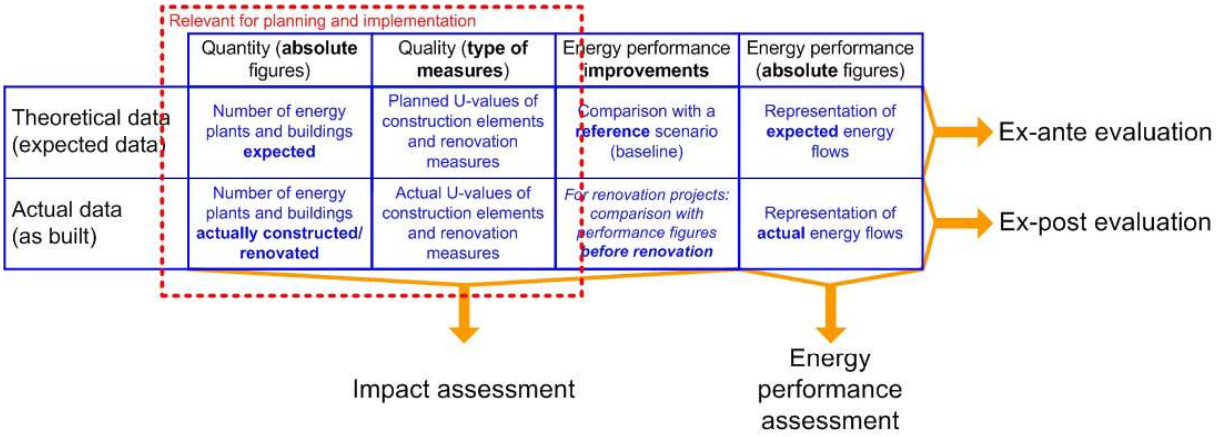



Figure 2: Different aspects of technical monitoring in the context of impact assessment and energy performance assessment

**The socio-economic monitoring framework**

The socio-economic (SE) impact assessment points out the effects which policies or projects will have on the social and economic conditions in a given community or region. At the community level, the awareness of socio-economic effects is important so that local planners can be prepared for changes that are likely to arise in the community because of a specific policy or project. But also at regional or national level, the assessment of SE impacts may provide decision makers with important information to weigh up the potential positive and negative effects of an action.

The major initial challenge for CONCERTO Plus was to devise a framework able to grasp the impact of sustainable interventions suitable for different contexts and situations and to find a common structure for the SE analysis for all 28 communities. This has considered a number of factors and their interrelationship and has tried to reflect the specific characteristics of the various projects.

Initial tasks have concentrated on:

- designing a *common framework* to analyse and evaluate the impact of (demo-sites) accompanying CONCERTO measures which fit to different contexts and situations;
- developing a *common methodology* with performance indicators for monitoring the progress of local communities.

The framework has been designed to understand the impact of CONCERTO measures on the demonstration site and, more generally, on the participating communities and has been discussed with selected CONCERTO projects for validation and feasibility within their local context. According to their specific context, the communities could integrate or tailor the framework in order to make it suit to the scope of their SE research.

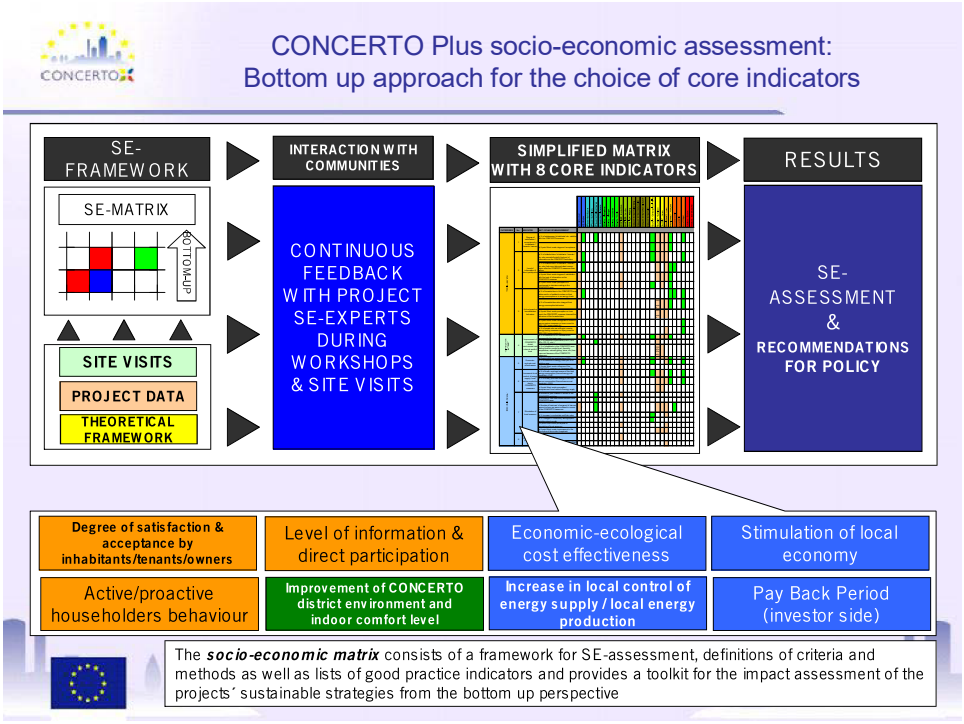



Figure 3: The socio-economic evaluation framework

The analysis of the initially planned measures - representing a sort of baseline - has been supplemented by the information collected in site visits, annual activity reports, workshops and further strategic documents as well as individual interviews with socio-economic experts[8]. In fact, in the period 2006-2009 a verification and mapping of the activities and methodologies and of the accompanying SE activities of the different projects has been carried out and has been followed by the development of the so-called "socio-economic matrix". The latter consists of a framework for SE-assessment, definitions of criteria and methods as well as lists of good practice indicators and provides a toolkit for the impact assessment of the projects' sustainable strategies from the bottom-up perspective. However, since the various communities have chosen different methodologies and approaches and are at different stages of implementation, it has been necessary to simplify the matrix and to reduce the number of indicators.

[8] A detailed overview on the planned socio-economic and soft measures based on all of these sources has provided by Spitzbart (2007).

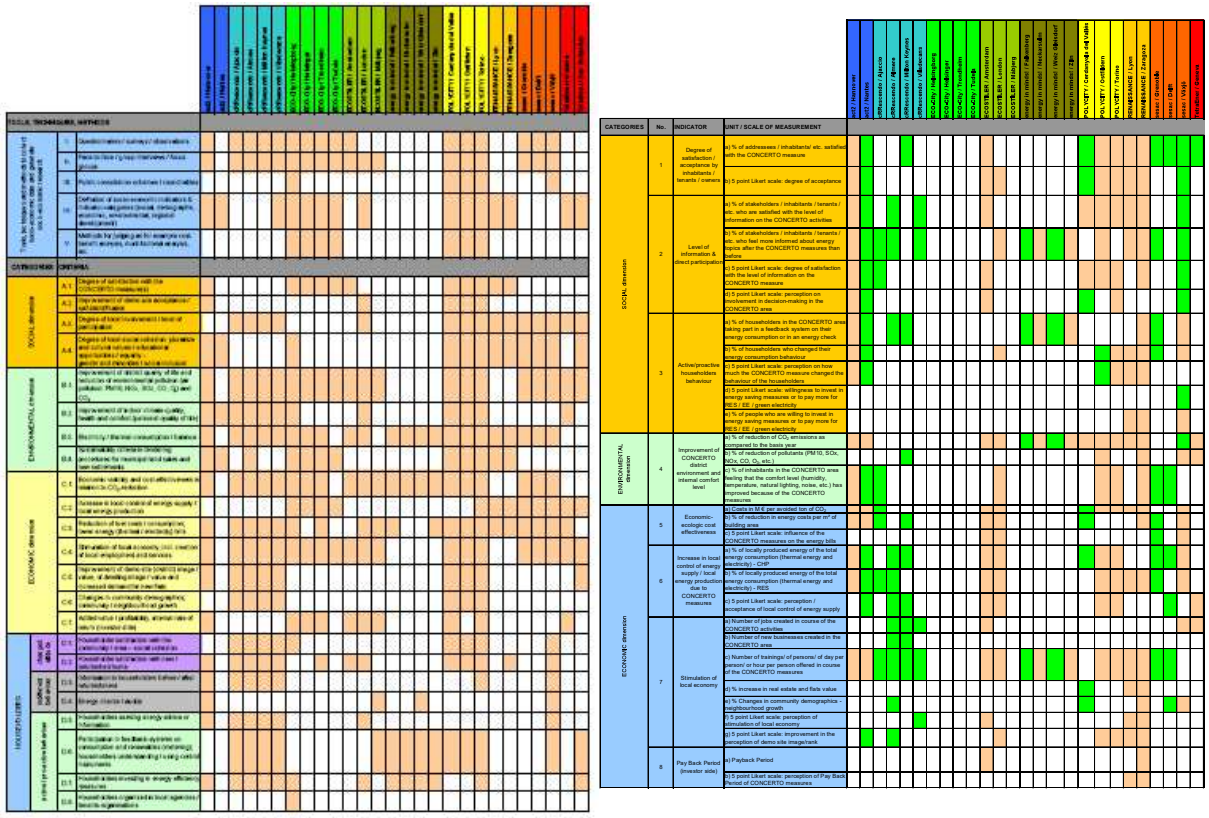


Figure 4: Initial and current draft of the socio-economic matrix mapping the methods and criteria planned to be used by the communities

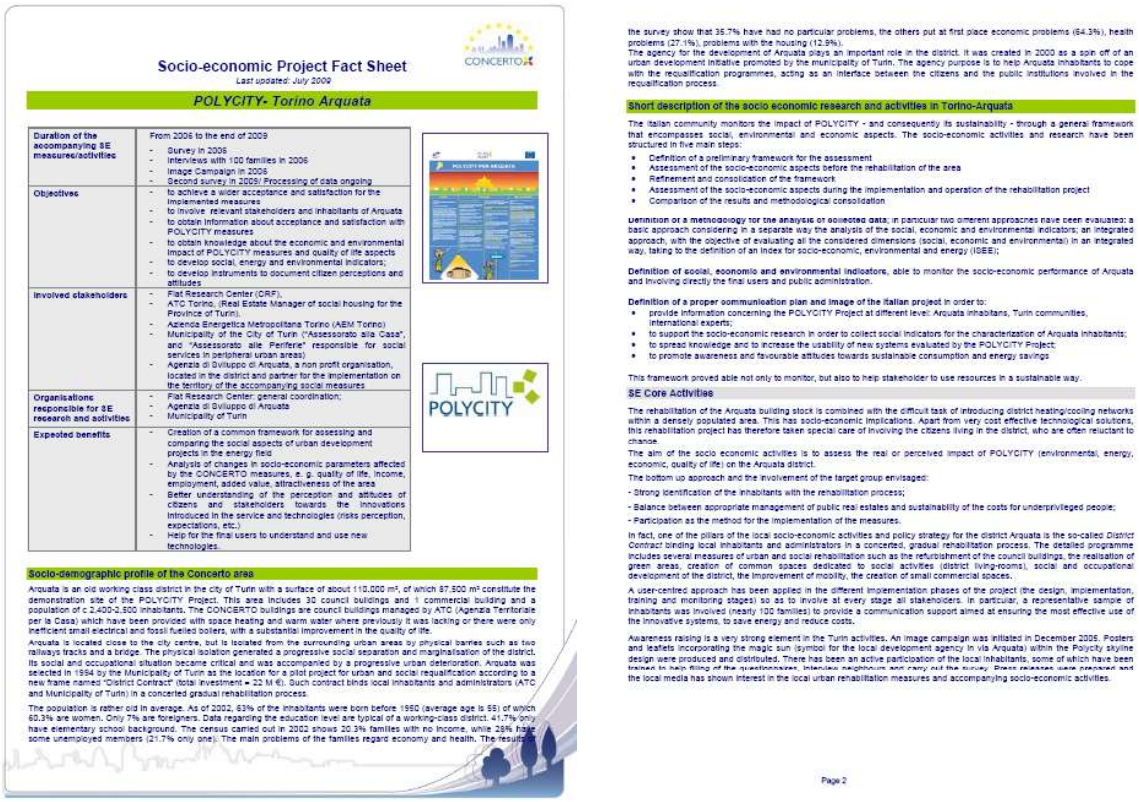
Based on the clustered information on the indicators planned or already used by the communities, CONCERTO Plus has selected a set of 8 core indicators. These have been defined and agreed upon in a SE-workshop with Concerto communities in June 2008. For each core indicator a unit and scale of measurement has been proposed for qualitative and quantitative criteria. The resulting matrix represents the backbone for the mapping and evaluation of the SE implications of the communities' activities.

The data available has been integrated by published case studies and reports and by information deriving from interviews, site visits and deliverables[9]. Additionally, the information gathered has been supplemented by facts and figures collected through the so called "SE-Fact sheets". The fact sheets provide a description of the communities´ SE accompanying activities and of preliminary results and expected benefits. The SE fact sheets provide:

- Socio-demographic profiles of the Concerto districts
- Short description of the socio economic core activities in the community
- Information about methods for data collection and data sources
- Information about performed surveys, issues addressed by them and response
- (Concerto plus) Indicators used e.g.
    - Acceptance by inhabitants/householders
    - Improvement of perception of the district
    - Level of satisfaction with the Concerto measures
    - Increase in property value

[9] For details, see Di Nucci/Moisan/Spitzbart (2009)

- New services / positive spill over on neighbourhood and employment
- Preliminary findings
- Lessons for policy



Socio-economic Project Fact Sheet

Last updated: July 2009

POLYCITY- Torino Arquata

| | |
|---|---|
| Duration of the accompanying SE measures/activities | From 2006 to the end of 2009<br>- Survey in 2006<br>- Interviews with 100 families in 2006<br>- Image Campaign in 2008<br>- Second survey in 2009/ Processing of data ongoing |
| Objectives | - to achieve a wider acceptance and satisfaction for the implemented measures<br>- to involve relevant stakeholders and inhabitants of Arquata<br>- to obtain information about acceptance and satisfaction with POLYCITY measures<br>- to obtain knowledge about the economic and environmental impact of POLYCITY measures and quality of life aspects<br>- to develop social, energy and environmental indicators;<br>- to develop instruments to document citizen perceptions and attitudes |
| Involved stakeholders | - Fiat Research Center (CRF);<br>- ATC Torino, (Real Estate Manager of social housing for the Province of Turin),<br>- Azienda Energetica Metropolitana Torino (AEM Torino)<br>- Municipality of the City of Turin ("Assessorato alla Casa", and "Assessorato alle Periferie" responsible for social services in peripheral urban areas);<br>- Agenzia di Sviluppo di Arquata, a non profit organisation, located in the district and partner for the implementation on the territory of the accompanying social measures |
| Organisations responsible for SE research and activities | - Fiat Research Center: general coordination;<br>- Agenzia di Sviluppo di Arquata<br>- Municipality of Turin |
| Expected benefits | - Creation of a common framework for assessing and comparing the social aspects of urban development projects in the energy field<br>- Analysis of changes in socio-economic parameters affected by the CONCERTO measures, e. g. quality of life, income, employment, added value, attractiveness of the area<br>- Better understanding of the perception and attitudes of citizens and stakeholders towards the innovations introduced in the service and technologies (risks perception, expectations, etc.)<br>- Help for the final users to understand and use new technologies. |

Socio-demographic profile of the Concerto area

Arquata is an old working class district in the city of Turin with a surface of about 110.000 m², of which 87.500 m² constitute the demonstration site of the POLYCITY Project. This area includes 30 council buildings and 1 commercial building and a population of c.2.400-2.500 inhabitants. The CONCERTO buildings are council buildings managed by ATC (Agenzia Territoriale per la Casa) which have been provided with space heating and warm water where previously it was lacking or there were only inefficient small electrical and fossil fuelled boilers, with a substantial improvement in the quality of life.

Arquata is located close to the city centre, but is isolated from the surrounding urban areas by physical barries such as two railways tracks and a bridge. The physical isolation generated a progressive social separation and marginalisation of the district. Its social and occupational situation became critical and was accompanied by a progressive urban deterioration. Arquata was selected in 1994 by the Municipality of Turin as the location for a pilot project for urban and social requalification according to a new frame named "District Contract" (total investment = 22 M €). Such contract binds local inhabitants and administrators (ATC and Municipality of Turin) in a concerted gradual rehabilitation process.

The population is rather old in average. As of 2002, 63% of the inhabitants were born before 1960 (average age is 55) of which 60,3% are women. Only 7% are foreigners. Data regarding the education level are typical of a working-class district. 41,7% only have elementary school background. The census carried out in 2002 shows 20.3% families with no income, while 28% have some unemployed members (21,7% only one). The main problems of the families regard economy and health. The results of the survey show that 36.7% have had no particular problems, the others put at first place economic problems (64,3%), health problems (27,1%), problems with the housing (12,9%).

The agency for the development of Arquata plays an important role in the district. It was created in 2000 as a spin off of an urban development initiative promoted by the municipality of Turin. The agency purpose is to help Arquata inhabitants to cope with the requalification programmes, acting as an interface between the citizens and the public institutions involved in the requalification process.

Short description of the socio economic research and activities in Torino-Arquata

The italian community monitors the impact of POLYCITY - and consequently its sustainability - through a general framework that encompasses social, environmental and economic aspects. The socio-economic activities and research have been structured in five main steps:

- Definition of a preliminary framework for the assessment
- Assessment of the socio-economic aspects before the rehabilitation of the area
- Refinement and consolidation of the framework
- Assessment of the socio-economic aspects during the implementation and operation of the rehabilitation project
- Comparison of the results and methodological consolidation

Definition of a methodology for the analysis of collected data; in particular two different approaches have been evaluated: a basic approach considering in a separate way the analysis of the social, economic and environmental indicators; an integrated approach, with the objective of evaluating all the considered dimensions (social, economic and environmental) in an integrated way, taking to the definition of an index for socio-economic, environmental and energy (ISEE);

Definition of social, economic and environmental indicators, able to monitor the socio-economic performance of Arquata and involving directly the final users and public administration.

Definition of a proper communication plan and image of the italian project in order to:

- provide information concerning the POLYCITY Project at different level: Arquata inhabitans, Turin communities, international experts;
- to support the socio-economic research in order to collect social indicators for the characterization of Arquata inhabitants;
- to spread knowledge and to increase the usability of new systems evaluated by the POLYCITY Project;
- to promote awareness and favourable attitudes towards sustainable consumption and energy savings

This framework proved able not only to monitor, but also to help stakeholder to use resources in a sustainable way.

SE Core Activities

The rehabilitation of the Arquata building stock is combined with the difficult task of introducing district heating/cooling networks within a densely populated area. This has socio-economic implications. Apart from very cost effective technological solutions, this rehabilitation project has therefore taken special care of involving the citizens living in the district, who are often reluctant to change.

The aim of the socio economic activities is to assess the real or perceived impact of POLYCITY (environmental, energy, economic, quality of life) on the Arquata district.

The bottom up approach and the involvement of the target group envisaged:

- Strong identification of the inhabitants with the rehabilitation process;
- Balance between appropriate management of public real estates and sustainability of the costs for underprivileged people;
- Participation as the method for the implementation of the measures.

In fact, one of the pillars of the local socio-economic activities and policy strategy for the district Arquata is the so-called *District Contract* binding local inhabitants and administrators in a concerted, gradual rehabilitation process. The detailed programme includes several measures of urban and social rehabilitation such as the refurbishment of the council buildings, the realisation of green areas, creation of common spaces dedicated to social activities (district living-rooms), social and occupational development of the district, the improvement of mobility, the creation of small commercial spaces.

A user-centred approach has been applied in the different implementation phases of the project (the design, implementation, training and monitoring stages) so as to involve at every stage all stakeholders. In particular, a representative sample of inhabitants was involved (nearly 100 families) to provide a communication support aimed at ensuring the most effective use of the innovative systems, to save energy and reduce costs.

Awareness raising is a very strong element in the Turin activities. An image campaign was initiated in December 2005. Posters and leaflets incorporating the magic sun (symbol for the local development agency in via Arquata) within the Polycity skyline design were produced and distributed. There has been an active participation of the local inhabitants, some of which have been trained in help filling of the questionnaires. Interview neighbours and carry out the survey. Press releases were prepared and the local media has shown interest in the local urban rehabilitation measures and accompanying socio-economic activities.

Page 2

Figure 5: Example for a socio-economic fact sheet showing the activities carried out in Turin

## Assessment limitations

All projects are still in the implementation stage and only for a few projects there are usable preliminary results. A limitation concerns the short period under review. This encompasses the time between the launch of the CONCERTO Initiative (2004), the beginning of the various projects (between January 2005 and January 2006) and the cut-off date for this assessment report (November 2009) which does not allow to consider progress reports for 2009, Therefore it cannot regard activities that have just started to be implemented, especially in new urban development areas. For that reason, for the new development areas (where most measures concern new buildings which have just entered the construction stage) the assessment concentrates on the process rather than on the measures themselves. In view of this short time span, the report focuses on initiatives implemented until October 2009, rather than on indicators or measured progress on the ground of accomplished measures. The technical monitoring framework in this case only provides information on the implementation status by October 2009. Communities that by this time completed only a small amount of demonstration activities had to face many implementation barriers. These are analysed in detail in Chapter 3 and Chapter 4. A similar situation can be observed for rehabilitation and refurbishing activities. However, renovation programmes could be implemented more easily than large-scale new urban developments. Here mostly the type of renovation measures

implemented (see part 0) can be used as indicators of success for the implementation processes supporting the planned measures.

Other reasons that complicated the measurement of progress are:

- There is usually no baseline measurement available for a number of important variables, esp. the socio-economic ones (except for some of the structural indicators measured by Eurostat);
- Although there is an increasing amount of sustainable development indicators in use, these are not completely adaptable to CONCERTO topics and can hardly be used for planning and implementation process assessment.
- It is difficult to find common indicators for measuring progress in the chosen project typologies (new urban developments, large scale renovation programmes and measures in towns/rural areas). For example, the yearly installed area of solar thermal systems can be a useful indicator for projects where the installation of individual solar thermal systems is financially supported in a community. This is the case for the projects belonging to the cluster covering measures in towns/rural areas, where the CONCERTO funding is granted in combination with local subsidies (for renewable energy technologies, renovation activities etc.). In other situations, namely if a large solar thermal plant is built in connection with a district heating network for a new urban development area, this indicator would not be relevant, as this plant will be built at once in a limited time period. In this second case, the assessment needs to focus rather on the individual planning and implementation mechanisms leading to the construction of the large solar thermal plant, focussing on financing aspects and mechanisms guaranteeing that in the future buildings will be connected to the district-heating network.
- Evidence on the effectiveness of measures is not always clear from either the reports or interviews: in many cases, implementation success or failures are influenced by a combination of barriers and/or drivers and it is difficult to isolate single parameters and qualify their impact on the implementation process.

## 1.4 Comparative analysis and assessment

The appraisal has been based on a comparative analysis of all communities including some benchmarking and an analysis of the causes for differences in performance and in effectiveness (gap analysis).

**Analytical steps**

The starting point was the attempt to understand the specific challenges faced by the participating communities. Subsequently, a second move was concerned with a mapping of innovative technological, institutional, social and economic solutions. This mapping and matrices have allowed the identification of similarity of approaches and solutions by combining *planning, decision-making* and *implementation* processes.

**Box 3: Steps in the comparative analysis and assessment**

- Understanding specific challenges faced by the participating communities
- Mapping of innovative technological, institutional, social and economic solutions
- Analysis and comparison of governance structure and operating model of the regional/local support infrastructure
- Analysis and comparison of different planning and implementation processes and

institutional frameworks
- Differences and similarities in nature of measures and processes within the context of:

  - ✓ Characteristics of the regional target groups/stakeholders
  - ✓ Regional/community situation
  - ✓ Environmental factors
  - ✓ Socio-economic factors
  - ✓ Project typology

- Clustering heterogeneous structures and procedures
- Benchmarking analysis
- Gap analysis: What are the underlying reasons for differences in performance and diversity in effectiveness?

A major challenge has been to assess and compare very heterogeneous national strategies and decision-making frameworks and to overcome a low comparability due to differences in processes and procedures. In fact, the national context is very different in each country, so are the political goals that have led to the respective strategy, planning and implementation processes and policy framework. In addition, indicators to measure the performance of the framework are also diverse or not always clearly defined. To overcome the problems linked with the low degree of comparability between projects due to their heterogeneity, three clusters have been created (two urban and one rural/peri-urban category) to classify communities according to project typologies. Preparatory work consisted in screening each project for its main characteristics related to the type of demonstration activities implemented and the size of the CONCERTO area chosen in the projects.

Even though CONCERTO communities follow very different approaches, mainly depending on the concentration of demonstration activities in the CONCERTO area, the proposed clusters cover them well and enable a good comparability between the communities. Thus, it can be said that in CONCERTO communities, demonstration activities are implemented as milestones in the development of sustainable communities in new urban area developments and new settlements, existing urban neighbourhoods in mixed renewal and refurbishment districts and rural/peri-urban areas.

The three selected couples of clusters can be characterised as follows:

*New urban development; revitalised urban development areas with newly constructed buildings/facilities*

This cluster includes communities that redevelop areas previously used for military or industrial purposes. Buildings or facilities erected in these communities are all newly built. However, the area also includes buildings that previously were in industrial or military use and which are not part of the CONCERTO demonstration activities. The aim of these projects was to revitalise sites that would otherwise remain brownfields and include elements of sustainable urban development.

*New urban development; green field urban development*

These communities built new buildings/facilities on previously completely undeveloped sites, i.e. greenfields. The aim of these projects was to develop completely new neighbourhoods including elements of sustainable urban development. Compared to the projects of Cluster 1a, these areas initially did not have any public or technical infrastructure.

*Large-scale renovation measures and improvements in urban areas; refurbished buildings*

This cluster includes communities that have decided to engage in large-scale refurbishment of several buildings in a particular neighbourhood or specific buildings selected by the project proponents located in different neighbourhoods in an urban area. The aim of these projects was to considerably improve the quality of life in the concerned neighbourhoods in a remarkable way while focussing on energy efficiency improvements.

*Large-scale renovation measures and improvements in urban areas; large-scale energy systems*

This cluster is distinctive in that it contains only two communities, where large scale district energy systems have been implemented in existing neighbourhoods. In Geneva, a lake water piping system was built for a particular neighbourhood of Geneva to provide cooling and heating energy mainly to office buildings. In Grenoble (Viscose), the existing district heating network was extended to supply heat to an existing residential area belonging entirely to a social housing company.

*Measures in towns/rural areas; refurbished buildings/facilities*

Communities in this cluster include rural areas, towns or an association of towns and villages in a particular region where buildings/facilities scattered over the area were renovated to achieve higher energy efficiency standards. Scattered is in this case a geographical term indicating that a variety of refurbishment measures were accomplished within a rural area/village/town/region. Scattering activities was a necessity for these projects where it was practically impossible to concentrate all demonstration activities in a very small area, as the renovation programmes are addressed mainly to owners of single-family houses (to some extent to municipal housing companies) and municipal buildings. On the energy supply side, existing facilities (e.g. district heating) have been improved.

*Measures in towns/rural areas; newly constructed buildings/facilities*

These communities include rural areas, towns or an association of towns and villages in a particular region where new buildings/facilities were erected following high energy performance requirements. Scattered is in this case a geographical term indicating that a variety of technologies were applied in new buildings/facilities within a particular rural area/village/town/region. As in cluster 3a, scattering activities was a necessity for these projects where it was practically impossible to develop completely new neighbourhoods like in high density urban areas. The demonstration activities include mainly the construction of new apartment buildings by municipal housing companies (there is no private developer involved) and energy supply infrastructure by the municipal utility.

Following the grouping of projects in these three clusters, six broad assessment areas were selected.

**Critical factors for success and benchmarking assumptions**

The search for critical factors for success has followed both a quantitative and qualitative approach. In general, qualitative assessments by selected experts have been considered appropriate to capture the progress in its complexity. Quantitative data have been provided by the technical monitoring and partly by the SE monitoring and projects reports and deliverables.

The appraisal has loosely followed the typical steps summarised by the so called "benchmarking wheel"[10]. These steps are illustrated in **Box 4** below.

**Box 4: Benchmarking steps**

**Plan**

- Analyse critical success factors
- Select processes for benchmarking
- Develop performance measures to be benchmarked

**Observe**

- collect information
- document performance and practice

**Analyse and compare**

- identify gaps in performance
- find the causes for performance gaps

The challenge has consisted in assessing 26 implementation processes in twelve different national frameworks. In order to meet this challenge, a set of broader assessment areas covering the implementation practices of the most widespread areas of measures and performance criteria applying to all three clusters have been defined.

These broad categories encompass 4 technical fields alongside with 2 overarching, cross-section issues. The latter two assessment areas consider a number of internal and external issues and drivers relevant to implementing CONCERTO measures that could be summarised as knowledge sharing through partnerships and integration of sustainability.

**Box 5: Assessment areas**

1) Performance requirements for buildings that are more ambitious than present building codes
2) (High) Degree of integration of renewables
3) Polygeneration and cascade of resources (if applicable)
4) (Community) Energy management systems/Effective approach to technical monitoring
5) Commitment of stakeholders (pro-active involvement)
6) Integration of sustainability criteria (SE accompanying activities)

Each assessment area was appraised through a number of evaluation questions. Performance criteria were defined for the technical dimension, the institutional/ administrative dimension and the replication potential (outreach dimension). The criteria were designed in a slightly different (but comparable way) for technical and non-technical domains.

[10] See for example Andersen, B., Pettersen, P.G, *The benchmarking handbook. Step by Step Instructions*, Chapman & Hall, London, 1996

The three performance criteria are:

- coherent/effective technical approach (technical dimension, degree of innovation);
- efficiency of administrative procedures (institutional/ administrative/organisational dimension, giving answers especially to barriers and drivers);
- spill-over effects / replications potential (outreach).

The following boxes (**Box 6** - **Box 8**) illustrate the various items corresponding to differentiated research questions adopted for each assessment area.

**Box 6: Performance criteria for implementation in technical areas**

**Assessment areas 1, 2, 3 and 4**

**Performance criterion Nr.1: Coherent/efficient technical approach (technical dimension) This criterion is assessed by means of the following research questions:**

1.a) Was the community able to meet the technical requirements/targets/challenges related with the implementation of measure X?

1.b) If changes were necessary to meet technical requirements, were the steps taken successful?

1.c) Is this approach based on a sound methodology and comprehensive, reliable data?

1.d) Does this approach consider both the physically available and economically viable potential?

**Performance criterion Nr 2: Efficiency of administrative procedures (institutional/ administrative dimension) This is assessed by means of the following research questions:**

2.a) Are there (local, regional, national) rules/regulations regarding the administrative procedures required to plan, and implement measure X ?

2.b) Are these rules supportive?

**Performance criterion Nr 3: spill-over/replications effect (replication potential/outreach) This is assessed by means of the following research questions:**

3.a) Is there an impact of the measure on neighbouring communities/districts?

3.b) Is there an impact of the measures on observing communities? (indicator: number of applications through observer communities in Concerto 2 and 3, number of similar projects, number of trainings, dissemination activities, etc).

For the assessment of stakeholder commitment, a different formulation for the research questions has been necessary.

**Box 7: Performance criteria for stakeholder commitment**

**Assessment areas 5**

**Performance criterion Nr.1: Coherent approach (technical dimension)**

1a) Was the composition of the consortium (as a whole) adequate to meet the requirements/ targets/ challenges related with the implementation of the project or did the absence of one group jeopardise the achievement of project targets?

1b) Did the composition of the consortium (because of the absence of relevant stakeholders) restrict the range of technical options?

1c) If changes in the consortium were necessary to meet requirements (e.g. investors as new partners, etc.), were the steps taken successful?

1d) Were all relevant stakeholders committed to meet the specific objectives of the project?

**Performance criterion Nr. 2: Efficiency of administrative procedures (institutional/administrative dimension)**

2a) Were there (local or regional) rules/regulations/procedures that encouraged stakeholders implementing specific project measures?

2b) If there were possibilities for public-private partnership, have these been adequately exploited?

**Performance criterion Nr. 3: Consideration of spill-over/replication effect (outreach dimension)**

3.a) Were stakeholders promoting (also through awareness raising) the benefits of the partnership to other communities?

3.b) Does the commitment of stakeholders go above and beyond CONCERTO measures?

For assessing the integration of sustainability issues, including socio-economic activities, the following formulation for performance has been used:

**Box 8: Socio-economic dimension as integral part of sustainability strategy**

**Assessment area 6:**

**Performance criterion Nr.1: Coherent approach (technical dimension)**

1.a) Has the community considered the socio-economic challenges related with the implementation of the CONCERTO measures?

1.b) Has the community implemented a dedicated plan for socio-economic accompanying measures ?

1.c) If yes, was the planned approach based on a sound methodology and comprehensive, reliable data?

1.d) If changes were necessary to better consider the SE dimension as integral part of the sustainability strategy, were these steps successful?

**Performance criterion Nr. 2: Efficiency of administrative procedures**

(institutional/administrative dimension)

2.a) Has the community available data on relevant socio-demographic issues (e.g. socio-demographic census) or relevant studies? Has the community realised specific supporting activities (e.g. surveys/ questionnaires/studies/ focus groups/users´ training, etc?)

2.b) ) If yes, have these been helpful for the implementation of the measures?

**Performance criterion Nr. 3: Consideration of spill-over/replications effect** (outreach dimension)

3.a) Is there an impact or a transfer of SE methods on neighbouring communities/ districts?

3b) Is there an impact or a transfer of SE methods of the SE measures on observing communities?

## 1.5 Key success and failure factors and gap analysis

Following the benchmarking, the communities were transposed into a table mapping the strength / success of implementation in relationship with the strength / degree of innovation of design / planning for each of the assessment areas.

A **high strength / degree of innovation in planning / design** corresponds to ambitious and unconventional planning and design mechanisms which go beyond state of the art project development traditions. This refers to decision support methods based mainly on modelling tools (relying on an active contribution of research institutes) applied at community scale, optimisation procedures, comprehensive cost/benefit analyses, etc. One of the main innovations of these mechanisms consists in including the neighbourhood dimension in design / planning activities.

A **low strength / degree of innovation in planning / design** corresponds to projects applying conventional planning / design mechanisms, i.e. considering individual actions and clustering them, without taking into account a holistic perspective at neighbourhood scale. These projects follow a rather cautious (risk averse) approach and rely on proven mechanisms (opting mostly for economically viable/technically feasible, proven measures), which however does not mean that the targets they are pursuing show low ambitions.

The strength / success of implementation is always assessed in relation with the planning / design strength in the given assessment area.

A **high strength / success of implementation** means that the measures could be implemented successfully on a broad basis, following the goals, guidelines and findings generated in the planning / design process. A high commitment of stakeholders is one way to ensure high strength / success of implementation.

A **low strength / success of implementation** points to projects/communities where measures could not be implemented as intended in the planning / design phase. It evaluates how successful communities were in trying to meet their targets in the short time frame given by the CONCERTO programme.

The overall evaluation exercise is not a judgement on the competencies of communities to implement their targets, but rather an assessment of their capability to adapt to unexpected barriers that might have occurred (administrative, legal, economic. etc). It is a way to evaluate the resilience of the planning / design process in relationship to unexpected events. As an

example, communities having reached a broad consensus among all local stakeholders (including politics) are not very sensitive to political changes in local governments.

Per definition, in Figure 6 below, **Square 1** shows excellence and the communities placed there can be considered good/best practice for successful and innovative planning / design processes in given assessment areas. The planning / design processes are ambitious and the success of implementation of activities is also high, mainly because projects where planned / designed to "resist" unexpected changes in framework conditions.

Communities classified in **Square 2** are less satisfactory in terms of degree of innovation reached in the planning / design process. In this situation, more conventional planning / design approaches have been applied, which nonetheless led to successful implementation of the planned measures. Success can be due to high commitment of local stakeholders, resolved administrative/political issues, information campaigns, etc. No remarkable technical advancement is expected (almost counterfactual), but important results in terms of energy savings or use of RES can be reached. These projects can still be considered near to good practice.

For communities classified in **Square 3,** there are ambitious, even detailed design and planning procedures that however - for various reasons - were not implemented satisfactorily: no notable results are available. The evaluative questions focus on the implementation processes and procedures: Why did what was supposed to take place not actually occur? Did the implementation of the measures fail because of lack of commitment? Were there unforeseen changes of legal / administrative framework conditions that jeopardised the project implementation? These projects cannot be considered near to good practice as some decisive supporting element for implementation was missing.

**Square 4** embeds a group of communities using conventional planning and design processes that have been (for a number of reasons) weakly implemented.

| Strength / success of implementation | Strength / degree of innovation of planning / design: high | Strength / degree of innovation of planning / design: low |
|---|---|---|
| high | **(1)**<br>• Key stakeholders involved in the design, planning and implementation process<br>• Carefully assessed internal development capabilities<br>• Clearly defined requirements<br>• Users involvement<br>• Problems distinguished from the symptoms surrounding them<br>• Political issues resolved | **(2)**<br>• Design not comprehensive/ ambitious enough: activities are often piecemeal and follow opportunistic strategies<br>• Implementation takes place smoothly<br>• Political issues are resolved<br>• Key stakeholders are involved in the implementation |
| low | **(3)**<br>• Overly complex: measures require much time and skill to comprehend and apply<br>• Not enforced: proper guidelines are there, but the project lacks the discipline to enforce them<br>• Not flexible: activities are not easily tailored to meet the specific needs/specifications of the communities/ stakeholders.<br>• Not continuously improved: lessons learned not used to improve the current processes<br>• Weak or no buy-in from the project's stakeholders | **(4)**<br>• Major political issues are unresolved<br>• Stakeholders cannot agree on exactly what the problems or objectives are.<br>• No/ little stakeholder involvement<br>• Risks (technical, economic, organisational) are too high.<br>• Cost/benefit ratio is not favourable enough, especially when benefits are "soft"<br>• Requirements are unclear, and/or keep changing radically during the project lifetime |

Figure 6: Impact of design, planning and implementation on outcome: Selected factors affecting success and failure

Following this classification, we have analysed the causes for the gaps, and the methods and practice that make it possible for the good practice communities to achieve their high performance levels (see Chapter 3-4). Also for this analysis, the review was conducted in a manner to ensure broad, transparent project participation through consultations, site visits, phone calls, workshops, etc. Additional modalities have included interviews and involvement in activities relevant to the review. The review process has benefited from input from experts from policy, technical monitoring, socio-economic experts, local coordinators and coordinators of the projects as well as dissemination experts participating in regional workshops. In some cases, during selected workshops also SWOT analyses was carried out. These methods have eased the communication and the understanding of the objectives and strategies and have enabled strategic feedback and learning.

# 2 CONTEXT - Institutional, political, cultural, organisational, financial and legal background

Europe is facing the challenge of meeting its ambitious renewable energy, energy efficiency and climate change targets. Despite a number of instruments adopted (e.g. directives) and all joint combined efforts, the achievement of the aimed targets is uncertain. One of the key reasons is the existence of a still high number of barriers and various levels of responsibilities, especially in the crucial implementation stage. Thus, coordinated approaches at European level are hard to set through. This applies to promotion instruments (where there still exists a variety of national/regional support schemes), but especially to organisational and institutional matters. Against this background, it is evident that pace and efficiency of implementation also varies from country to country and from region to region depending upon socio-economic, and technological development status of a given country or region. Ecological and economic issues are interacting and interdependent. Both are linked to socio-cultural-political factors.

Moreover, allocation of responsibility in critical issues, including site approval and authorisation procedures vary from country to country and even from region to region. The implementation of most programmes rests at regional/local level with local authorities and local investors, and not at macro, community or Member State level. Whist policy and initiatives to promote sustainable energy are essential at the macro level, implementation and uptake depend upon key local actors and local authorities. Moreover, with increasing liberalisation of Europe's energy economies, local investors and developers have more investment autonomy and power than ever before. This results in an additional fragmentation of decision-making competences.

The successful implementation of sustainable energy plans is strongly influenced by factors related to the planning and implementation processes themselves, including the commitment of local community leaders, and the choice of accompanying activities such as the dissemination of information, the use of appropriate communication tools, awareness raising, participation of relevant decision makers and other market actors, involvement of user groups, etc.

Key questions in analysing the influence of a specific context on the implementation of the projects were:

- Have the economic, institutional, cultural, financial, legal and political framework conditions hindered or contributed to the implementation of CONCERTO projects?
- Which barriers and which drivers played an important role?

Answers have come from a qualitative evaluation, utilising questionnaires and interviews especially during site visits. The purpose of this investigation has been to identify barriers, as well as drivers affecting the implementation process. Several recommendations for improving the process were identified by the participating communities.

## 2.1 Background characteristics: The national and regional context

The level of centralisation and decentralisation of a country plays a fundamental role in the decisional process. Decentralisation implies a transfer of authority, responsibilities and resources. This affects also the support in the environmental and climate policies through the various acting political actors. Accordingly, CONCERTO projects have been differently supported in their implementation phases in the various countries.

The Figure below subdivides CONCERTO countries according to their level of decentralisation of decision-making. Decentralisation implies a transfer of authority from the central level (national state) to lower governmental levels (regional, local, etc.). Political decentralisation is characterised by legislative power and differentiated capacity in policy making; fiscal decentralisation concerns the capacity to raise taxes and allocate funds to different policy priorities, administrative decentralisation indicates executive power to implement what has been decided at other levels of government.

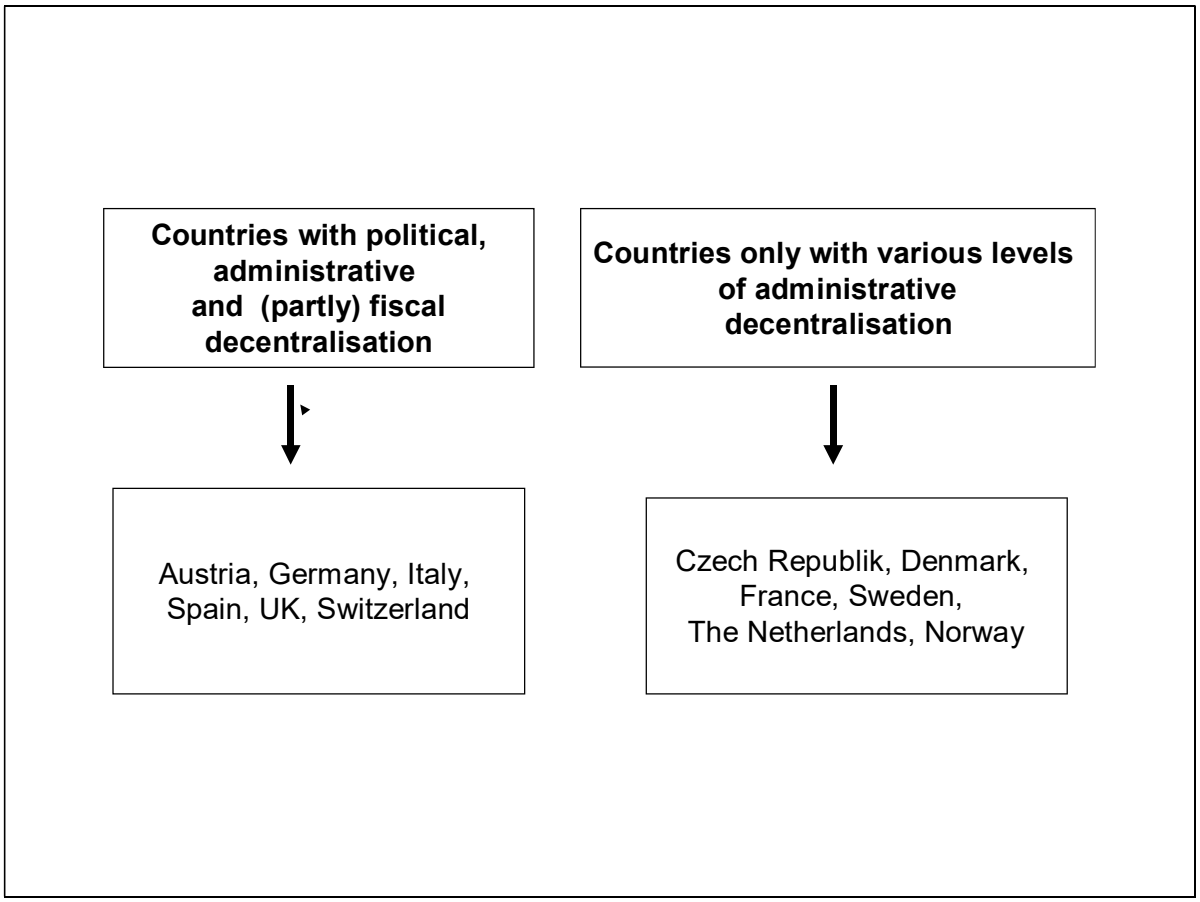



Figure 7: Classification of CONCERTO countries according to their degree of decentralisation

In France and Norway, for example, where there is a high level of centralisation, regions and municipalities do not have responsibility to define specific energy requirements. Nevertheless, they can develop energy action plans with supporting measures including awareness raising, education, technical studies and financing tools. Sweden, The Netherlands, the Czech Republic and Denmark are characterised by a certain administrative decentralisation, whereas Germany, Switzerland, Italy, Austria, Spain, and the United Kingdom are characterised by a high to medium level of decentralisation at political, administrative and fiscal level. In Germany, regional and municipal legislations play the major role in fostering renewables and energy efficiency. Indeed, a large number of responsibilities in the area of energy rest upon the Länder and their respective ministries and municipalities. In Austria, there are various administrative levels encompassing the Federal State, 9 "Länder" and municipalities. As the district administration has no competence in energy planning or infrastructure issues, municipalities have to find other paths to facilitate implementation of measures going beyond the border of each municipality. This is the case in Weiz-Gleisdorf which has created the ERWG association (Energieregion Weiz-Gleisdorf) allowing for energy planning at regional scale.

Switzerland is a Confederation State and as a result, decisional power is often delegated to local and cantonal administrations. The framework for the building sector is set at the national level, and specific local building regulations (concrete measures and goals) are left to the cantons. They have defined minimal common strategic goals and each canton sets its own priorities.

In Italy, the decentralisation of the public administration set in motion by the Bassanini Decree of 1998 and a change in the Constitution (Law 3/2001) have strengthened the role of the twenty "Regioni" in matter of production, transport and national distribution of energy, establishing that such issues are subject for "competing" legislation. The Regions, however, have no jurisdiction in case of basic rulings, reserved to the legislation of the State. The Regions have to define the general system of rules, whilst the municipalities identify the local conditions for realisation, with special attention being paid to landscape issues and participation of citizens.

As far as the French communities are concerned, in 2008, their activities have been significantly influenced by the 'Grenelle de l'Environnement' process led by the French Government. This new legal framework has set ambitious targets in both the energy and real estate sectors.

In the Czech Republic, the decentralisation of the public administration initiated through the Constitutional Act n° 347/1997 entered into force in January 2000. It created the regulatory platform to transfer competences to regions (Kraje). Since 2004, the government takes decision on infrastructures and strategic issues whereas the regions are responsible for energy action plans and regional energy agencies.

The Swedish energy policy aims to create conditions for efficient and sustainable energy use and a competitive, cost-effective and secure energy supply, with low negative impacts on health, environment and climate. The Ministry of Sustainable Development has led on energy policy since January 2005 whereas the Swedish Energy Agency is the principal agency for policy implementation.

A characteristic of the Danish energy policy is that its outcome is generated through the cooperation of many committed parties. This commitment should be continued both in the Danish energy sector and through local activities. In negotiations with the energy companies, i. a. the Government tries to ensure that the energy sector is well rooted in a democratic, consumer-oriented structure. As far as possible, this is pursued in accordance with the principle of self-sustainability, by securing consumer ownership, and by promoting consumer democracy within the companies. Energy policy has a priority and is seen as a mean to secure stable, long-term frameworks for the energy sector and for protecting consumers. In February 2008, the Danish government stipulated an energy agreement with most of the parliamentary parties. The agreement lays down Denmark's energy policy for 2008-2011, which meets or surpasses the EU environmental goals in several areas.

The ability of the UK to cut down on carbon dioxide is very closely linked to the way energy is produced, which is currently mostly based on coal and gas. The Climate Change Programme is moving towards increasing the share of renewable energy and combined heat and power (CHP). In the UK, the Building Regulations include all national requirements such as the EPBD which is related to the 'Conservation of Fuel and Power' and thus to energy requirements in both new and refurbished buildings. The Buildings Regulations are executed by local governments and apply to England and Wales. Scotland has different regulations, which however closely follow the standards in the rest of the UK. Local councils can impose, in addition, even higher environmental standards than the ones fixed by the Building Regulations through local sustainable development plans, the so-called 'Local Agenda 21

plans'. Both CONCERTO communities in the UK, London and Milton Keynes have Agenda 21 plans and can therefore already be seen as frontrunners in this field. For example Milton Keynes is implementing a 'carbon offset fund' to force developments to be carbon neutral as the fund is based on a 'penalty tax', which works on the principle the higher the development aims to surpassing current building regulations the lower the 'penalty tax'.

The Norwegian Government's vision is a lead in the development of sustainable energy technologies. A new public enterprise, Enova SF, was established in 2001 and has taken over responsibility for state efforts to promote energy savings and environmentally friendly forms of energy production (including renewable energy). The Norwegian regulation - whereby if a district heating network is available, houses must be connected to the grid and pay the connection fee and the fixed part of the energy- represents a good example also for other countries.

In the Netherlands, the main administrative responsibility for energy policy lies with the national Ministry for Economic Affairs. This formulates the guidelines for the Dutch energy policy. Its implementation is executed by the Netherlands Agency for Energy and Environment (NOVEM). The Dutch national legislation concerning energy performance needs to be updated. Energy performance is part of the building regulation, but it focuses only on new buildings whereas the percentage of the existing building stock in the Netherlands is very relevant. The CONCERTO projects are actively involved in the 'Energy Transition' process, an initiative developed by the Dutch Government and with private sector as a partner. It focuses on making existing constructions more energy efficient through a participatory approach where all national and local actors are involved.

**Enhancement of energy efficiency**

Enhancing the energy efficiency of existing buildings is particularly challenging. While still much has to be done in this area, it is encouraging to see that all European countries have made progress[11]. Countries have begun to collect systematically information on the existing building stock, examine barriers to energy efficiency in the sector and develop packages of initiatives to enhance energy efficiency in existing buildings.

Concerning the spread of energy efficiency measures, most countries have a national energy efficiency strategy or action plans and can rely on ex ante evaluations of energy efficiency policies. In terms of energy efficiency requirements for new buildings, the European countries perform well. In terms of stringency of building code standards, Germany and Denmark stand out as having the most advanced requirements. Germany's current energy efficiency standards for buildings are strong and these are expected to be raised by a further 30% in 2012. Denmark also has strong energy efficiency requirements and the Parliament has agreed to raise these by 25% to 30% in 2010 and again by 2015. With this improvement, the requirements for all new buildings in Denmark will be below the passive-energy house (PEH) level. Once these amendments are in force, it is expected that both Germany's and Denmark's building code energy requirements will be close to the optimum 30-year least life cycle cost.

Germany and Denmark are not alone in pushing for more ambitious requirements for new buildings. Also the Netherlands announced a tightening of standards for new buildings by 25% by 2011 and 50% by 2015. Many countries have developed policies aimed at promoting and supporting passive and other highly efficient new buildings. Austria, Denmark, France, Germany, Ireland and the UK have the most advanced policies. In Germany for

[11] This section relies heavily on the IEA (2008), see International Energy Agency, Energy Efficiency Policy, Paris

example, the adopted policy includes incentives and measures that ensure capacity development and information campaigns. Passive house technologies are becoming more commonly available in most parts of the country and their implementation is encouraging.

**Economic and financial measures supporting RES and EE**

The generation of electricity from renewable energy sources is enhanced through different national measures and incentives. They include a wide range of measures fostering the implementation of RES and energy efficiency in buildings. Amongst them especially prominent are direct and indirect financial and fiscal measures. The direct fiscal measures consist of a tax deduction of investment costs for systems generating electricity from RES, and the indirect ones are applied through fiscal charging of conventional power and tax relief of electricity consumption from renewable sources. Fiscal measures exist in Spain, that has developed a tax reduction on investment cost for a certain percentage of unsubsidised investments, in Italy[12] and France that have both applied a VAT reduction. France has furthermore developed an income tax credit[13] whereas Switzerland has developed the "Climate Cent", a $CO_2$ tax on stationary fuels[14]. Austria applies an energy tax to both small consumers and the industry on gas and electricity since 1996. Approximately 12 % of tax revenues are remitted to the Länder for the implementation of energy saving and environmental protection measures via intergovernmental transfers. This also includes measures for the promotion of renewable energy sources[15].

In the majority of CONCERTO projects, the generation of electricity from renewable sources is mainly promoted through guaranteed feed-in tariffs for the electricity fed into the grid [16]. In the UK and Poland, there is a quota-certificate system. In Italy, both systems co-exist whereby feed-in tariffs are a specific instrument for promoting photovoltaic systems. Germany, Austria, and Italy developed specific investment subsidies for companies[17] investing in solar thermal applications. Austria has investment subsidies limited to the promotion of hydropower only, Italy for micro, small scale and diffused cogeneration units, and Germany for small-scale biomass heat generation. In France, a tender system[18] exists for large renewable projects. Spain is encouraging the development of Energy Service Companies (ESCOs), by ensuring legal protection of these companies, providing financing and offering public contracts. Additionally, countries such as Spain[19,] Germany, and France[20] offer special loans for private

[12] In Italy VAT of 10% instead of 20%

[13] Persons investing in systems for the generation of electricity from renewable sources by 31st December 2009 are eligible for an income tax credit (Crédit d'Impôt).

14 The tax, which came into force on 1 January 2008, is of CHF 12 per tCO2 equals CHF 0.03 per litre of heating oil and CHF 0.025 per m3 of natural gas. The tax is revenue neutral, the income is going directly into an energy fund, the "Centime Climatique", and is going to be redistributed to the population and to companies in an equitable way.

[15] It amounts to 4.36 cents/Nm3 + 20 % VAT for natural gas and to 1.50 cents/kWh + 20 % VAT for electricity at the time being.

[16] Spain, Germany, Switzerland, France, Italy, Austria, Czech Republic, Norway, The Netherlands and Denmark.

[17] Germany with the new Renewable Energies Heat Act released in December 2007, Austria has grants up to 30% of the investment costs at federal level. In Italy, a regulation from January 2007 establishes among others investment incentives for the solar thermal installations.

[18] Producers winning a tender have a contract with the price they proposed.

[19] Spain launched in 2008 low-interest loans, the so-called "Renewable Energy Project's loan programme".

[20] In France since 2009 there's the "éco-pret à taux zéro" for individuals. Funding for the zero-interest loan for energy efficiency improvements doubled as part of France's economic stimulus plan. In addition, the 2009 Finance Law provides a zero-interest loan for the purchase of a new or existing home. The amount provided by this loan can be significantly increased if the building is better than the current building code requirements (low and positive energy buildings).

investors. Austria, Italy[21] and Switzerland offer special grants. Germany and Spain[22] have introduced the obligation to use RES systems in new buildings.

In Denmark, a wide range of subsidies, taxes and environmental legislations, administrated by the Danish Energy Authority, govern the development of renewable energy. In Sweden, RES utilisation and EE improvements are strongly supported by environmental and climate policies. The Swedish government has large investment programmes for local sustainability and climate protection and there are several incentives for building sustainable energy systems, such as the $CO_2$-tax imposed in 1991. However, a change of the current quota of the electricity certificate systems is advocated by many experts as a prerequisite to give RES a real boost.

In Norway, the state enterprise Enova SF administrates the Energy Fund and supports through grants energy savings and environmentally friendly forms of energy production including renewable energy. The energy fund is financed through a levy on the transmission tariffs and by the revenue from the so-called "Basic Fund for Renewable Energy and Energy Efficiency". The Norwegian regulation mandating connection to the network in the cases where district heating is available (the users pay the connection fee and the fixed part of energy) can be considered a good example for other countries.

The United Kingdom is implementing a 'carbon offset fund' to force new carbon neutral developments. The fund is based on a 'penalty tax' which developers have to pay if their development just meets the current building regulations. The higher the development aims at surpassing these regulations, the lower the 'penalty tax.'

## 2.2 Aspects of the national/regional institutional, financial and legal frameworks which are of particular importance for CONCERTO Communities

A regulatory environment combined with effective funding schemes can strongly encourage the uptake and replication of CONCERTO projects. Interviews with the 26 first generation CONCERTO communities confirmed that 23 Communities have been strongly supported by national environmental and climate policies and 21 communities have been partly supported with public funds. In particular, in Germany, Austria and Italy funding schemes were clearly a major driver in motivating refurbishment activities. Another important driver for the uptake of CONCERTO objectives is public acceptance. In Scandinavian countries, in Germany, in Switzerland and in The Netherlands, citizens are very receptive to environmental issues and therefore measures improving environmental standards find public support.

### AUSTRIA

In Austria, the legal framework within the Federal States provides the possibility for regional decision makers to position their own "Land" as leader with regard to energy efficiency measures and use of renewable energy sources. Several Länder and many communities

21 In Italy, grants are available for citizens within the Programme "Comune Solarizzato" from the Ministry of Environment in combination with funds from regional governments. Both parties contribute by 50% to a scheme that refunds citizens who install domestic solar thermal systems.

22 In Spain a Solar Thermal Obligation has been enforced.

participating in a climate protection agreement have adopted, and partly implemented, climate protection programmes of their own. Additionally, the national programme "klima:aktiv" has made it its objective to increase the share of energy-friendly and ecologically compatible new buildings in the residential and tertiary sector.

Many Austrian measures go beyond EU legislation, particularly the EPBD, and offer various financial, legal and promotion instruments and transposition with more stringent provisions.

In the building sector, Austria has made good progress in addressing the "principal-agent" problem, setting mandatory building codes, and requiring energy certification schemes that ensure buyers and tenants get information on the energy efficiency of buildings. Austria has also lent strong support to the development of energy-efficient technologies, such as those used in Passive house and Zero Energy Building. The municipalities of Weiz and Gleisdorf offered additional incentives for the implementation of EE and RES measures, which could be combined with CONCERTO funds. Funding schemes were clearly a major driver in enhancing refurbishment.

**CZECH REPUBLIC**

The Czech Republic committed itself to increase the share of electricity produced from renewable sources under the Accession Treaty. This Treaty envisages achieving the target of 8% share of electricity produced from renewable sources of energy in the gross consumption of electricity in the Czech Republic by 2010.

The project in Zlin is aligned with the Government's position Energy Policy laid down in the "green scenario", including energy savings, use of domestic primary energy sources and development of renewable energy. This strategy is reviewed every two years and integrates security of energy supply, environmental protection, economic development and social advancement.

Thanks to CONCERTO funds and other EU and national funding schemes, the CONCERTO project in Zlin could implement several activities within other programmes, originally planned within "Energy in Minds!" project only, so that CONCERTO objectives of promotion and development of renewable energies can be spread at a wider level

The Community of Zlin holds a reputation of "City of Innovations" and intends to take the lead for renewables and rational energy use in the Czech Republic. This should be reached thanks to small and large-scale installations of solar thermal and photovoltaic systems.

**DENMARK**

In Denmark, the responsibility to lay down guidelines for the best possible production and distribution of energy is taken by the Danish Energy Authority. Compared to many other countries, Denmark has a well-established planning system with a high degree of public participation. A wide range of subsidies, taxes and environmental legislations, administrated by the Danish Energy Authority, promoted the development of RES. The implementation of the Energy Performance Directive and the integration of new energy regulations into national building regulations are the most important specific legal instruments, which facilitate the takeover of CONCERTO in the country. This has forced the building sector to design low energy buildings. The national act on planning has been changed recently and municipalities can demand low energy buildings in newly developed urban areas. The new energy policy also makes Denmark the first country in the world to commit itself to reducing overall energy consumption - the target is a 2% reduction by 2011 in relation to 2006. By 2011, it is expected that renewable energy will provide 20% of the country's total energy needs. Concerning energy savings, the target is decreasing gross energy consumption by 2% by 2011 and by 4% by 2020, compared to 2006.

## FRANCE

While energy performance in buildings was not an issue in the French building regulation at the time the first CONCERTO call was launched in 2003, the legal framework has positively changed since then.

In 2005, the French Government launched the Programme and Orientation Law on Energy Policy (Loi POPE) that set up national commitment in favour of energy savings and renewable energy sources. It confirmed and reinforced pre-existing measures such as the building thermal regulation, tax-credits or feed in-tariffs, established new measures such as the "white (energy savings) certificates" or guarantee of origin for RES, and finally created several sectoral Plans. Another driver for CONCERTO projects has been "Grenelle de l'Environnement" consultation process that started in 2007 with continuation in 2008 with 34 specific "Operational Committees", (among which 6 concerning urban planning, energy in buildings and renewable energy sources), preparing detailed reports of measures to be taken by law or regulation. In this process, CONCERTO projects have actively participated in setting up recommendations. Also the French law on Urban Solidarity and Regeneration (13/12/2000) pushed the projects supporting agglomerations to devote up to 35% of the funds for housing to social housing23. Active collaboration between the four French CONCERTO Communities on socio-economic and training issues started in the early stage of the projects development and proved to be an efficient boost for accelerating the promotion of sustainable building all over France, although they failed to integrate the National-State "Prebat" programme because of purely bureaucratic reasons.

With regard to the regional and agglomeration level, the Rhone Alps Region, Pay de la Loire and Corse Region not only have strongly supported CONCERTO projects with regional and local Energy action Plans in close coordination with the national initiative from ADEME (together with large low-energy Social Housing Plans), but also took up the CONCERTO innovative's approach and recommendations for improving local climate and urban plans at administrative and legal level. This has had a strong impact on the local market and for awareness raising.

## GERMANY

In Germany in spite of reliance on coal and the presence of nuclear power, a stable policy framework has created conditions favourable to renewable penetration and growth. The feed in tariffs for renewable electricity (FIT), together with incentives for RES-Heat, have proven to be a successful policy mix leading to a very dynamic market for RES. Energy efficiency and the enhancement of building standards remain crucial policy fields and the major instruments are the amendment of important legal rulings such as the Federal Directive for Energy Efficiency (ENEV) and the Combined Heat and Power Act (KWK-Gesetz).

Additionally, Germany has a range of policies in place for the energy-efficient refurbishment of existing buildings, including a high target to increase the refurbishment process in the old building stock. The German government just increased funding to the Kreditanstalt für Wiederaufbau (KfW) CO2 building modernisation programme. The KfW, a non-profit public banking group, manages a loan programme for the refurbishment of old buildings and ecological construction. The goal of this programme is to help customers meet the increased

[23] Local authorities are obliged to ensure that at least 20% of all housing available across each municipality is in the form of social housing. If they fail to meet this obligation, a proportion of their tax income will be used to fund land and property acquisitions to create social housing.

upfront costs of energy efficiency refurbishment. The new "efficiency in buildings" programme contains an integrated package of building standards, subsidies, loans, grants and retrofit programmes.

**ITALY**

The twenty Regions and the Autonomous Provinces exercise strategic planning and coordination regarding energy issues; they define the measures for governance of the energy system and issue regulations for energy certification of buildings and guidelines for the technical planning of the plants and systems for the production, distribution and use of energy.

An important aspect of governance is the planning of the development of the energy sector, which is dealt with by the Regioni through the preparation of energy plans, setting the objectives to be pursued for achieving the Kyoto-targets and the objectives to be realised according to the European directives. The energy plans identify the conditions for development of the regional energy system; increasing energy efficiency in all sectors and improving energy distribution and transport systems.

Most of the Regions and Autonomous Provinces share a common objective of guaranteeing greater energy independence through environmentally friendly and efficient technologies.

However, there is a discrepancy between the production of RES E regional targets and what Regions have done. The 20-20-20 target pinpoints the critical Italian situation, which, despite an attractive incentives system, shows difficulties in planning energy efficiency and in achieving of the Kyoto objectives.

Lately, Italy has been active in providing financial support for energy efficiency. The 2008-2011 Economic and Financial Programming document recently approved by the government envisages fiscal measures to encourage energy efficiency of buildings and energy-use equipment. Overlapping incentives are seen as potential consequence of the absence of an energy efficiency strategy, in particular in the case of the building sector. In fact, the recently introduced fiscal incentives significantly overlap with the “White Certificates”, while further regional incentives could also apply. The risk of double-funding measures is increased by the lack of a co-ordinating body between the different agencies responsible for energy efficiency at the national, regional and provincial level.

**THE NETHERLANDS**

The CONCERTO projects in the Netherlands are actively involved in the ‘Energy Transition’ process, an initiative developed by the Dutch Government with the private sector as a partner. It focuses on making existing constructions more energy efficient, through a participatory approach where all national and local actors (like research centres and businesses) are involved. Its concept (strong effort to make existing construction more energy saving) has many similarities with the CONCERTO programme. Additionally, the Energy in the Built Environment Platform focuses in particular on the development and realisation of energy concepts for new and existing buildings.

Following the approval of a new law regulating spatial planning procedures, each municipality has to provide a “structural plan”, which is a kind of master plan for the different districts valid for the next 25 years. This plan does not define only land use characteristics, but also gives indications on the general infrastructure to be built, including in particular the energy supply infrastructure. The plan can be adapted every five years, if necessary. In case of new

urban development projects, national energy performance requirements have to be observed and there is no possibility for local authorities to implement more ambitious standards (in order, for instance, to realise a new neighbourhood at passive house level). The only possibility for municipalities to go beyond those standards is to include the specific targets already in the "structural plan". Also the decision to provide a district heating infrastructure in a neighbourhood has to be included in the "structural plan".

**NORWAY**

An important part of Norwegian energy policy is promoting energy efficiency and renewable energy. In Norway's electricity supply, hydropower has the lion's share (about 850 hydroelectric plants, with a total installed capacity of over 27,000 MW). Part of the country's RES programme has focused on ways to reduce losses incurred in the transmission of electricity generated via hydropower and to develop undersea cable technology. However, as Norway's energy demand increases, there is limited capacity for further hydropower development. Current controversies over the use of natural gas to meet Norway's energy needs place a greater emphasis on the need to develop renewable energy resources. Experiences of co-operation at the European level, such as the participation of Trondheim at CONCERTO project, give important impulses to the formulation and implementation of domestic policies and contribute to the dissemination of policy measures and energy technologies. The CONCERTO community Trondheim pursues as a municipality a strategy aiming at achieving at municipal level the Kyoto-target set for Norway.

**SPAIN**

In 2005, the Spanish government launched the Renewable Energy Plan 2005–2010. Its objective was to ensure that, by 2010, 12% of the total primary energy consumption comes from RES. The plan also includes financial guidelines and innovative research.

Since the launch of the Concerto project, the Royal Decree 314/2006 on Building Technical Code established basic safety and "habitability" requirements for buildings and laid down two guidelines: a "prescriptive" one, dealing with insulation and solar protection, and a "performance-related" one, defining energy-saving objectives, but not the means to obtain them. It also established minimum contributions for solar thermal and photovoltaic energy, and some requirements related to lighting. The aim is to achieve a reduction in heating demand of 25%.

In 2007, the Royal Decree 47/2007 on Energy Certification was passed, which approves the basic procedure for energy certification in newly constructed buildings. This involves measuring energy consumption and CO2 emissions, and passing on this information to buyers and users via an energy tag. Each region decides how to apply it within its territory. In 2007, also the Spanish Climate Change and Clean Energy Strategy, Horizon 2007–2012–2020 has been approved. The so-called "Clean Energy Chapter" encompasses measures in various sectors, including buildings.

Aragon, Catalonia, Navarra, Basque Generalitat together with Municipalities directly involved in CONCERTO strongly supported their projects. Catalonia has developed an "Energy Plan on the 2015 horizon" which considers the Catalan energy situation from the point of view of management of both demand and supply side supported by an Action plan 2006-2010 with incentives for RES use, Energy Efficiency measures and for heating installations.

The city of Zaragoza, for example, had a previous experience in bioclimatic urban planning in Barrio Goya (co-financed by the Thermie programme), and subsidies for energy savings and

diversification, rational use of energy, use of local and renewable resources and energy infrastructures for the year 2007.

## SWEDEN

A milestone in Sweden's climate strategy was the adoption in 2006 of a climate policy resolution, which meant that the interim target for 2008-2012 was retained. At the same time, the Swedish Government decided to reduce the CO2 emissions in 2020 by 25 % with respect to the basis year 1990. Additionally, it was claimed that the various sectors in society should contribute to the fulfilment of medium and long-term targets through sector-by-sector orientation targets by 2015.

The Swedish government has large investment programmes for local sustainability and climate protection and there are several incentives for building sustainable energy systems, such as the CO2-tax. The Swedish CONCERTO communities are implementing eco-rehabilitation of existing buildings and erecting new eco-buildings with energy performance levels that go well beyond the existing Swedish regulation. Moreover, the CONCERTO actions contribute to local economic growth.

Since the Swedish municipalities have a high degree of autonomy and are very influential, they are encouraged to set their own environmental protection goals following a consultation process among citizens, industries, energy suppliers, NGOs and universities. Additionally, they have taxation rights and planning responsibility. The climate protection policy and action programme for Växjö (Fossil Fuel Free Växjö) has become a model for cities all over the world. CONCERTO thus significantly contributes to the achievement of such ambitious climate protection targets.

Because the municipality of Falkenberg is the owner of the energy company, the local energy strategy is shaped by a close cooperation between the energy company and the municipality. The energy action plan (the Council adopted an energy action plan for the period 2007-2009 which is based on the Commission Communication "An Energy Policy for Europe") is considered crucial for achieving the established targets of reducing greenhouse gas emissions by 20% (30%) by 2020.

## SWITZERLAND

In Switzerland, the framework for the building sector is set at the national level, and specific local building regulations (concrete measures and goals) are left to the cantons. In the past few years, cantons clustered themselves in a group called EnDK with the objective to establish a common regulation framework, resulting in the creation of a catalogue of legal measures for Energy Efficiency and Renewable Energies. Cantons define minimal common strategic goals, whereas each canton sets its own priorities. The Geneva Council has adopted a very ambitious energy plan for 2005-2009 with measures to reach the first steps toward the "2000 watt society without nuclear". Goals are translated into local area plans (PLG), where new districts are developed in a sustainable way. At the same time, the cantons can impose incentives or taxes to steer and promote energy efficient behaviour and RES. Genève provides a financial guarantee fund called "éco21" and tax incentives up to 100% of the investment value in order to facilitate the realisation of "risky" projects. This has paved the way for the realisation of the CONCERTO project in Genève. Furthermore, large energy consumer projects in Geneva have to submit an energy concept to the canton. Concerning new buildings, the construction permit is granted only after the approval of the energy concept. Possible

synergies with other buildings in the neighbourhood can then be more easily identified and exploited. In Geneva, large buildings with high-energy consumption are obliged to report to authorities, on a yearly basis, an energy performance index that enables the detection of any deviation.

**UNITED KINGDOM**

In the UK, the Building Regulations include all national requirements such as the EPBD. Keynes is implementing a 'carbon offset fund' to force developments to be carbon neutral as the fund is based on a 'penalty tax', which developers have to pay if their development just meets the current building regulations. The higher the development aims at surpassing these regulations, the lower the 'penalty tax.' This might be an interesting model for other cities.

## 2.3 Technological and non-technological planning and implementation barriers

During the entire project, Concerto Plus has encouraged communities to explain the barriers they met, the lessons learnt, etc. This has enabled CONCERTO Plus to take into consideration all factors that could be relevant for the evaluation of the planning and implementation process. The analysis has identified barriers and drivers affecting the success or failure of the process of planning and implementation of the CONCERTO measures and the institutions that are responsible for the existence of these barriers and drivers. This process has been visualised in the so-called PIP diagrams (see Annex 1). The classification aims to synthesise facts from three broad perspectives, micro (project/end user), meso (organisation), and macro (state, market, civil society). Barriers and drivers have been analysed within planning and implementation sessions during the site visits.

Although a much-differentiated picture has emerged, it can be summarised that the barriers indicated by the stakeholders in the CONCERTO communities are not only of technical and administrative nature, but also of social and financial nature or specific to the design of the implemented measures. In general, it can be said that whilst most of the barriers detected in the communities are in most of the cases common for the technologies analysed, institutional, economic and social barriers are strongly correlated with the projects' and communities' specific characteristics.

The process has been illustrated in the Planning and Implementation Matrix below. The matrix highlights the presence of multiple barriers for the development and growth of RES and EE in the building sector in most communities. The identified barriers have been classified in the following categories:

- **Technical barriers:** Lack of experience in developing a specific technology, lack of training in the sector, esp. installers, lack of foresight in the town planning, etc.
- **Administrative/institutional barriers:** Lack of by-laws/ordinances at local level, long and difficult authorisation procedures, high number of authorities involved, lack of co-ordination between different authorities, RES insufficiently taken into account in spatial planning, master plans are seldom based on background studies that spatially analyse the opportunities of using local energy sources and installations).
- **Economic barriers:** High construction costs, reduced profitability, invisibility of full costs of electricity from non-RES sources, lack of tax incentives, lack of subsidies, etc.

- **Social Barriers:** Lack of awareness of the public in general and of target groups – constructors, architects, installers, etc, resistance towards behaviour changes, low acceptance of new projects, etc.

The analysis shows that the most frequent barriers encountered by CONCERTO Communities are administrative and legal ones. In most cases, bureaucratic problems encountered by municipalities due to the need to involve separate departments in the authorisation process together with budget binding provoked delays in early project deployment. Time spent to find mechanisms how to involve stakeholders is another crucial point typical of the planning phase together with short term (on yearly basis) budget planning, in particular in refurbishment activities. The number of technical barriers is limited, usually depending on the use of new technologies that in the demonstration phase do not work properly or do not give the expected results[24].

The *P&I Matrix* below indicates in a condensed manner the barriers that the stakeholders perceive as especially crucial. The communities were subdivided according to countries, so that the influence of the national context is discernable and specific as well typical country barriers are immediately noticeable.

[24] Concrete examples for this can be found in Milton Keynes

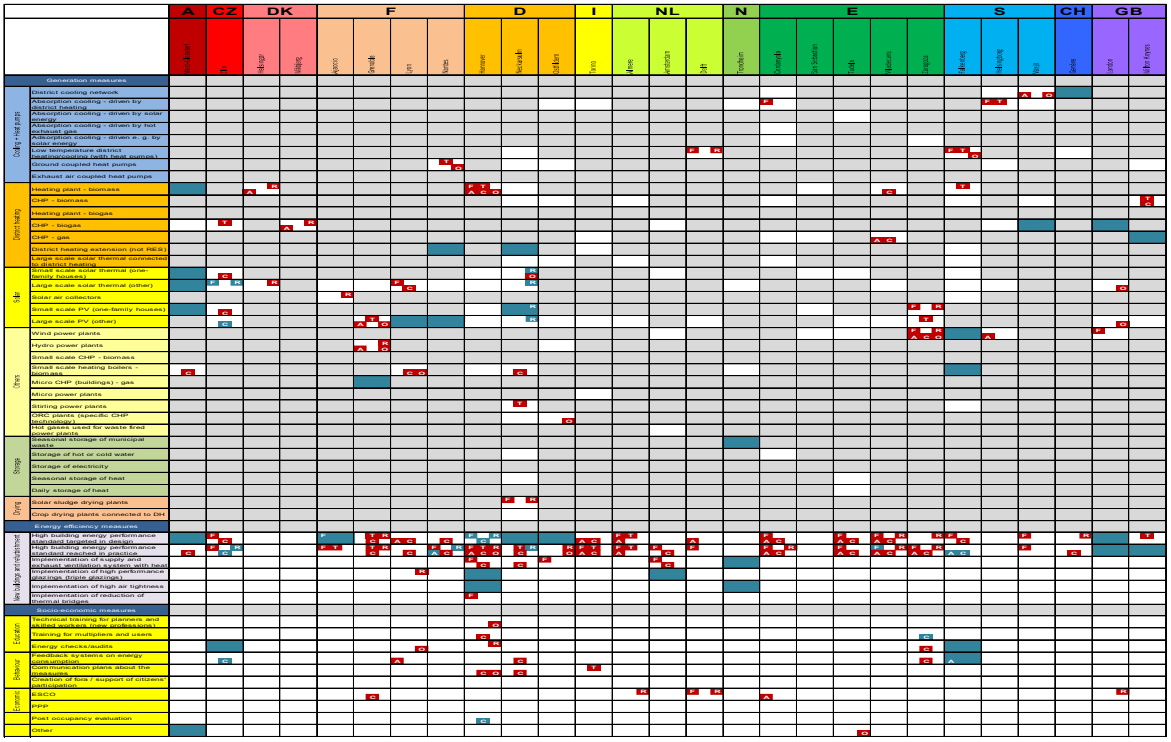



Figure 7 Planning and Implementation matrix

The complete matrix in the Appendix also shows a reference to the so called "renewable energy country attractiveness index" by Ernst & Young (see Chapter 1, p.5), which has been used as a yardstick for detecting favourable conditions for sustainable measures of the participating countries and provides a ranking for national RES energy markets and infrastructures[25]. The "Renewables Infrastructure Index" comprises access to finance planning and grid connection issues, level of political support for RES, level of deregulation in the power sector, local support level, lead time for projects , grid issues, etc. A country with a high ranking indicates higher opportunities available to producers and hence lower or no barriers. The reference to this index also shows that high scoring countries normally benefit from high political engagement in green energy and have low institutional barriers.

Countries with a satisfactory "Renewables Infrastructure Index" provide a positive assessment of the general regulatory infrastructure for renewable energy and important stakeholders perceive a favourable trend and anticipate a continuing political support for renewable energy. In fact, communities in countries with high indices such as Germany and relatively high, such as Italy and Spain show in the table below minimal (more on the administrative side) or no barriers concerning renewable technologies and their infrastructure. Thus, Spain represents a strong planning and grid environment driven by a number of factors such as priority of dispatch for RES technologies and strong local support. Project size allows for economies of scale savings. The legal framework, especially the RD661/2007 provides a stable environment and a good return for developers.

In general, the development of new technologies is mostly linked to administrative or legal barriers related to obtaining permits in a short time (especially for buildings or connection to the grid of polygeneration plants), authorisations or long lead times in tender procedures. In Spain, for example, there are difficulties related to the software tools in force to meet building energy efficiency and certification law. The technical code obliges stakeholders to use software tools provided where some devises are missing and cannot be simulated (like bioclimatic architecture), so bioclimatic projects have additional difficulties and their improved energy performance is not simulated.

Sometimes barriers emerge that can be loosely classified as economic-technical barriers and are connected to opposition to a distinctive technical option eroding existing economic interests. This is the case of Denmark where the natural gas company opposes if municipalities decide to convert a natural gas supplied area to district heating fed with biomass. The reason for this is that natural gas companies were given the exclusive right to supply certain heating areas in order to ensure that they could finance the development of a national pipeline system around 30 years ago. The exclusive supply right is slowly being abolished, but the gas companies still fight for their original privilege. This was experienced in Helsingør where due to a high workload in the Court and *Complaints Board* and several other issues, the settlement of the case took more than five years to decide (in favour of biomass). In fact, in Denmark a company is only allowed to construct biomass boilers in gas supplied regions if this is a demonstration plant or the heat demand has increased, leaving room for additional energy supply (without reducing the gas sales) or if it is socio-economic benefits are strong. However, the criteria to determine the benefits include technicalities that

[25] See, Ernst & Young, Renewable Energy Country Attractiveness Indices, Issue 22, August 2009 downloadable at http://www.ey.com/GL/en/Industries/Oil---Gas/Oil_Gas_Renewable_Energy_Attractiveness-Indices

take into account the trade off between lost sales revenue from gas and benefits deriving from the renewable alternative.

In some cases, also cultural and social barriers play a role and are mostly due to reluctance to adopt more innovative solutions. This applies also to the construction of renewable energy plants like in Geneva, Zaragoza, Viladecans, Zlin, Neckarsulm and to some extent Lyon. There are also cases as recently in Austria (Weiz-Gleisdorf), where previously well accepted technical systems (e.g. wooden pellets) systems have started encountering problems. The decreasing acceptance is however more due to the escalating prices for pellets than a lower social tolerance due to the technical system.

Very often local actors are not sufficiently skilled for the planning, designing and building use innovative solutions. There is a lack of know-how exchange between designers and operators and other project actors.

The current real estate and financial crisis together with falling oil prices are having a strong influence on private investors. Many of them show difficulties in respecting construction engagements, especially in Spain and the UK. Furthermore, some countries are shifting financial support on increasing employment measures instead of RES and EE with a negative impact on the sector, slowing the development of new energy technologies and supplies.

Additionally, some legal and economic barriers are typically related with the characteristics of a country. For example, in Italy and France, where the number of historical buildings is very high, it is difficult to reconcile historical preservation and environmental aspects in particular in the case of solar panel installations. Nevertheless, Turin is experimenting new models of governance with good results.

In France, in the existing building regulation, windows are considered as private parts, while facades are considered common parts. This aspect can potentially lead to misunderstanding between the co-owner council and owners.

In Denmark, multinational companies mainly manage renewable energy. They can effectively block local RES energy activities if they do not agree with local plans.

In Sweden there is a general problem due to the definition of minimal energy performance requirements for buildings. The same factors (=1) are used for electricity and for district heating. As a result, there is no particular encouragement to prefer district heating to electrical heating by designing a new building.

Additionally to the barriers summarised in the matrix, the following factors in the planning and implementation phases have represented obstacles for further implementation.

Table 1: Synopsis of barriers to implementation of Concerto measures and examples of opportunities and important stakeholders

| Administrative/Institutional Barriers | Opportunities | Important stakeholders |
|---|---|---|
| **1. New legislations**<br><br>Additional complexity for implementing CONCERTO projects has been induced by new legislations that came into force during CONCERTO projects development. | - The use of Concerto project experience in the preparatory phase of new legislation at national and regional levels.<br><br>- Avoided transaction costs in case of higher/same energy efficiency standards/ renewable energy standards as in new legislation(s) | National, regional and local authorities, energy agencies, consumers, universities and technical design offices |
| **2. Local political changes**<br><br>New elections of local authorities during the project implementation affected a change of strategies in several CONCERTO projects. | - Regular communication and information flows towards local authorities. | Local authorities, CONCERTO partners |
| **3. Administrative procedures**<br><br>Time spent for administrative procedures and consensus processes for local stakeholder's involvement at the start of the project is not proportional to the total duration of the project. | - Information sessions or documents that clearly outline the timelines and implications of the pre-proposal phase.<br><br>- draw a standard consortium agreement to facilitate the relations between partners and stakeholders involved.<br><br>- Set up an energy sustainable management process with a structural framework and monitoring tools. | Local project coordinators, local authorities, energy agencies, energy companies; universities and technical colleges, promoters. |

| Administrative/Institutional Barriers | Opportunities | Important stakeholders |
|---|---|---|
| **4. Planning procedures**<br><br>The local planning procedures and related legal procedures take too much time (i.e. 2-3 years). This makes it difficult to fulfil the 5 year CONCERTO deadlines. This applies especially to new buildings and energy production plants (biomass, wind, geo-thermal) | Planning system with a high degree of public participation (Denmark as best practice). | Local authorities, energy agencies, NGOs, energy supply companies |
| **5. Legal permits**<br><br>Too many administrative levels involved to obtain legal permits (buildings, connection to the grid of poly- generation plants) and tender processes | | Local authorities, local CONCERTO partners, energy companies, promoters |
| **6. Inter-departmental communication**<br><br>Lack of cooperation and acceptance between departments within the public administration involved in the set-up of operational plans concerning tender submission specifications. | - Set up interdepartmental and disciplinary working groups<br><br>- Improved communication mechanisms | Local authorities, consumers, universities and technical colleges, operational personnel |

| Administrative/Institutional Barriers | Opportunities | Important stakeholders |
|---|---|---|
| **7. PPP in masterplans**<br><br>In case of PPP projects, local economic stakeholders are barely informed with regard to the local district energy master plans. In some cases, district energy concepts are carried out once a preliminary draft of a district master plan has been made. Energy companies are involved only at the call for tender stage (Geneva). | - Propose background studies to analyse the opportunity of using local energy sources and installations before master plan acceptance<br><br>Local economic stakeholders' involvement in the consultation during master plan preparation<br><br>The chapter "energy management" systematically included in the master plan planning | Local authorities, energy companies CONCERTO partners |
| **8. Change of standards**<br><br>Permanent changes/adaptations of local energy standards (systems, permits, grids…) due to the liberalisation of the EU energy market. | | Concerto partners, local authorities, energy companies |
| **9. Short – term budget planning**<br><br>In many countries the budget at local/regional level, (in particular for refurbishment activities) is negotiated on a yearly basis. No long term planning is possible. | Support long-term investments<br><br>Allow combination with regional/national support programmes (for refurbishment, e-efficiency, renewables in buildings) | Local authorities |

| Economic Barriers | Opportunities | Important stakeholders |
|---|---|---|
| **1. *Perceived* too high costs for RES**<br><br>The RES generation costs are still too high when compared with the generation costs of conventional systems. This is also due to the fact that the negative external effects of fossil and nuclear generation are not taken into account. | National measures and incentives (feed in tariffs, quota-certificate system)<br><br>A demand-pull, induced by the security offered by tariffs and incentives is a major driver to reach economies of scale. Some RES technologies are nearer to the market (biomass, wind) than others (PV) and therefore digressive tariffs could be applied in these cases.<br><br>Establish special support programmes for innovative RES technologies, still in the R&D/pre-market phase | Concerto partners, Local authorities, energy companies, local promoters, national authorities/regulators |
| **2. EE in refurbishment**<br><br>Environmental quality is sometimes seen as detrimental to a building's architectural quality. It is demonstrated that it is more difficult and expensive to achieve high levels of environmental quality performance in a building that has not been designed with that purpose from the very beginning of the project | As 80% of the CONCERTO projects include new buildings, Concerto can have a significant impact on this attitude by creating buildings that are "exemplary" both in terms of architectural and energy quality from the initial conception phase.<br><br>Concerto communities could establish exemplary provisions regarding obligatory e-efficiency and RES use/measures also in refurbishment of buildings (together with local/regional subsidy/soft loan programmes) | Architects, Engineers, CONCERTO Partners, Local authorities |

| Economic Barriers | Opportunities | Important stakeholders |
|---|---|---|
| **3. Effects of financial crisis**<br><br>In PPP projects, there is a strong reluctance of the private investors to construct the planned buildings because of the current real estate and financial crisis. | Financial mechanisms or benefits supporting economic stakeholders like for example training sessions and job opportunities for locals in the field of RES installations. | Local authorities, local promoters, energy supply companies, skilled, unemployed local people. |
| **4. Contrasting interests on energy options**<br><br>Energy companies, especially multinational ones follow different objectives and might consequently block local RES energy activities (especially in Scandinavian countries). In Denmark the gas-supply company in the region appealed to the authorities to refuse the permit for a biomass fired district heating boiler as it would reduce the sales of gas in the area | - Improved communication<br><br>- Previous consensus with them before starting the activities | Energy companies, National and local authorities, energy agencies, NGOs, social housing companies, consumers, |
| **5. Social housing/ lack of incentives**<br><br>In tenders' specifications there are not always particular financial incentives in favour of renewable or EE solutions. | - Governments initiatives in stimulation of the use of EE and renewable energies and solutions<br><br>- Land prices/ discount schemes for ecological solutions. | National and local authorities, energy agencies, Social housing companies, consumers, |

| Technical Barriers | Opportunities | Important stakeholders |
|---|---|---|
| **1. Insufficient data quality and unsuitable data structure at local/community level**<br><br>Decision making in relation with local energy planning requires consistent data on resource availability, actual building stock and energy use. Mainly because of limited interoperability of data gathering systems, databases and non-technical issues (data confidentiality and data property). In many cases, it is not possible to define quantifiable objectives that can be verified in practice. | - Acceptance clauses in rent or sales contracts for communicating personal energy use data<br><br>- Building stock analysis available in free access national databases<br><br>- Facilitating access to statistical data and improving quality and structure of statistical data related with energy use in the built environment (e.g. The Netherlands: energy use data provided by the National Office of Statistics on the basis of ZIP code or by the electricity distribution network operator).<br><br>- Energy distribution overtaken for all energy carriers by only one company (municipal utility or ESCO) | - tenants, housing companies and associations<br><br>- national statistical office<br><br>- national statistical office, network operators (municipal utilities and ESCO) |
| **2. Unsuitable building monitoring systems and lack of interoperability**<br><br>In tertiary buildings, monitoring systems and their coupling with facility management still have to be improved mainly with regard to interoperability between systems and post-processing of monitored data. | | - industry |

| Technical Barriers | Opportunities | Important stakeholders |
|---|---|---|
| **3. Immature technologies for large scale applications**<br><br>Some energy technologies are still in development phase and cannot be implemented on a large scale at the moment (e.g. Stirling engines) | - Demonstration projects and field studies to improve the performance of the technology | - industry and building developers (for field studies) |
| **4. Difficult integration of single technologies in large-scale energy systems**<br><br>Some energy technologies still have to be further optimised with regard to their integration into community energy systems. In particular, the performance of district heating systems integrating absorption chillers for cold water production still have to be improved. In concepts based on solar thermal, heat pump technologies and seasonal heat storage, there are still high potentials for optimising system performance. | - Demonstration projects and field studies to improve the performance of the technology<br><br>- Monitoring and modelling: research work | - industry, energy systems planners, R&D players |

| Technical Barriers | Opportunities | Important stakeholders |
|---|---|---|
| **5. Lack of suitable construction technologies/processes ensuring high quality**<br><br>In many cases, the technologies used on construction sites are not compatible with the high quality of construction required for the buildings. Improvements (prefabrication…) are to be done. | - Use of a tent to protect the construction site from weather variations (successful example from Sweden: the timber frame buildings in Växjö were constructed under a tent, being a guarantee for better working conditions and higher construction quality) | - construction companies, building developers |
| **Social Barriers** | **Opportunities** | **Important stakeholders** |
| **1. Reluctance to innovation**<br><br>Opposition of local groups (associations or inhabitants) against the implementation of CONCERTO projects especially concerning wind and biomass projects | - Awareness campaigns underpinning the positive aspects, characteristics and innovative systems used. | local authorities, energy associations NGOs, consumers, universities and technical colleges, operational personnel, inhabitants |
| **2. Low private motivation to invest**<br><br>Low motivation of private house owners in the CONCERTO refurbishment programme | - Accompanying socio-economic activities to inform about the projects as well as about relatively short amortisation periods of E-efficiency/ RES investments and to involve stakeholders in all relevant planning and implementation stages.<br><br>-Dedicated, free counselling activities | House-owners, inhabitants, Concerto partners, Local authorities, energy companies, local promoters. |

## 2.4 Attitudes, contributions and levels of participation of relevant stakeholders and the general public

The involvement and continuous engagement of different stakeholders and stakeholder groups is essential in any successful planning and implementation process. In most cases, certain key stakeholders such as municipalities, housing associations or municipal utilities among others drive the entire process and are capable of influencing the outcome of a process to a very large extent. Good cooperation among key stakeholders, but also among the entire stakeholder group is in all cases central to realising a successful project. Different stakeholders have very different approaches, goals and targets. They also have different resources at hand and consequently different bargaining capacities throughout the design, planning and implementation stages.

This section provides an overview of the types of stakeholders encountered most frequently in planning and implementation processes, their characteristics, stakeholder management issues and challenges related to cooperative arrangements.

Figure 7 below indicates major groups of stakeholders and the frequency with which they are encountered in the projects assessed.

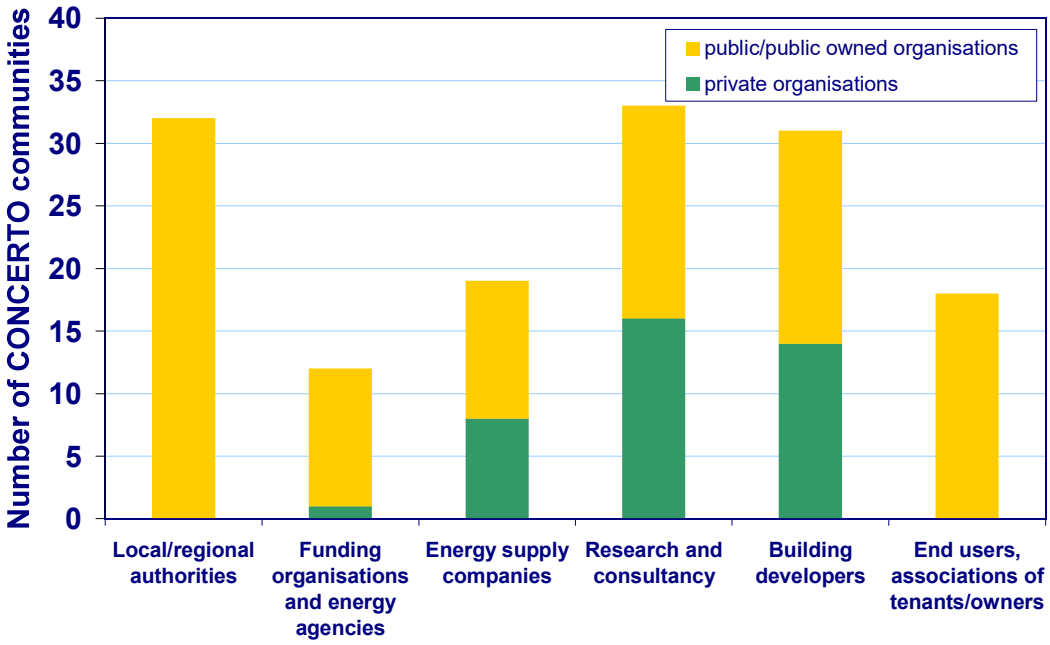



Figure 7: Most frequent stakeholder groups participating in CONCERTO projects

Local/regional authorities typically include environmental/energy/ urban planning or housing departments. As is illustrated in the Figure above, this stakeholder group is active in nearly all projects. In many projects, local authorities even initiate and coordinate the entire planning process because it is in their prime interest that sustainable planning which includes energy efficient buildings are implemented. As a public body, they also have to keep in mind quality of life issues that potentially affect a large number of inhabitants and go beyond the energy issues alone. They also often coordinate initiatives with agencies at the national level. If local authorities do not initiate the process, they are key stakeholders who cooperate with e.g. housing associations or utility companies throughout the entire planning and implementation process. When their interests coincide, projects usually can be implemented smoothly.

Funding organisations and energy agencies also play a central role in many projects. The figure shows that the vast majority of agencies involved is public. Energy agencies often act as consultants to local authorities and other stakeholders because they have a large knowledge base in the energy field and a vast local and regional network of stakeholders related to energy issues. Energy agencies also assist in specifying energy standards and can be involved in monitoring programs. Funding organisations/agencies typically provide a portion of the funds necessary to support energy-efficient building initiatives. They also coordinate with local authorities and funding organisations at the EU and national level in order to ensure that the project receives funds and subsidies as originally foreseen.

Energy supply companies/municipal utilities are almost evenly divided between the private and the public sector in CONCERTO projects. On the public side, an energy supply company is a municipal utility company while on the private side it is an ESCO – usually a partnership between several agencies and firms with the goal to provide energy at district or city level through performance contracting or other innovative financing mechanisms. Their role is ideally to get involved in project design and planning as early as possible in the process (i.e. through defining energy priority zones) in order to be able to influence energy supply. They have an important role in negotiating with building owners, which helps overcome legal barriers such as enforcing the use of community energy systems. District heating for instance has to be planned well ahead of time in order to be able to supply newly built buildings and facilities with heat.

Universities and consultancy organisations consist of a vast body of organisations such as university departments on the public side and technical consultants on the private and they are represented in all projects. These can include architects and designers, engineers, monitoring experts etc. Their main role is to provide the expertise in the fields necessary to design, plan and implement the project. Unlike some other stakeholder groups such as public authorities, they may not be involved throughout the entire process but rather during certain phases of the project. For the benefit of all stakeholders and the project, however, it was demonstrated in many projects that continuous involvement on their part improves efficiency and can support a positive project outcome.

Developers/housing associations/building owners make up a group of stakeholders charged with having to design and build the measures/buildings/facilities agreed upon in the project contract. In some cases, these stakeholders also manage the building once it is finished or maintain the newly installed measures when refurbishments were done. Public and private representation is also fairly evenly divided although there are more public representatives than private in CONCERTO projects. This group of stakeholders is often involved throughout the entire process and their continuous engagement and ability to cooperate with all other stakeholders is central to a successful project outcome. In some cities, housing associations play an important role in promoting energy efficiency and the use of RES in their buildings because they typically build, own and operate buildings, which is not always the case with e.g. private developers. They also often face the added challenge of having to keep rents low even after refurbishments because they serve the low income and social housing market.

End users include tenants/owners associations and facility managers. This group is represented in a number of projects and fulfils an important role, ideally throughout the project and particularly once the project is finished. In refurbishment cases, it has been shown that including tenants/owners in the process through information campaigns, involving them in metering energy use, allowing them to provide feedback to designated persons when problems occur tends to improve end user satisfaction and a positive project outcome. The role of facility managers is to operate buildings and optimise the technology at hand. They are also often involved in monitoring operations and should therefore be involved early on in the planning process as well.

# 3 ANALYSIS of the planning and implementation processes

This chapter identifies and evaluates the planning and implementation mechanisms in the communities by using a multi-dimensional framework (technological, institutional, socio-economic, environmental and organisational). As described in the methodology session under Chapter 1, system analysis methods were combined with other approaches into an integrated methodology supported by an assessment of form, function and dynamics of the implementation.

The appraisal relies greatly on primary data and information derived from the analysis of the annexes of the Concerto projects contracts and reports. Additional information was gathered through site visits and interviews with different stakeholders focusing on the identification of barriers and drivers. When necessary, further detailed interviews with project coordinators and members of the consortia were performed. Additionally, in 2009, various workshops and so-called "planning and implementation sessions" were carried through during regional and project site visits.

## 3.1 Analysis of the planning and early implementation process

The analysis of the design and planning stage encompasses 28 communities, i. e. it includes also the community of Bracknell that left the Renaissance project at an early stage. The process evaluation focused on:

- the overall project management of all phases of the measures;
- barriers encountered;
- the general commitment of various stakeholders to the measures.

The analysis has taken into account the influence of a number of internal and external factors on the realisation of the planned measures including typical mechanisms applied in the implementation process. A number of mechanisms and issues concerning the role of stakeholders in the decision-making process, the influence of organisational, institutional and legal mechanisms and the role of accompanying soft measures were screened and comparatively analysed. These issues concerning process and procedures are illustrated in **Box 9** below.

**Box 9: Specific mechanisms analysed in the P&I process**

**General decision making mechanisms**

- **What is the role of each stakeholder in these mechanisms?**

✓ Joint decision taking: who is involved?
✓ Consultation: who is involved?
✓ Requirement setting: which requirements, fixed by whom, on which basis?

**Institutional/administrative mechanisms**

- **What are the influencing organisational, institutional, economic and legal mechanisms?**

✓ Additional financial/fiscal incentives
✓ Bylaws and local legal measures (e.g. solar thermal obligation in Spain)

- ✓ Mandatory connection to the district heating network
- ✓ Higher energy standards/requirements attached to sale of building land
- ✓ Creation of (dedicated) urban development companies
- ✓ Creation of public-private partnerships
- ✓ Call for tender for ESCOs

**Supporting soft mechanisms**

- **What are the influencing soft measures?**

- ✓ Information activities and campaigns
- ✓ Internal/external training and dissemination
- ✓ Socio-economic accompanying activities to increase the acceptance of the implemented measures

## Analysis of procedures in the planning and design stage

Because the process evaluation requires a monitoring of the strategy adopted in each project and site, a special emphasis was placed on defining a specific tool – the *PIP-diagram*- to enable a robust and measurable evaluation.

After data gathering, the planning and implementation process mechanisms were drawn schematically according to a common template, which enables comparisons between communities. The *PIP diagrams* comprehensively illustrate the entire process the communities engage in. They provide an overview of the planning and implementation process from the decision and design to the implementation and operation phases. The diagrams illustrate the integrative and interwoven nature of the process, show barriers and drivers that appear at different stages, provide some background of a given administrative and policy background in a community and point out the key mechanisms which are supporting project planning and implementation at its successive stages. Comparing and contrasting the diagrams for each of the communities made common features visible that appear to be crucial for success. It also illustrates aspects that can differ completely from one community to another.

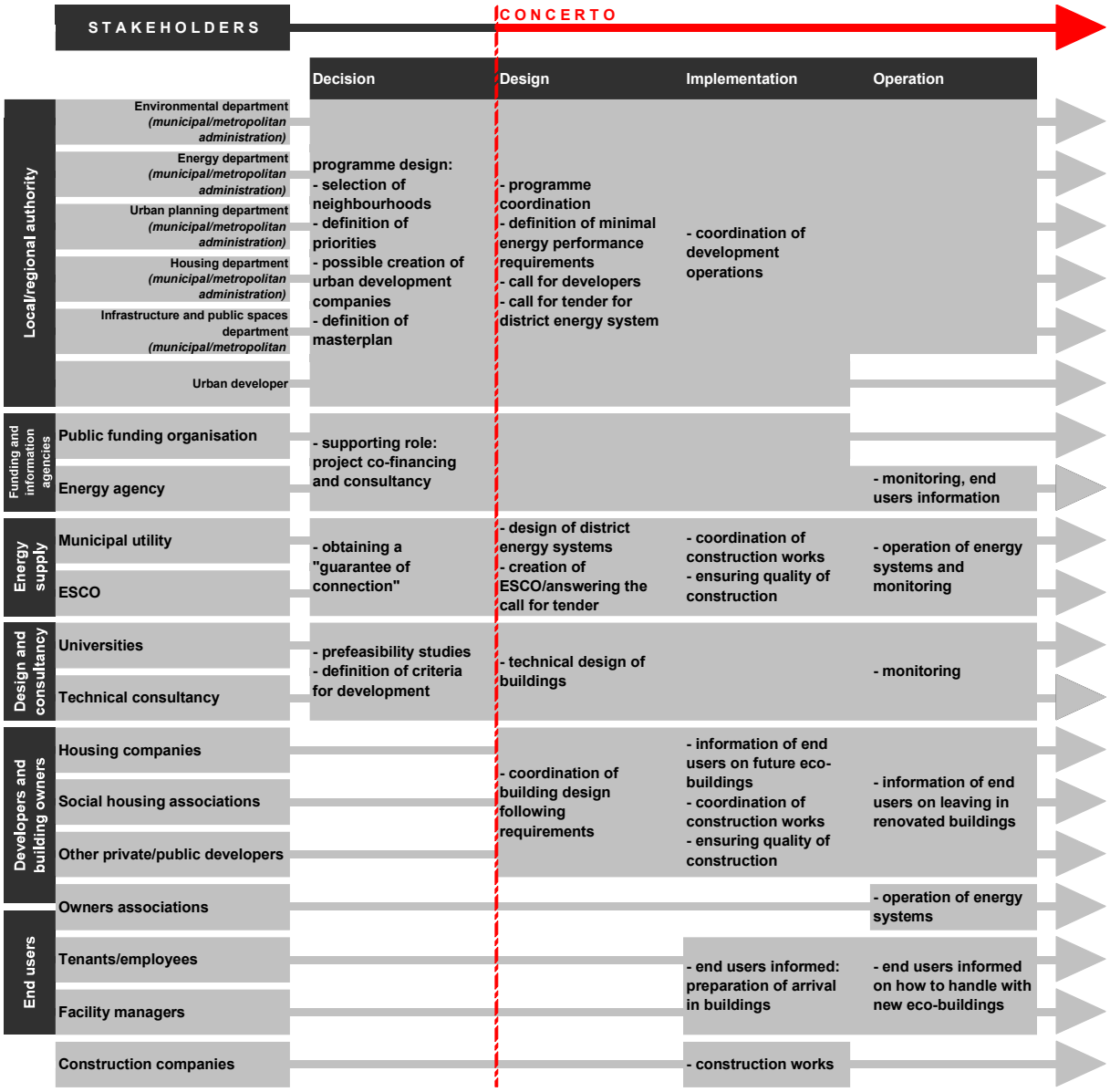



Figure 8: Key mechanisms observed in planning and implementation processes for new development in urban areas

The obtained *PIP-diagrams* were discussed a second time with the concerned communities and the involved stakeholders during dedicated workshops. In fact, a clear understanding of the characteristics of local and urban conditions and technological systems and the continuous feedback of the communities are a prerequisite for a targeted assessment. The workshops have been organised with clusters of communities belonging to the same countries and implementing similar projects (e.g. new urban developments) in order to allow for cross-cutting community analyses.

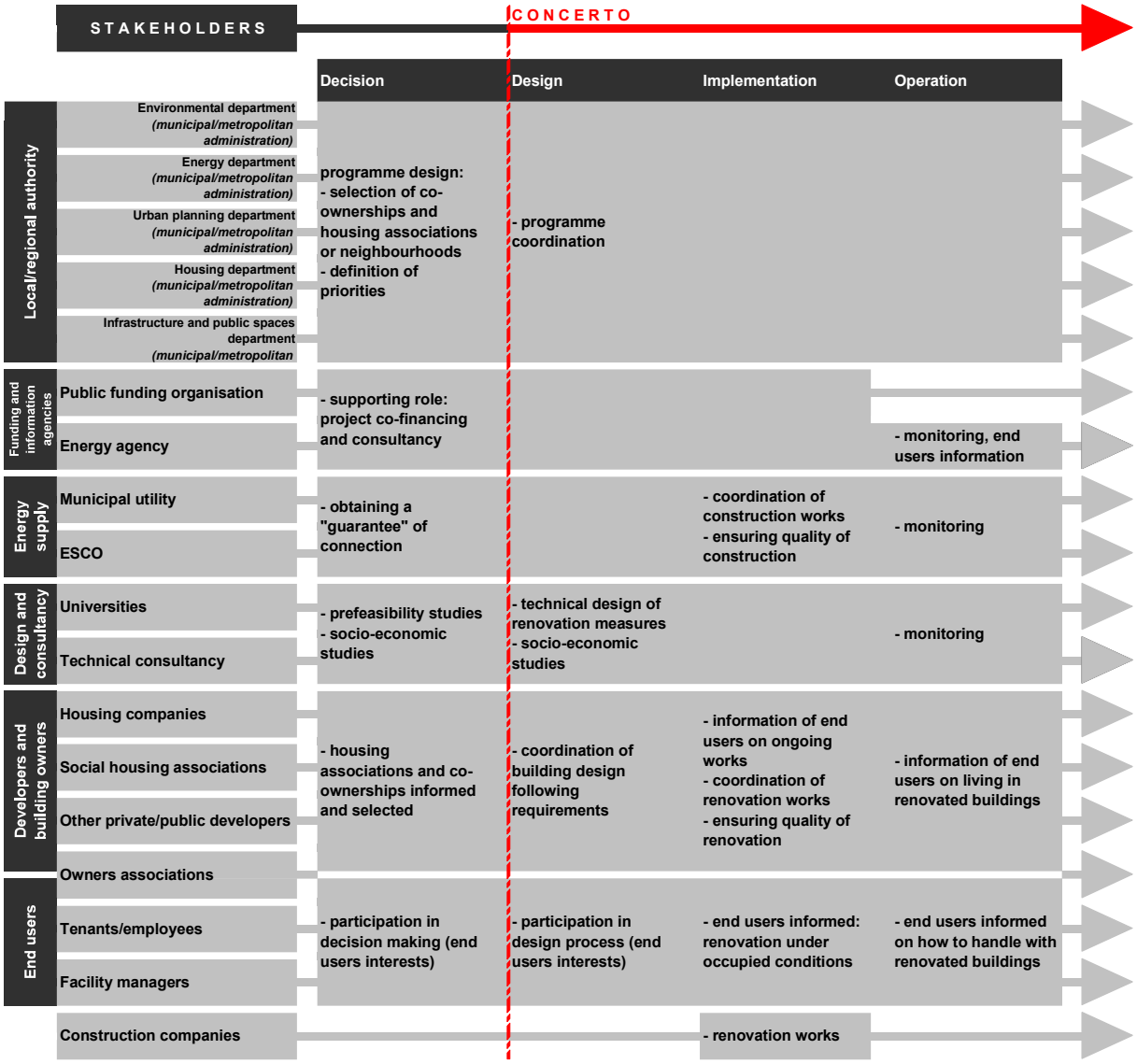



Figure 9: Key mechanisms observed in planning and implementation processes for large-scale renovation measures and improvements in urban areas

## Similarities and differences

Among factors affecting both planning and implementation, consideration has been given also to administrative traditions, regulatory structures, policy styles and the long lasting influence of past policies. In fact, the perceived administrative implications of adopting certain decisions or instruments are factors influencing the decision to adopt a certain course of policy and implement given measures.

As evident from the PIP-diagrams, the majority of projects in the planning/design stage adopted a pattern, which corresponds to the following common general approach.

**Box 10: Process steps in the CONCERTO Projects Design and Planning Stage**

1. Selection of specific targets and demo-area (mostly) by local authority
2. Agenda setting
3. Identification of local stakeholders
4. Set up of the project team
5. Pre-feasibility or feasibility studies undertaken by technical teams and selection of relevant technologies for the project
6. Final planning stage
7. Fine tuning of the studies and relevant documents resulting in the final CONCERTO application and consortium agreement.

The process steps as they appear in Figure and Figure indicate that most communities follow these steps with slight variations between communities in the phase leading up to and including the decision and design phases. Depending on stakeholders involved and their engagement and mutual trust, speed of process, familiarity and experience with the type of project, etc. this process can take months to years. In all cases, this initial process is a key factor for success, because in the decision phase, important alliances between stakeholders are created, contracts are negotiated and crucial agreements made that condition all future project phases. Clearly, potential for changes that occur in later phases of the projects is always present and all project partners may need to adapt to potentially new circumstances.

The largest similarities in phases 4-6 reveal that pre-feasibility or feasibility studies are primarily undertaken by technical teams, usually consisting of local authorities with support from contractors and/or research institutes involved. These are also responsible for the selection of relevant technologies for the project. The final planning stage frequently includes a presentation of preliminary results of calculations and an agreement between the local authorities, the owner or developers on the technical requirements needed for the project to reach the set objectives (e.g. integrating energy efficiency and renewable energies in urban planning and housing policies). Final common steps for all examined procedures in the planning stage are the adaptation of the document resulting in the final application document and consortium agreement.

The analysis has shown that key actors such as a municipality or a 100% publicly owned development company often provide the necessary momentum in the initial stage of a project in order to allow a project to move forward. The presence of motivated and capable actors who are willing to implement certain measures to achieve the goals set out appears to be a prerequisite for a successful implementation.

In several cases, municipalities provided the initial push to engage in e.g. large-scale refurbishment in their cities or in building new, energy-efficient buildings. The municipality would then often engage in project coordination through all project phases (decision to operation), select key stakeholders in the public and private arena that they needed to cooperate with such as other public departments and agencies, private developers, utility companies, housing associations, research organisations, construction firms, etc. Having public entities playing this role has a number of advantages: financial, administrative or legislative changes affecting the original plan can usually be buffered better because resulting project delays may not be as financially detrimental as might be the case for private firms. They also have to act in the public interest not just regarding energy efficiency and RES, but also with regard to quality of life factors affecting communities. They are also capable of gathering large groups of stakeholders who have an interest in participating in state of the art

projects because a public entity represents a guarantee that the project will be carried through to the end.

Occasionally (e.g. in Amsterdam), a 100% public owned company was created to assume the role of the urban developer. In these cases, all activities relating to the development or refurbishment are carried out by the private sector. However, the public entity and other stakeholders sit on the board and may still influence decision-making to some extent. Other models, where project coordination was carried out by housing associations, private consultants or several partners such as the municipality and a housing association throughout the entire project were also applied.

In the design phase, preliminary energy performance and building design requirements, energy system design requirements, monitoring requirements etc. previously established are made concrete and binding for all partners. These guidelines provide the basis for the implementation and operational phases and usually get not changed significantly.

The level of involvement and ambition in the planning stage also depended on the level of intervention, e.g. on the dimension of the project, on whether it concerned a development area or it was a renewal project, etc.

## 3.2 Similarities and differences in approach and procedure during the implementation stage

During the implementation phase, shortcomings and barriers often become apparent and need to be handled capably and dealt with quickly in order to be able to proceed with the project and not jeopardise its outcome. These shortcomings can include deficiencies in the design guidelines, barriers such as inhabitants opposing certain refurbishment activities, construction companies not performing as required, financial shortcomings or key partners deciding to exit the project, etc. Likewise, success factors such as stakeholders cooperating well, finances being lined-up can help speed up the process and provide further motivation for all involved to proceed with the project and finish it according to initial specifications.

In this phase, the coordination of all contractors and a continued strong project management and leadership become very important, because previously established contracts and agreements between all stakeholders need to be abided by and plans implemented. In refurbishment cases, several communities also engaged in a dialogue with residents in order to make sure that their needs are satisfied. Often, renovation takes place under occupied conditions. This requires residents to put up with potential noise, dust and other disturbances. A continual dialogue between residents and project coordinators is essential to ensure a smooth renovation process. Some communities also engage in quality control during and after the construction phase, which ensures that renovation was carried out to the standards specified in the contracts.

In the operation phase, several aspects including coordination of monitoring activities such as energy performance monitoring and a continued dialogue with residents are central to success. Monitoring details in most cases have been agreed upon in earlier phases such as the design phase and need to be carried out and evaluated for several years during the operations phase. In some communities, residents are asked to become involved in the monitoring process. They may read meters and report results to project coordinators or one trained resident may be contact person for other residents of an entire apartment building to provide support and technical help to others.

It is clear that the characteristics of implementation mechanisms can hardly be detached from diverse national contexts as the context significantly affects the technical and political feasibility of the implemented measures. The administrative implications of the implementation procedures, for example, pose different adjustment challenges to different national regulatory structures, approaches and attitudes. The analysed case studies confirm the initial hypothesis that the *pre-existent structures* and planning traditions influence the pace and success of implementation[26].

Empirically, it has been observed that implementation of projects related to issues whose effects are not directly visible and which, therefore, cannot easily be placed on the political agenda, disseminate rather slowly. The same applies for an implementation of measures for which standard technical solutions are not available.

## 3.3 Meeting original ambitions and objectives

For the assessment of the implementation process, a major step has been to understand and analyse in which way in each project/community it has been ensured that the ambitions discussed at early design/planning stage would be realised. Indeed, a number of projects had set themselves ambitious targets. We have also tried to analyse whether difficulties in implementing measures might have been correlated with setting overambitious general and specific goals. Key criteria for evaluating ambition and divergences between desired/ achieved goals were: degree of ambition of the objectives; shared understanding and involvement of all stakeholders; available means/necessary adjustments and to what extent the project could be (re)-negotiated.

**Achievement of general goals**

The comparative analysis of the general goals in the CONCERTO communities, i.e. $CO_2$ reduction, percentage increase in RES share and energy efficiency, reveals that ambitions are generally agreed upon national or regional targets. Sometimes (in the case of the CONCERTO area) these are outperformed significantly. This claim is evident if the aimed objectives for CONCERTO are compared with the national, regional and municipal goals (see Figures 10-14 below).

[26] Thus in Lyon, for example, the way of approaching urban planning and design used in the CONCERTO project builds upon the Lyon tradition. Confirmation of this can be found in planning documents such as the SCoT (*Schéma de Cohérence Territoriale* – Territorial Cohesion Scheme) which encourage coherence through careful planning and distribution of urban functions (housing, businesses, offices, leisure facilities, etc.) and social functions (population balance) across the entire Lyon urban area.

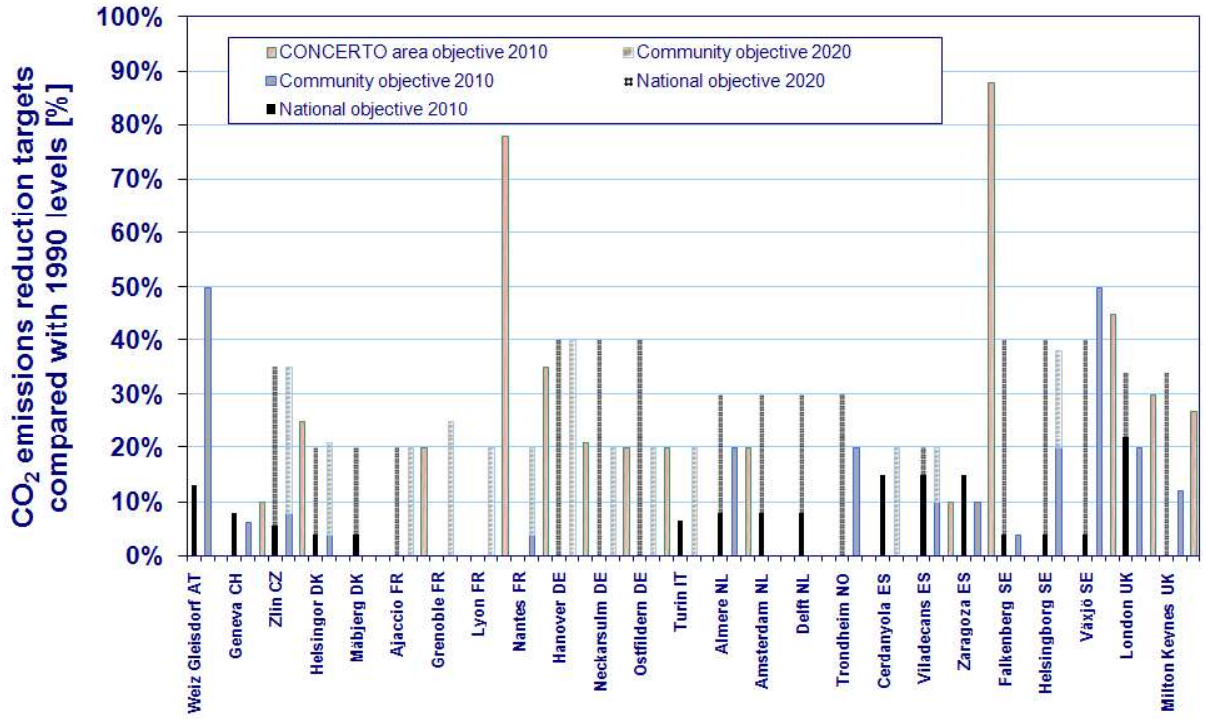



Figure 10: $CO_2$ targets for 2010/2020 at national, community and CONCERTO area level

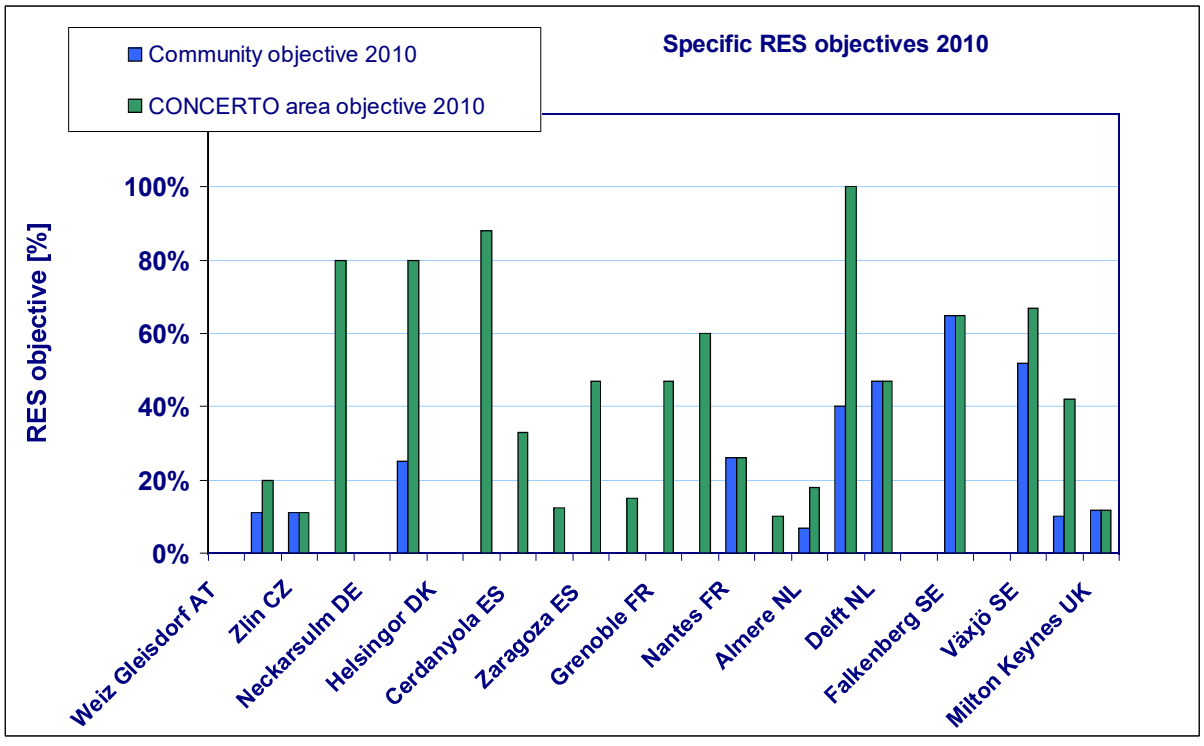



Figure 6: RES targets for 2010 at national, community and CONCERTO area level

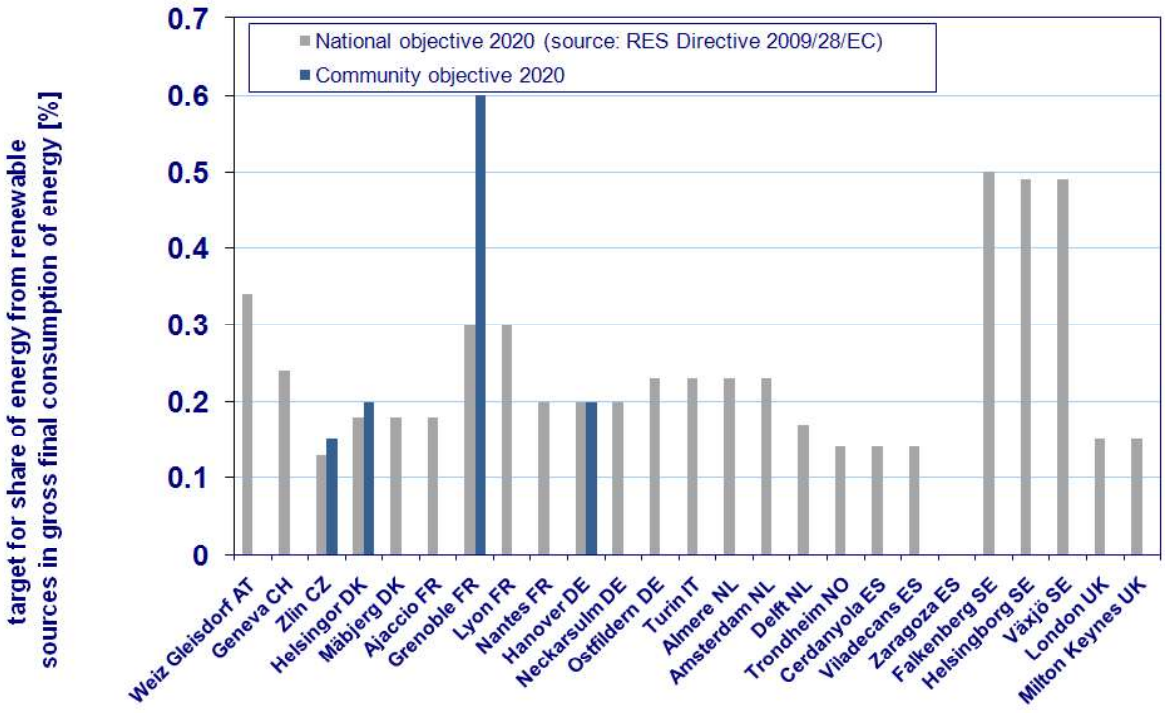



Figure 7: RES targets for 2020 at national and community level

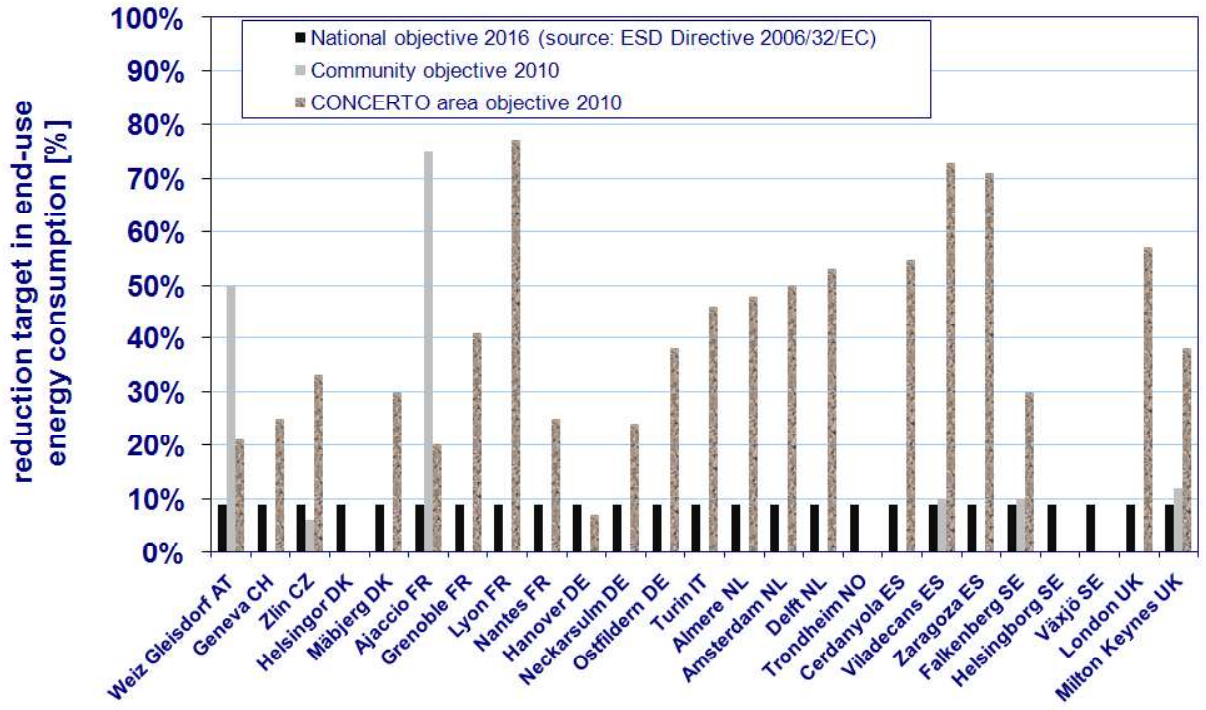



Figure 8: Energy efficiency targets for 2010/2016 at national, community and CONCERTO area level

The achievement of municipal targets that are higher than national ones has often been made possible when at the local level there is a high political commitment. A good proxy for this commitment is the participation or signing of pledges such as by participation in the Covenant of Mayors and Networks such as Climate alliance, Energie Cités or the Aalborg Charter. In fact, a number of CONCERTO communities are members of sustainability networks such as the Covenant of Mayors (Cerdanyola, Viladecans, San Sebastian, Nantes, Lyon, Grenoble,

Turin, Amsterdam, Delft, Vaxjö, London, Hanover). Hanover and Nantes are also a member of the Climate Alliance together with Weiz. A number of other communities have signed the Aalborg Charter[27]. These are: Weiz, Lyon, Grenoble, Turin, Amsterdam, Trondheim, Tudela, Zaragoza, Viladecans, Växjo, Milton Keynes, London Southwork and Lambeth.

| | Weiz-Gleisdorf AT | Geneva CH | Zlin CZ | Helsingør DK | Mabjerg DK | Ajaccio F | Grenoble F | Lyon F | Nantes F | Hannover DE | Neckarslum DE | Ostfildern DE | Torino IT | Almere NL | Amsterdam NL | Delft NL | Trondheim NO | Cerdanyola ES | San Sebastian ES | Tudela ES | Viladecans ES | Zaragoza ES | Falkenberg S | Helsingbørg S | Växjö S | London UK | Milton Keynes UK | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Covenant of Mayors | | | | | | | | | | | | | | | | | | | | | | | | | | | | 13 |
| Aalborg Charter | | | | | | | | | | | | | | | | | | | | | | | | | | | | 12 |
| Énergie Cités | | | | | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| ICLEI | | | | | | | | | | | | | | | | | | | | | | | | | | | | 9 |
| Climate Alliance | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| RESET | | | | | | | | | | | | | | | | | | | | | | | | | | | | 3 |
| No membership | | | | | | | | | | | | | | | | | | | | | | | | | | | | 9 |

Figure 9: Participation of CONCERTO Communities in selected sustainability networks

Additionally, some of the same communities (e.g. Zaragoza, Amsterdam, Växjo, Milton Keynes, London Southwork and Lambeth) and other ones developed their own Agenda 21 programmes, focusing on priority objectives such as to integrate nature into the city and its area of influence, improve air quality, promote the development of clean technologies and adopt waste management operating systems or improve water quality.

But also communities that are not members of these sustainability networks, such as for example the ones participating in the *Energy in Minds* project can document success in achieving by and large the desired objectives. Thus, by the end of year 4, the communities belonging to Energy in Minds document their progress in realising the set goals for 2010. A reduction of $CO_2$ emissions of between 17% (Neckarsulm) to 28% has already been reached and it can be foreseen that the planned energy savings will be achieved by the end of the project.

Sometimes political commitment is flanked at the same time by a strong commitment of departments in the public administration in implementing and realising more advanced goals. In some cases, these endeavours are also accompanied by a timely provision of necessary additional funding. This is the case in Hanover (ProKlima fund) and Neckarsulm (*Klimaschutzprogramm*) of the municipality.

Some communities (e.g. Lyon, Almere) strive for higher ambitions also with regard to mixed-use urban development and aim at creating exemplary models in terms of high-quality city life. Whilst the city of Almere aims to implement a "cradle-2-cradle" vision for the future, the vision in Lyon envisages the creation of public spaces such as promenades, gardens, etc.;

[27] The Charter was launched in Aalborg during the European Sustainable Cities and Towns Campaign in 1994 to enhance local sustainable development and to stimulate local authorities to engage in Local Agenda 21 processes. The 4th European Sustainable Cities and Towns Conference, Aalborg +10, adopted the so called Aalborg +10 Commitments to initiate real activities.

integration of housing, offices, shops, services and culture, amenities, educational and scientific establishments as well as development of river tourism.

In the case of Almere, the "cradle-2-cradle" very high ambition is to implement measures achieved in environmentally intelligent design using environmentally safe and healthy materials; design for material reutilisation such as recycling; the use of renewable energy and energy efficiency; efficient use of water, and maximum water quality associated with production coupled by strategies for social responsibility ended up delaying decisions.

A higher degree of ambition has been possible mostly when the core decision makers, i.e. the public authority as the maker of public decision, had the power to set high-level targets in accordance with their available means. Call for tenders in some cases have integrated eco-friendly criteria to choose developers (Milton Keynes, Grenoble de Bonne) or to force a connection to the district heating network (Ostfildern)

In the case of specific targets, often these have included not only a transposition of national targets in the building and energy sectors, but also the increase in standards by a notable percentage. A number of communities have also tried to undercut the national standard by 30% (Neckarsulm).

These objectives have mostly been integrated into local strategies and programmes such as Agenda 21 (Turin, Amsterdam, Zaragoza, Växjo, Milton Keynes), Climate Change Action Plans (Hanover) and in some cases have been complemented by commitments of economic actors (Grenoble, Delft) or additional local regulation or voluntary action/agreements (private developer in Trondheim). In the cases where a discussion at early design stage has taken place for new and existing areas, energy and climate change issues have been an integral part of the planning process (Almere, Vaxjo, Lyon) or have required a previous assessment of energy and emissions reductions and costs and the establishment of realistic targets in accordance with traditional means, use and technical aspects.

**The achievement of specific objectives: the case of eco-buildings and renovation projects**

In some of the projects, the specific targets (e.g. in terms of gross floor area concerned by renovations) have been reduced because they faced difficulties in achieving the established goals. These difficulties were related to the high renovation costs induced by high-energy performance requirements to be reached in the course of comprehensive renovations. In some cases (Nantes), the CONCERTO subsidy (below 50 /m²) alone was insufficient to allow for comprehensive renovation, and the absence of additional funding could not support project implementation. Other projects (Neckarsulm, Zlin) had to revise their targets because they were mainly targeting a comprehensive renovation of individual homes. This turned out to be very difficult to implement because of the traditional practice consisting in renovating successive building parts during the entire lifetime of the buildings.

On the other hand, there are also cases in which the communities have increased their targets, because of e.g. internal budget redistribution - when building owners (housing associations, private developers, etc.) could confirm that they would be able to renovate more buildings than planned initially. This is the case when in the course of implementation, measures turned out to be more appealing for building owners (technical solutions known, first experience with first buildings, additional funding available, etc.), thus motivating building owners to renovate more buildings. This was the case with larger housing companies and associations in Hanover and Ajaccio (additional funding available at national scale).

In a large number of cases, it can be claimed that the level of ambition is not too high. This applies especially to relatively modest energy performance targets in new buildings. In these cases, there has been no particular difficulty in designing and implementing building concepts leading to the stated target values. The first experience from already completed new eco-buildings shows that the planned targets have been reached in nearly all projects. One of the major contributions of the CONCERTO initiative in this sector was to provide mechanisms ensuring the quality of the implementation process. In many communities, new training programmes were set for the different actors of the construction process (e.g. builders, installers, etc.) in order to ensure the implementation of all design specifications. In France for instance, these trainings have been included in the catalogue of the recognised training institutions in the building sector.

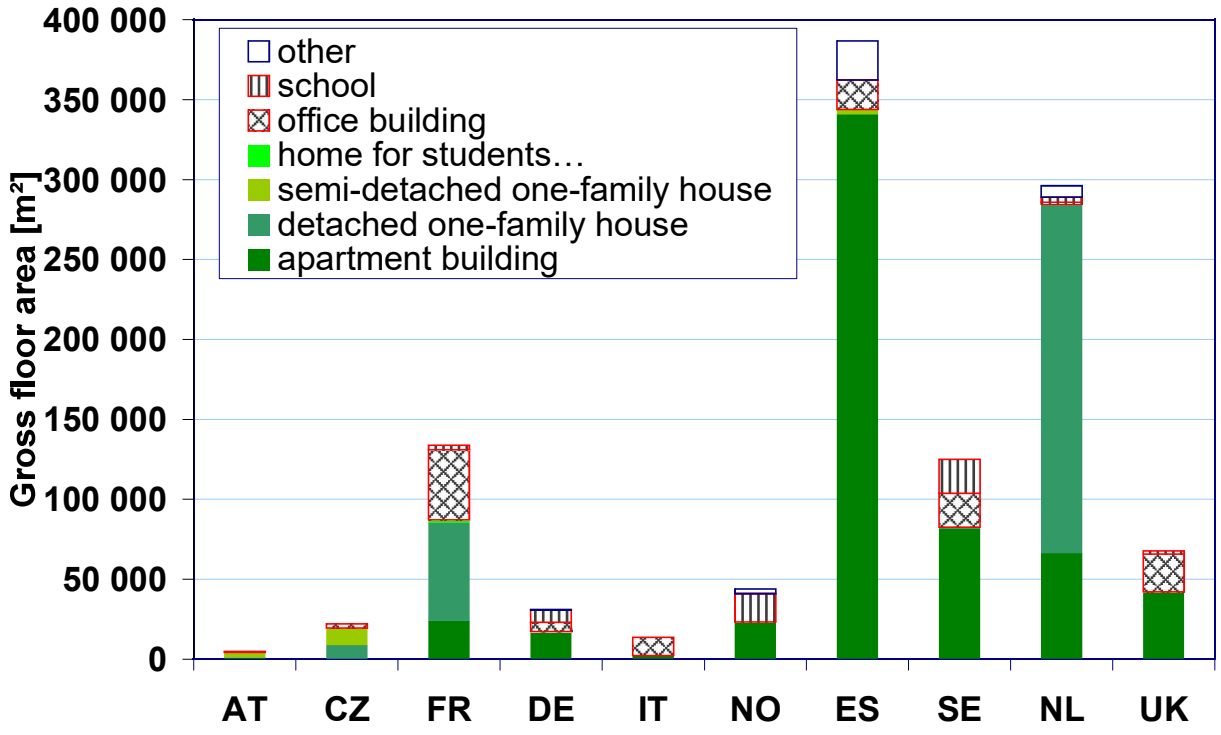
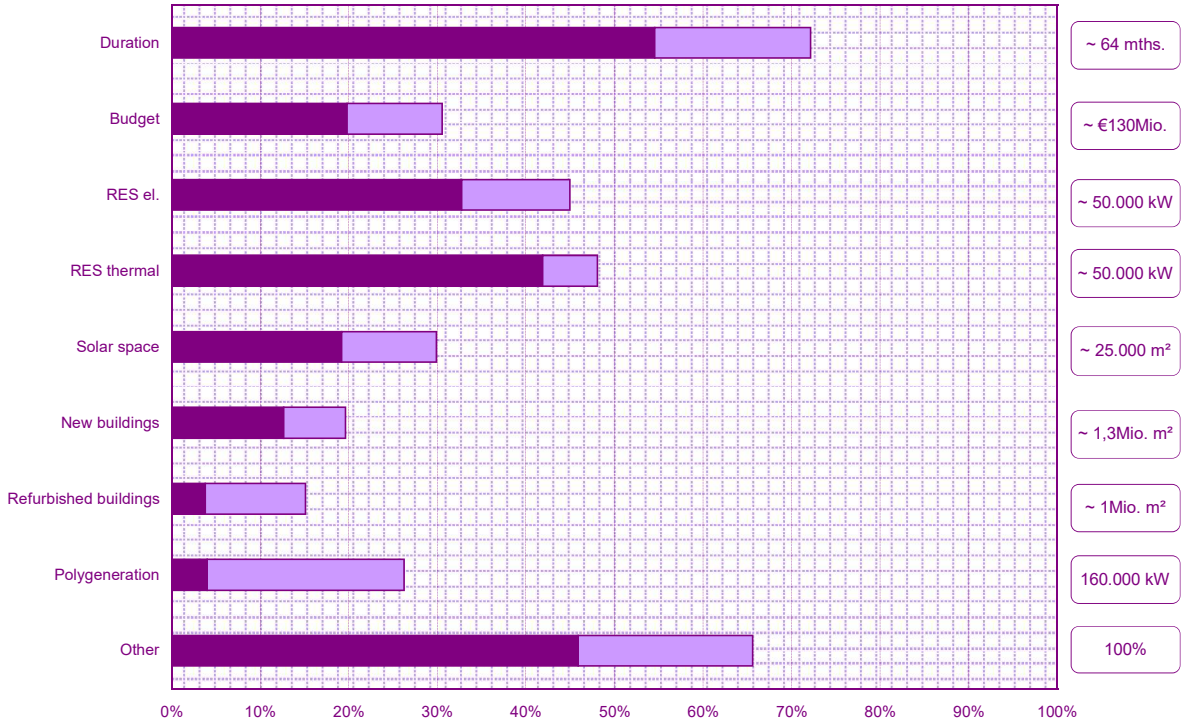



Figure 10: Eco-buildings planned (and partially built) in 26 CONCERTO communities (country distribution)

## 3.4 Adjustments, possible extensions and re-negotiations

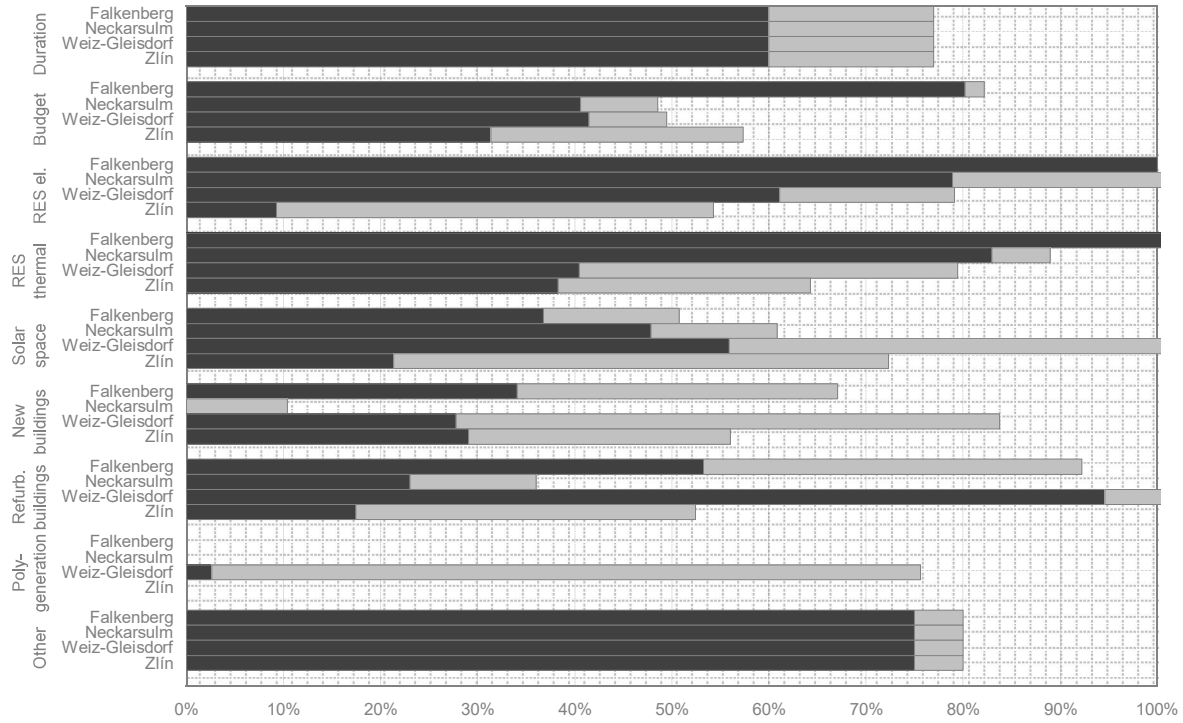
All projects have completed the third implementation year and two projects, EiM and POLYCITY, have already finalised the fourth activity year. Most of them have managed to proceed by and large on schedule and according to plan (see Figure 16).




*Legend: dark violet – implementation in 2008; light violet – implementation in 2009*

Figure 11: State of advancement (cumulative) in the implementation of the 9 projects in broad application fields (as of April 2009)

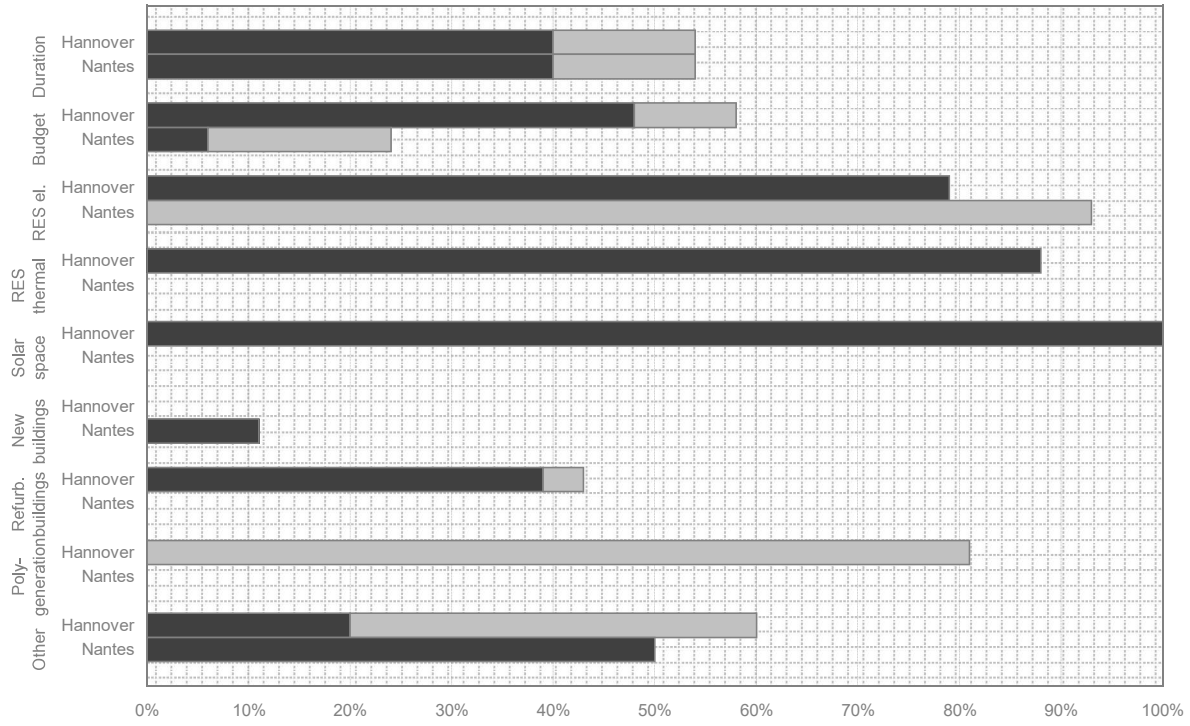
This claim is confirmed even if we compare the project that started first (EiM) with the project that started a year later (Act 2).




*Legend: black – implementation in 2008; grey – implementation in 2009*

Figure 12: State of advancement in the implementation of technical measures in the Energy in Minds! Communities (as of April 2009)

Difficulties and delays have mostly occurred in the implementation of large new settlements and new constructions. The implementation of these activities has often experienced legal and contractual barriers. Only seldom there have been specific socio-economic constraints. The case of Act 2 demonstrates in a striking way that also within the same projects/communities there are great differences in implementation depending upon whether the demonstrations activities take place mostly in renovation (Hannover) or imply new construction activities (Nantes). Therefore a legitimate question that can be derived from the lessons learnt is – given the relatively short project life of five years- whether CONCERTO projects should focus more on the post occupancy monitoring and evaluation, including the human interaction/behaviour rather than the construction and installation of the buildings and RES.




*Legend: black – implementation in 2008, grey – implementation in 2009*

Figure 13: State of advancement in the implementation of technical measures in Act 2 Communities Hannover and Nantes (as of June 2009)

In some cases, delays in implementation of renovations were due to the time-consuming process of finding interested housing companies/associations or co-ownerships willing to participate in the initiative. This is for instance the case in Ajaccio or Zaragoza, where the buildings to be refurbished were not named from the beginning (building owners not involved as contractual partner in the CONCERTO consortium).

There are a few projects being delayed due to unforeseen technical problems and/or difficult authorisation procedures (e.g. Maabjerg, Tudela). However, for a limited number of cases, it can be said that there have been some difficulties in reaching common agreements and implementation on previously agreed objectives. Some partners have therefore left the projects during the early implementation stage (e.g. TV-Bracknell/Renaissance, some others have left the project in an already advanced stage, (e.g. Ecodes in Zaragoza and San Sebastian in TetraEner).

Broadly speaking, it can be assumed that without strong negotiation between all stakeholders in the early design stage, default choices will be made along the project.

Following the analysis of the barriers encountered during the planning and implementation stage for each major measure (See P&I matrix) major deviations from the original planning can be subdivided into eight broad groups. These are:

a) Delays/withdrawal of one of the communities from the project due to legal and contractual issues (Bracknell)
b) New agendas due to major political changes, e.g. new 'masterplans' provoking delays and eventually even jeopardising the possibility for the community to meet the CONCERTO requirements (Almere, San Sebastian, Tudela)

c) Change of Concerto district location within a community (London/Southwark)
d) Change of Concerto area/location within a neighbourhood (Milton Keynes, Nantes)
e) Change of major partners/stakeholders/ due to unforeseen (technical) problems or to investors plans affected by the international financial crisis (Zaragoza)
f) Changes/reduction and substitution of initially designated (major) Concerto buildings and facilities due especially to the crisis of the real estate market. (Viladecans, Nantes, Almere)
g) Difficulties to find appropriate developers willing to meet CONCERTO performance and time schedule targets (Nantes)
h) Project life time too short for reaching the set targets and implement monitoring/need for extension

The following cases are representative of these kinds of deviations.

**a) Delays/withdrawal of one of the communities from the project due to legal and contractual issues. The case of Renaissance-Bracknell**

In the original planning Bracknell was supposed to coordinate the Renaissance project. The community should have delivered energy efficiency demonstrations (c 27,000 m²) achieving high levels of performance, 20% above those specified in the existing UK building directive. This should have been based on combining innovative, low energy architecture and construction based on bioclimatic/passive solar design and retrofitting innovative technologies and materials; integration of efficient technological solutions and renewable energy technologies; innovative building management systems and new energy management practices.

The withdrawal can be attributed to a number of reasons or the combination of them, including psychological factors, e.g. the death in December 2005 of the politician who was the main supporter of the project at local level. However, main impediments regarded personnel change within TV Energy in charge of coordination and problems concerning the tender process for the selection of the ESCO which should have been in charge of monitoring and of the Renewable Energy CHP Scheme. Additionally, there were problems concerning the town centre developer, BRP who could not sign the Renaissance contract due to legal barriers. In fact, BRP continued for a while to offer its support in delivering the work packages under Renaissance, but was unable to find a solution to the existing legal problem. Moreover, there were worries that the project might not be commercially viable under current market conditions. In the end, negotiations with BRP and the EC became complicated and eventually Bracknell abandoned the Renaissance project in 2006.

**b) New agendas due to major political changes, e.g. new 'masterplans' provoking delays and eventually even jeopardising the possibility for the community to meet the CONCERTO requirements. The case of Tetraener-San Sebastian**

The Antondegi project is a new development of a whole district in San Sebastian. The implementation of the overall development has been severely delayed and eventually abandoned. The main reason is the complete change of the master plan for the Antondegi Hill because of political changes and agenda resetting by the city council. In 2005, the master plan was developed and agreed upon based on an architectural competition. Later, however, the city council changed the GUP (general urban plan) thus requiring an adjustment of the master plan with a re-definition of the uses for the area.

There has been a formal request of San Sebastian to replace the demonstration activities planned for San Sebastian under the TetraEner project with activities in Bilbao. This has however been rejected by the EC.

A further problem causing delays has been the implementation of an ESCO to provide heating and hot water to the new urban estate. Since ESCOs are in Spain still a novelty, there were legal and administrative problems to deal with. One of the barriers lies also in the distribution of the cost for the electricity grid: the ESCO will have to pay for the development of the grid on site and then has to return the grid to the main electricity provider Iberdrola. The objectives regarding energy efficiency and renewable energy gains did not change; it is important for the community to be part of the CONCERTO initiative because of marketing; this is an edge over conventional dwellings.

**c) Change of Concerto district location within a community. The case of Ecostiler-London/Southwark**

The ECOSTILER project submitted in 2007 an amendment to transfer the CONCERTO site from the London borough of Southwark to the London borough of Lambeth. Reasons for the change were:

- The project idea in Aylesbury was already defined at a quite advanced stage: feasibility studies (CHP, typology and extension of district heating network etc.) were completed and very concrete measures (e.g. refurbishment of schools) were defined. As political interests and motivations changed and energy was no longer the focus for the regeneration of this district, it would have been too difficult to adapt the CONCERTO idea in a very new context to this area.
- Due to social issues in the Aylesbury area, urban regeneration issues are highly dependent on political forces. After a change in the organisation of the Southwark council and due to structural problems with the buildings, the CONCERTO project was no longer possible: Major Parts of the Aylesbury estate were to be demolished and the focus was shifted to urban regeneration projects and core services to improve the quality of life in this area. Although sustainability has remained a main topic, the focus in this area will be on social aspects rather than energy aspects.

The new area is Roupell Park in the London borough of Lambeth. The estate consists of a series of social housing blocks, which will be served by a new CHP plant. It is aimed to adjust the electricity prices to take the energy efficiency of the CHP into account, the heating will be charged at a flat rate as it depends on the regulation of the local borough.

**d) Change of CONCERTO area location within a neighbourhood. The case of CRRESCENDO Milton-Keynes**

In Milton Keynes some of the proposed activities (and accordingly also the location within the neighbourhood) have changed due to the international financial crisis. Consequently, there has been a delay due to a change of area. The originally planned demonstration project could not be built because of the financial crises. To be able to continue working the English Partnership proposed eight options for other demonstration projects to the European Commission out of which two buildings were chosen (one residential building that has already been refused by the EC two times and one commercial building). It has been agreed with the EC that PV will be integrated on both buildings.
These changes will allow the project team to finalise the construction process of the demonstration buildings by July 2010 and – with a one-year prolongation of the project – spend one year on monitoring.

The new community will comprise about 1,000 residents and activate 150 new jobs. As currently envisaged, the demonstration project in Milton Keynes' city centre comprises an apartment development and an office development both served by a CHP and private network.

**e) Change of major partners/stakeholders/ due to unforeseen (technical) problems or to investors' plans affected by the international financial crisis. The case of Ecodes withdrawing from the Renaissance-Zaragoza project**

Plans in Zaragoza envisaged the realisation of a 2 MW wind turbine. However, there have been problems with finding a proper site and three possible locations have been checked. In the third case screening, a new location for the wind turbine in plot 5-103 of Zaragoza has been considered. The new site for the wind plant would however affect one of the building blocks in the Valdespartera district (Plot 15) as well as the pre-existing infrastructure (high voltage power line, Fourth City Ring Road), due to its little distance to the area (the distance is less than the double height of the wind turbine). Therefore it was considered necessary to have an "evacuation line" for the wind turbine and to cross the Forth City Ring Road (above or through a subterranean way) and to design the RSMT and the SET Valdespartera in an urbanised area.

Due to the delays with the realisation of the planned wind power plant and consequently because of the lack of revenues accruing from the sale of electricity generated by the wind power plant which originally should have been used to finance the project activities of ECODES within the RENAISSANCE project, ECODES announced its withdrawal from the project.

**f) Changes/reduction and substitution of initially designated (major) CONCERTO buildings and facilities due especially to the crisis of the real estate market. The case of CRRESCENDO-Almere and Viladecans**

***Almere***

Almere is a young and fast growing community. Its first house was completed only in 1976. Almere has the aim of doubling in size – from 175.000 in 2005 to 350.000 people by 2030 – in a sustainable way. The Almere districts of Noorderplassen West and Columbuskwartier are the designated CONCERTO districts. In these areas, over 2.000 eco-homes (of which over 500 will be certified as so-called 'Solarhomes')are being built, together with commercial and public buildings.

In the Netherlands, the decline of the real estate market following the economic crisis and credit crunch has started later than in the UK, France and Spain and the peak does not appear to have been reached yet. Whilst the Almere projects that started early had little to no delay, the projects that were scheduled later (2008/2009) are experiencing delays. This is the case for around 25% of the buildings.

The direction of the city of Almere in wishing to implement cradle-2-cradle vision for the future is an interesting development but can delay decisions. Also the chosen form of private development is creating hurdles to realising sustainable communities in the future, as all private persons will need to be contacted and convinced in participating and using sustainable solutions.

***Viladecans***

In the original planning Viladecans aimed to build 2100 new dwellings and 10 public buildings using a high share of RES and RUE measures. In addition, it was planned to set up

a polygeneration plant to provide renewable energy to 3000 dwellings. Because of the crisis of the construction sector in Spain, Viladecans had to re-adjust the project and reduce the number of demonstration objects. As a result, only 60 new dwellings and 4 public buildings will be built before July 2011. These will have solar water heaters, PV-systems, extra insulation, high efficiency air conditioners, external shading measures, low infiltration. Two public buildings are being refurbished with similar measures.

**g) Difficulties to find appropriate developers willing to meet CONCERTO performance and time schedule targets. The case of Act 2-Nantes**

Nantes has been badly affected by the crisis of the construction sector. For this reason, some of the originally planned demo objects had to be substituted. One of the affected activities has concerned the so-called "Tripode". The 10.000-m² residential part of the project had finalised its design at the end of June 2008 according to the *act2* standards for housing projects. In the mean time, decisive measures to meet the CONCERTO requirements on the 20.000 m² tertiary part were under study. Then, the global investment and real estate crisis obliged partners of the project to revise the funding scheme and suspend the design for 6 months. An 860 kW substation connected to the waste-to-energy district heating grid is expected to heat the residential buildings.

Ville de Nantes adjusted its participation within the local demonstration programme by screening the application of the act 2 requirements on a new 3.700 m² school (Prairie au Duc school) to be delivered in August 2011. This project should even apply the highest energy standard (BBC) and use RES.

There have been problems in finding demonstration projects because of the current situation on the housing market and the funding rate offered by act2. Interested parties consider this as being too low compared to the requested standard of the demonstration project.

In accordance with the planning and due to the difficulties encountered with OPATB 24.500 m² programme, two new objects have been selected and proposed as adjustments to the demonstration programme (in the amendment of February 2009). [28]

**h) Project lifetime too short for reaching the set targets and implement monitoring/ need for extension**

In general, all projects (with exception for EiM) have been extended for one year. This applies also to projects, which are on schedule and have reached their aimed objectives such as POLYCITY. In this project, however, monitoring activities are still ongoing and in Cerdanyola new constructions are still in the implementation stage. Thus, even if the implementation measures in the POLYCITY project are proceeding as planned, in Cerdanyola because of very large-scale implementation measures, serious legal and contractual issues have delayed the construction process (new transformer substation regulations). Also the demand side is growing only slowly, so that the expensive tri-generation systems cannot run in full operation mode yet. However, with the one-year extension of the monitoring project, all construction work should be duly completed and monitoring results obtained within the frame of the project

[28] These are: Terrain des Gendarmes, a c. 19.500 m² residential area with connections to the waste-to-energy district heating system; - CG44 Offices. A 14.250 m² tertiary building hosting the services of the Loire-Atlantique Department and the Departmental House for disabled persons.

In Cerdanyola, the start of the construction of the electrical substation, which is not in the scope of the POLYCITY project, but is strictly necessary to start-up the polygeneration plant, has been delayed due to the complicated process of negotiations with the distribution grid owner (ENDESA), the transport grid owner (REE, which is also the Transmission System Operator) and the Ministry of Industry. The substation will not be in operation until the end of 2009, which implies that the polygeneration plant will not be connected to the grid until that date. The ESCO has focused on the ST-4 plant (biomass gasification), whose construction started last year and is almost finished, though it will not start operation until its connection to the grid. The engineering process of the second plant, ST-2 (biomass gasification), has been delayed since it will not have customers connected until 2011.

# 4 COMPARATIVE ASSESSMENT of the implementation in CONCERTO communities

This chapter analyses and compares the advanced implementation stages. As described in Chapter 1, the evaluation is based on an iterative process in order to ensure a quality assessment of these complex and interdisciplinary procedures, where technical and socio-economic drivers, governance and policy framework play a major role. Additionally, to overcome the problems connected with the low comparability, three clusters (two urban and one rural/peri-urban category) were created and communities have been allocated to them. These are:

- *New urban development*
- *Large-scale renovation measures and improvements in urban areas:*
- *Measures in small towns/rural areas*

Some communities, e.g. the ones with activities in both new urban development areas and large-scale renovation measures and improvements in urban areas were analysed in two different clusters. For the sake of comparability, the analysed measures were grouped in six separate assessment areas. The evaluation has been carried out in all three clusters for the following broad assessment areas.

1. Performance requirements for buildings that are more ambitious than present building codes
2. High degree of integration of renewables
3. Polygeneration and cascade of resources
4. Community energy management systems/Effective approach to technical monitoring
5. Commitment of stakeholders (pro-active involvement)
6. Integration of sustainability criteria (SE accompanying activities)

These were analysed and benchmarked in detail for each applicable community in each cluster. The six assessment areas were weighted by different criteria belonging to the technical, administrative/ institutional and outreach dimensions (s. Chapter 1, pp. 18-20). These criteria were designed in a slightly different (but comparable way) for technical and non-technical domains. Since differences in evaluation could emerge, depending on which weighting approach is used, it was decided to carry out the comparative assessment using all three dimensions.

The evaluation of the implementation of the measures relies on a qualitative marking of each indicator/item, on a scale from (-) to (++), based on a comparison to a status-quo (counterfactual), which by definition is set to (0). More specifically:

A (++) grade is granted when the implementation of the analysed measures shows a significant improvement to the status quo.

A (+) grade is granted when the implementation provides satisfactory improvement compared to the status quo, in particular considering a moderate impact on the advancement of the energy technology innovation process.

A (0) grade is granted when no progress is made.

(4) A (-) grade indicates a possible downgrading (deterioration) of initially planned objectives/measures (due to encountered technical, institutional, or financial barriers, or negative synergy or inter-linkages with other measures).

This step was followed by the analysis of gaps, and a transferability analysis. The review of core outcomes was an important part of the task as they are a key factor in ensuring the full effect of the project in terms of generalisation of its results beyond participating communities.

The following sections analyse and compare the planning and implementation process in relation to the six assessment areas. Concerto Plus has performed an initial assessment which subsequently has been fine-tuned with a large majority of communities.

## 4.1 Assessment of the performance requirements for buildings that are more ambitious than present building codes

### Mechanisms assessed in new urban development areas

Relying upon the theoretical approach presented in the previous chapters, preliminary results are presented for the three defined clusters. For each of these clusters, the analysis was carried out in the defined assessment areas that are relevant for the type of implemented range of measures.

The implementation of ambitious building energy performance standards is ensured by differing mechanisms depending upon whether the communities are engaged in new development of urban areas or are implementing large-scale renovation measures and improvements in existing urban areas.

In new urban development areas, the challenge is to set ambitious energy performance requirements in buildings and to design and implement optimised community energy systems. In the design phase, research institutes and consultants involved may be playing an important role to support developers of new districts in decision making. The analysis of energy needs, available resources and their geographical distribution in the areas concerned is ideally supported through specific modelling and optimisation algorithms. Only after this preliminary phase, requirements for a community energy system can be set up and technical solutions can be found in the course of a tendering process. Experience shows that when public land is sold to building developers, ambitious energy performance targets and strict energy criteria can be mandated. In fact, the definition of these criteria has to take place jointly with the definition of an optimised energy system.

The large majority of new developments in urban areas have been either coordinated directly by municipalities or by development companies acting on behalf of local authorities. CONCERTO communities follow one or the other approach (see **Box 11** and Table 2) mainly depending on the related importance of the urban development schemes in the municipality or the size and competencies of municipal planning departments. Among the 26 CONCERTO communities assessed, there is only one example of exclusively private development programme (in Trondheim, the eco-village Granås Gård developed by Heimdal Gruppen). There are two examples where the development is carried out completely by municipalities, i.e. where the neighbourhood development only consists of municipal buildings (in Helsingør, the cultural facilities Kulturvaerftet and in Växjö, the garden city Biskopshagen consisting of

residential buildings owned by the municipal housing company Växjöhem). For the three communities mentioned, formulating and implementing ambitious energy performance requirements did not represent a challenge, as the initial landowner and building developer are the same institution.

**Box 11: Key role of organisations taking on urban development schemes**

*Development taken on internally by municipal planning departments*

Some of the programmes are carried out directly by municipal planning departments. This is mainly the case for medium size cities where there are few large-scale development schemes. Municipalities chose to coordinate themselves and directly the entire development programme.

*Development taken on by (publicly owned) urban development companies*

In some communities, namely the French projects in Grenoble (De Bonne), Lyon (Confluence) and Nantes (Ile de Nantes) and the Spanish projects in Cerdanyola and Zaragoza (Valdespartera), the development operations are coordinated by urban development companies owned by public institutions (by majority) and operating on behalf of the local authorities. With the exception of eco-village Granås Gård developed by Heimdal Gruppen in Trondheim, the development areas are always in public hand or if they are not, the development companies have the task to buy privately owned estates and sell them to building developers, thus having the possibility to include additional requirements to the sales contracts. The shareholders of these development companies are always local public institutions and sometimes include also private investors[29]. The majority ownership by public institutions is a guarantee that the development programmes fulfil public interest.

Milton Keynes is the only example of a scheme carried out by a development company active at national level[30]. This is a way to implement a coherent development strategy at national level.

If the urban development programme is public, energy performance requirements are specified in the contractual documents related to the real estate sales and are included in the requirement specifications (development brief). The best example of an implementation mechanism in this field comes from Denmark, where municipalities are legally authorised to set minimal energy performance requirements for new development areas which are more

[29] The company coordinating the development of the area Lyon Confluence has changed status in 2008. It used to be a "SEM" ("Société d'Économie Mixte") owned by the majority (>51%) by public institutions (Grand Lyon, Ville de Lyon…). As there were also private shareholders, the company would have had to comply with competition rules (as required at European level). In that case, the extension of the development area to other existing neighbourhoods located in the confluence area (Sainte-Blandine) would also have to observe competition rules. In order to be exempted from this rule ("obligation de mise en concurrence"), the "SEM" status was modified into a "SPLA" status (Société Publique Locale d'Aménagement) 100% owned by public institutions (the shares owned previously by private shareholders were sold to other public institutions, like additional municipalities from the Grand Lyon area). This change of status has no influence on the implementation process of the CONCERTO project. However, it underpins that public engagement and participation is a major driver in such a large-scale urban renewal project. It would have not been possible to reach such a high quality project (from service, infrastructure and quality of life aspects) if the development of the area would have been taken up completely by private companies.

[30] In Milton Keynes the operations are coordinated by the Homes and Communities Agency (HCA), which is a new governmental agency combining 'The Housing Cooperation' (government funded body for social housing) and English Partnership (EP), the organisation initially taking over the development operations. The general purpose of EP and its successor HCA is to manage land owned by the government, to buy derelict land (run down town centres, contaminated land, minefields, ministry of defence land etc.) and to invest in regeneration projects.

ambitious than the requirements of the national building codes. This mechanism can be applied both for public and private soil being sold to building developers. There is no similar law in any other European country.

Thus all CONCERTO communities assessed had to find ways to formulate and force the implementation of ambitious energy performance requirements. There are different possibilities for formulating such requirements, as shown by CONCERTO communities. Requirements are formulated in terms of:

I. *Percentage improvement of energy performance*
II. *Specific technical solutions to be used or avoided*
III. *Specific architectural solutions*
IV. *Additional requirements and contractual incentives*

***I) percentage improvements compared to the requirements of the national building code or concrete targets formulated as maximal energy performance ratings in [kWh/m².yr]***

This procedure is used in nearly all CONCERTO communities, as it directly derives from the types of requirements defined in the CONCERTO calls for proposals. These requirements enable the largest leeway to building developers and their respective design teams, since different technical and architectural solutions can lead to the same energy performance rating.

***II) Specific technical solutions to be used or avoided***

Specific technical solutions (external insulation, supply and exhaust ventilation systems, etc.) are required in some cases. This path was followed in Grenoble and was a successful step to guarantee the implementation of technologies which were not common in France, but which have been already demonstrated in other countries. Thanks to this type of requirement, all external walls were insulated from the outside in all buildings in Grenoble, but not in Lyon, where such a requirement was not formulated. Similarly, active cooling systems were defined as a technical solution to be avoided in Nantes. There, residential buildings were to be designed without active cooling systems whereas in commercial buildings, cooling demand had to be compensated by energy saving measures in other fields (lighting or heating) and the design process had to be supported by a transient thermal analysis to improve the buildings characteristics from this point of view (process related requirement).

Similar requirements have been specified in the development brief in Milton-Keynes, mainly in relation with ventilation systems including heat recovery and with the avoidance of boilers: As district heating connection is mandatory for all buildings, it is explicitly formulated that "boilers, hot water cylinders, header tanks" should be avoided. In the case of Milton-Keynes, there are also different types of requirements for the different types of buildings (town-houses, apartment buildings and mixed use buildings).

***III) Specific architectural solutions to be used***

Concrete architectural solutions (specifying the minimal/maximal share of glazing area in the façade, specifying requirements regarding compactness and orientation, etc.) are required in few cases. Such an approach was implemented in Zaragoza after preliminary research work supported by modelling tools could provide very specific guidelines on how to design an energy-optimised neighbourhood. These elements are included in the development brief for

Valdespartera[31]. Although this procedure is often perceived either as a limitation of architectural choice or as a strong guideline for architects, it offers the possibility for a coherent urban design approach from an energy point of view.

***IV) Additional requirements and contractual incentives***

Beyond quantitative requirements, a few communities included process related requirements in the sales contracts in order to allow all potential solutions to be considered and the project to be developed by competent planners in the energy field. Nantes is the only known example where:

- design teams were asked to provide a feasibility study for an alternative technical solution going beyond the minimal energy performance requirements. This was a way to oblige buildings developers and designers to consider the possibility of being even more ambitious, thus getting more familiar with alternative technologies.

- according to the development brief, the design process had to be supported by energy specialists (technical design support for energy or environmental issues). In some countries (e.g. Germany), it is already state of the art to include energy specialists in the design team, therefore this requirement does not need to be specified explicitly.

As an incentive for building developers to observe and apply the requirements formulated in the development brief, few communities have developed and applied special approaches. In Milton Keynes, the value of the land is adapted as a function of the requirements formulated in the development brief. The urban developer HCA would have received more for the land if there had been no requirement for sustainability measures. The building developer saves on land costs, thus compensating the high level of requirements that need to be observed.

[31] In Valdespartera, the development brief ("Plan parcial") specifies minimal requirements for the glazed area in the southern façade to guarantee high passive solar gains in winter. An attempt to define maximal values to avoid overheating was made in a previous project in Zaragoza, which turned out to be too limiting for architects, mainly because of cost reasons. To avoid overheating, technical support is provided by energy specialists at the building scale in order to help architects optimising the facades. This is done before the building permit is issued.

Table 2: Overview on possibilities for formulating ambitious energy performance standards in buildings

| | | Neighbourhood´s development coordinated by… | | | Requirements formulated in terms of… | | | Additional requirements and contractual incentives | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Community (neighbourhood) | Municipal departments | Publicly owned urban development company | Private building developer | Percentage improvement for energy performance | Specific technical solutions to be used or avoided | Specific architectural solutions | Feasibility study for an alternative solution | Energy specialist explicitly required in the development brief | Contractual incentive |
| a) Revitalised urban development areas with newly constructed buildings/ facilities | Grenoble (de Bonne) | | X | | X | X | | | X | |
| | Helsingør (Kulturvaerftet) | X | | | N/A | N/A | N/A | N/A | N/A | N/A |
| | Lyon | | X | | X | | | | | |
| | Nantes | | X | | X | | | X | X | |
| | Ostfildern | X | | | X | | | | N/A | |
| b) Green field urban development | Almere | X | | | X | | | | | |
| | Cerdanyola | | X | | X | | | | | |
| | Delft (Harnaschpolder) | X | | | X | | | | | |
| | Milton Keynes | | X | | X | X | | | X | X |
| | Trondheim (Granås Gård) | | | X | N/A | N/A | N/A | N/A | N/A | N/A |
| | Tudela | X | | | | | | | | |
| | Växjo (Biskopshagen) | X | | | N/A | N/A | N/A | N/A | N/A | N/A |
| | Viladecans | X | | | | | | | | |
| | Zaragoza (Valdespartera) | | X | | | | X | | X | |

In this process, the important role of public institutions or of organisations owned by public institutions is shown schematically on Figure 19 for the case of Grenoble De Bonne (upper part of the diagram). The number of public stakeholders is in fact much higher than in the other project typology (large scale renovation measures and improvements in urban areas).

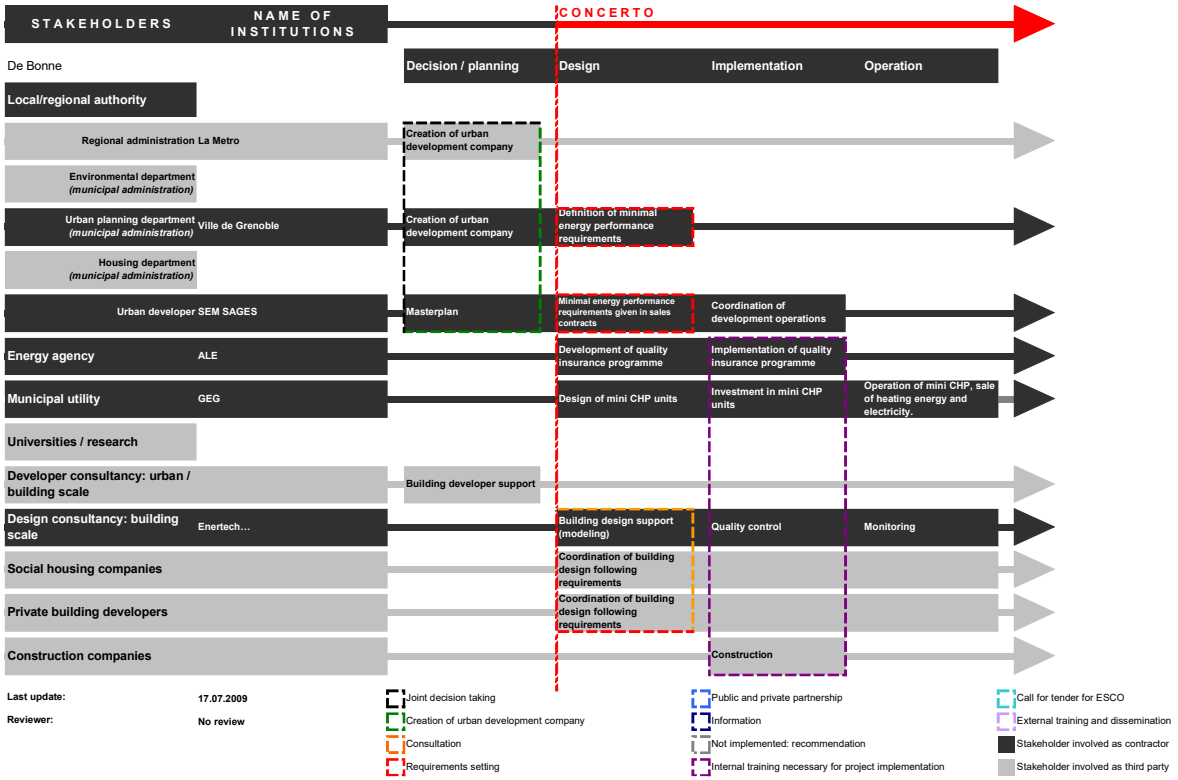



Figure 14: Planning and implementation process diagram representing the case of projects coordinated by urban developers

In many projects, training programmes were developed for construction companies and on-site inspections were organised to control the construction quality in order to reach a high energy performance. However, in practice, there has been no systematic and contractually defined process to guarantee a high construction quality for all components ensuring a high energy performance (thermal insulation materials, air tightness layer, mechanical ventilation units, etc.), as in the case of the renovation project in Delft/Poptahof. In this field, a lot will still have to be accomplished.

## Mechanisms assessed in the case of large-scale renovation measures and improvements in urban areas

In existing urban neighbourhoods, the challenge is to implement comprehensive renovation activities ensuring significant primary energy savings. In some cases, this is achieved through additionally connecting buildings to community energy systems having a high share of RES in their energy mix. In parallel, the social cohesion in the concerned districts has to be maintained or improved. First results show that the most successful projects are those initiated and coordinated by local authorities, mainly housing, environmental or urban regeneration departments of municipal administrations. The involvement of municipal utilities and their support in negotiating with building owners is a key success factor for planning, thus overcoming the legal barriers due to the difficulty to enforce the use of community energy systems. Customised energy consultancy and participative approaches involving residents in the renovation process are also a prerequisite for successful implementation.

While renovating existing building stock to improve quality of life in existing neighbourhoods, the challenge of municipalities is to target both quantity (i.e. a high number of buildings renovated) and quality (i.e. a high energy performance level reached after renovation).

To target quantity, it can be assumed that CONCERTO communities follow two distinctive implementation approaches:

I. *"neighbourhood-driven" approach*
II. *"stakeholder/target-group-centred" approach*

***I) "neighbourhood-driven" approach***

The first approach (neighbourhood-driven) is linked to urban renewal processes focusing on specific neighbourhoods[32]. It targets first a general improvement of quality of life in specific neighbourhoods facing major problems (low social cohesion, physical decay, segregation, bad image, ghettoisation, etc.) and takes this opportunity to implement major energy improvements in a general sustainability perspective.

Examples of such approaches are to be found in Ajaccio (F), Amsterdam (NL), Delft Poptahof (NL) and Turin (I), as shown in Table 4. The CONCERTO areas in these cities include a high share of social housing needing urban renewal to improve living conditions in the neighbourhoods. The Turin case (Via Arquata) is the simplest from an implementation point of view because all buildings belong to a single housing association (ATC). In Ajaccio and Amsterdam, the areas of intervention are much larger and the building stock belongs to many housing associations and there are even cases of co-ownerships (Ajaccio). Although none of the above mentioned communities has enforced a municipal ordinance mandating ambitious energy performance requirements, in the course of renovation operations, these communities have experienced other paths to achieve their objectives.

*The cases of Delft Poptahof and Turin Arquata*

As shown in Table 4, both in Delft Poptahof and Turin Arquata the buildings concerned by the renovation programmes are all located in one neighbourhood and belong to one social housing company.

In Turin, the entire renovation programme, from decision taking to implementing construction works, is managed by the housing association ATC. The demonstration site covers an area of 87500 m² with 758 dwellings. The population involved is about 2600 persons, of which 2200–2300 are inhabitants and 300 are employees of ATC. The process has been characterised by a participative process involving tenants and local authorities which is also co-funded in the framework of a programme called "contratto di quartiere" ("neighbourhood contract")[33]. The bottom-up approach and the involvement of the target group guaranteed by the "contratto di quartiere", binding local inhabitants and administrators (ATC and Turin Municipality) in a concerted gradual rehabilitation process, relies strongly on the following conditions:

- Strong identification of the inhabitants with the rehabilitation process;
- Balance between correct management of public real estates and rent control for underprivileged people;
- Participation as a method for the executive definition of the measures.

[32] This approach has been analysed extensively in Di Nucci & Pol (2009). For details, see: Di Nucci, Maria Rosaria; Pol, Olivier, Nachhaltiger Stadtumbau und Klimaschutz in der CONCERTO-Initiative, *Energiewirtschaftliche Tagesfragen* 59 (2009)1/2, 44-48

33 For further details, see Chapter 5, p. 152

The rehabilitation of the old building stock has been combined with the difficult task of introducing district heating within a densely populated area where many dwellings did not have any heating system before implementing CONCERTO measures.

From an energy perspective, ATC as a building owner decides about renovation measures and energy performance standards to be achieved. In this case, the energy performance targets could be only partly reached mainly because of the high costs of renovation measures.

*The case of Ajaccio*

In Ajaccio, the area where urban renovation is seen as highest priority is much larger than the Arquata neighbourhood in Turin. This area fulfils the requirements of the national agency for urban renovation (ANRU: "Agence Nationale pour la Rénovation Urbaine", created in 2003 to improve quality of life in specific areas characterised by socio-economic difficulties (ANRU, 2009)) and benefits so far from financial support for the urban renovation programme (PRU). This support is much higher than the CONCERTO funding but doesn't cover energy improvement measures which are funded as part of CONCERTO activities. At local level, the programme is managed by the municipal urban renewal department. As there is no local regulation fixing minimal energy performance requirements to be reached after renovation works, the municipality selected housing companies which were interested in obtaining additional financial support (in the framework of CONCERTO) to reach more ambitious energy performance levels. A limitation of this strategy is that the success of the operation highly depends on the willingness of housing associations to collaborate. Another target group in the area are co-ownerships which need other types of information and consultancy before starting to implement renovation measures.

*The case of Amsterdam*

In Amsterdam, an exceptionally broad consensus was reached among all housing associations to initiate the long term urban renewal of the "Nieuw West" area under the direction of the municipality of Amsterdam. The main housing associations having part of their building stock in the western part of Amsterdam funded the temporary organisation "Far West" (Far West, 2009) to overtake the role of regenerating the area by 2015. Far West represents and temporarily substitutes every single housing association during the time urban regeneration will take place, decides over renovation options and negotiates with tenants, the municipality, etc. The building stock will return to the participating housing associations after completion of the area's regeneration. As there is no requirement fixed at municipal level for energy performance of buildings, this is a way to have a coherent approach at community scale for energy matters but also in particular facilitating access of tenants to temporary dwellings during construction works etc.

There are marked differences between the projects in Ajaccio and Amsterdam (see the corresponding PIP diagrams provided in the Annex). Whilst in Ajaccio the entire process is coordinated by the municipality (urban planning department), in Amsterdam this task is taken over directly by the temporary organisation replacing the social housing association. As a consequence, the task of the municipality of selecting and convincing each single social housing association is paramount in Ajaccio. In Amsterdam instead, this continuous process is unnecessary since the initial decision helps remove all barriers related to the possibly diverging and evolving interests of social housing associations.

***II) "stakeholder/target-group-centred" approach***

The second approach (stakeholder/target-group-centred approach) is linked to specific target groups (co-ownerships, detached family houses, etc.) being the target for the measures and making building renovation possible over the entire municipal area, without being linked to any specific neighbourhood. The implementation tools depend on the strategy followed by the municipalities. Many municipalities choose both types of strategies in parallel and use suitable implementation tools.

*The case of Hanover*

One successful example of this strategy can be found in Hanover (D), where financial subsidies for building renovation including substantial energy performance improvements were granted to property developers (housing companies) in the course of a tendering process organised by the municipality. This has been carried out prior to CONCERTO and the housing companies have been included as contractors in CONCERTO at a later date. As subsidies were then granted in the framework of special contracts, energy performance requirements could be included in such contracts, being thus a guarantee for the renovation measures to be designed in order to reach the expected targets.

Table 3: Overview of mechanisms used for implementing ambitious energy performance standards in buildings to be renovated

| | | Ownership structure of building stock in neighbourhood | | | Ensuring a high number of renovations | | |
|---|---|---|---|---|---|---|---|
| | Community (neighbourhood) | Private co-ownerships | One neighbourhood, one housing company | One neighbourhood, many housing companies | neighbourhood-driven approach | stakeholder/target-group-centred approach | Ensuring a high quality of renovation |
| a) Refurbished buildings | Ajaccio | | | X | X | | |
| | Amsterdam | | | X | X | | |
| | Delft (Poptahof) | | X | | X | | X |
| | Hanover | | | X | | X | |
| | London | | X | | X | | |
| | Turin | | X | | X | | |
| | Zaragoza (Picaral) | X | | | | X | |

Few systematic procedures are available to allow for readjustment in case the quality of the implemented measure is not satisfying. In the majority of cases, quality checks are implemented after the realisation of renovation measures (infrared thermographs and blower-door tests), but no corrective measure can be implemented if problems are detected, since nobody is able to take over the additional costs. There is only one example in CONCERTO, where the fulfilment of a given quality standard of renovation works is contractually defined as a task of the construction company:

*The case of Delft Poptahof*

Even in the framework of CONCERTO, very few systematic processes to target quality, are available, showing that still a lot has to be done in this field. However, the solution implemented on the construction site of the Poptahof renovation area in Delft (NL) can be considered as a successful developer-driven quality insurance process.

The main innovation at the Poptahof building renovation site in Delft (NL) is related to the quality insurance process during the renovation works. According to the contracts between the housing association (Woonbron) and the construction companies, all renovation works have to be first implemented on a test dwelling before being implemented at a larger scale on the entire building. The quality of the renovation works is then controlled by using blower door tests (to ensure the air tightness of the envelope) and IR-thermographs (to ensure the correct installation of insulation components). If failures are detected at this early construction stage, the construction companies are contractually obliged to improve their works at their own expenses as long as some failures are detected. Only after this first phase, renovation works can be implemented on the remaining part of the building, considering the lessons learnt from the test dwelling. This procedure shows the importance of the developer (in this case the housing company) in setting rules ensuring a high quality of construction.

## Mechanisms assessed the case of measures in small towns and rural areas

The main difference between the projects of Cluster 3 implementing "measures in towns / rural areas" and the projects focussing on new urban development or large-scale renovations and improvements in urban areas is that the measures can be implemented on a broader area. They cannot be limited to a specific neighbourhood[34] because they rely principally on specific tasks to be implemented by each stakeholder in their activity and responsibility area. New urban developments are intrinsically linked to the neighbourhood undergoing the development programme. Their implementation is supported by specific rules and procedures, which might not be applicable to other parts of the city (e.g. the intervention of an urban developer, the creation of an ESCO dedicated to distribute energy in the concerned area…). These "exceptional rules" apply also to the projects implementing large-scale renovation measures in case a neighbourhood driven approach is followed (see description in 0)[35].

The communities implementing "measures in towns / rural areas" (i.e. Falkenberg, Helsingborg, Neckarsulm, Växjö, Weiz-Gleisdorf and Zlin) are all characterised by at least one of the following approaches[36]:

I. *"subsidy-driven" approach towards one-family house owners*
II. *municipal housing programmes*
III. *municipal buildings programmes*
IV. *municipal utility programmes*

[34] In some cases (e.g. Neckarsulm) there have been attempts to define specific neighbourhoods where all measures had to be included in. This artificial limitation turned out to be non-acceptable to the stakeholders targeted by the different measures: why should a household benefit from a subsidy for thermal renovation in one part of the town and not elsewhere in the same town?

[35] In the case of a "stakeholder-centred approach", the procedure might be quite similar to the one of communities implementing "measures in towns / rural areas". In the particular case of Hanover, the stakeholder-centred approach could lead to find housing companies who were interested in renovating their building stock in a defined neighbourhood.

[36] The Mabjerg project has different characteristics but also an exceptional large project size.

***I) "subsidy-driven" approach towards one-family house owners***

Households owning one-family houses are the targets of dedicated measures (thermal renovation, installation of renewable energy systems, etc.) which can be put into practice through dedicated subsidies. This is the basic mechanism implemented in the four communities of the project Energy in minds!, where renovation measures as well as the use of small scale renewable energy systems (solar thermal systems, heat pumps, pellet boilers, photovoltaic) is being subsidised. Dependent on the national and regional subsidies which might be already available for these measures, additional subsidies are structured in different ways in the different communities.

***II) Municipal housing programmes***

In case municipal housing companies own a high share of the local building stock, they can implement energy improvement measures in their activity field (construction of new housing and renovation of their building stock). This approach has been implemented mainly in Falkenberg, Helsingborg and Växjö, where there are close connections between municipal authorities and municipally owned housing companies.

***III) Municipal buildings programmes***

Through the leading role of municipalities in the projects, energy improvement measures can be realised on a large scale in public buildings. This is carried out in nearly all communities mentioned, and measures are implemented in schools, public administration buildings, fire stations, swimming pools, sport halls, etc. In many cases this is a way to highlight the exemplary role of municipalities in these issues.

***IV) Municipal utility programmes***

Municipal utilities can implement different types of improvement measures in their activity field. In nearly all communities analysed, measures are implemented to increase the efficiency of existing district energy systems (control strategies), extend existing district heating networks, build new district heating and cooling networks or build new energy generation plants (CHP, photovoltaic and wind turbines).

**Assessment analysis**

This section compares the new construction activities initially planned in 2004-2005 as new urban development projects and those actually implemented in 2009, thus pointing out the main barriers faced when dealing with implementation of ambitious energy performance requirements.

Table 5 gives an overview of the magnitude and categories of measures (heating systems) initially planned and the actually implemented measures. When targets in terms of amount of gross area concerned have been revised during project implementation (few or more buildings concerned), the new targets after revision are specified in a second line of the table.

Table 4: Overview of new construction projects planned and implemented (new urban development)

| Community [Country] | | Planned initially *In cursive: successively revised targets* | | Implemented 2009 | |
|---|---|---|---|---|---|
| | | m² of gross floor area to be built | heat supply measures planned | m² of gross floor area built | heat supply measures implemented |
| Ajaccio | [FR] | 2.000 | none | 0 | none |
| Almere | [NL] | 245.208 | - district heating | 0 | none |
| Cerdanyola | [ES] | 10.962 | - district heating | 9.012 | - district heating |
| Delft | [NL] | 35.177<br>*38.571* | - district heating | 0 | none |
| Grenoble | [FR] | 44.920<br>*60.142* | - co-generation with natural gas | 30.258 | - co-generation with natural gas |
| Helsingør | [DK] | 54.019<br>*53.989* | data missing | 51.789 | data missing |
| Milton Keynes | [GB] | 241.414 | - district heating<br>- heat pumps | 700 | none |
| Lyon | [FR] | 78.870 | - biomass boilers | 42.611 | - biomass boiler |
| Nantes | [FR] | 57.185 | - district heating | 6.058 | - district heating |
| Ostfildern | [DE] | 20.585 | - district heating | 18.285 | - district heating |
| Trondheim | [NO] | 22.400<br>*26.260* | data missing | 12.000 | data missing |
| Tudela | [ES] | 70.000<br>*50.000* | data missing | 0 | data missing |
| Växjö | [SE] | 36.476<br>*41.314* | - district heating | 35.864 | - district heating |
| Viladecans | [ES] | 231.439 | - district heating | 1.398 | data missing |
| Zaragoza | [ES] | 53.360 | - natural gas | 44.380 | - natural gas |

The first remark concerns the type of heating system implemented: in all projects which have been realised, the heating system planned initially could be implemented as expected (requirements fulfilled).

On the other hand, the number of demonstration buildings actually implemented in new urban development projects is low, compared to the expected targets (c 258.000 m² against c 1,204,000 m² planned initially). Around 20% of the planned buildings (in terms of gross floor area) have been realised. In Almere, Milton Keynes and Viladecans, the very ambitious targets in terms of quantity of new buildings constructed is influencing this figure. By excluding these three communities, around 50% of the planned buildings are already constructed at the time this report is being written.

The following Table 6 depicts the assessment of each community by cluster in assessment area 1. Following that, the text illustrates the comparative assessment results.

Table 5: Comparative assessment for new urban development: performance requirements for buildings that are more ambitious than present building codes

| **Performance requirements for buildings that are more ambitious than present building codes**<br>Comparative assessment for new urban development | Almere | Cerdanyola | Delft Harnaschpolder | Grenoble De Bonne | Helsingør | Lyon | Milton Keynes | Nantes | Ostfildern | Trondheim | Tudela | Växjö Biskopshagen | Viladecans | Zaragoza Valdespartera |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/targets/ challenges related with the implementation of the measure? | 0 | + | N/A | ++ | + | +/0 | 0 | + | + | ++ | N/A | + | 0 | ++ |
| 1b) If changes were necessary to meet technical requirements, were the steps taken successful? | + | N/A | | N/A | N/A | N/A | + | + | N/A | N/A | | N/A | 0 | N/A |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | ++ | + | | + | + | + | + | + | + | ++ | | + | + | ++ |
| 1d) Does this approach consider both the physically available and economically viable potential? | + | + | | + | + | 0 | + | + | + | ++ | | + | + | + |
| 2a) Are there local or regional rules/regulations regarding the administrative procedures required to plan & implement the measure? | + | ++ | | + | 0 | + | + | + | ++ | 0 | | + | ++ | + |
| 2b) Are these rules supportive? | + | ++ | | + | N/A | + | + | + | + | N/A | | + | ++ | + |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | | + | | ++ | N/A | + | | + | + | N/A | | ++ | + | + |
| 3b) Is there an impact of the measures on observing communities? | | + | | ? | N/A | 0 | | + | 0 | N/A | | ++ | + | 0 |

The success of implementation of ambitious energy performance targets in new urban development programmes (see assessment results on Table 6) is mainly influenced by the possibility to find developers willing to build following these requirements (formulated for instance in the development brief). The following factors could support the process:

- **high number of public development projects**: both in Zaragoza and in Cerdanyola, all demonstration buildings constructed are public development projects (including the housing projects which are all implemented by publicly owned housing companies). These institutions are leading the sustainable building sector, so there was no particular difficulty to implement the ambitious energy performance targets. No privately developed building could be implemented in those projects. In particular, the innovative approach in Zaragoza which consisted in defining urban bio-climatic criteria in the urban development programme (through dedicated preliminary research and modelling work) could be implemented successfully in the public development projects. Similarly, in Viladecans, the targets had to be readjusted by reducing the numbers of buildings and selecting only public building developers (no private building developer could be included into the project). Also in Nantes, buildings owned by social housing companies were built first and there is still no private development project completed at the time this report is being written. There is a similar situation in Ostfildern.

- **including private developers as contractual partners in the CONCERTO project**: this solution was implemented successfully in Lyon and Ostfildern, where three large private building developers could be convinced to build following more ambitious energy performance standards.

- **motivating private developers to observe ambitious requirements**: Grenoble De Bonne is the only CONCERTO project where private developers could be successfully motivated to apply ambitious energy performance requirements. The main reason for that lies in the exceptional location of the neighbourhood. This provides a sales argument for developers and acts as a guarantee for a secure investment. However, this alone was not enough to reach the expected performance: technical consultancy for the developers was necessary as well as a constant check of the objectives fixed initially. This is to some extent also the case in Lyon, where it was conceded that private developers could reach the targets on average for their building stock, but not for each individual building. In this case, the not entirely satisfactory performance of some buildings could be compensated by a better performance of other buildings.

On the other side and in the majority of cases, an ambitious energy performance could not be applied in private development activities:

- **too ambitious requirements for private developers**: in Nantes and Milton Keynes it has not been possible to find private developers willing to build according to the ambitious requirements formulated in the development brief. The crisis in the real-estate sector is one of the main reasons for it.

- **too ambitious requirements for private one-family house owners**: in Almere, after the change of the master plan which has included a high amount of one-family houses in the project, it has been difficult to impose ambitious requirements to private builders of one-family houses. It is clear that for this type of building, it is not possible to require more ambitious performance as the one stated in the national building code. The construction of individual passive houses, for instance, depends only on the willingness and conviction of private house owners to build better than the national building codes.

Table 6: Comparative assessment for large-scale renovation and improvements: performance requirements for buildings that are more ambitious than present building codes

| **Performance requirements for buildings that are more ambitious than present building codes**<br>Large scale renovations and improvements in urban areas | Ajaccio | Amsterdam | Delft Poptahof | Geneva | Grenoble Viscose | Hannover | London Lambeth | Turin | Zaragoza Picaral |
|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/targets/ challenges related with the implementation of the measure? | 0 | 0 | 0 | N/A | N/A | ++ | 0 | 0 | 0 |
| 1b) If changes were necessary to meet technical requirements, were the steps taken successful? | N/A | N/A | N/A | | | + | N/A | N/A | N/A |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | 0 | N/A | + | | | ++ | + | + | 0 |
| 1d) Does this approach consider both the physically available and economically viable potential? | -+ | ++ | 0 | | | ++ | + | -+ | + |
| 2a) Are there local or regional rules/regulations regarding the administrative procedures required to plan & implement the measure? | 0 | + | + | | | ++ | 0/ +? | + | 0? |
| 2b) Are these rules supportive? | N/A | + | + | | | ++ | N/A | + | |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | 0 | + | | | | + | | 0 | + |
| 3b) Is there an impact of the measures on observing communities? | + | 0 | | | | ++ | | + | 0 |

Concerning Cluster 2, in the following, a comparison is provided between the renovation measures initially planned in 2004-2005 and those actually implemented in 2009, thus pointing out the main barriers faced when dealing with large scale and ambitious renovation programmes driven by local authorities.

With 65% of all planned refurbishment activities in terms of gross floor area concerned, the residential sector provides a challenging opportunity for a cross-analysis among countries, even if there are also many refurbishment cases of schools and office buildings. Across all building types, approximately 190,000 m² of buildings have been already refurbished (in total[37]: 120,000 m² are related to large-scale renovation measures), representing nearly half of all renovation measures initially planned in total. For the projects which are included in large-scale renovation programmes, the figure is slightly lower (40%). As part of the assessment of planning and implementation of renovation measures, the analysis of the reasons behind redefinition of target and for major discrepancies between planned and actually implemented measures is paramount[38].

Table 7 gives an overview of the categories of renovation measures initially planned and the actually implemented measures. As there is always a disparity between targets and implementation, the following notes are included in the table:

- when targets in terms of amount of gross area concerned have been revised during project implementation (few or more buildings concerned), the new targets after revision are specified in a second line of the table;

- when groups of measures planned initially could not be implemented in practice because of different barriers, the measures are underlined in the Table.

[37] Data status: summer 2009

[38] These aspects have been described in detail in Di Nucci/Gigler/Pol (2009). See, Di Nucci Maria Rosaria; Gigler Ute, Pol, Olivier, "Integration of demand and supply side activities in CONCERTO communities: a preliminary assessment of planning and implementation mechanisms for sustainable local energy strategies". *Proceedings of the 10th IAEE European Conference*, Vienna, September 2009

Table 7: Overview of refurbishment projects planned and measures implemented (large scale renovation programmes)

| Community [Country] | | Initially planned *In italics: successively revised targets* | | Implemented 2009 | |
|---|---|---|---|---|---|
| | | $m^2$ of gross floor area to be refur-bished | refurbishment measures Underlined: measures not implemented | $m^2$ of gross floor area refur-bished | refurbishment measures implemented |
| Ajaccio | [F] | 20.000<br>*46.325* | - Thermal improvement of building envelope<br>- Solar thermal collectors for DHW<br>- *Photovoltaics* | 0 (renovations partially started) | - Thermal insulation of gables partially realised |
| Amsterdam | [NL] | 29.364 | - Thermal improvement of building envelope<br>- Replacement of individual boilers: Connection to district heating<br>- Photovoltaics | 27.000 | - Thermal improvement of building envelope<br>- Photovoltaics |
| Delft | [NL] | 14.960 | - Thermal improvement of building envelope<br>- Connection to new low-temperature district heating<br>- Photovoltaics | 0 (ongoing reno-vations) | - Thermal improvement of building envelope<br>- Connection to new district heating |
| Hanover | [DE] | 33.654<br>*39.410* | - Thermal improvement of building envelope<br>- Connection to district heating (for apartment buildings) | 13.919 | - Thermal improvement of building envelope<br>- Connection to district heating (for apartment buildings) |
| London | [UK] | 21.622 | - Thermal improvement of building envelope<br>- Improvement of heating distribution system<br>- Biogas CHP<br>- Photovoltaics<br>- Integrated wind turbines | Data missing | - Improvement of heating distribution system<br>- Gas CHP<br>- Integrated wind turbines |
| Nantes | [F] | 24.500<br>*0* | - Thermal improvement of building envelope | 0 | - Project will not be implemented |
| Trondheim | [NO] | 21.560<br>*20.920* | Data missing | 3.000 | Data missing |
| Tudela | [ES] | 0<br>*20.000* | Data missing | 0 | Data missing |
| Turin | [IT] | 79.825 | - Comprehensive housing renovation<br>- Connection to district heating<br>- Photovoltaics | 79.825 | - Partial housing renovation<br>- Connection to district heating<br>- Photovoltaics |
| Zaragoza | [ES] | 27.480 | - Comprehensive renovation of apartment buildings | 1.150 | - Roof renovation of school |

The types of renovation measures, which have not been implemented, vary from community to community:

- **Connection to district heating**: Amsterdam is one of the examples where connection to district heating could not be implemented because the costs of replacing old individual systems were too high (conversion from a decentralised to a central heating system).

- **Partial renovation measures**: In some other projects (e.g. Turin, London, Ajaccio), comprehensive renovation measures could not be implemented for apartment buildings: in Turin only a limited number of windows could be replaced, mainly because of high costs (funding was not available to replace all windows).

- **Supply and exhaust ventilation systems**: supply and exhaust ventilation systems have never been implemented in CONCERTO projects. When included, ventilation systems always consist of exhaust ventilation units, sometimes in combination with exhaust air heat pumps (e.g. in Falkenberg).

There are a few examples of comprehensive renovation projects, which could be implemented, in rather exceptional conditions:

- **First experience with high performance renovation before CONCERTO**: Hanover is the only example of a nearly comprehensive renovation programme carried out in quasi-occupied conditions. The main housing company involved already had the experience of a housing renovation at passive house level in the past. Therefore they could learn from this experience and for instance select the renovation measures which were really bringing the major savings at limited investment costs, thus renouncing for instance to implement a mechanical ventilation system. The assessment in Table 7 confirms this claim.

- **Renovation realised in unoccupied conditions**: in Amsterdam (De Leeuw van Vlanderen building) and Delft (Poptahof), renovation was realised in unoccupied conditions, thus allowing for comprehensive improvement measures. These high costs solutions are rather exceptional and not easily replicable.

Figure 15 and Figure 16 show the distribution of U-values of external walls for the renovation projects in Central European and Northern European (Scandinavia) communities before and after implementation of renovation measures. The largest differences can be observed for the status before renovation. As the goals in terms of U-values reached after renovation are quite similar for the Central and Northern European communities, the effort of insulating external walls has been higher in the Central European communities than in the Northern communities. First experience from CONCERTO communities in Central and Northern Europe show that there was no particular difficulty to reach the insulation targets in terms of U-values of external walls.

Presently, there are not enough completed case studies to draw similar conclusions for Southern European communities.

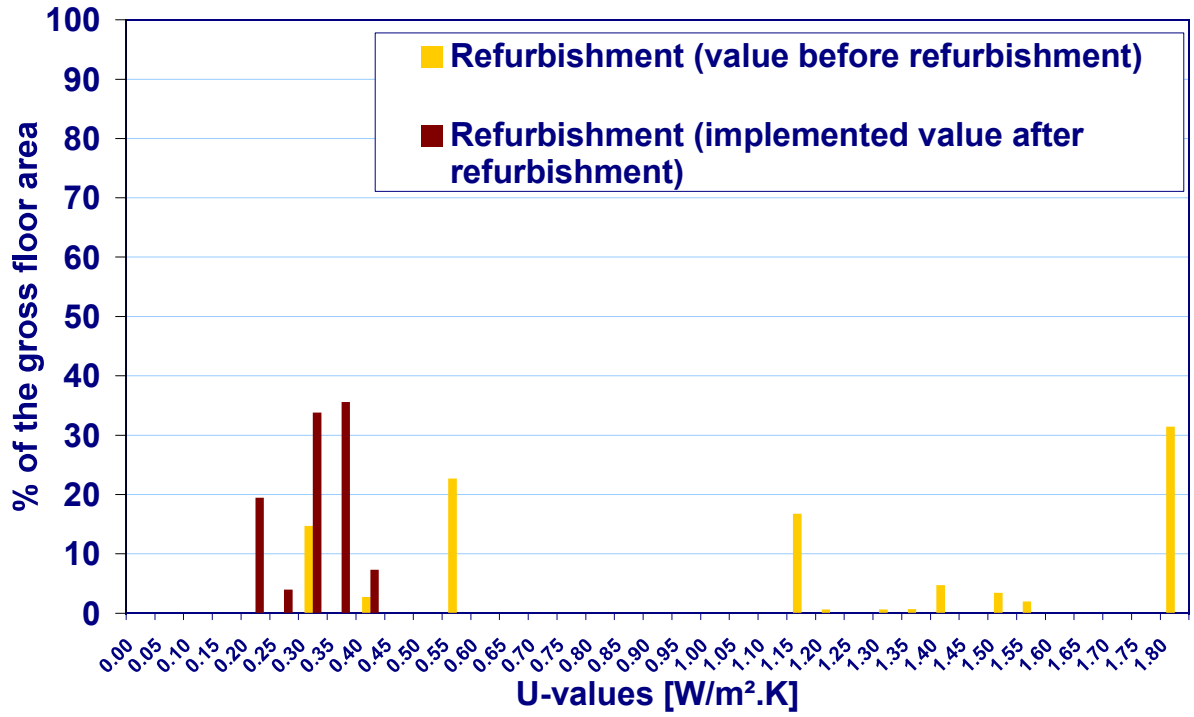



Figure 15: Distribution of U-values in Central European communities

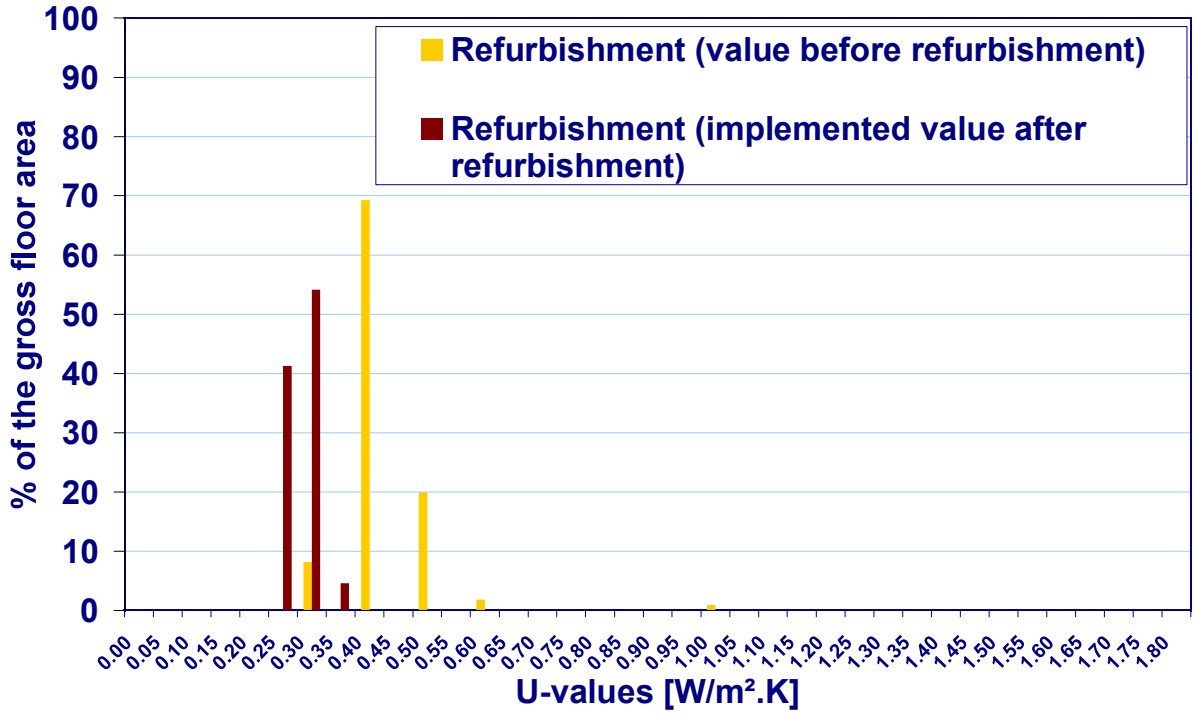



Figure 16: Distribution of U-values in Northern European communities

Table 8: Comparative assessment of measures in towns / rural areas: performance requirements for buildings that are more ambitious than present building codes

| **Performance requirements for buildings that are more ambitious than present building codes**<br>Measures in towns / rural areas | Falkenberg new buildings | Falkenberg renovation | Helsingborg | Mâbjerg | Neckarsulm new buildings | Neckarsulm renovation | Växjö | Weiz-Gleisdorf new buildings | Weiz-Gleisdorf renovation | Zlín new buildings | Zlín renovation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/targets/ challenges related with the implementation of the measure? | ++ | 0 | + | N/A | + | + | ++ | + | + | + | 0 |
| 1b) If changes were necessary to meet technical requirements, were the steps taken successful? | N/A | N/A | N/A | | N/A | N/A | N/A | N/A | + | N/A | N/A |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | + | + | + | | 0 | 0 | + | 0 | 0 | 0 | 0 |
| 1d) Does this approach consider both the physically available and economically viable potential? | + | -+ | + | | + | + | + | + | + | 0 | 0 |
| 2a) Are there local or regional rules/regulations regarding the administrative procedures required to plan & implement the measure? | 0 | 0 | 0 | | ++ | + | 0 | + | + | N/A | N/A |
| 2b) Are these rules supportive? | N/A | N/A | N/A | | ++ | + | N/A | + | + | | |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | + | ? | | | + | + | ++ | ? | | + | + |
| 3b) Is there an impact of the measures on observing communities? | + | ? | | | + | + | ++ | + | + | + | + |

Concerning Cluster 3, in the following, the renovation and new construction measures initially planned in 2004-2005 and those actually implemented in 2009 are compared, thus pointing out the relative success of the projects implemented.

Table 10 gives an overview of the categories of measures initially planned and the actually implemented measures. As there is some disparity between targets and implementation, the following notes are included in the table:

- when targets in terms of amount of gross area concerned have been revised during project implementation (few or more buildings concerned), the new targets after revision are specified in a second line of the table;

- when groups of measures planned initially could not be implemented in practice because of different barriers, the measures are underlined.

In terms of gross floor area constructed and renovated, the projects of Cluster 3 are the most advanced: nearly 75% of all planned activities have been already completed in summer 2009. This is much higher than the figures available for the new urban development projects (20%) and the large-scale renovation projects in urban areas (40%). This result can be easily explained by the flexibility given by the project structure in Cluster 3 communities: the planning and implementation processes are not as complex as for the other types of projects (for instance, there is no need to convince private investors or many social housing companies having their buildings in the same neighbourhood). The housing companies involved are usually owners of a large building stock and could find appropriate buildings to implement the planned CONCERTO measures.

The only major difficulty faced in these projects is related to the implementation of measures in one-family houses. in many communities, the expected number of renovated individual homes could not be reached and apartment buildings were selected instead. The share of private owned houses is for instance quite high in Neckarsulm. The work with the “Energieinitiative” (private organisation financed by the municipality of Neckarsulm, neighbour communities, companies, chambers…) is crucial, because it is the only possibility to contact households in order to motivate them to refurbish their own buildings. Energy checks have been realised on the basis of questionnaires distributed to the households (250 have been returned, 190 energy checks have been realised), and IR-thermographs have been done for 430 buildings. Because of their attractive price (69 euro), the IR-thermographs have encountered a large success. However, few private buildings have been refurbished. The main barrier is that households are not ready to implement a comprehensive thermal refurbishment of their houses. For investment reasons, activities (replacement of windows and boilers, thermal insulation, etc.) are usually implemented in different steps.

Table 9: Overview of measures planned and implemented in towns and rural areas (new buildings and renovation)

| Community [Country] | | Planned initially *In cursive: successively revised targets* | | Implemented 2009 | |
|---|---|---|---|---|---|
| | | m² of gross floor area to be built or renovated | heat supply measures planned Underlined: measures not implemented | m² of gross floor area built or renovated | heat supply measures implemented |
| Falkenberg new | [SE] | 9.180 *13.257* | - decentralised measures (funding schemes for residential and commercial sector)<br>- district heating | 8.887 | - municipal funding programme<br>- district heating system implemented |
| Falkenberg renovation | [SE] | 18.544 *21.181* | - Comprehensive renovation of individual houses and apartment buildings | 19.557 | - Comprehensive renovation of apartment buildings (limited number of individual homes) |
| Helsingborg & Helsingør new | [SE] [DK] | 54.019 *53.989* | data missing | 51.789 | data missing |
| Helsingborg & Helsingør renovation | [SE] [DK] | 60.736 *46.514* | data missing | 21.514 | data missing |
| Neckarsulm new | [DE] | 2.300 *12.011* | - decentralised measures (funding schemes for residential and commercial sector) | 1.250 | - municipal funding programme |
| Neckarsulm renovation | [DE] | 19.160 *16.764* | - Comprehensive renovation of individual houses and apartment buildings | 6.032 | - Comprehensive renovation of apartment buildings (limited number of individual homes) |
| Växjö | [SE] | 36.476 *41.314* | - district heating | 35.864 | - district heating |
| Weiz-Gleisdorf new | [AT] | 7.750 *8.825* | - decentralised measures (funding schemes for residential and commercial sector) | 7.386 | - municipal funding programme |
| Weiz-Gleisdorf renovation | [AT] | 10.550 | - Comprehensive renovation of individual houses and apartment buildings | 11.022 | - Comprehensive renovation of individual houses and apartment buildings |
| Zlín new | [CZ] | 5.000 *6.301* | - decentralised measures (funding schemes for residential and commercial sector) | 3.541 | - municipal funding programme |
| Zlín renovation | [CZ] | 17.400 *13.754* | - Comprehensive renovation of individual houses and apartment buildings | 7.134 | - Comprehensive renovation of individual houses and apartment buildings |

## 4.2 Assessment of design and implementation of community energy systems based on a high share of RES and polygeneration

In the course of the evaluation, assessment areas 2 and 3 were combined for simplification reasons and because only very few communities focus on polygeneration activities. During the initial analysis, it also turned out that the type of project implemented (new urban development/large-scale renovation measures and improvements/measures in towns and rural areas) was not decisive for the mechanisms applied to design and implement community energy systems based on a high share of RES and polygeneration. This is a major difference compared with assessment area 1, where the mechanisms applied vary substantially between the different types of communities. For this reason, all community clusters are considered together.

### Mechanisms assessed

There are different procedures for implementing RES technologies and polygeneration in the urban context, each of those requiring different stakeholders to be involved in the decision making and implementation process. For the CONCERTO projects, five different approaches were identified:

I. *Finding investors for RES-E plants in the urban context: market driven approach*
II. *Motivating utilities to diversify their portfolio also by increasing the share of RES and using polygeneration: utility driven approach*
III. *Motivating single building developers to use RES available locally: valorisation of local resources approach*
IV. *Motivating single building developers to connect to existing district energy systems: subsidy driven approach*
V. *Tendering design, construction and operation of district energy systems: shareholder-driven approach*

***i) Finding investors for RES-E plants in urban areas: market driven approach***

Photovoltaics and wind power plants were planned in many CONCERTO projects and they required the commitment of investors to build the power plants as well as the compliance with environmental requirements (low environmental impact). The simplest procedure to implement them has consisted in finding investors willing to build power plants using RES in urban areas.

- Large photovoltaic plants have been implemented in Nantes and Grenoble in the urban environment. From an energy and organisational point of view these plants in general do not need to have any link with the buildings they are installed on (the investor in the PV plant does not need to be the owner of the building). They only contribute to increase the share of electricity from RES in the calculated energy balance at community scale. In the case of CONCERTO, investors in such PV plants are always local authorities or energy suppliers.

- Wind power plants were planned in a number of communities. However, only one community could overcome the environmental impact barrier (Falkenberg, which in fact is not included in the category “new urban development”). All the other projects (Helsingborg, Tudela, Zaragoza)

had to abandon their plans because of an unfavourable environmental impact and/or resistance of local associations.

The construction of PV as well as wind and biomass plants can be viewed as mere investment activities, made achievable by attractive feed-in tariffs for RES-electricity. These measures could have been implemented anyway, independently of local energy planning activities. In the case of CONCERTO projects, the investors joined the project team as contractual partners as soon as they could commit themselves to build such power plants.

***ii) Motivating utilities to diversify their portfolio also by increasing the share of RES and using polygeneration: utility driven approach***

The so-called "utility driven approach" applies in cases where municipal utilities are taking over production and distribution of district heating and/or gas production and distribution. In such situations, there are many examples of municipal utilities investing in new technologies to provide services which are not included in their traditional portfolios. In those cases, the initial impulse can be provided by local authorities, but the final decision is taken by the utilities which envisage an opportunity to enter new markets. There are different examples of such approaches in CONCERTO:

- construction of mini- or micro-CHP plants and retail of heat and electricity. In Grenoble, one of the local utilities decided to invest in mini-CHP units installed directly in the new buildings and to sell heat and electricity. It was a way for them to enlarge their energy service portfolio[39]. In Weiz-Gleisdorf and in Neckarsulm, the same principles have been applied by using Stirling engines (Neckarsulm). However, in those two projects the plants have to be considered rather as combined demonstration and research activities (the engines are currently under further development).

- connection of absorption chillers to district heating grid and retail of cooling energy. In Ostfildern and Växjö, the municipal utilities decided to invest in absorption chillers using the excess heat available through district heating and to sell the cooling energy produced to the buildings they are installed in (Ostfildern) or to different buildings through a district cooling network (Växjö).

- construction of a new district cooling network: in Geneva and Växjö, urban areas with a high cooling demand (hospitals, universities, large office buildings) were seen as potential priority areas for district cooling networks. Under the impulse of local authorities, the utilities invested in network infrastructure to sell cooling energy as a new energy service to the community. In Växjö, after many modifications to the original project, the district cooling network will be realised in 2010.

- construction of a new biogas plant: in Amsterdam, the availability of biogas from existing sewage water treatment plants and the necessity to use additional resources to deliver heat to the existing district heating network led to the technical solution consisting of a biogas-fired CHP plant. The generated heat is fed into the district heating network.

[39] In the De Bonne area, in spite of the fact that district heating was available, it was decided for a number of reasons to install mini CHP units. Various stakeholders, especially GEG, the company installing and operating the small-scale cogeneration units, pushed for this option. In fact, GEG sells electricity to the electrical network operator (which is GEG itself) and the heat to the co-owner associations responsible for managing all building facilities.

### *iii) Motivating single building developers to use RES available locally: valorisation of local resources approach*

The procedures for motivating building developers to use RES technologies available locally are very challenging, as such requirements are not usually included in local building codes and there are only few local regulations of this type. In Germany, for example, this is possible in the case of tender procedures initiated by municipalities and specific requirements with high ecological criteria can be coupled with the sale of public property. Furthermore, in both Germany and Spain there are possibilities through municipal ordinances to mandate solar thermal usage (so called Barcelona solar obligation).

In CONCERTO projects, these targets were reached based on voluntary agreements, by motivating single developers to invest in such technologies as a condition to obtain additional financial support from CONCERTO. This incentive has been backed up by attractive feed-in tariffs for RES electricity, which in many projects represented an opportunity to finance part of the renovation works. For example, in Amsterdam and Turin, the benefits of selling electricity to the network operator are associated with a reduction of running costs for tenants: electricity costs for the common parts of the buildings are not paid by the tenants, but covered by the revenues accruing from selling electricity. In Ajaccio, running costs will not be reduced, but the feed in remuneration will support renovation measures. A direct link between installation of photovoltaics and reduction of running costs contributes to increase the acceptance of tenants towards renewable energy technologies.

### *iv) Motivating single building developers to connect to existing district energy systems: subsidy-driven approach*

In densely built urban neighbourhoods, the connection to district heating is in many cases an opportunity to improve the primary energy balance of buildings substantially. In fact, many district heating companies use heat from CHP plants or include a certain share of renewables in their energy mix, thus achieving low primary energy factors. In the past, energy conscious municipalities have enforced district heating through mandatory connection to the network and inclusion of district heating areas in master plans. However, the liberalisation of the energy market in practice has restricted the opportunity for mandatory connections. Nonetheless, different incentives can still be developed locally. CONCERTO communities demonstrate two implementation approaches to encourage district heating connection during renovation works: a "*shareholder/users-driven*" and a "*subsidy-driven*" approach. The first approach (shareholder-driven) consists in including potential clients (large building developers) as shareholders in the district heating company in order to motivate the connection of their housing stock to the district heating network. The second approach (subsidy-driven) consists of including district heating connection as a condition for obtaining a specific financial subsidy for building renovation.

An attractive possibility to guarantee a RES share of the total amount of heating energy used in buildings is to connect them to district heating networks having a certain share of RES in their energy mix. From a primary energy point of view it is also interesting to connect to networks distributing excess heat from CHP plants or from waste incineration.

- Whilst the Delft approach shows the unique chance to implement a totally new district heating network without letting a private company alone taking major financial risks, in other cases, district heating is quite often operated by a municipal utility and other solutions have to be found to enhance connection. In the case of Hanover, the connection to the network was a selection criterion for the housing companies participating in the tendering process

launched by the municipality. The costs of the connection to district heating could then be covered by combining a number of subsidies, including the ones accruing from the CONCERTO programme. This approach is easily replicable and requires the definition of priority areas where district heating extension makes sense from a primary energy and economic standpoint.

- In Grenoble (Viscose), the decision to connect existing buildings to the extended district heating network was taken by the social housing company owning the complete building stock in the concerned neighbourhood.

- In Nantes, district heating is already available in the eastern part of Ile de Nantes and there was no particular difficulty to connect new CONCERTO buildings, because a feasibility study based on district heating use was required in each case where the connection was available (included in the requirement specifications). Whilst the municipality maintains the ownership of the networks and infrastructure, the operation, maintenance and extension of the network of the local district heating are contracted to a company for a given period defined in the contract ("Délégation de service public").

- In Milton Keynes, the development brief includes concrete requirements regarding the use of building integrated urban wind turbines, photovoltaics, ground source heat pumps and the connection to the heating network connected to the gas CHP.

***v) Tendering design, construction and operation of district energy systems: shareholder-driven approach***

- In Delft (NL), even though the viability of a district heating network was proven (densely built area and appropriate consumer structure), the creation of the district heating company faced many challenges in order to ensure the economic feasibility of the project. A 100% private company would have not taken the risk to invest in a district heating network without being guaranteed that a sufficiently high number of buildings is to be connected. In fact every district heating project has to be economically feasible without benefiting from other activities: in particular, it is not possible to cross "subsidise" one project with the gains from another district heating network benefitting from better financial conditions. For this reason, a Public-Private-Partnership was created. A call for tender was launched by the municipality in order to find investors willing to become shareholders. The district heating company (Warmtebedrijf Eneco Delft BV) was then created and included the municipalities of Delft and Midden Delfland as well as the four largest housing associations in Delft, thus giving a guarantee on a certain number of buildings, which could be connected. Under these conditions, the district heating company could be economically feasible. By involving the largest housing associations as shareholders, the district heating company can have the guarantee that a large share of the local building stock will be connected to district heating.

- A similar procedure has been followed in Cerdanyola for a much more complex energy system. Local energy planning was accomplished before starting implementation in order to define priority areas for technologies on the basis of pre-feasibility studies. The design, construction and operation of the community energy system (including district heating and cooling and large-scale use of solar thermal and biomass sources) was then subject to a call for tender. Similar to the situation in Delft for the new district heating company, the share of the awarded private company was combined with public shares in a public-private - partnership.

The shareholder structure for the district heating company in Delft and the ESCO in Cerdanyola reflect the degree of risk taken by the investors: in Cerdanyola, the certainty that very large consumers will connect to the district heating and cooling networks (mainly the synchrotron facilities) was a guarantee for a secure investment. For this reason, the private investor is majority shareholder of the company (90%). The situation is similar in Delft, where the involvement of the largest housing companies is a guarantee for a high degree of connection of the existing housing stock. The share owned by the private investor is even larger than in Cerdanyola (97%). The remaining 3% shares are granted equally as so called "priority shares" among the local authorities, the private investors and the largest local housing companies. The definition of "priority shares" is the key factor to ensure that the ESCO will fulfil sustainable development criteria: all important decisions related to extension of district heating, major investments and sustainability issues have to be taken jointly by the three so called "priority shareholders". Even if the public hand is minor in the shareholder structure of the ESCO, this is a way to ensure that sustainability goals are taken into consideration in the development of the ESCO (not only profit-making).

In Cerdanyola, experts from universities and consulting companies played a key role by preparing the pre-feasibility studies and by providing the scientific methods for the set of requirements included in the call for tender for the ESCO. This was the solution for customising the community energy system on the basis of the energy needs of the neighbourhood (electricity, heating and cooling) and the availability of resources. Had each single building developer chosen his own energy supply solution, there would not have been any possibility to implement the polygeneration plant in combination with district heating and cooling as it is being done in Cerdanyola.

Table 10: Overview of mechanisms applied for integrating RES and polygeneration technologies

| | Community (neighbourhood) | Market driven approach (PV: photovoltaics, H: hydro power plants) | Utility driven approach | Valorisation of local RES in buildings | Connection to existing district energy systems / district heating extension | Tendering design, construction and operation of district energy systems |
|---|---|---|---|---|---|---|
| a) Revitalised urban development areas with newly constructed buildings / facilities | Grenoble (de Bonne) | **PV** | **X** | | | |
| | Helsingør (Kulturvaerftet) | | X | | | |
| | Lyon | | | **X** | | |
| | Nantes | **PV** | | | **X** | |
| | Ostfildern | **H** | **X** | | **X** | |
| b) Green field urban development | Almere | | | | | **X** |
| | Cerdanyola | | | | | **X** |
| | Delft (Harnaschpolder) | | | | | **X** |
| | Milton Keynes | | | **X** | **X** | |
| | Trondheim (Granås Gård) | | | | **X** | |
| | Tudela | | | | | |
| | Växjo (Biskopshagen) | | **X** | | **X** | |
| | Viladecans | | | | | |
| | Zaragoza (Valdespartera) | | | | | |
| a) Refurbished buildings | Ajaccio | | | **X** | | |
| | Amsterdam | | **X** | **X** | | |
| | Delft (Poptahof) | | | | | **X** |
| | Hanover | | | | **X** | |
| | London | | | **X** | | |
| | Turin | | **X** | | | |
| | Zaragoza (Picaral) | | | **X** | | |
| b) Large scale energy systems | Geneva (Lac Nations) | | **X** | | | |
| | Grenoble (Viscose) | | | | **X** | |

## Assessment analysis

The following tables depict the assessment of each community by cluster in assessment areas 2 and 3. Following that, the text provides the comparative assessment results.

Table 11: Comparative assessment in new urban development: high degree of integration of renewables

| **High degree of integration of renewables**<br>New urban development | Almere | Cerdanyola | Delft Harnaschpolder | Grenoble De Bonne | Helsingør | Lyon | Milton Keynes | Nantes | Ostfildern | Trondheim | Tudela | Växjö Biskopshagen | Viladecans | Zaragoza Valdespartera |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/ targets/ challenges related with the implementation of the measure? | + | ++ | N/A | + | 0 | ++ | N/A | + | ++ | ++ | N/A | + | N/A | + |
| 1b) If changes were necessary to meet technical requirements, were the steps taken successful? | + | + | | 0 | N/A | + | N/A | 0 | + | N/A | | N/A | | 0 |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | + | + | | 0 | + | + | N/A | + | + | ++ | | + | | 0 |
| 1d) Does this approach consider both the physically available and economically viable potential? | 0 | + | | 0 | 0 | + | N/A | + | + | ++ | | + | | 0 |
| 2a) Are there local or regional) rules/regulations regarding the administrative procedures required to plan & implement the measure ? | + | + | | 0 | 0 | + | + | + | + | 0 | | + | | + |
| 2b) Are these rules supportive? | + | + | | N/A | N/A | + | + | + | + | N/A | | + | | 0 |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | | + | | | | + | 0 | + | + | | | ++ | | + |
| 3b) Is there an impact of the measures on observing communities? | | 0 | | | | 0 | 0 | 0 | + | | | ++ | | 0 |

Table 12: Comparative assessment for large-scale renovations and improvements: high degree of integration of renewables

| **High degree of integration of renewables**<br>Large scale renovations and improvements in urban areas | Ajaccio | Amsterdam | Delft Poptahof | Geneva | Grenoble Viscose | Hannover | London Lambeth | Turin | Zaragoza Picaral |
|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/targets/ challenges related with the implementation of the measure? | + | 0 | N/A | + | + | 0 | + | + | N/A |
| 1b) If changes were necessary to meet technical requirements, were the steps taken successful? | + | N/A | | N/A | N/A | 0 | + | N/A | |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | 0 | + | | + | +/0 | + | + | 0 | |
| 1d) Does this approach consider both the physically available and economically viable potential? | + | + | | + | + | 0 | + | + | |
| 2a) Are there local or regional) rules/regulations regarding the administrative procedures required to plan & implement the measure ? | + | 0 | | + | N/A | + | 0 | + | |
| 2b) Are these rules supportive ? | N/A | N/A | | + | N/A | + | N/A | + | |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | N/A | | | + | | + | | + | |
| 3b) Is there an impact of the measures on observing communities? | N/A | | | 0 | | + | | 0 | |

Table 13: Comparative assessment for measures in towns / rural areas: high degree of integration of renewables

| **High degree of integration of renewables**<br>Measures in towns / rural areas | Falkenberg | Helsingborg | Mäbjerg | Neckarsulm | Växjö | Weiz-Gleisdorf | Zlín |
|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/targets/ challenges related with the implementation of the measure? | + | + | 0 | + | + | + | + |
| 1b) If changes were necessary to meet technical requirements, were the steps taken successful? | + | N/A | 0 | + | + | + | + |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | + | 0 | + | 0 | 0 | 0 | 0 |
| 1d) Does this approach consider both the physically available and economically viable potential? | + | 0 | 0 | + | + | + | + |
| 2a) Are there local or regional) rules/regulations regarding the administrative procedures required to plan & implement the measure? | ? | 0 | ? | + | + | + | 0 |
| 2b) Are these rules supportive? | ? | N/A | ? | + | + | + | 0 |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | | | | + | ++ | + | + |
| 3b) Is there an impact of the measures on observing communities? | | | | + | ++ | | |

Table 14: Comparative assessment for new urban development: polygeneration and cascade use of resources (where applicable)

| **Polygeneration and cascade use of resources**<br>New urban development | Almere | Cerdanyola | Delft Harnaschpolder | Grenoble De Bonne | Helsingør | Lyon | Milton Keynes | Nantes | Ostfildern | Trondheim | Tudela | Växjö Biskopshagen | Viladecans | Zaragoza Valdespartera |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/targets/ challenges related with the implementation of the measure? | 0 | ++ | N/A | N/A | + | N/A | + | N/A | ++ | + | N/A | N/A | 0 | N/A |
| 1b) If changes were necessary to meet technical requirements, were these steps successful? | + | + | | N/A | N/A | | N/A | | N/A | N/A | | | | |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | + | + | | + | 0 | | + | | + | + | | | + | |
| 1d) Does this approach consider both the physically available and economically viable potential? | + | + | | + | 0 | | + | | + | + | | | + | |
| 2a) Are there (national, local or regional) rules/regulations regarding the administrative procedures required to plan & implement the measure? | + | + | | + | + | | + | | + | N/A | | | | |
| 2b) Are these rules supportive? | 0/+ | + | | + | + | | 0 | | + | 0 | | | | |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | | + | | | | | + | | + | | | | | |
| 3b) Is there an impact of the measures on observing communities? | | 0 | | | | | 0 | | + | | | | | |

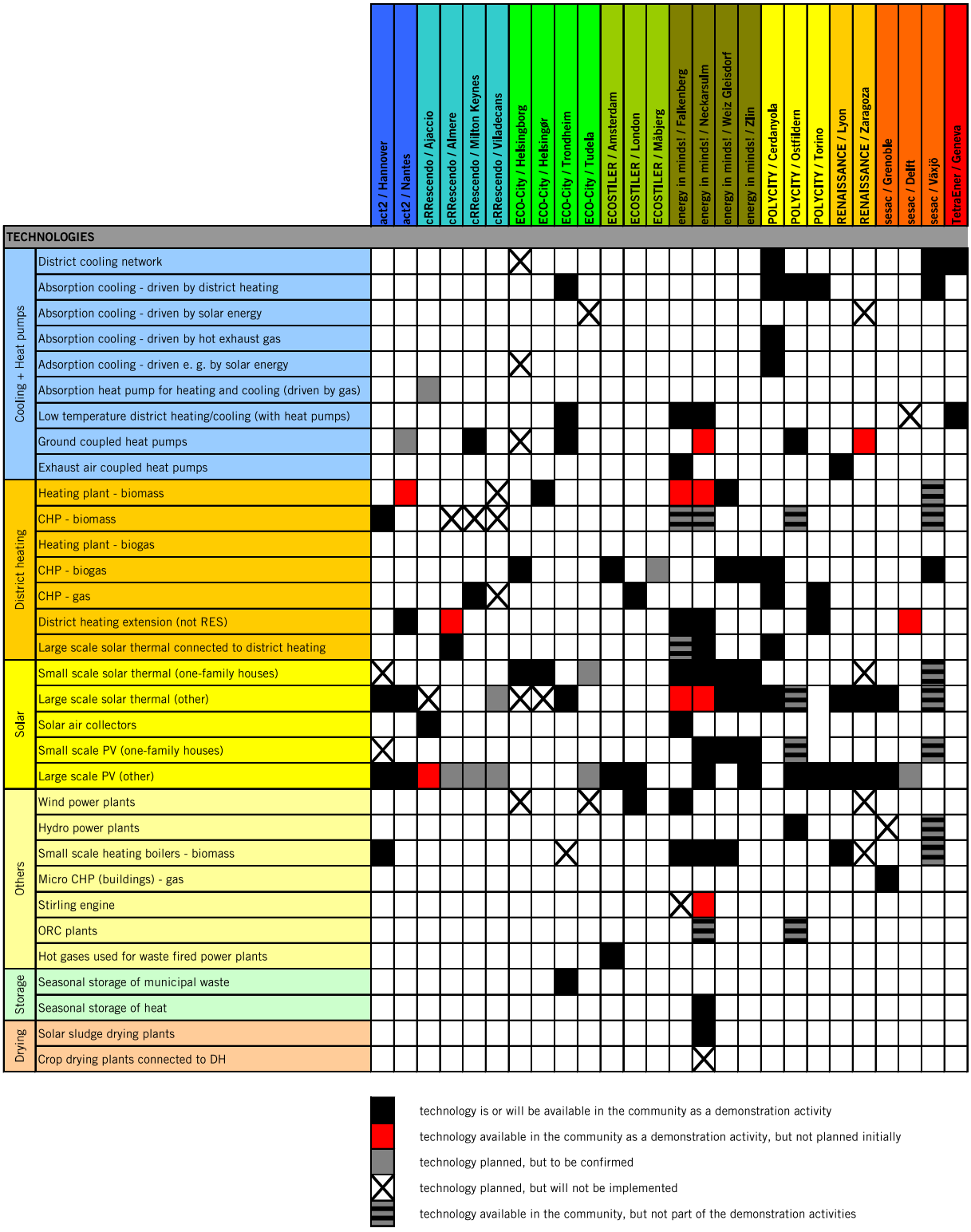
Table 15: Comparative assessment for large scale renovations and improvements: polygeneration and cascade use of resources (where applicable)

| **Polygeneration and cascade use of resources**<br>Large scale renovations and improvements in urban areas | Ajaccio | Amsterdam | Delft Poptahof | Geneva | Grenoble Viscose | Hannover | London Lambeth | Turin | Zaragoza Picaral |
|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/targets/ challenges related with the implementation of the measure? | N/A | + | N/A | 0 | + | N/A | + | ++ | N/A |
| 1b) If changes were necessary to meet technical requirements, were these steps successful? | | N/A | | N/A | N/A | | N/A | N/A | |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | | + | | + | 0 | | 0 | + | |
| 1d) Does this approach consider both the physically available and economically viable potential? | | + | | + | + | | + | + | |
| 2a) Are there (national, local or regional) rules/regulations regarding the administrative procedures required to plan & implement the measure? | | 0 | | + | 0 | | + | + | |
| 2b) Are these rules supportive? | | 0 | | + | N/A | | 0 | 0 | |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | | | | | | | | | |
| 3b) Is there an impact of the measures on observing communities? | | | | | | | | | |

Table 16: Comparative assessment for measures in towns / rural areas: polygeneration and cascade use of resources (where applicable)

| **Polygeneration and cascade use of resources**<br>Measures in towns / rural areas | Falkenberg | Helsingborg | Mäbjerg | Neckarsulm | Växjö | Weiz-Gleisdorf | Zlín |
|---|---|---|---|---|---|---|---|
| 1a) Was the community able to meet the technical requirements/targets/ challenges related with the implementation of the measure? | N/A | N/A | 0- | + | + | + | N/A |
| 1b) If changes were necessary to meet technical requirements, were these steps successful? | | | 0 | n/a | + | + | |
| 1c) Is the used approach based on a sound methodology & comprehensive, reliable data? | | | | 0 | + | 0 | |
| 1d) Does this approach consider both the physically available and economically viable potential? | | | | 0 | + | 0 | |
| 2a) Are there (national, local or regional) rules/regulations regarding the administrative procedures required to plan & implement the measure? | | | | + | + | + | |
| 2b) Are these rules supportive? | | | | + | + | + | |
| 3a) Is there an impact of the measure on neighbouring communities/ districts? | | | | | | | |
| 3b) Is there an impact of the measures on observing communities? | | | | | | | |

Table 17: Overview of energy technologies implemented in CONCERTO communities




As confirmed by the marks in

Table 12 -Table 17, the targets for RES technologies could be actually implemented in a large majority of communities. The following aspects characterise the successful implementation of single technologies:

- **Success of photovoltaics**: Photovoltaics represent the most successful RES measure implemented in CONCERTO (see Table 17). In the majority of countries, the targets regarding photovoltaics could be all reached or even outnumbered. In some cases (Ajaccio), photovoltaics are seen mainly as an opportunity to finance part of the renovation works, because of attractive feed-in tariffs. In other CONCERTO renovation projects (Amsterdam, Turin), the benefits of selling electricity to the network operator are associated with a reduction of running costs for tenants (electricity costs for the common parts of the buildings are not paid by the tenants but covered by the gains coming from selling electricity). Because of the same reasons, large photovoltaic plants could be installed in Grenoble (roof of the stadium) and Nantes (roof of an existing shopping centre).

- **Success of solar thermal systems and small-scale biomass boilers**: In Weiz-Gleisdorf the targets of solar thermal collectors could be out-performed. This was mainly due to a high interest of the inhabitants towards solar heating systems, the long tradition of solar thermal technology in Austria (in Styria in particular), which has led to a well-developed solar thermal market, and the subsidies available locally. In Ajaccio, the initially planned solar thermal collectors have been substituted through photovoltaic panels, mainly due to economic reasons. In other projects, solar thermal systems could be implemented as long as the buildings they were planned to be integrated in could be constructed. Individual pellets boilers were particularly successful in Falkenberg.

- **Success of the development of district energy systems**: In general, measures related to the implementation of district energy systems (district heating extension, connection of buildings to district heating, improvement of efficiency of existing district heating systems, etc.) could be implemented successfully. The district cooling network in Växjö is the only project that took many years before being implemented (will be done in 2010). The location of the district cooling network in the city had to be revised many times and the feasibility studies had to be adapted accordingly.

Some other technologies had to face many barriers and could not be always implemented as planned:

- **Difficulty to implement wind turbine projects**: Falkenberg is the only CONCERTO community assessed where the large-scale wind turbine project (five turbines) could be successfully implemented (Table 17). Indeed, all administrative and authorisation procedures were clarified at the beginning of the CONCERTO projects. In all other communities (Zaragoza, Helsingborg) where large-scale wind turbines where planned[40], the implementation barriers could not be overcome during the project time (spatial planning limitation in Zaragoza, acceptance and national energy planning reasons in Helsingborg). Small-scale wind turbines in urban environment could be implemented in London as part of a demonstration and research project. In Milton-Keynes, urban wind turbines are specified in the development brief but could not be implemented yet. (no developer found).

- **In few cases, low degree of integration between RES technologies and buildings**: in some projects, there is no direct physical connection between the RES technology implementation and the buildings where energy efficiency improvement measures are applied. This is the case in Amsterdam, where the buildings after renovation are not connected to the district heating network and cannot benefit so far from the heating energy generated from biogas by the CHP

[40] However, the planning process was not as advanced as in Falkenberg. In particular, authorisation procedures were only at the application stage.

and distributed through the district heating network. In Hanover, even if the buildings could be successfully connected to the district heating network, they do not benefit continuously from heating energy generated from renewable energy sources. A certain amount of biomass could be co-fired in an existing coal fired plant (power plant Stöcken) for a period corresponding to the heating energy use of the renovated buildings in a 5 years-period (duration of the CONCERTO programme). For economic reasons, this attempt was not carried forward. This is a reason why the success of the integration of RES for heating buildings in Hanover has to be put into perspective.

- **Difficulty to implement biomass CHP in particular and large scale polygeneration projects**: As illustrated in Table 17, many biomass CHP plants planned initially could not be implemented. In some cases (Viladecans, Almere), the feasibility studies were not completed at the time the project proposal was submitted, so they had to be performed later on and the plants eventually turned out to be not feasible[41]. A similar situation happened to absorption and adsorption chillers, which were planned to use excess heat available. In many cases, the technical and economic feasibility studies were done during the project (and not beforehand) and the technologies turned out to be not feasible. However, there are some successful examples of this technology implemented in the CONCERTO project in Trondheim (hospital) and in Ostfildern[42] (office building).

- **In few cases, difficulties to implement district heating systems**: In general, the strategic extension plan for district heating has to be prepared at municipal level. The problem in Lyon was that different parts of the network (not physically interconnected) were operated by different private companies (like in Nantes, in the framework of a regulated delegation of infrastructure operation (contracting)) and their actions were not coordinated at municipal level. In particular, there was no centralised information system gathering data for each of the district heating networks. Unusual in other countries, this situation is rather typical in France, where approximately 10% of the district heating networks are operated directly by municipal utilities[43]. In Lyon, a coordinating unit is going to be created.

[41] In The Netherlands, the national energy policy strategies have moved towards a major support for an extended use of waste heat from existing power plants, even if there are long distances (up to 20-30 km) between the plants and the cities where the heat can be used. This is the case also for Almere.
[42] In Ostfildern, the absorption chiller is operated directly by the utility in an energy contracting solution: it is installed at an office building and delivers cooling energy for this office building.
[43] Information available on http://www.sp2000.asso.fr/ (Service Public 2000, une association pour l'Expertise des Services Publics Locaux)

## 4.3 Assessment of energy management / effective approach to technical monitoring

### Mechanisms assessed / strategies employed

Technical monitoring activities are crucial for any type of supporting programme and, in case of CONCERTO, cover more than the mere assessment of actual community energy performance as described in part 0. In fact, the type of monitoring programme set up by each community depends on the general targets followed and the resources, which can be allocated to monitoring in relation with the costs of the measure implemented. In general, an effective approach to monitoring is reached:

- when the monitoring costs are not "too high" in comparison with the costs of the measure whose impact is being monitored.
- when the monitoring programme delivers satisfying results in relation to the targets followed by the monitoring programme.

Figures about the total costs of monitoring activities in each CONCERTO community are not available since quite often they are combined or included in broader monitoring programmes at municipal level. They cannot be associated exclusively to CONCERTO measures. For the assessment of the degree of efficiency of the monitoring programmes, monitoring costs are classified as follows:

- "low-cost" monitoring programmes do not require any particular initial investment for dedicated equipment (hardware and software) to perform monitoring activities. They are usually based either on questionnaires filled in manually or on existing databases gathering data anyway (e.g. delivered energy data available at network operators). As soon as these monitoring activities need to be performed at regular time intervals (to show for instance the evolution of a performance indicator with the time), there might be the necessity to increase the degree of automation of the monitoring programme, requiring additional initial investments.
- "high-cost" monitoring programmes are quite often developed as ad-hoc systems and require the installation of dedicated monitoring equipment (meters, data loggers, data communication infrastructure). The target is mainly to follow the variations of performance indicators during time and implement real-time functionalities (e.g. real-time energy management). An efficient way to reduce monitoring equipment costs would be to use existing metering devices available anyway in buildings and/or plants.

In all cases, if the quality of monitoring results obtained is not satisfying (i.e. if the obtained data cannot be used as planned), the monitoring programme cannot be defined as efficient.

The main aspect characterising the CONCERTO initiative is that the scale of monitoring activities has been extended from building to community level. One can distinguish a number of individual concepts, but often a mixed approach was followed:

I. *Detailed building and/or plant energy use metering adopting dedicated metering equipment for permanent large scale metering of energy use and comfort parameters*

II. *Energy management for chosen buildings (public buildings) assisted by measurement of energy use data and real-time data transmission (supply / demand control system)*

III. *Community energy management assisted by measurement of energy use data and real-time data transmission (supply / demand control system)*

IV. *Collection of energy consumption data from existing databases gathering energy use data anyway*

V. *Collection of energy consumption data using questionnaires distributed among consumers*

VI. *Punctual (in space and time) metering of comfort and quality parameters*

***i) Detailed building and/or plant energy use metering using dedicated metering equipment for permanent large scale metering of energy use and comfort parameters***

Some communities implement ambitious energy use monitoring programmes for a high number of buildings and plants in the CONCERTO area. The approach consists of using dedicated metering equipment (temperature and humidity sensors, heat, flow and electricity meters, data loggers and dedicated servers) to collect during a defined time period energy use and comfort parameters in a group of buildings. The degree of centralisation of the monitoring system, i.e. the availability of a server collecting the metered data, determines the type of usage that is possible for the monitored data:

- The most traditional system consists in installing many stand alone data loggers at different places of the buildings and/or plants and exporting the data recorded in the embedded processor at the end of the monitoring period for post-processing and data analysis. With this system, implemented in Grenoble and Lyon, results can be only available at the end of the monitoring period. In particular, monitoring can be used neither for real-time assessment of building and/or plant energy performance (error detection and correction) nor for end-user information.

- A most advanced system consists in connecting data loggers with devices (e.g. servers) having the task to collect data and implement post-processing functionalities. The frequency of data emission by the network connected data loggers (e.g. wireless) determines how often data can be processed. Real-time functionalities can be implemented with very high transmission frequencies for data packets. Such a system is implemented in Zaragoza with a combined optic fibre and GSM communication system. A database software is installed at the acquisition server, which is directly coupled with information displays in a public assess building in the neighbourhood.

***ii) Energy management for chosen buildings (public buildings) assisted by measurement of energy use data and real-time data transmission (supply / demand control system)***

In a few cases, the communities keep the metering system already used in the past for energy management targets, mainly for public buildings. Some commercial products are available and used by facility managers who are also taking over the task of energy management for large buildings (mainly public buildings or buildings belonging to large housing companies). In many cases, these functionalities are included in the general building automation systems. Such systems are implemented in the public buildings in Ostfildern and Neckarsulm as well as in the residential buildings owned by the municipal housing company in Falkenberg. They are adapted for individual building energy management but they do not include any functionality related to monitoring at neighbourhood scale (difference with the monitoring concept described in i)).

***iii) Community energy management assisted by measurement of energy use data and real-time data transmission (supply / demand control system)***

As a combination of both systems described in i) and ii), real-time community energy management systems are the most advanced and innovative monitoring systems implemented in CONCERTO communities. Such concepts are being implemented only in Turin (Arquata) and Cerdanyola. They are based on the idea to manage energy generation and storage patterns dependent on the varying energy demand and energy resource availability (real-time energy management system), considering for instance weather and energy price forecast information. They are mainly adapted for complex energy systems including polygeneration and storage features, in which there are many possibilities at a given time to provide the required energy service (necessity of optimisation). The main condition for operating these systems is that energy use data for both buildings and energy plants has to be collected in a unique database (dedicated server). This challenge is also linked with the question of the institution taking over the monitoring task.

***iv) Collection of energy consumption data from existing databases gathering energy use data anyway***

In other cases, mainly because energy use monitoring does not serve any real-time energy management system, no ad-hoc metering system is necessary and the monitoring task consists mainly of collecting data from databases existing anyway for other reasons (e.g. for billing issues). This solution is used mainly for buildings being renovated, as quite often it is not possible and it does not make sense either to implement an ad-hoc monitoring system in an existing building before the renovation works are started. Energy use data is available in different forms at the energy supplier, the network operator and the end-user and/or the building owner. The challenge consists in collecting data available at different sources, for different metering/billing periods and structured in different ways. This data collection procedure has been / is being implemented in Amsterdam, Delft, Hanover, Nantes and Växjö.

***v) Collection of energy consumption data using forms and questionnaires distributed among consumers***

For small and decentralised RES-systems (mainly solar thermal collectors or small scale biomass boilers) and one-family houses, energy use and/or generation is not being metered in all cases due to limited budget resources. In particular, data is not communicated automatically to a central server. For these reasons, the communities implementing such measures have decided to use questionnaires to be filled in by the end-users. It highly depends so far on the willingness of end-users to collaborate. In general, this procedure cannot be replicated on a yearly basis (problem of end-user acceptance), since a long-term energy monitoring programme cannot rely entirely on questionnaires. This is of course not the case of socio-economic monitoring activities that are based mostly on questionnaires.

***vi) Punctual (in space and time) metering of comfort and quality parameters***

Punctual metering of comfort and quality parameters is a common activity consisting of measuring indicators of comfort and construction quality. Infrared thermographs and blower door tests are realised for instance to check the construction quality of the building envelope with regard to thermal bridges and air-tightness. Punctual temperature and humidity measurements within buildings also allow for checking the construction quality with regard to thermal bridges (measurement of surface temperature at the internal side of an external wall)

or the appropriate operation of the heating or cooling system. Such punctual monitoring activities are realised in nearly all projects with different degrees of extension. The communities marked in Table 18 are implementing extensive monitoring activities of this type (i.e. replicated in all buildings concerned).

Going beyond the mere fulfilment of the scientific task consisting of assessing the actual impact of energy saving measures, some communities extend the use of monitoring data towards end-users. This approach is based on the conviction that the awareness of one's own energy use can lead to additional energy savings. Different methods have been implemented by CONCERTO communities:

I. Use of price signals depending on actual hot water consumption and/or indoor temperature
II. Display of metered energy use data at end users
III. Presentation of metering results using a Geographical Information System

***i) Use of price signals depending on actual hot water consumption and/or indoor temperature***

Theoretically, figures concerning space heating energy usage should be always presented in association with the air temperature reached in the rooms of a building. In fact, this is a practicable way to check if an abnormally high space heating energy usage can be due to an overheating of internal spaces or excessive window opening during wintertime. In practice, this is done very rarely. In the case of the housing buildings owned by the municipal housing company in Falkenberg, the specific price for space heating (in [ /kWh]) is increasing if the internal air temperature is set above a maximal temperature considered as "normal" (e.g. 22°C). Higher air temperatures can be reached if the end-user is willing to have warmer internal spaces; however, the end-user will have to pay more per unit of energy used.

***ii) Display of metered energy use data at end users***

Display of metered energy usage data is a known way to increase awareness of end-users. There are two examples of CONCERTO communities employing this concept in different ways, mainly depending on the institution taking over the task:

- In Växjö, the municipal utility VEAB in its role of network operator (for electricity and district heating network) informs end users about their own energy use (both for electricity and district heating, if the building is connected) through a user interface called ENERGIKÖLLEN. This interface is available online and can be accessed by every end-user. The municipal utility has also set up a successful energy saving campaign based on competition between households. The main interest of the utility is to avoid the operation of peak power plants.

- In Falkenberg, a comparable system has been implemented by the municipal housing company FABO and installed in the new dwellings built as CONCERTO demonstration activities. It consists of displays installed at each dwelling and providing information on the energy and water use, but also on other issues that might be interesting for residents (weather forecast, time schedule of public transport, etc.). The system is connected to the general building automation infrastructure.

When displaying energy use data is taken over by the network operator, the system can be implemented in the premises of all end-users connected to the energy supply infrastructure (electricity, district heating and gas network). This allows on the one hand for a broad

distribution of information. On the other hand, the most economic solution to display information is to use existing supports (web-based interface for instance) and the challenge is then to bring end-user to look for this information. By bringing into play competition between end-users, the municipal utility in Växjö could find a successful way to increase interest of end-users' apartments. In Falkenberg, by installing a dedicated display at the end-users, the municipal housing company wanted to be sure that tenants would check their energy consumption. However, the system implemented cannot be implemented on the same scale as in Växjö, as it depends on the willingness of the building owner (housing companies) to install such devices.

***iii) Presentation of metering results using a Geographical Information System***

Visualising the actual energy use of buildings directly on the neighbourhood map is a convenient way to understand the energy demand of a neighbourhood by indicating for instance the groups of buildings with the highest energy demand and those with a high energy performance. This method has been implemented in Ostfildern (Scharnhauser Park), where energy use data is transferred automatically from heat meters to a dedicated database which is coupled with a Geographical Information System (GIS). For privacy issues, energy consumption data is not associated with single dwellings, but to the group of buildings of the same type the dwelling belongs to, and average energy use figures among this group of buildings is presented. The results are illustrated on a publicly accessible web site (Polycity website).

Table 18: Overview of monitoring concepts

| | | Main aspects of monitoring concept | | | | | | Additional features | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Community (neighbourhood) | Detailed building and/or plant energy use metering | Energy management for chosen buildings (public buildings) | Community energy management | Collection of energy consumption data from existing databases | Collection of energy consumption data using forms / questionnaires | Punctual metering of comfort and quality parameters | Use of price signals | Display of metered energy use data at end users | Presentation of metering results using GIS |
| a) Revitalised urban development areas with newly constructed buildings/ facilities | Grenoble (deBonne) | X | | | | | | | | |
| | Helsingør | | | | | | | | | |
| | Lyon | X | | | | | | | | |
| | Nantes | | X | | X | | X | | X | |
| | Ostfildern | | X | | | | | | | X |
| b) Green field urban development | Almere | | | | | | | | | |
| | Cerdanyola | | | X | | | | | | |
| | Delft (Harnaschp.) | | | | | | | | | |
| | Milton Keynes | | | | | | | | | |
| | Trondheim | | | | | | | | | |
| | Tudela | | | Xn)) | | | | | | |
| | Växjo (Biskopsh.) | | | | X | | | | X | |
| | Viladecans | | | | | | | | | |
| | Zaragoza (Valdes.) | X | | | | | X | | X | |
| a) Refurbished buildings | Ajaccio | | | X(n) | | | | | X | |
| | Amsterdam | | | | X | | | | | |
| | Delft (Poptahof) | | | | X | | X | | | |
| | Hanover | | | | X | | X | | | |
| | London | | | | | | | | | |
| | Turin | | X(n) | X | | | | | | |
| | Zaragoza (Picaral) | | | | | X | | | | |
| b) Large scale energy systems | Geneva/LacNations | | | | | X | | | | |
| | Grenoble (Viscose) | | | | | | | | | |
| Measures in towns / rural areas | Falkenberg | | X | | | X | | X | | |
| | Helsingborg | X(n) | | X(n) | | | | | | |
| | Måbjerg | | | | | | | | | |
| | Neckarsulm | | X | | | X | | | | |
| | Växjö | | | | X | | | | X | |
| | Weiz-Gleisdorf | | | | | X | | | | |
| | Zlín | | | | | X | | | | |

(n) – not implemented at the time the report is being written

### Assessment analysis

The major elements of the assessment analysis for this area especially stress and specify for each of the monitoring programmes mentioned in Table 18, whether:

- the monitoring costs are not "too high" in comparison with the costs of the measure whose impact is being monitored.
- the monitoring programme delivers satisfying results in relation to the targets followed by the monitoring programme.

As technical monitoring activities have just started at the time this report is being written, the facts presented in Table 19 should be merely considered as interim assessment results.

Table 19: Assessment of efficiency of monitoring programmes

| | Community (neighbourhood) | Low cost solution | High cost solution | Monitoring targets reached |
|---|---|---|---|---|
| a) Revitalised urban development areas with newly constructed buildings/ facilities | Grenoble (de Bonne) | | **X** | No result available<br>Results only available at the end of the monitoring period |
| | Helsingør | | | Demonstration not completed |
| | Lyon | | **X** | No result available<br>Results only available at the end of the monitoring period |
| | Nantes | **X** | | Results available and satisfying |
| | Ostfildern | | **X** | Results available and satisfying |
| b) Green field urban development | Almere | | | Demonstration not completed |
| | Cerdanyola | | **X** | Demonstration not completed |
| | Delft (Harnaschpolder) | | | Demonstration not completed |
| | Milton Keynes | | | Demonstration not completed |
| | Trondheim | | | Demonstration not completed |
| | Tudela | | **X(n)** | Demonstration not completed |
| | Växjo (Biskopshagen) | **X** | | Few results available (not satisfying) |
| | Viladecans | | | Demonstration not completed |
| | Zaragoza (Valdespartera) | | **X** | No result available |
| a) Refurbished buildings | Ajaccio | | **X** | Demonstration not completed |
| | Amsterdam | **X** | | No result available |
| | Delft (Poptahof) | | | Demonstration not completed |
| | Hanover | **X** | | Results available and satisfying |
| | London | | | No result available |
| | Turin | | **X** | Few results available (not satisfying) |
| | Zaragoza (Picaral) | **X** | | Demonstration not completed |
| Large scale energy system | Geneva (Lac Nations) | **X** | | Demonstration not completed |
| | Grenoble (Viscose) | **X** | | Few results available (not satisfying) |
| Measures in towns / rural areas | Falkenberg | **X** | | Results available and satisfying |
| | Helsingborg | **X(n)** | | Few results available (not satisfying) |
| | Måbjerg | | | Demonstration not completed |
| | Neckarsulm | **X** | | Results available and satisfying |
| | Växjö | **X** | | Few results available (not satisfying) |
| | Weiz-Gleisdorf | **X** | | Results partly available |
| | Zlín | X | | Results partly available |

The projects characterised by a small amount of available results (not satisfying) or no results are facing difficulties while implementing their monitoring strategies. The main problems faced are the following:

- Database and data structure problem: when data on electricity / gas / district heating use is available at different institutions, there might be difficulties to combine data from different sources available at different aggregation levels. In particular, there are quite often major differences between figures coming from top-down (mainly from statistics) and bottom-up calculations.
- Complex monitoring systems at community scale are often confronted with compatibility problems between communication protocols and compromised because the data transfer is not functioning properly.
- When monitoring activities involve many partners and institutions (municipal utilities, housing owners, research centres, consultants, etc.), quite often the responsibility for providing monitoring data is not clearly defined. Experience shows that if only one stakeholder is taking over the general monitoring task (i.e. implementing the entire monitoring programme), the chances to obtain satisfying results are higher. If the different tasks of the monitoring programme are subdivided among different stakeholders (metering by the network operator, data collection by third parties, etc.), there is a higher need for coordination. If not implemented successfully, there might be unusable monitoring results (incomplete monitoring data).
- Compared with demonstration activities, where tasks and roles are well defined because they are part of the usual construction process (developer, architect, planner, consultant, etc.), monitoring activities are still not a standardised process yet. Therefore they are implemented in a high variety of forms. The question of who in future should take over monitoring activities at community scale has not found yet a systematic answer, as it always depends on the type of measures implemented and to be monitored.

## 4.4 Assessment of Commitment of stakeholders

### Mechanisms assessed / strategies employed

The continuous engagement of different stakeholder groups has proved crucial for both the planning and implementation process in all clusters. In most cases, certain stakeholder groups such as municipalities, housing associations and/or municipal utilities among others have taken the lead. Most frequent stakeholders are also urban planners, professional training associations, regional/urban economic promotion agencies, local (energy) agencies and sometimes also users or representatives of future users. In selected cases, the development of a project and its successful implementation can count on a long-standing cooperation history among stakeholders. This applies mostly to development companies with a long-term contractual agreement with the communities, as in the example of SAMOA, which has a 20-year public redevelopment agreement with Nantes Métropole.

A number of projects, but especially the communities in act2 and Renaissance, have fully integrated local politicians from the demonstration cities and sometimes also observer cities in the project. This has proved central, as without the support of political decision makers no significant decision can be made and implemented in a smooth way. In selected cases, the commitment of stakeholders goes far beyond CONCERTO measures. This is the case of Nantes, Hanover, Lyon, Grenoble, Torino, Cerdanyola, Växjo, Amsterdam and Delft). These cities have also committed, by signing the Covenant of Mayors, to go beyond the EU energy objective of reducing by 20% their $CO_2$ emissions by 2020. Whilst the Dutch communities have been especially successful in their promotion activities and have inspired new projects (second and third generation CONCERTO projects), the case of act2 is especially commendable since all cities (Nantes Metropole and Hannover together with the observing communities Malmo and Newcastle) joined the Covenant of Mayors.

### Assessment analysis

The following tables depict the assessment of each community by cluster in assessment area 5. Following that, the text provides a comparative assessment.

Table 20: Comparative assessment of stakeholder commitment (pro-active involvement)in new urban development

| **Stakeholder commitment**<br>New urban development | Almere | Cerdanyola | Delft Harnaschpolder | Grenoble De Bonne | Helsingør | Lyon | Milton Keynes | Nantes | Ostfildern | Trondheim | Tudela | Växjö Biskopshagen | Viladecans | Zaragoza Valdespartera |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the composition of the consortium/involved stakeholder groups adequate to meet the requirements/ targets/ challenges related with the implementation of the project? | + | + | + | + | + | + | + | + | ++ | ++ | | + | 0 | + |
| 1b) Did the absence of relevant stakeholders restrict the range of technical options? | - | N/A | na | N/A | N/A | N/A | N/A | N/A | N/A | N/A | | N/A | - | - |
| 1c) If changes concerning the consortium and/or involved stakeholders were necessary to meet requirements (e.g. investors as new partners, etc.), were the steps taken successful? | + | + | N/A | N/A | N/A | ++ | N/A | ++ | N/A | N/A | | N/A | + | ? |
| 1d) Were all relevant stakeholders committed to meet the specific objectives of the project? | + | + | ++ | ++ | + | + | + | +/0 | + | + | | + | 0 | + |
| 2a) Were there local or regional rules/regulations/procedures that encouraged stakeholders implementing specific project measures? | 0 | + | 0 | + | 0 | + | + | + | + | 0 | | + | + | + |
| 2b) Have public-private partnership solutions been taken into account? | + | ++ | + | 0 | 0 | 0 | + | 0 | + | 0 | + | + | 0 | 0 |
| 3.a) Were stakeholders promoting (also through awareness raising) the benefits of the project to other communities? | 0/+ | + | ? | + | 0 | + | 0 | + | + | N/A | | + | + | + |
| 3.b) Does the commitment of stakeholders go above and beyond CONCERTO measures? | 0/+ | + | ? | + | 0 | ++ | + | + | + | + | | + | + | ++ |

Table 21: Comparative assessment of stakeholder commitment in large renovations (pro-active involvement)

| **Stakeholder commitment**<br>Large scale renovations and improvements in urban areas | Ajaccio | Amsterdam | Delft Poptahof | Geneva | Grenoble Viscose | Hannover | Helsingborg | London Lambeth | Turin | Zaragoza Picaral |
|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the composition of the consortium/involved stakeholder groups adequate to meet the requirements/ targets/ challenges related with the implementation of the project? | 0 | 0 | + | + | + | ++ | + | + | + | + |
| 1b) Did the absence of relevant stakeholders restrict the range of technical options? | -N/A | -N/A | N/A | N/A | -N/A | N/A | N/A | N/A | N/A | N/A |
| 1c) If changes concerning the consortium and/or involved stakeholders were necessary to meet requirements (e.g. investors as new partners, etc.), were the steps taken successful? | 0 | + | + | N/A | 0 | N/A | N/A | + | N/A | ? |
| 1d) Were all relevant stakeholders committed to meet the specific objectives of the project? | 0 | + | + | +/0 | + | ++ | + | + | + | + |
| 2a) Were there local or regional rules/regulations/procedures that encouraged stakeholders implementing specific project measures? | ++ | + | + ? | ? | + | ++ | + | + | + | + |
| 2b) Have public-private partnership solutions been taken into account? | 0 | 0 | + | + | 0 | 0 | 0 | + | 0 | 0 |
| 3.a) Were stakeholders promoting (also through awareness raising) the benefits of the project to other communities? | N/A | 0 | ? | 0 | + | + | 0 | + | + | + |
| 3.b) Does the commitment of stakeholders go above and beyond CONCERTO measures? | N/A | + | ? | 0 | + | ++ | + | + | + | ++ |

Table 22: Comparative assessment of stakeholder commitment for measures in towns/rural areas (pro-active involvement)

| **Stakeholder commitment**<br>Measures in towns / rural areas | Falkenberg new buildings | Falkenberg renovation | Mâbjerg | Neckarsulm new buildings | Neckarsulm renovation | Växjö | Weiz-Gleisdorf new buildings | Weiz-Gleisdorf renovation | Zlín new buildings | Zlín renovation |
|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Was the composition of the consortium/involved stakeholder groups adequate to meet the requirements/ targets/ challenges related with the implementation of the project? | ++ | ++ | 0 | + | + | ++ | + | + | + | + |
| 1b) Did the absence of relevant stakeholders restrict the range of technical options? | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 1c) If changes concerning the consortium and/or involved stakeholders were necessary to meet requirements (e.g. investors as new partners, etc.), were the steps taken successful? | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| 1d) Were all relevant stakeholders committed to meet the specific objectives of the project? | ++ | ++ | + | ++ | ++ | ++ | + | ++ | ++ | ++ |
| 2a) Were there local or regional rules/regulations/procedures that encouraged stakeholders implementing specific project measures? | ? | ? | + | + | + | + | ++ | ++ | ? | |
| 2b) Have public-private partnership solutions been taken into account? | 0 | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 |
| 3.a) Were stakeholders promoting (also through awareness raising) the benefits of the project to other communities? | + | + | 0 | +? | + | + | + | + | + | + |
| 3.b) Does the commitment of stakeholders go above and beyond CONCERTO measures? | 0 | | 0 | 0 | 0 | + | + | + | 0 | 0 |

Overall, the composition of the consortium and the number of involved stakeholder groups is considered by the communities adequate to meet the requirements, targets and challenges related with the implementation of the projects. This applies equally to communities in Cluster 1, 2 and 3. Sometimes communities create public-private companies or public local redevelopment companies acting as the contracting owner for the project (e.g. in Cerdanyola, Nantes, Amsterdam, etc.). In a few cases (Nantes, Viladecans, Lyon) changes concerning the consortium and involved stakeholders were necessary to meet requirements. In this case, for example Lyon, the steps taken were successful. In fact, the three major investors (developers and construction companies) joined the project at a later stage as partners and could also play a multiplier role in applying these standards to other construction plans elsewhere in France.

Most of the time, the right selection of stakeholders, esp. housing companies is crucial for reaching more ambitious energy performance levels. Even if this strategy is constrained by the fact that success of the operation highly depends on the willingness of housing associations to collaborate, a number of CONCERTO cases show that this path is promising. In a large number of CONCERTO cities, the public administrations took the lead and managed to mobilise actors that can influence the town agenda and, therefore, maximise stakeholder support for it. In a limited number of cases, major stakeholders have changed (Zaragoza). In some cities, there have been longstanding issues to work around as for example economic competition among some stakeholders, as in the case of ESCOs and existing municipal utilities or energy providers.

The commitment of the relevant stakeholders to meet the specific objectives of the project is generally high. In some projects, the political commitment (as for example in Act 2 and Renaissance) is very high. The political impetus given from the administrations has also been determinant for setting sustainability standards. This is evident in Lyon, where a major focus is the comprehensive approach including ground de-pollution, transport re-organisation, waste management, water preservation and sustainable energy.

Positive engagement by stakeholders has meant that they have not only accepted and acknowledged their role in the consortium or partnership, but also that they have provided the financial and time resources towards the project. They have also publicly supported the partnership positively and have helped to plan, review and refine activities based on their knowledge and connections as in the case of Ostfildern, through the regional economic promotion agency (*Wirtschaftsförderung*).

In general, cooperation between stakeholders contributes to greater levels of achievement. For example, in Delft Poptahof, the housing association Woonbron-Maasoevers and the Municipality of Delft have joined forces to produce energy efficient dwellings. Collaboration between a housing company and municipality is also underway in Amsterdam for the New West neighbourhood. This cooperation appeals to the social aspects of the large scale urban regeneration programme of both cities, as in both areas the dwellings included provide social housing. The fact that housing associations own a major part of the housing stock in Dutch cities (e.g. about 70 % in Amsterdam), means that a good coalition between municipalities and housing associations is essential. Bringing both entities together in a constant process of negotiation allows the tenants to be better informed and increases their involvement in the process. This process is carried out similarly in all Dutch cities.

Most of the time, it is not perceived that the absence of relevant stakeholders restricted the range of technical options. However, projects involving municipal utilities have experienced additional benefits especially because of their support in negotiating with building owners and developers. This has helped in some cases to overcome legal and administrative barriers due to the difficulty to enforce for example the use of community energy systems. The analysis applies equally to Cluster 1 and 2.

Some communities have taken the chance offered by public-private partnership solutions and have for example established Energy Service Companies. This is the case in Delft (Poptahof project) where an ESCO has been created and is jointly owned by the city, the power supplier ENECO and the most important housing associations. The district heating company was created after a tendering process and involves, together with the winning company ENECO, the municipality of Delft and three housing companies (including Woonbron), which facilitates the connection strategy of district heating, thus making it economically feasible. Production and distribution of district heating will be integrated within the ESCO (the district heating network is currently under construction). In Sweden, the *Växjö Energi AB (VEAB)* was created by the municipality of Växjö and is owned by the local residents. It is devoted to the provision of district heating and electricity (the Sandvik bio-fuel based CHP-plant) as well as the implementation of energy saving technologies. VEAB has a wholly owned subsidiary responsible for the electricity network in Växjö town and owns an electricity trading company, based on a partnership of several local energy companies. Similar experiences have been made in Cerdanyola and Ostfildern.

In some projects/communities, stakeholders are active in promoting the benefits of the project also to other communities (assessment item 3a). Active promotion of the CONCERTO vision and objectives through stakeholders has resulted in transfer of good practices from one community to another. A typical case is the transfer of training for site workers on the CONCERTO demonstration area first implemented by SESAC project in Grenoble and then transferred to Lyon. There, the local energy agency (ALE) initially contacted the building companies. Then a training approach was defined and financial and technical partnerships were initiated with the national and regional agencies responsible for funding and organising training programmes in the French construction sector (AREF-BTP and AFPA). Now the first companies have joined the training programme. Courses last about 18 hours and focus on technical topics such as thermal insulation, water and air tightness etc. They also target interdisciplinarity: specialised workers need to have some knowledge about the work done by their colleagues from other technical fields in order to better coordinate their activities, thus contributing to improve construction quality. The trainings take place on the construction site and are supported by practical examples. In addition, the socio-economic activities in Turin and Ostfildern have provided inspiration also for other cities not only within the same project (Cerdanyola) but also for the ones starting later with own dedicated socio-economic activities (Lyon).

The active promotion of CONCERTO objectives is particularly evident by analysing the experience of a number of so-called observing communities. Most observers have already begun to take concrete actions, which will help them to pursue the same goals of energy efficiency and maximum use of renewables as the participating cities. These range from

feasibility studies and research into financing possibilities to training and networking for interested stakeholders and dissemination campaigns targeting the citizens.

Concerto Pus has organised in 2009 a small survey amongst observing/associated communities in order to assess the perceived benefits connected with the role of an observer community. Over 80% of respondents rated the experience as useful. Over half the respondents are considering becoming CONCERTO communities themselves, and all but one would recommend the observer experience to other towns and cities. The observers put forward many different ways in which their partnership with a CONCERTO community has given insight into innovative solutions to energy performance issues. At the top of the list are areas like financing, where observers have learned about how public-private partnerships and how ESCOs can help to find the capital needed to take action.

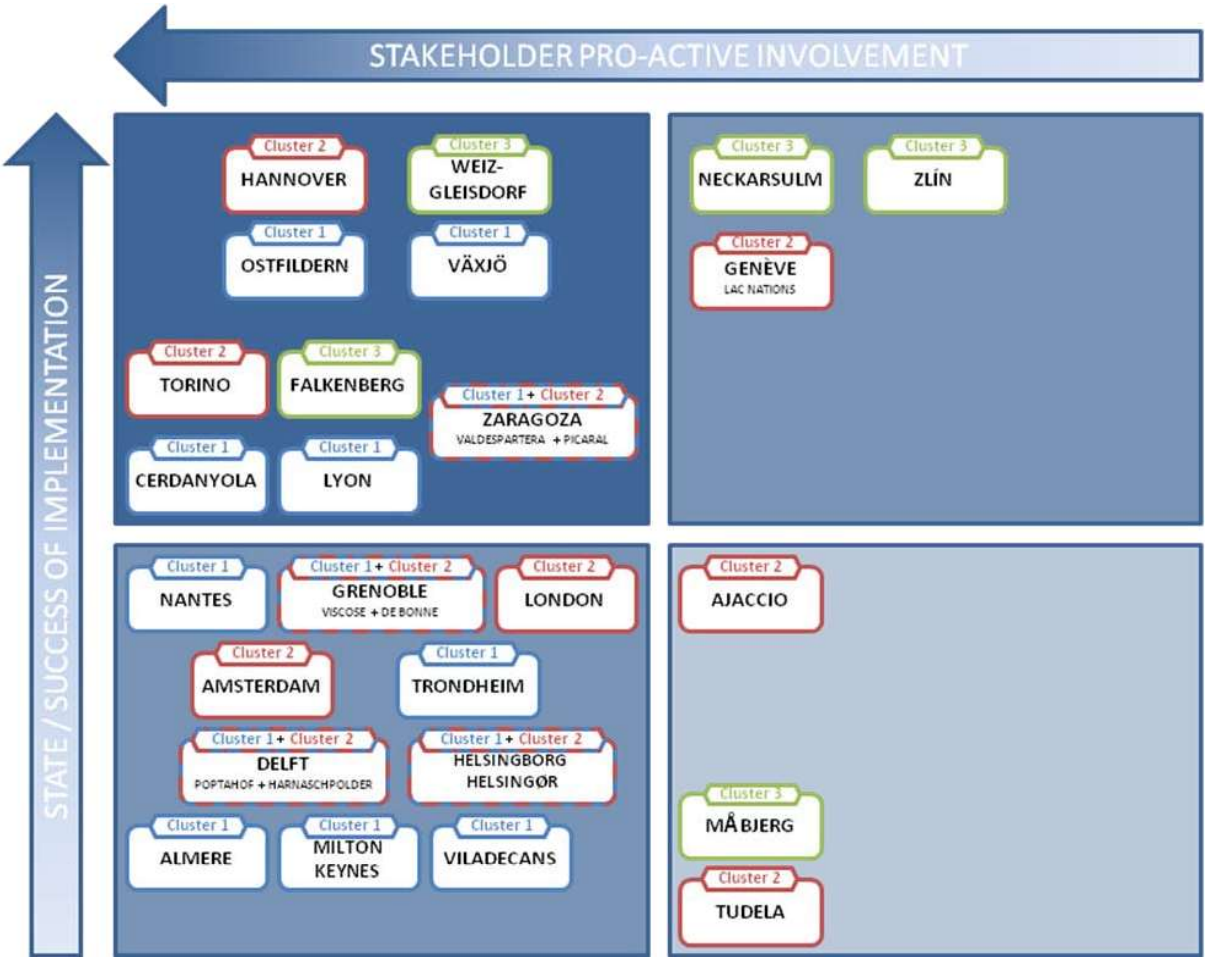



Figure 17: Commitment of stakeholders and success of implementation

## 4.5 Assessment of integration of sustainability criteria (SE accompanying activities and soft measures[44])

This session analyses the planned socio-economic and soft measures and compares them with the measures implemented so far. Since in many projects and communities the socio-economic and soft measures such as awareness raising are strongly correlated to the demonstration activities, delays concerning the demonstration activities also have a strong influence on these measures. In the monitoring of the implementation of SE activities, a major problem has been that only a limited number of communities has a dedicated socio-economic research or carry out specific accompanying socio-economic activities - and that these have started relatively late. Against this background - and because of the fact that in a high number of communities the socio-economic activities have just begun - this assessment can be considered merely as an anticipation of the work, which will be carried out in the socio-economic assessment report due at the end of 2010.

### Mechanisms assessed / strategies employed

The Concerto plus socio-economic theoretical framework and the methodological steps have been described in Chapter 1.3.2. A major problem for the evaluation of the SE measures has been the lack of a proper baseline, the spare information about the socio-demographic characteristics of the communities and the near absence of initial status indicators for socio-economics. One of the reasons for this is also that socio-economic research was not a mandatory field for CONCERTO applications of the first generation. A major source for information on planned initiatives and on the framework for socio-economic and soft measures to be carried out in the communities is provided in the annexes of the projects' applications. However, since these were written mostly before the demonstration activities were fully developed, they are often rather vague.

For the preliminary analysis of the planning and implementation process, communities have been subdivided into different categories according to their level of ambition, the status of implementation and the deviations from the originally planned measures. The following categories have been defined:

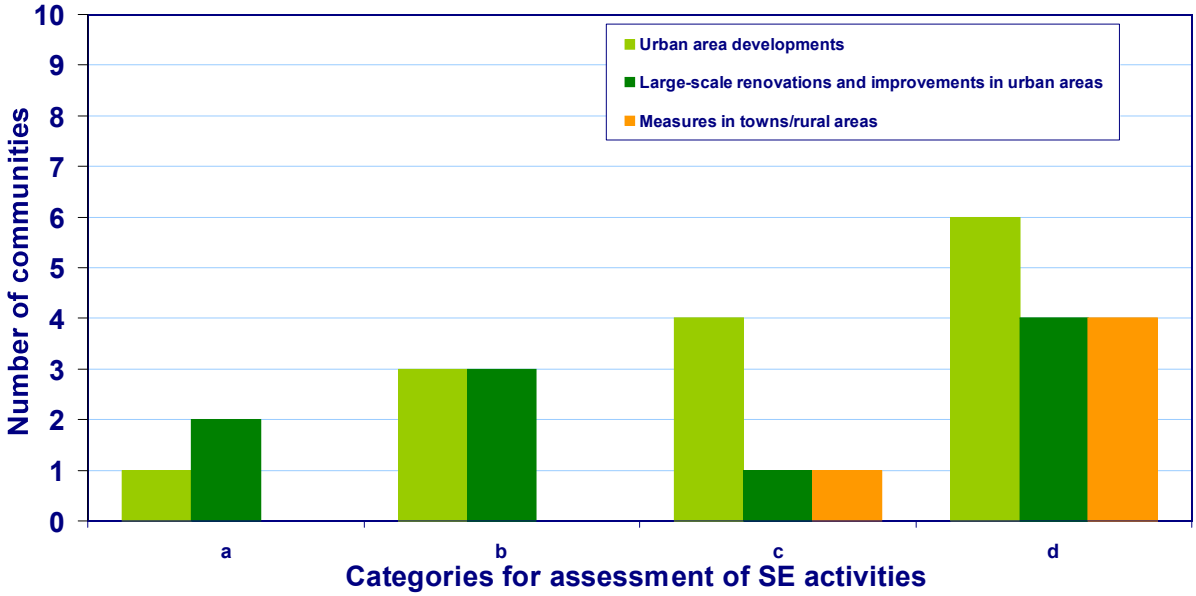
**a)** Communities with an ambitious and dedicated plan for socio-economic accompanying measures and a sound implementation of this plan (only minor deviations from the planned measures, implementation is on time or only minor delays because of delays in the demonstration process): Hannover (act2), Ostfildern (POLYCITY), Turin (POLYCITY).

**b)** Communities mostly with a traditional and/or very focused (e.g. on economic aspects), but dedicated plan on socio-economic and soft measures facing some delays in the implementation of this plan, especially because related to new construction activities (minor deviations from the planned measures, delays due to the demonstration process): Cerdanyola (POLYCITY), Lyon (Renaissance), Amsterdam (Ecostiler), Zaragoza (Renaissance), London (Ecostiler).

[44] Soft measures are, differently from technical measures, activities influencing behaviour, also including information and awareness raising.

**c)** Communities which originally planned dedicated socio-economic activities and soft measures that (for a number of reasons) face major delays and deviations compared with the initial plan: cRRescendo projects (Ajaccio, Almere, Milton Keynes, Viladecans), Nantes (act2), Mabjerg (Ecostiler).

**d)** Communities with no dedicated socio-economic plan but awareness raising measures and other soft measures such as training, environmental education campaigns and counselling activities (either focusing on the overall project or a specific part of the project): sesac projects (Växjö, Delft, Grenoble), Geneva (TetraEner), ECOcity projects (Helsingborg/Helsingör, Trondheim, Tudela), energy in minds projects (Falkenberg, Neckarsulm, Weiz Gleisdorf, Zlin)




| | a | b | c | d |
|---|---|---|---|---|
| **Urban area developments** | Ostfildern | Cerdanyola<br>Lyon<br>Zaragoza | Almere<br>Milton Keynes<br>Nantes<br>Viladecans | Delft - Harnaschpolder<br>Grenoble - de Bonne<br>Helsingör<br>Tudela<br>Trondheim<br>Växjö |
| **Large-scale renovations and improvements in urban areas** | Hanover<br>Turin | Amsterdam<br>London<br>Zaragoza | Ajaccio | Delft - Poptahof<br>Geneva<br>Grenoble - Viscose<br>Helsingborg |
| **Measures in towns/rural areas** | | | Mabjerg | Falkenberg<br>Neckarsulm<br>Weiz Gleisdorf<br>Zlin |

Figure 18: Subdivision of communities according to clusters and kind of implementation of SE-measures

## Assessment analysis

The following tables depict the assessment of each community by cluster in assessment area 6. Subsequently a comparative evaluation is provided. Even though the communities have not completed their activities and have not started applying indicators, yet, some preliminary conclusions can already be drawn.

Table 23: Comparative assessment of the integration of sustainability criteria (SE accompanying activities) in new urban development

| **Integration of sustainability criteria**<br>New urban development | Almere | Cerdanyola | Delft Harnaschpolder | Grenoble De Bonne | Helsingør | Lyon | Milton Keynes | Nantes | Ostfildern | Trondheim | Tudela | Växjö Biskopshagen | Viladecans | Zaragoza Valdespartera |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Has the community considered the socio-economic challenges related with the implementation of the CONCERTO measures? | + | ++ | 0 | + | + | + | + | + | ++ | + | + | + | + | + |
| 1b) Has the community implemented a dedicated plan for socio-economic accompanying measures ? | On-going | ++ | 0 | 0 | 0 | + | 0 | 0 | ++ | 0 | 0 | 0 | ? | + |
| 1c) If yes, was the planned approach based on a sound methodology & comprehensive, reliable data? | 0 | ++ | N/A | N/A | N/A | + | N/A | N/A | ++ | N/A | N/A | 0 | 0 | + |
| 1d) If changes were necessary to better consider the SE dimension as integral part of sustainability strategy, were these step successful? | on-going | + | ? | N/A | N/A | ++ | ? | N/A | N/A | N/A | N/A | + | 0 | N/A |
| 2a) Has the community got a socio-demographic census? Has the community realised specific supporting activities (e.g. surveys/questionnaires/studies/ focus groups/users´ training, etc?) | + | + | 0 | 0 | on-going | ++ | 0 | + | ++ | on-going | on-going | + | + | + |
| 2b) If yes, have these been helpful for the implementation of the SE measures? | ? | + | N/A | N/A | ? | + | N/A | + | + | ? | ? | + | ? | + |
| 3a) Is there an impact or a transfer of SE methods on neighbouring communities/ districts? | + | + | 0 | ? | ? | + | 0 | + | + | ? | ? | 0 | 0 | + |
| 3b) Is there an impact or a transfer of SE methods of the SE measures on observing communities? | + | + | 0 | ? | ? | ? | 0 | + | + | ? | ? | 0 | 0 | 0 |

Table 24: Comparative assessment of the integration of sustainability criteria (SE accompanying activities) in large scale renovation

| **Integration of sustainability criteria**<br>Large scale renovations and improvements in urban areas | Ajaccio | Amsterdam | Delft Poptahof | Geneva | Grenoble Viscose | Hannover | Helsingborg | London Lambeth | Turin | Zaragoza Picaral |
|---|---|---|---|---|---|---|---|---|---|---|
| 1a) Has the community considered the socio-economic challenges related with the implementation of the CONCERTO measures? | + | + | + | 0 | + | + | + | + | ++ | + |
| 1b) Has the community implemented a dedicated plan for socio-economic accompanying measures ? | 0 | + | 0 | 0 | 0 | + | 0 | 0 | ++ | + |
| 1c) If yes, was the planned approach based on a sound methodology & comprehensive, reliable data? | N/A | + | N/A | N/A | N/A | + | N/A | + | ++ | + |
| 1d) If changes were necessary to better consider the SE dimension as integral part of sustainability strategy, were these step successful? | on-going | + | 0 | + | N/A | + | N/A | ++ | N/A | N/A |
| 2a) Has the community got a socio-demographic census? Has the community realised specific supporting activities (e.g. surveys/questionnaires/studies/ focus groups/users´ training, etc?) | 0 | + | 0 | + | 0 | ++ | On-going | + | ++ | + |
| 2b) If yes, have these been helpful for the implementation of the SE measures? | N/A | ? | N/A | + | N/A | ++ | ? | + | ++ | + |
| 3a) Is there an impact or a transfer of SE methods on neighbouring communities/ districts? | N/A | + | ? | 0 | ? | + | ? | ? | + | + |
| 3b) Is there an impact or a transfer of SE methods of the SE measures on observing communities? | N/A | 0 | ? | 0 | ? | + | ? | ? | + | 0 |

Table 25: Comparative assessment of the integration of sustainability criteria (SE accompanying activities) on measures in towns

| **Integration of sustainability criteria**<br>Measures in towns / rural areas | Falkenberg | Mäbjerg | Neckarsulm | Växjö | Weiz-Gleisdorf | Zlín |
|---|---|---|---|---|---|---|
| 1a) Has the community considered the socio-economic challenges related with the implementation of the CONCERTO measures? | 0 | + | 0 | N/A | 0 | 0 |
| 1b) Has the community implemented a dedicated plan for socio-economic accompanying measures ? | 0 | 0 | 0 | | 0 | 0 |
| 1c) If yes, was the planned approach based on a sound methodology & comprehensive, reliable data? | N/A | N/A | N/A | | N/A | N/A |
| 1d) If changes were necessary to better consider the SE dimension as integral part of sustainability strategy, were these step successful? | 0 | 0 | 0 | | 0 | 0 |
| 2a) Has the community got a socio-demographic census? Has the community realised specific supporting activities (e.g. surveys/questionnaires/studies/ focus groups/users´ training, etc?) | 0 | ? | + | | + | + |
| 2b) If yes, have these been helpful for the implementation of the SE measures? | N/A | N/A | + | | + | + |
| 3a) Is there an impact or a transfer of SE methods on neighbouring communities/ districts? | 0 | 0 | 0 | | 0 | 0 |
| 3b) Is there an impact or a transfer of SE methods of the SE measures on observing communities? | 0 | 0 | 0 | | 0 | 0 |

*Designing and planning SE strategies*

The analysis of the communities corresponding to the different categories shows that most of them do not have a dedicated socio-economic plan, but single soft measures like awareness raising, information activities, training, etc. However, analysed according to the three clusters that are also used for the assessment areas for the technical measures, it turns out that most communities with a dedicated socio-economic plan that face none or only minor delays focus their activities on renovation.

In contrast, the majority of communities classified in Cluster 1 and concentrating on new urban developments face major delays, mainly because of a slow down in their demonstration projects and the fact that tenants to be addressed by socio-economic measures have not moved in yet. Moreover, although the projects are now already in an advanced stage, some of the socio-economic measures and concepts had to be adapted in accordance with contract amendments, delays in the implementation process, changes in responsibilities and similar reasons. The majority of communities classified in cluster 3 do not have dedicated socio-economic measures.

Following the comparison and analysis of the planned socio-economic and soft measures, concepts that include measures focusing on all three pillars of sustainability (social, environmental and economic components) are comprehensive. Ambitious and dedicated concepts cover all stages of the project process, from initial information towards the stakeholders and definition of a baseline for evaluation of the measures to the use of defined indicators for evaluation of the measures. In ambitious concepts, responsibilities have been clearly defined from the outset. Such concepts were tailored from the very beginning to the specific characteristics of the project.

Dedicated concepts for socio-economic and soft measures have been mainly proposed by communities from the projects POLYCITY, act 2, Renaissance, Ecostiler and cRRescendo.

A good example for an ambitious and dedicated concept is provided by Turin (POLYCITY). This project deals with the implementation of a district heating network and refurbishment activities in the urban district of Arquata, including PV. Starting point of the socio-economic measures is the so-called District Contract, a detailed programme including several measures of urban and social rehabilitation such as the refurbishment of the council buildings, the realisation of green areas, the creation of common spaces dedicated to social activities, social and occupational development of the district, the improvement of mobility and the creation of small commercial spaces. Evaluation of the impact of the project includes social, environmental and economic aspects surveyed at the beginning and the end of the activities using a wide range of methods (questionnaires, focus groups, diaries, monitoring data from technical part of the project, analysis of energy bills and real estate values, etc.).

Other projects have either a very focused socio-economic and soft measures concept, like London, where a large part of the socio-economic activities concentrated on the involved schools, or -as in Amsterdam- a focus on economic aspects of the refurbishment process.

Whereas in some communities the original concept could be implemented without too remarkable deviations, in other cases the concept had to be adapted because of changes in

the demonstration objects. This mainly applies to communities with urban development like Lyon and Zaragoza. In Lyon, for example, most of the initially planned socio-economic activities were intended to address the future tenants of the new built flats. However, delays in the implementation required that the concept had to be adapted. In this case, the participation in the socio-economic workshop organised by CONCERTO Plus in June 2008 has been an important impulse for the planning and development of a new concept.

The communities in the ECOCITY project concentrate on general social aspects of sustainable energy production, including acceptance issues on RES and RUE and environmental psychology and education. In Helsingör, Trondheim and Tudela surveys have been initiated and focus especially on the involvement of the communities in project activities such as awareness raising campaigns.

Additionally, there is a wide range of projects and communities that did not plan to implement dedicated socio-economic or soft measures and therefore no comprehensive concept exists. These projects are: energy in minds, TetraEner and sesac.

According to their socio-economic and soft measures concepts, the CONCERTO communities have been mostly interested in the following topics:

- Acceptance of and satisfaction with the measures (of different stakeholders)
- Information, dissemination and training for different stakeholders
- Stakeholder involvement in the implementation process
- Increase of living and working conditions, comfort level, etc. (indoor and outdoor)
- Economic development in the CONCERTO area (new jobs and businesses, neighbourhood growth, increase in real estate value, etc.)
- Cost effectiveness of the planned and implemented measures
- New markets for renewable energy and energy efficiency technologies
- Change of behaviour of the inhabitants (combined with results from technical monitoring) and participation in energy consultancy or monitoring
- Influence on future projects, building tenders, etc.

These areas of interest together with the implementation of the respective measures and their evaluation have also been considered and mapped in the socio-economic matrix. Many of these topics are of particular interest for most communities from cluster 1 (urban area development) and cluster 2 (large-scale renovations and improvements in urban areas). Refurbishment projects focus their research more on comparison between the original situation and the situation after the completion of the demonstration activities. In fact, involvement, information and training of tenants, increase of comfort levels and change of behaviour are topics addressed in most of the communities focusing on refurbishment of residential buildings, like Hanover, Turin or London.

Projects that concentrate on new urban developments are lacking a baseline for tenants satisfaction, comfort levels or change of behaviour. They can only analyse the behaviour of the tenants after they move in. On the other hand, information and training, acceptance of the

deployed technologies, economic development of the district in terms of businesses, jobs and public facilities are of key interest in communities such as Ostfildern, Lyon, Cerdanyola and Zaragoza.

In Lyon, for example, the socio-economic activities are based on a 3 steps model. The first step analyses the market for sustainable flats through the sales agents and provides information, which they can use for their marketing and sales negotiations. The second step addresses the tenants at the point when they move into their flats, providing an information booklet and asking them to take part in a survey. Finally, in the last step the tenants are informed within training sessions more in detail about the CONCERTO area, their flats and the technologies used. Another set of questionnaires and interviews is conducted, focusing on living conditions.

Communities from cluster 3 (towns/rural areas) as well as communities with no dedicated socio-economic concept in their contract often focus their interests on very specific topics. These are for example information, environmental education, dissemination and training, economic conditions and markets for one specific technology (as in the case of Mabjerg – biogas, or Geneva – district cooling/heating) or participation in energy monitoring (for example in energy in minds projects or in smart metering studies in Växjö/sesac).

*State of implementation*

The implementation of socio-economic measures is more advanced in communities with a focus on refurbishment activities. In most of the refurbishment projects, the socio-economic and soft activities accompany the whole process, starting with information campaigns and surveys even before the demonstration activities start.

As many demonstration activities focusing on new construction face delays, the related socio-economic and soft measures also have implementation difficulties. However, for projects that concentrate on new buildings or green field urban developments, the delays concerning socio-economic measures are even more significant because they mainly start after the construction activities have finished and the inhabitants start to move in.

Socio-economic activities and concepts are developing more smoothly when there is a dedicated concept and an experienced project partner in charge of it. Projects teams without socio-economic experts involved were more reluctant to undertake socio-economic measures or were just inexperienced so that they did not know how to plan and implement their activities. In these cases, the two socio-economic workshops organised by CONCERTO Plus as well as the sessions dedicated to socio-economics at project meetings and during site visits turned out to be helpful.

Broadly speaking, it can be claimed that the accompanying socio-economic and soft measures have had positive to very positive effects on the implementation of the demonstration activities. Due to information and increased acceptance, adjustments to the needs of the target groups and involvement of inhabitants and stakeholders, the implementation also of very complex measures has advanced. Surveys amongst the stakeholders allowed to react to problems and to dissatisfaction and prevent major difficulties. Thus, even communities that at the beginning were reluctant to undertake any socio-economic activities, now concede that these are important to achieve better energy consumption awareness; to reach a wider acceptance and satisfaction for the implemented measures; to obtain knowledge about the

economic and environmental impact of the CONCERTO measures and quality of life aspects; to help change attitudes and behaviour regarding RES and RUE and to inform about a variety of energy saving measures and its impact on the reduction of $CO_2$-emissions.

Consequently, the implementation of measures affecting the inhabitants have been well accepted in communities where the tenants have been informed and involved in the activities from the very beginning. Examples for this are the refurbishment activities in Turin and Hanover.

The success of surveys on tenants´ attitudes did depend on the method chosen. Methods that included personal contact either for example through interviews or a personal delivery of a questionnaire did achieve a higher return rate than methods where a questionnaire was sent by email or mail. Successful surveys have been carried out in Ostfildern and London for instance, while in Almere there have only been very few answers to an email campaign.

Due to the accompanying socio-economic research, it has been possible in some of the communities to identify problems at an early stage and react to these problems either by adapting the project activities or by taking these aspects into account for further activities. An example is a survey carried out in Ostfildern. This showed that generally inhabitants were satisfied with the biomass CHP plant in their district. However, people living very close to the CHP plant felt disturbed and were less satisfied. This important finding will influence participation and information processes in the future. In London, a survey on tenants' satisfaction with their living situation and level of pride for their district showed shortcomings in one of the two areas. Therefore, it is planned to improve future activities on that issue to make a positive impact on this situation.

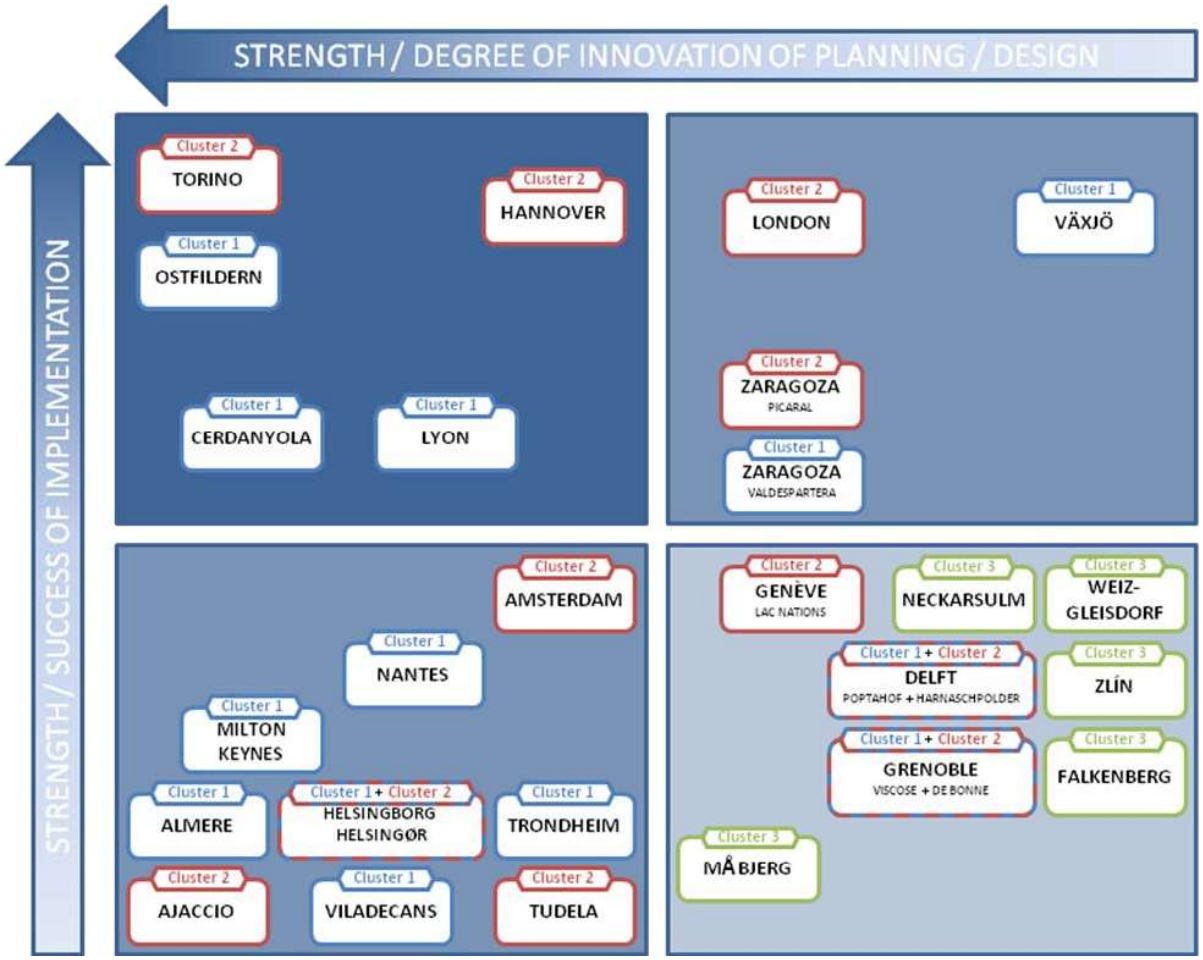



Figure 19: Integration of sustainability criteria / level of implementation

# 5 CONCLUSIONS and key lessons learnt

The implementation analysis has taken into account the influence of a number of internal and external factors on the realisation of the planned measures. The general assessment confirms the initial hypothesis that planning procedures and both quality and pace of implementation strongly depend on general administrative and legislative framework conditions and project types. Commitment of local administrations, a reasonable mix of stakeholders, choice of accompanying activities such as dissemination of information, use of appropriate communication tools, identification of the right target groups, level of awareness raised in the communities, participation of relevant decision makers, user groups and market actors have also proved to be important success factors.

Especially stakeholder direct involvement can turn out to be a decisive prerequisite for a successful venture. In reality, it is quite difficult to let actors not directly involved in a project sign a third party agreement as the procedures are often very long, construction as such quite complex and the leverage of financial incentives somehow limited. All of these reasons discourage construction partners to "formally" participate in projects, even if they are fully aware of the benefit of the project in general.

In the course of the assessment described in the previous chapters, various evaluation steps have been taken. By drawing conclusions, consolidated findings with a certain “transferability” value will be illustrated in terms of lessons learned and good practice stories will be sketched in order to give CONCERTO actors and other communities in Europe the opportunity for capitalising on these experiences.

## 5.1 Key lessons learnt

The analysis and evaluation carried out in the previous chapters have provided insight into why certain targets are or are not being accomplished and have identified and investigated reasons for the progress / delay of a project. Although the success of communities in promoting sustainable paths and a variety of measures has taken place based on a unique set of circumstances that would be impossible to directly replicate in their entirety, important lessons can be extracted and experiences used to promote the uptake of sustainable paths within similar communities.

This session summarises the findings presented in the previous chapters on the planning and implementation process and highlights lessons learnt which can be used for addressing similar problems. The lessons learnt are subdivided into 6 large areas as outlined below:

a. Planning and Implementation process/procedures
b. Local /regional/national context/administrative/institutional framework
c. Stakeholder mix and involvement
d. Choice of accompanying activities: dissemination, training and socio-economic measures
e. Technology specific factors
f. Outreach/applicability/scalability of the projects

**a) Planning and implementation process/procedures**

Even well-planned and designed projects need to be fine-tuned in the initial months of operation and data needs to be continually analysed to make improvements along the way. Quality control mechanisms on construction sites are decisive to ensure that ambitious energy performance requirements are reached in practice.

Difficulties and delays have mostly occurred in the implementation of large new settlements and new constructions. The implementation of these activities has often experienced legal and contractual barriers.

Implementation of projects related to issues of which the effects are not directly visible - and which therefore cannot be placed easily on the political agenda - progress rather slowly. The same applies for the implementation of measures for which standard technical solutions are not available.

During the implementation phase, shortcomings and unforeseen barriers need to be handled capably and dealt with quickly in order to be able to proceed with the project and not jeopardise its outcome. These shortcomings can include deficiencies in the design guidelines, inhabitants opposing certain refurbishment activities, construction companies not performing as required, financial shortcomings or key partners deciding to abandon the project. Likewise, success factors such as stakeholders cooperating well, finances being lined-up can help speed up the process and provide further motivation for all involved to proceed with the project and finish it according to initial specifications. In this phase, the coordination of all contractors and a continued strong project management and leadership become very important, because previously established contracts and agreements between all stakeholders need to be abided by and plans implemented.

In particular, CONCERTO projects could demonstrate that making mandatory an ambitious set of requirements (e.g. the so called development briefs) alone was not a sufficient condition for a successful implementation in case of new urban development projects involving private developers. Accompanying measures (verification of targets and technical solutions, involvement of technical consultancy, etc.) turned out to be decisive in a real-estate crisis situation. In all cases, public development projects were the most successful, which confirms the major role of local authorities in triggering off such projects.

During the operation phase, several aspects including coordination of monitoring activities such as energy performance monitoring and a continued dialogue with residents are central to ensure that the buildings perform as planned. Monitoring details in most cases have to be agreed upon in earlier project phases and the energy performance has to be evaluated for several years. The project lifetime is generally too short to allow a proper monitoring of the realised measures. The monitoring should continue at least two years after the end of the project.

In small towns and rural areas, limiting the applicability of subsidies for renovation or RES technologies in “artificial” geographical areas of the city can have some negative implications. In some communities, for contractual reasons “artificial” areas had to be defined. As a consequence, several potential interesting households or housing companies could not benefit from subsidies because the concerned buildings were located outside the “CONCERTO-area”. This is not a coherent approach for a small town. However, some of the affected stakeholders

found smart solutions: in the Czech city of Zlín, house owners within the "CONCERTO-area" could cooperate with inhabitants outside the area by giving access to their roof for installation of photovoltaic modules.

***Good practice example: Alternative implementation mechanisms***

*Not all innovation processes relate to the improvement in energy performance. A remarkable innovation concerns alternative implementation mechanisms. This has been achieved in Delft at the Poptahof building and is related to the quality process during the renovation works. According to the contracts between Woonbron housing association and the construction companies, all renovation works have to be first implemented on a test dwelling before being implemented at a larger scale on the entire building. The quality of the renovation works is then controlled by using blower door tests (to ensure the air tightness of the envelope) and IR-thermographs (to ensure the correct installation of insulation components). If failures are detected at this early construction stage, the construction companies are contractually obliged to improve their works at their own expense as long as some failures are detected. Only after this first phase, renovation works can be implemented on the remaining part of the building, considering the lessons learnt from the test dwelling. This procedure shows the importance of the developer (in this case the housing company) in setting rules ensuring high quality construction.*

***Good practice example: Tender procedures and investment risk reduction through a guaranteed demand***

*In Cerdanyola, local energy planning was accomplished before starting implementation in order to define priority areas for technologies based on pre-feasibility studies. The design, construction and operation of the community energy system (including district heating and cooling and large-scale use of solar thermal and biomass sources) was subject to a call for tender.*
*A particularly innovative aspect of the implementation concerns the tender procedures for the ESCO. In Cerdanyola, experts from universities and consulting companies played a key role by preparing the pre-feasibility studies and by providing the scientific methods for the set of requirements included in the call for tender for the ESCO. This was the solution for customising the community energy system based on the energy needs of the neighbourhood (electricity, heating and cooling) and the availability of resources. Had each single building developer chosen his own energy supply solution, there would not have been any possibility to implement the polygeneration plant in combination with district heating and cooling as it is being done.*
*The shareholder structure of the ESCO in Cerdanyola reflects the degree of risk taken by the investors. The private investor owns the main share of the company (90%). The certainty that very large consumers (mainly public buildings) will connect to the district heating and cooling networks (mainly the synchrotron facilities) has been a guarantee for a secure investment and acted as a major driver.*

**b) Local /regional/national context and institutional framework/ decision-making structure**

The characteristics of the implementation mechanisms can hardly be detached from diverse national contexts, as the context significantly affects the technical and political feasibility of

the implemented measures. The administrative implications of the implementation procedures, for example, pose different adjustment challenges to different national regulatory structures, approaches and attitudes. The analysed case studies confirm the initial hypothesis that the pre-existent structures and planning traditions influence the pace and success of implementation.

A higher degree of ambition has been possible mostly when the core decision makers, i.e. the public authority as the maker of public decision, had the power to set high-level targets in accordance with their available means. The achievement of municipal targets that are higher than national ones has often been made possible when there was a high political commitment at local level. An indicator for this commitment is the pledge by signatory towns and cities to go beyond the objectives of EU energy policy targets in terms of reduction in $CO_2$ emissions through enhanced energy efficiency and cleaner energy production and use. In fact, a number of CONCERTO communities are members of sustainability networks such as the Covenant of Mayors, Energie Cités and Climate Alliance and/or have signed the Aalborg Charter.

Participating communities do not always have the necessary financial means to implement their projects. Investment programmes are often not adequately budgeted, so that their impact in terms of new installations is limited right from the outset. However, communities and their regions have been supported by regional / national legislations and incentive schemes, such as “feed-in” tariffs, and (financial and infrastructural) backing for the rational use of energy. All CONCERTO communities benefit from the economic incentives in place for the different markets (heat, electricity and fuels) in force in their respective countries. However, for CONCERTO actors the security / reliability of framework conditions over a medium / long term are even more important than the attractiveness of support schemes for investments. Although this is not a distinctive factor of any of the communities involved, it is this interaction of local conditions with the national frameworks that has helped produce convincing track records.

The policy (national) framework should be designed to give sustainable measures a basic chance to expand on their own and become gradually more competitive and independent from public support. If the (European/national/local) policy framework thus manages to create a playground for fair competition between technologies, specific local market conditions will decide which ones are used best for different applications and segments.

Measures concerning RES integration in most communities/countries are characterised by a strong support by both policymakers and the general public. Wide acceptance is also the pre-requisite for ensuring the integration of sustainability principles in developing policies and support programmes.

Allocation of responsibility in critical issues, including site approval and authorisation procedures, vary from country to country and even region to region. Different authorities at different levels (municipal, district, regional, national) and different legislative fields (energy, environment, urban planning, waste, land-use, etc.) are involved in this process. Specific as well as general administrative and legislative framework conditions and project types influence implementation procedures and mechanisms. Unsuitably complex approval / licensing requirements during the early planning and implementation phase turned out to be the most challenging barrier encountered. To streamline and to add transparency to these procedures is especially crucial for the renewable energy sector.

Whilst policy and initiatives to promote sustainable energy are essential at the macro level, implementation and uptake depend upon key local actors and local authorities. Also, with

increasing liberalisation of Europe's energy economies, local investors and developers have more investment autonomy and power than ever before. Thus commitment of local administrations, choice of accompanying activities such as dissemination of information, use of appropriate communication tools, awareness raising, participation of relevant decision makers, user groups and market actors are crucial success factors (see Chapter 4).

Present legal and institutional frameworks are not sufficient to guide and support the home-owners to opt for complex refurbishment measures. Regulations that make e.g. refurbishment measures with especially short payback times mandatory are therefore crucial. There is a need for guidelines for contractual issues and quality control as well as detailed and standardised tendering documents to streamline procedures.

High cost of solar DHW systems in refurbishment projects (in private co-ownerships as well as in social housing) represent a deterrent for potential investors. In France, for example for social housing organisations, the total amount allowed for public grants (including regional, national or European grants) cannot exceed 80%. Nevertheless, the remaining 20% is still hard to collect.

***Good practice example: Legislative amendments***

*Efficient administrative procedures and/or institutional changes can become a major driver for the achievement of ambitious goals. Urban and functional diversity aimed by some projects (e.g. Lyon, Grenoble) has been made possible thanks to legislative amendments that required planning authorities to take a more cross-disciplinary approach, to avoid thinking in a purely zone-based manner and to consider the wider issues involved. Instruments such as the French Law on Urban Solidarity and Regeneration whereby local authorities are obliged to ensure that at least 20% of all housing available across each municipality is social housing are powerful instruments to combine social acceptability with ecological standards. Moreover, the city of Grenoble set an even higher target of 35% of social housing share.*

***Good practice example: Small community/ high ambitions***

*The Energy Region Weiz-Gleisdorf is part of the Energy in Minds! project which promotes renewable energy sources, and in particular solar thermal systems. As with CONCERTO communities, energy efficiency in buildings is a key focus in Weiz-Gleisdorf. Weiz is a member of the Climate Alliance (Klimabündnis). The Austrian town has set high targets for future years: the departure from fossil fuels and the switch to domestic renewable resources; by 2010 the town should almost be self-sufficient in generating about 90% of its energy needs. In order to achieve this target, Weiz and Gleisdorf offered additional subsidies for the implementation of EE and RES measures. These subsidies can be combined with CONCERTO funds. The energy action plan 2015 for the city of Weiz is developed and in discussion within the community council for the time being. The objective is to increase the use of renewable energy from 25% to 33% in 2015. This action plan will be transferred to other communities of the so-called Energieregion Weiz-Gleisdorf. Gleisdorf's objectives include developing the regional economy and its energy supply. Much progress has already been made, by installing PV systems, solar collectors and biomass heating systems.*

*Recently, the community Gleisdorf received the energy star award in the category of municipalities with a population of up to 10,000.*

***Good practice example: Financial support at local level***

*In Ajaccio, the urban renovation area is regarded as highest priority, which fulfils the requirements of the national agency for urban renovation (ANRU: "Agence Nationale pour la Rénovation Urbaine", created in 2003 to improve quality of life in specific areas characterised by socio-economic difficulties). It benefits from financial support for the urban renovation programme (PRU). This support is much higher than the CONCERTO funding but does not cover energy improvement measures, which are funded as part of CONCERTO activities.*

*At local level, the programme is managed by the municipal urban renewal department. As there is no local regulation fixing minimal energy performance requirements to be reached after renovation works, the municipality selected housing companies which were interested in obtaining additional financial support (in the framework of CONCERTO) to reach more ambitious energy performance levels. Another target group in the area are co-ownerships which are required to carry out a consultancy process before starting to implement renovation measures*

***Good practice example: Financial promotion at local level***

*The Hanover municipal utility (Stadtwerke Hannover – enercity) together with the city of Hanover and neighbouring municipalities and organizations established the enercity-fund proKlima in 1998. The proKlima fund represents a unique model for the voluntary, local and cooperative implementation of climate protection targets. The main tasks of the enercity-fund proKlima are to initiate climate protection projects and to provide implementation support with expert knowledge The climate protection fund awards subsidies if four established criteria are addressed: $CO_2$-efficiency; absolute $CO_2$ reduction; dissemination effects ; level of innovation.*

*The fund only supports measures that go beyond legal minimum requirements or common practice. One concrete example is the promotion of passive houses that hardly require any heating energy and guarantee highest living comfort at the same time. The range of services provided includes financial subsidies, expert information and project advice.*

*ProKlima Know-how and different promotional programmes support especially:*

- *Energy-efficient building and construction*
- *Consultations on energy-saving measures for tenants*
- *Installation of solar thermal applications*
- *Expansion of district heating and installation of combined heat and power plants*
- *School equipment, including teaching materials on climate protection and renewable*

*energies*
*In addition, proKlima provides vocational training for tradesmen, engineers and architects and supports independent quality assurance.*

*This scheme is a lighthouse example showing how climate protection can boost the regional economy. Awarded incentives have provided an important impetus for the regional building and construction industry, especially the building trades and stimulated innovations and investments of more than 300 million Euros.*

*The proKlima office awards subsidies in a direct and unbureaucratic manner within different promotional programmes. The board of trustees and advisory board decide on individual cases and projects as well as on the installation and/or changes of existing promotion programmes.*

**c) Stakeholder mix and involvement**

A proper mix of stakeholders involving both public and private actors and their active involvement has been a crucial determinant in achieving a wide consensus and to help bring the CONCERTO vision closer to the targeted groups and citizens.

The right selection of stakeholders, esp. housing companies, is crucial for reaching more ambitious energy performance levels. Even if this strategy is constrained by the fact that success of the operation highly depends on the willingness of housing associations to collaborate, a number of CONCERTO cases show that it is a path to pursue.

In several cases, municipalities provided the initial push to engage in e.g. large-scale refurbishment projects in their cities or in building new, energy-efficient buildings. Municipalities often engage in project coordination throughout all project phases (decision to operation), select key stakeholders in the public and private arena that they need to cooperate with such as other public departments and agencies, private developers, utility companies, housing associations, research organisations, construction firms, etc.

Having public entities playing a leading role has a number of advantages: financial, administrative or legislative changes affecting the original plan can usually be managed better because resulting project delays may not be as financially harmful as might be the case for private firms. They also have to act in the public interest not just regarding energy efficiency and RES, but also with regard to quality of life factors affecting communities. They are also capable of gathering large groups of stakeholders who have an interest in participating in ambitious projects because a public entity represents a guarantee that the project will be carried through to the end.

An effective integration of stakeholders in policy processes is a key success factor. This has proved crucial also in the case of projects focusing on biomass, where strategies needed better integration between different policy sectors, but especially with regards to the different steps of the supply chain (links between resource production, conversion, supply and use). A well-defined cooperation framework between administrative levels on and regional and local levels is beneficial. This framework should align efforts for biomass promotion and regulate technical and financial issues related to them. These infrastructures concern the local organisation for biomass production and supply.

Projects can take more than 5 years and keeping stakeholders interested, engaged, motivated and committed throughout the entire period can be rather challenging. Initial project objectives can change significantly which requires an adaptive, iterative approach towards project management and requires constant attention on the part of the stakeholders. Therefore, in the interest of the project, some stakeholder or stakeholder group should engage in a type of stakeholder management, which helps ensure stakeholder commitment. Theoretically, this role can be taken on by any stakeholder; in practice it has shown that those stakeholders that initiate the project or help drive project progress are best suited to take on this role. Since many projects are initiated by e.g. public administrations, housing associations or municipal utilities, these stakeholders or groups of stakeholders in cooperation tend to take on this informal role. Practices such as transparent communication and a general open-minded approach all contribute to an environment of trust that will help achieve a positive project outcome.

Naturally, as in any cooperative arrangement, conflicting interests do occur and need to be dealt with in order to avoid serious project delays due to conflicts between stakeholders. A lack of understanding of other motivations and requirements can lead to serious disagreements between certain groups of stakeholders. Imbalances between the representation of public and private entities and/or a low profile of some stakeholders can also be a source of conflict. Stakeholders also tend to invest time and financial resources in the project differently which can result in an unbalanced arrangement. All these issues can and need to be resolved which again requires good stakeholder management and a sensitivity on the part of those responsible for interpersonal and group conflicts. Conflict resolution and mediation skills as well as a detailed stakeholder engagement plan that is reviewed and approved regularly by all involved can assist in resolving a number of issues that arise in long-term, complex projects.

For a successful implementation, it has proved important that the coordinators of activities are public authorities. Public authorities are influential and committed. They are the actors with major capabilities to bind and involve a large number of stakeholders. Implementation, management, control and monitoring of the planning and regulatory tools require a capacity of intervention at local level, i.e. public institutions must act as planners, managers and supervisory bodies. First results show that the projects, which experienced a smooth implementation, are those led and coordinated by local authorities, mainly housing, environmental or urban regeneration departments of municipal administrations. The additional involvement of municipal utilities and their support in negotiating with building owners is a key success factor for planning, thus overcoming the legal barriers due to the difficulty to enforce the use of community energy systems.

In undertaking CONCERTO projects, each stakeholder takes into account a number of factors when considering an investment. These include perception of risks and uncertainties involved by adopting the measures; the discount rate used to evaluate benefits and costs resulting from the measure; future evolution of energy costs and prices. Most utilities, large consumers and the public hand have access to low-cost capital, which is not the case for the majority of investors, especially in building branch. Utilities can afford to make long-term investments, have longer payback periods, and spread the risks of individual investments across a broad range of many actions. Stakeholders such as homeowners are more difficult to motivate and are only prepared to realise projects with short payback periods.

The main challenge for public administrations taking up the lead is to mobilise actors that can influence the town agenda and, therefore, maximise stakeholder support. This is not an easy task especially since in a high number of cases stakeholders have changed. In addition,

there have been longstanding issues to work around, for example economic competition among some stakeholders (as in the case of ESCOs and existing municipal utilities or energy providers). Stakeholders may not immediately see the benefits of engaging in the initiative, may not be willing to invest time or own resources. Moreover, potential stakeholders may not even share the motivation of the initiative. It is also the case that existing networks may not allow access to influential and supportive partners. They may view what is being done as 'competitive' and block access to relevant partners. In addition, the municipal authority officers may not be sufficiently senior or well known to establish credibility.

Pro-active engagement by stakeholders has meant that they have not only accepted and acknowledged their role in the consortium or partnership, but also that they have provided additional financial, time and resources backing for the project. Additionally, they have also publicly supported the partnership and have helped to plan and fine-tune the activities based on their knowledge and connections.

Users' involvement is a key driver for a successful project. It is imperative that the end-users are proactively involved throughout all phases of the project. They need to be involved during the setting of requirements, during the design phase and to test and enhance acceptance. The involvement and the end-user participation can be decisive for success. Involvement of residents is equally important. They may read meters and report results to project coordinators or trained residents may be contact persons for other residents of an entire apartment building to provide support and technical help to others.

The promotion of energy efficiency is more effective if public administrations promote actions on their own premises. This path allows the achievements of two goals: the improvement of the energy quality of public properties (with significant economic savings) and the lighthouse function with potential replication of energy efficiency in the private sector.

***Good practice example: Establishment of temporary associations***

*Organisations acting for the duration of regeneration projects can help in reducing uncertainties as they represent as 'one-stop shop' a major reference for various stakeholders.*

*In Amsterdam, an exceptionally broad consensus was reached among all housing associations to initiate the long-term urban renewal of the "Nieuw West" area under the impulse of the municipality of Amsterdam. The main housing associations having part of their building stock in the western part of Amsterdam funded the temporary organisation "Far West" to overtake the role of the regeneration of the area until 2015. Far West substitutes every single housing association during the time the urban regeneration will take place, decides over renovation options and negotiates with tenants, the municipality and other relevant stakeholders. The building stock will return to the participating housing associations after the completion of the area's regeneration. As there is no requirement fixed at municipal level for energy performance of buildings, this is a way to have a coherent approach at community scale, for energy matters but also for example in facilitating access of tenants to temporary dwellings during construction works.*

If an initial analysis shows that significant primary energy savings can be achieved, local authorities tend to support the development of district energy concepts. This represents a

good approach to support companies (municipal utilities and ESCOs) involved in their implementation. In existing urban structures, the installation and extension of district energy systems primarily results from technical and economic feasibility studies. Projects striving for the establishment of ESCOs have in the majority of cases met restrictions and delays. In some cases, no company initially wanted to fulfil the requirements formulated in the call for tenders, mainly because of the technical complexity of the energy system. In some other cases, the legal form and shareholder structure had to be redefined many times before achieving a satisfactory solution.

Despite their evident benefits, ESCOs are not yet widespread. Barriers include a lack of integrated planning, long pay-back periods for energy efficiency investments and procurement problems. Additionally, there is still a lack of knowledge about how ESCOs can be managed. ESCO markets in Europe are at very different stages of development. Some countries such as Germany, Italy, France and Spain have large numbers of ESCOs, whereas others are just setting the initial steps. Sweden and the Czech Republic are among those countries where there has been a rapid rise in the number of ESCOs and EPCs established in recent years.

***Good practice example: Enlarging the range of stakeholders by establishing ESCOs***

***Växjö*** *Energi AB (VEAB) is an energy company created by the municipality of Växjö and owned by the local residents. It is devoted to the provision of district heating and electricity (the Sandvik bio-fuel based combined heat and power plant) as well as the implementation of energy saving measures. VEAB has a wholly owned subsidiary responsible for the electricity network in Växjö town and owns an electricity trading company, based on a partnership of several local energy companies.*

*In* ***Delft*** *an ESCO has been established to build and operate the new district heating network (there was no district heating before). The district heating company (Warmtebedrijf Eneco Delft BV) was created after a call for tender to find the main private investor. This included the municipalities of Delft and Midden Delfland as well as the four largest housing associations in Delft, thus giving a guarantee on a sufficient number of buildings to be connected. Under these conditions, the district heating company could be economically feasible. Even if the private investor is the main shareholder (97%), the definition of so called "priority shares" is the key success to ensure that the ESCO will fulfil sustainable development criteria. In fact, all important decisions related to the extension of district heating, major investments and sustainability issues have to be taken jointly by the three "priority" shareholders.*

*In* ***Ostfildern****, an innovative energy contracting model was developed between the municipal company-ESCO (Stadtwerke Esslingen) and the company ELEKTROR air systems which is the beneficiary of the ESCO concept (user of cooling energy). All feasibility studies have been accompanied by a research partner (zafh.net)). The ESCO concept is strongly focused on using waste heat from the biomass plant - especially in summer - for cooling the office building. The chiller is installed at the office building but is owned by the ESCO which is delivering chilled water as an energy service.*

*In* ***Geneva*** *for the GLN project, the ESCO is managed directly by the municipal utility SIG which is owner / designer / manager of the project. With the state which guaranteed for the financial risks taken, there was no major legal or regulatory problem, except for the financial*

*aspect (financing of the investment and the project risk) which was quickly solved.*
*The project implementation was supported by the fact that the public financial guarantee was known from the beginning. The building structure for the pumping station and the hydraulic infrastructure to supply the office buildings of SERONO were already completed in 2006. The works were financed by the private company SERONO under a public financial guarantee (ScanE – State of Geneva). The building structure was oversized and prepared to be compatible with the future construction of the GLN network which was being designed at that time. Between 2006 and 2008, the main Geneva utility provider SIG repaid the main parts of the infrastructure that had been pre-financed by SERONO.*

***Good practice example: Improving stakeholder interaction by establishing steering groups at the local level***

*In Trondheim, COWI Norway and the municipality initiated together with many local stakeholders regular local steering group meetings in order to ensure that everyone is updated on current events in the project and provides helpful insights whenever necessary. The meetings take place about every two months or as needed and attendance ranges between 6-14 people. Most of the time, the majority of stakeholders attend the meetings. Tasks include information exchange and especially updating each other on potential changes, challenges or issues that have arisen in the project. Steering group members also pass on newsletters they receive from other CONCERTO projects or CONCERTO plus and assist each other on financial reporting issues, which can be challenging for those not familiar with EC reporting rules. Steering group members report that these regular meetings have very much helped the entire project with all project-related activities and have enables all local partners to work together very closely.*

**d) Choice of accompanying activities: dissemination, training and socio-economic measures**

Extensive renovation projects for existing urban neighbourhoods are especially challenging due to socio-economic implications and resistance to changes. The challenge is to implement comprehensive renovation activities that ensure significant primary energy savings, but at the same time also guarantee an increased social cohesion, sense of place and identification of the inhabitants in the concerned districts.

Lack of information or limited knowledge on the part of users, installers, architects, planners and policy makers can restrict the introduction of renewables and energy efficiency measures in situations where they make technical and economic sense (e.g. by connecting buildings to community energy systems having a high share of RES in their energy mix). Potential users are frequently unaware of practices and technologies available. Developers, architects, and facility managers are often prejudiced about new or unknown technologies.

Accompanying "soft measures" have positive effects upon the implementation of the CONCERTO activities. In most refurbishment projects, socio-economic initiatives accompany the whole process, commencing with information campaigns and surveys even before the demonstration activities start. Targeted information and increased levels of acceptance, thanks to the involvement of inhabitants and stakeholders, are found to have facilitated the implementation even of very complex measures. These include dedicated communication plans, awareness raising schemes, activities to increase the involvement of inhabitants (particularly in the case of renovation programmes), and stimulating the participation of relevant decision makers, market actors and user groups.

In the case of blocks of flats, refurbishment activities, esp. retrofitting the building envelope and simultaneously converting individual heating systems to a centralised district heating system often lead to difficulties in comparing energy bills before and after the conversion and misunderstandings concerning the resulting higher standing charge and instalments. As a result, retrofitting measures are often opposed by tenants. Early tenant information on the refurbishment activities, especially concerning changes in rent, energy cost and additional cost to be covered by the tenant and targeted information material helps to increase acceptance.

Due to the accompanying socio-economic research, it has been possible in some of the communities to identify problems at an early stage and react on these problems either by adapting the project activities or by taking these aspects into account for further activities.

Even communities which were initially reluctant to undertake any socioeconomic activities, concede that such activities have helped to improve energy consumption awareness, to obtain wider acceptance and satisfaction for the implemented measures, to build up knowledge about the economic and environmental impact of the CONCERTO measures and about their effects on quality of life, and to change attitudes and behaviour regarding renewable energy sources and rational use of energy.

Environmental perception and energy saving behaviour vary according to the populations' composition, demographic structure (age, level of studies and occupation) as well as the dominant life styles. Experience shows that information (provided accordingly to a dedicated communication plan) helps inhabitants to adopt a more ecological life style. In most cases they improved their practical knowledge about renewable energies and learned about technical solutions to save energy. Participative approaches involving residents in the

renovation process and customised energy counselling are important factors for a successful implementation.

The analysis of investment potentials shows that in a number of cases non-energy-specific potentials outweigh energy-specific potentials. As a result, a general marketing strategy for new sustainable investments should be based on fundamental site-related factors as transport, public infrastructure, market potential etc. rather than on energy-specific factors alone. Experience shows that in the decision process of investors, general site-related factors such as transport, public infrastructure, market potential etc. by far outweigh the ecological potentials within the project framework. A number of cases showed that investors are - and this is similar to the inhabitants' point of view - generally not willing to bear additional costs for more advanced energy related solutions as compared to conventional solutions.

***Good practice example: Involve, inform, form***

*In Turin the implementation process has been characterised by a participative process involving tenants, citizens´ agencies and local authorities which is also co-funded in the framework of a scheme called "contratto di quartiere". This is a detailed programme including several measures of urban and social rehabilitation such as the refurbishment of the council buildings, the realisation of green areas, the creation of common spaces dedicated to social activities (district 'living-rooms'), social and occupational development of the district, the improvement of mobility and the creation of small commercial spaces.*

*A user-centred approach has been applied in the different implementation phases of the project (the design, implementation, training and monitoring stages) to involve all stakeholders at every stage. The rehabilitation process has taken special care of including the citizens living in the neighbourhood. The bottom up approach and the involvement of the target group guaranteed by the so called "District Contract" binding local inhabitants and administrators (ATC and Municipality of Torino) in a concerted gradual rehabilitation process has proved successful. The strategy envisaged: strong identification of the inhabitants with the rehabilitation process; balance between appropriate management of public real estates and sustainability of the costs for underprivileged people; participation as the method for the implementation of the measures.*

*The CONCERTO area in Turin encompasses the old working class district Arquata. This is located close to the city centre, but is separated by physical barriers from the rest of the town. Within CONCERTO, several of the council buildings in the area have been provided with space heating and warm water which was either lacking or was provided by very inefficient electrical and fossil fuel boilers before the CONCERTO initiative. As the project had to deal with the difficult task of introducing district heating/cooling networks in a densely populated area, socio-economic and soft measures have been indispensable to involve the citizens living in the district.*

*An image campaign was initiated at a very early stage of the project in December 2005. The approach motto can be summarised as: to involve, to inform, to form all stakeholders involved in the project. In particular, a representative sample of inhabitants was involved (nearly 100 families) to provide a communication support aimed at ensuring the most effective use of the innovative systems, to save energy and reduce costs. Thus some*

*inhabitants have been trained to help filling the questionnaires, interview neighbours and carry out surveys. Inhabitants trained to interview tenants that act as multipliers were valuable to speed up the construction process, to take the pressure off the site supervisors and to increase the social acceptance of the measures.*

**e) Technical matters**

***High buildings quality***

The CONCERTO initiative has spearheaded a number of important innovations throughout the sustainable building sector. One of the most significant relates to quality control during the construction process. Making sure that quality standards are maintained by each successive participant in the building process is crucial. The CONCERTO mechanisms put in place during renovation works and new building construction, help to ensure that buildings are of consistently high quality and perform according to the targets which their design characteristics are intended to reach. Ensuring high building quality is a necessary condition allowing buildings to actually perform according to their design characteristics. In many cases, the technologies used on construction sites are not compatible with the high quality of construction required for the buildings. Improvements are then necessary.

***Good practice example: Quality assurance through energy assistants***

*The joint effort of renovating the existing building stock and improving quality of life in existing neighbourhoods presents municipalities with the challenge of targeting both quantity (i.e. a high number of buildings renovated) and quality (i.e. a high energy performance level reached after renovation). This is especially difficult for one-family houses as generally homeowners are more difficult to motivate and are only prepared to realise projects with short pay-back periods.*

*In Hanover, the home owners of the CONCERTO areas (districts Ahlem, Vinnhorst, Hainholz and Vahrenwald) could benefit from the services of the so called "Energy Assistant". The "Energy Assistant" was first introduced by the Climate Protection Agency in Ahlem with a consultation campaign called "Gut beraten starten!" (Starting well advised!). The "Energy Assistant" supported owners who wanted to retrofit their buildings in an energy efficient way by offering an initial consultation, helping to apply for funding, calculating energy balance and providing quality assurance for the retrofitting activities. Owners that applied the CONCERTO standards by retrofitting received a voucher of 2,500 from the Energy and Climate Protection Unit of the city of Hannover, which is 100% financed by the enercity fond proKlima.*

***Good practice example: Simple devices/strong effects***

*In Växjo, the social housing company "Växjöhem" is building small apartment buildings in the new developed district Biskopshagen. Each 2-storey building will consist of 4-6 apartments. The bearing structure is made of concrete and the façade wooden panels*

*containing one insulation layer are prepared in a small prefabrication tent on the construction site. The use of a tent was meant to protect the construction site, especially the timber frame buildings from weather variations. This device resulted in being a guarantee for better working conditions and higher construction quality. The last insulation layer is put over the whole envelope after all panels have been installed and the external shell consists of wooden planking. One building on site is also used as a 'Test and Training Building' were construction personnel are trained in the new aspects of the low energy buildings (air tightness, fitting of insulation etc.)*

***Photovoltaics, solar thermal systems and wind projects***

The implementation of integrated PV is a measure facing almost no barriers from social, technical, but also economic perspective. Because of attractive feed-in tariffs, in many renovation projects, photovoltaics is seen as an opportunity to finance part of the renovation works. In some cases, the benefits of selling electricity to the network operator are associated with a reduction of running costs for tenants: electricity costs for the common parts of the buildings are not paid by the tenants, but covered by the revenues accruing from selling electricity. A direct association between installation of photovoltaics and reduction of running costs contributes to increasing the acceptance of tenants towards renewable energy technologies.

Except for one case, where a large-scale wind turbine venture could be successfully implemented, because all administrative and authorisation procedures were clarified at the beginning, implementing large wind projects has proved difficult. Implementation barriers could not be overcome during the project time because of spatial planning limitation, acceptance and national energy planning reasons. In contrast, small-scale wind turbines in urban environment could be implemented in one case as part of a demonstration and research project, in another case wind turbines were specified in the development brief, no developer could be found.

***Integration of single technologies in large scale energy systems- District heating and polygeneration***

In densely built urban neighbourhoods, a connection to district heating is in many cases an opportunity to substantially improve the primary energy balance of buildings. In fact, many district heating companies use heat from CHP plants or include a certain share of renewables in their energy mix, thus achieving low primary energy factors. In the past, many municipalities have enforced district heating through mandatory connection to the network and inclusion of district heating areas in the master plans. However, the liberalisation of the energy market has rendered the use of municipal paths such as a mandatory connection more difficult. Nonetheless, different incentives can still be developed locally.

CONCERTO communities demonstrate two implementation approaches to encourage district heating connections during renovation works: a "third party participation approach" and a "mandatory/regulative approach". The first approach consists in including potential customers (large building developers) as shareholders in the district heating company in order to

motivate the connection of their housing stock to the district heating network. By involving large housing associations as shareholders, district heating companies can have the guarantee that a large share of the local building stock will be connected to district heating. The second approach consists in including district heating connection as a condition for obtaining a specific financial subsidy for building renovation.

Some energy technologies still have to be further optimised with regard to their integration into community energy systems. In particular, the performance of district heating systems integrating absorption chillers for chill water production still has to be improved. In concepts based on solar thermal, heat pump technologies and seasonal heat storage, there is still a high potential for optimising the performance of the system.

***Availability and visibility of data and monitoring***

Insufficient data quality and an unsuitable data structure at local/community level represent crucial barriers. Decision making in relation with local energy planning requires consistent data on resource availability, actual building stock and energy use. Difficulties can arise mainly because of limited interoperability of data gathering systems and databases and non-technical issues (data confidentiality and data property). In many cases, it is not possible to define quantifiable objectives that can be verified in practice. Acceptance clauses in rent or sales contracts for communicating personal energy use data would be beneficial and are sometimes implemented. The experience from the Netherlands shows that facilitating access to statistical data and improving quality and structure of statistical data related with energy use in the built environment is a possible path (energy use data provided by the National Office of Statistics on the basis of ZIP codes or by the electricity distribution network operator).

Some building monitoring systems are unsuitable and lack interoperability. In tertiary buildings, monitoring systems and their coupling with facility management still have to be improved mainly in regards to interoperability between systems and post-processing of monitored data.

The question of who should take over monitoring activities at community scale in future still has no systematic answer, as it always depends on the type of measures implemented and to be monitored.

***Good practice example: who should take over monitoring activities?***

*- In case of public institutions owning and operating a large number of building (municipalities), building energy monitoring concepts should be implemented in the buildings characterised by particularly high specific energy ratings. The first step consists in realising an energy bookkeeping for all building in order to select the prioritary buildings where a building energy management system is necessary. This can be done through benchmarking of buildings of the same type, as in the case of all public schools in the Energieregion Weiz-Gleisdorf. In a second step, commercial systems integrating facility management and building energy management functionalities should be implemented in the buildings characterised by complex energy system and usage schedules.*

*- In case of large housing companies (private, public, social housing) renting the majority of their flats, systematic energy monitoring approaches should be implemented over the entire building stock by the housing company itself. This does not mean that it should be the task of the housing company to install energy displays in each flat as in the case of Falkenberg, but systematic and replicable procedures for collecting and analysing data available for instance at municipal utilities should be defined, following the example of Hanover. Energy use data should be monitored for space heating and domestic hot water preparation as well as for electricity use in public spaces.*

*- Electricity use of private households should be made available by the network operator as it is done in Växjö, since this data is relevant also for the network operator itself to manage efficiently the network.*

*- In case of new urban development activities or large scale renovation programmes where municipal utilities or ESCO take over the task of energy supply, energy use monitoring should be integrated with the community energy management system, if available.*

*- In case of small scale measures implemented in towns and rural areas (for instance the renovation of one-family houses or the installation of solar thermal collectors or biomass boilers), an automatic energy use monitoring system should not be put into operation unless a real-time energy management programme is implemented at community level (there is no example of such type of project in CONCERTO communities). The institution providing the financial support for the measures (local authorities) has the task to coordinate monitoring activities. Like for the communities participating to the project Energy in minds!, questionnaires should be used to gather the initial energy use of the building, mainly motivating house owners to record their past energy bills. If manufacturers do not include telemetering functionalities in their devices to inform end-users on the performance of their energy system, it should be the task of the end-user to collect manually energy use figures. The communication of these figures to the financing institution should be part of the funding contract, as a condition for obtaining the subsidy. This has been successfully implemented in Falkenberg.*

***Good practice example: actual energy use made visible***

*The POLYCITY communities have developed and implemented an energy management system, for two of the three project sites: Turin and Scharnhauser Park in Ostfildern (the community energy management system in Cerdanyola has not been implemented yet at the time this report is being written).*
*With the aim of visualising all energy flows in the project area of Scharnhauser Park, a geo-information system (GIS) has been established. This generates and displays descriptive information about energy consumption of all houses and production data. The development of the GIS is based on actual data from buildings that is being recorded in a data base. The building data covers both the characteristics of the buildings and the key data about the energy consumption levels for heating.*

*The geo-information system offers a good solution for understanding the energy consumption patterns of entire neighbourhoods and therefore allows an optimised use of available renewable energy sources (not implemented at the time this report is being written). Thanks to the GIS, resident and interested public can see on the public web site the heat consumption (and thus control their current heating habits), and the potentially available roofs for photovoltaics on the buildings located in Scharnhauser Park.*
*In order to make the energy use levels more visible, a systematic energy bookkeeping has been implemented in many public buildings. Heating energy, electricity and water use in the most energy-intensive buildings are closely monitored, and these records are saved in the long term. Thus, it becomes possible to reconstruct the success of energy-saving efforts, which can be quickly passed on to maintenance personnel and consumers. Within 18 months, these few simple and inexpensive saving measures have already led to a reduction of more than 20 % compared to the former electricity use, which was constantly increasing. This measure is accompanied by an automatic reporting procedure, including warnings about unusual levels of energy use (by comparing actual energy use figures with expected figures from simulation for instance). In this way, the effects of the user's behaviour on energy use can be specifically addressed.*

***Good practice example: Regular check of key indicators for quality standard***

*An important step in ensuring high construction quality is to check frequently certain key indicators, which guarantee that the defined quality standards are being met. The most common methods involve using infrared thermographs to verify that insulation components are correctly installed and that the main thermal bridges have been removed. Another test (blower door tests) consists in measuring the air-tightness of the building envelope. In some countries such as Austria, it is already a pre-condition to achieve positive results on blower-door tests to obtain funding for the housing sector. Elsewhere in Zaragoza, Spain, procedures are being developed in the framework of CONCERTO to include the results of such tests in certification documents. Among the 18 buildings inspected in the framework of the Renaissance project, only 4 had failures with regard to thermal insulation quality.*

### e) Outreach/applicability/scalability of the projects measures

The CONCERTO cities have developed effective implementation approaches and activities that can be replicated by other projects. Communities and stakeholders have been active in promoting the benefits of the project also to other communities. Active promotion of CONCERTO vision and objectives through stakeholders has resulted in transfer of good practices from one community to another and has motivated associated communities.

Some innovative implementation approaches focus on specific training programmes for on-site workers, while others involve frequent verification of the quality of construction works. In some cases, the measures are implemented voluntarily, but the most advanced cities have included contractual obligations for construction companies towards building developers in terms of quality assurance.

One of the key advantages of the experiences associated community has been to learn about the organisational steps involved in moving to cleaner, greener energy use at the level of the community. The observers have learnt that it is important to have all stakeholders on board from the start, and to have a clear road map for the entire project.

Most associated communities have begun to take concrete actions, which will help them to pursue the same goals of energy efficiency and maximum use of renewables as the participating cities. These range from feasibility studies and research into financing possibilities to training and networking for interested stakeholders and dissemination campaigns targeting the citizens. Several observer communities have drawn up their own energy action plan, which is the first step in the direction of sustainability.

***Good practice example: Dissemination among project's communities and beyond***

*The collaboration and increasing interdependency between the three cities participating in the SESAC project led to a platform where knowledge could be exchanged. In this regard, Grenoble can be considered as an example for the erection of ecological housing in the Växjö suburb of Välle Broar. The use of wood as the main construction material, in combination with mechanical ventilation in the flats, leads to a very high level of heat recovery in Välle Broar.*

*In Lyon, training for site workers on the CONCERTO demonstration area is provided following the model of the SESAC project in Grenoble, where this concept was first implemented. The local energy agency (ALE) initially contacted the building companies. Then a training approach was defined and financial and technical partnerships were initiated with the national and regional agencies responsible for funding and organising training programmes in the French construction sector (AREF-BTP and AFPA). Now the first companies have joined the training programme. Courses last about 18 hours and focus on technical topics such as thermal insulation, water and air tightness etc. They also target interdisciplinarity: specialised workers need to have some knowledge about the work done by their colleagues from other technical fields in order to better coordinate their activities, thus contributing to improve construction quality. The trainings take place on the construction site and are supported by practical examples. Participation is free of charge and the salaries for the workers are covered.*

## 5.2 Remaining challenges

The majority of projects/communities are just concluding their fourth activity year. Although the implementation level for the largest majority is quite advanced, a number of communities are still confronted with a number of complications regarding the implementation. Difficulties have been encountered more often in the case of projects dealing with new development than with large refurbishment and are of both of endogenous and exogenous nature. Also for this reasons, most projects have been granted a year extension for their completion.

Exogenous factors, such as the economic crisis have provoked serious worries for demonstration projects. In some communities, especially in France, the effects of the crisis have been further aggravated by a rise of around 20% in the price of building materials,

which discouraged many investors from starting large retrofitting projects or investing in renewable energies. In most CONCERTO countries, local authorities face financial difficulties, as the global banking and property crisis has reduced tax revenue and provoked deficits in municipal budgets. This is further aggravated by the fact that at community level the funding of CONCERTO demonstration activities is in competition with other economic and social priorities and interests. Although public-private partnerships and contracting models are proving to offer good alternatives for financing efficiency measures in public buildings, their application is still negligible.
The evaluation of the economic attractiveness and the convenience of implementing a given CONCERTO measure depend on the perspective and priorities of each stakeholder. This is especially evident if one considers the demand side in its complexity (which includes energy consumers, non-consumers and the energy sector) and the different parties involved in energy-related investments, e.g. the energy service and generation sector, the construction sector, the users and society. Additionally, many stakeholders, especially in the private sector, are now reluctant to make additional investments in energy efficiency because they lack capital. In the refurbishment field, for example, a certain measure might be very cost effective, with reasonable payback, but it will not be implemented unless the investor can meet the direct capital costs. Furthermore, it is often the case that the one who pays the energy bill is also the one responsible for the selection and purchase of energy-saving measures and equipment.

This conflict of interest between investors and users has existed for a long time, but has come particularly to the fore in the course of the economic crisis. Investment cost will be minimised if a building is constructed to be sold, because the new owner or a tenant, respectively will pay operation cost. These are lost opportunities concerning energy savings, taking into account that a little increase in investment cost will result in large cost and energy savings during building operation. For the time being, life cycle cost assessment will only be carried out if the investor in the building is the user at the same time. Therefore, investments in energy efficiency measures and in renewable energy technologies are still limited. This conflict of interest poses a major barrier for the breakthrough of energy efficient buildings, and has to be addressed by tailored policy instruments. This issue becomes even more important due to the implications to be expected in the course of implementing the EPBD Recast. In order to achieve “close to net zero energy buildings”, efforts have to be made regarding energy efficiency measures and renewable energy technologies, probably resulting in increased investment costs.

The same applies, on the energy efficiency side, to demand side management (DSM) programmes. These are promising, but need to consider the diversity of actors involved and the different perceptions with regard to costs and benefits, along with risks and uncertainties of each DSM measure.

The Concerto programme requires a one-year monitoring phase, which is definitely a step forward in creating data on the European construction sector. However, the challenge of data availability remains unsolved in terms of really reliable information, because in the first year after having completed refurbishment or construction, energy consumption data are biased due to adjustments that are taking place as a matter of principle. In fact, monitoring actual energy consumption is of paramount importance because it paves the way for new policy instruments and economic models. Monitoring devices and feedback systems to be installed

on a permanent basis offer new opportunities as well as smart metering technologies. However, issues concerning consumerism and privacy have to be tackled to fully tap the potential of these developments.

A large share of the European residential building stock in cold climates is connected to district heating grids. Especially in cities, district heating is an environmentally friendly heat supply option: in most cases, it makes use of waste heat from CHP plants and waste incineration plants, and air pollution is limited to a centralised production site where efficient pollution control mechanisms can be implemented. However, due to the existing tariff systems with a large base share that is independent of the actual energy consumption, it is hardly financially attractive for grid-connected buildings to reduce energy consumption through ambitious refurbishment measures or new construction of very energy efficient buildings. It will be indispensable to address this barrier, in order to facilitate the break-through of energy efficient buildings.

In this respect, it is necessary to intertwine energy efficiency end renewable energy production on the building level, and regional planning issues. This challenge remains unsolved.

A number of cities have attempted to implement holistic projects in order to shape city districts according to ecological sustainability, with lower energy use and a high degree of integration of renewable energy. Regrettably, only a limited number of projects/communities have integrated the citizens. A future challenge in the remaining activity years will be to engage the inhabitants of the participating cities, inform, and educate them about questions regarding energy use and the impact of the CONCERTO measures. It is crucial that local administrations start/continue to integrate energy planning with existing local energy planning and regulatory tools related to urban management, building rules, etc. This approach enables the implementation of a comprehensive project, coherent with the socio-economic development of the community and with its environmental and ecological characteristics.

The major endeavour for the communities (and for CONCERTO plus as a platform) in the remaining years of the CONCERTO programme is therefore to ensure that the implementation of the technical measures will be coupled by a better visibility of the activities already undertaken and to flank and reinforce them by serious, visible monitoring and outreach activities, in order to state good examples and obtain higher levels of recognition. In fact, a wide acceptance and understanding is and remains the main prerequisite for ensuring the integration of sustainability principles in implementing policies and developing future support programmes.

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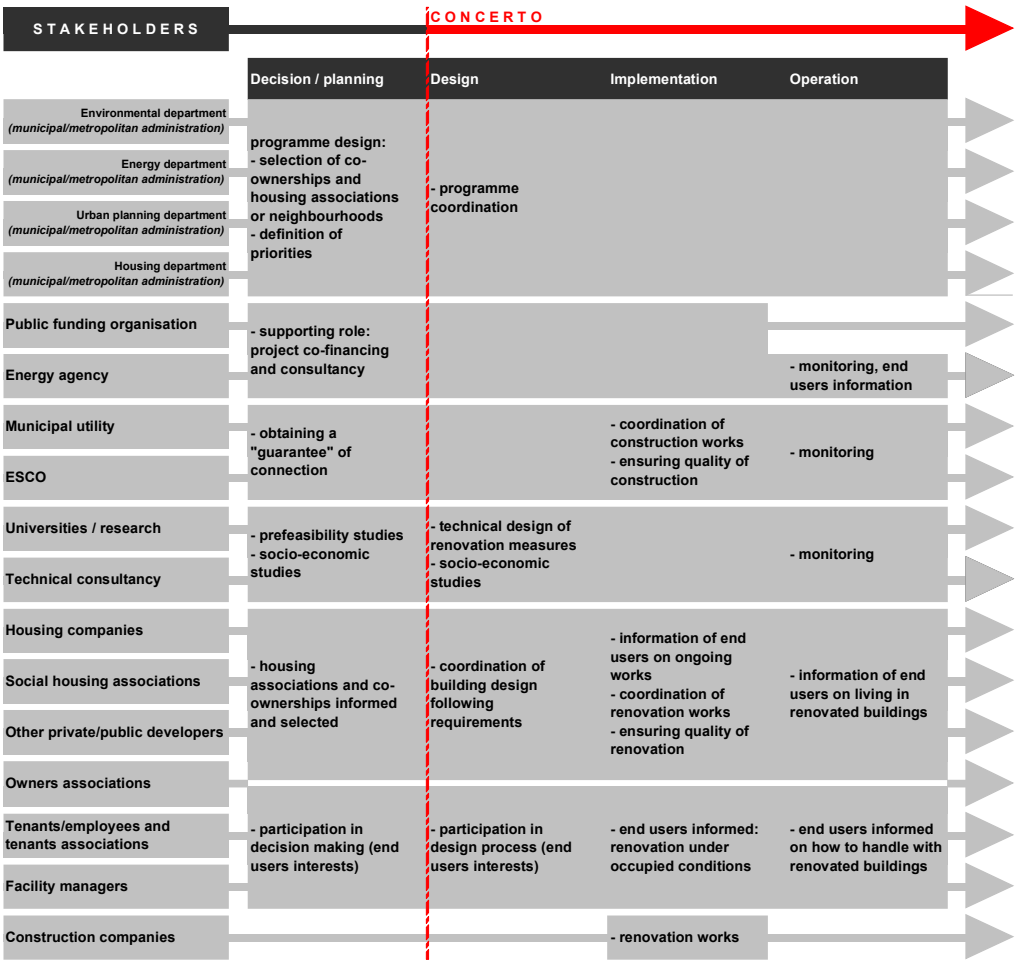
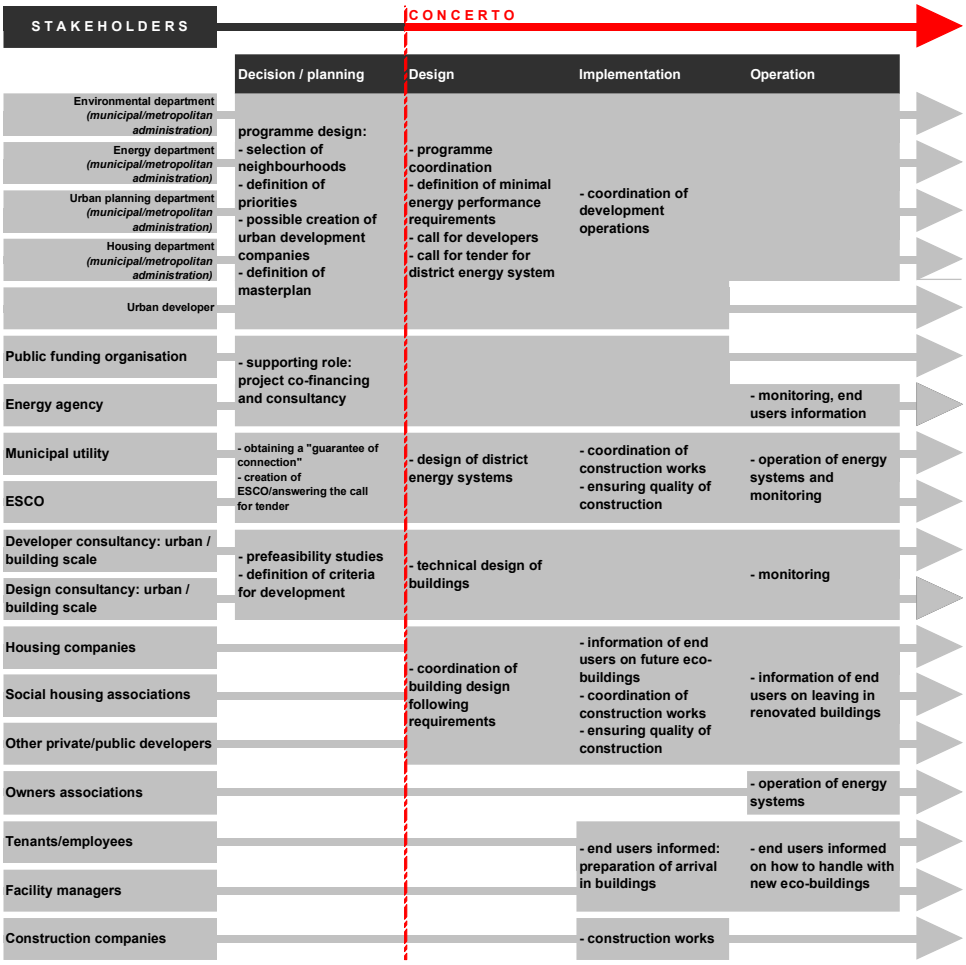
# Appendices

# Annex 1 to Planning and implementation process assessment report: Synopsis of planning and implementation process diagrams

# General_R

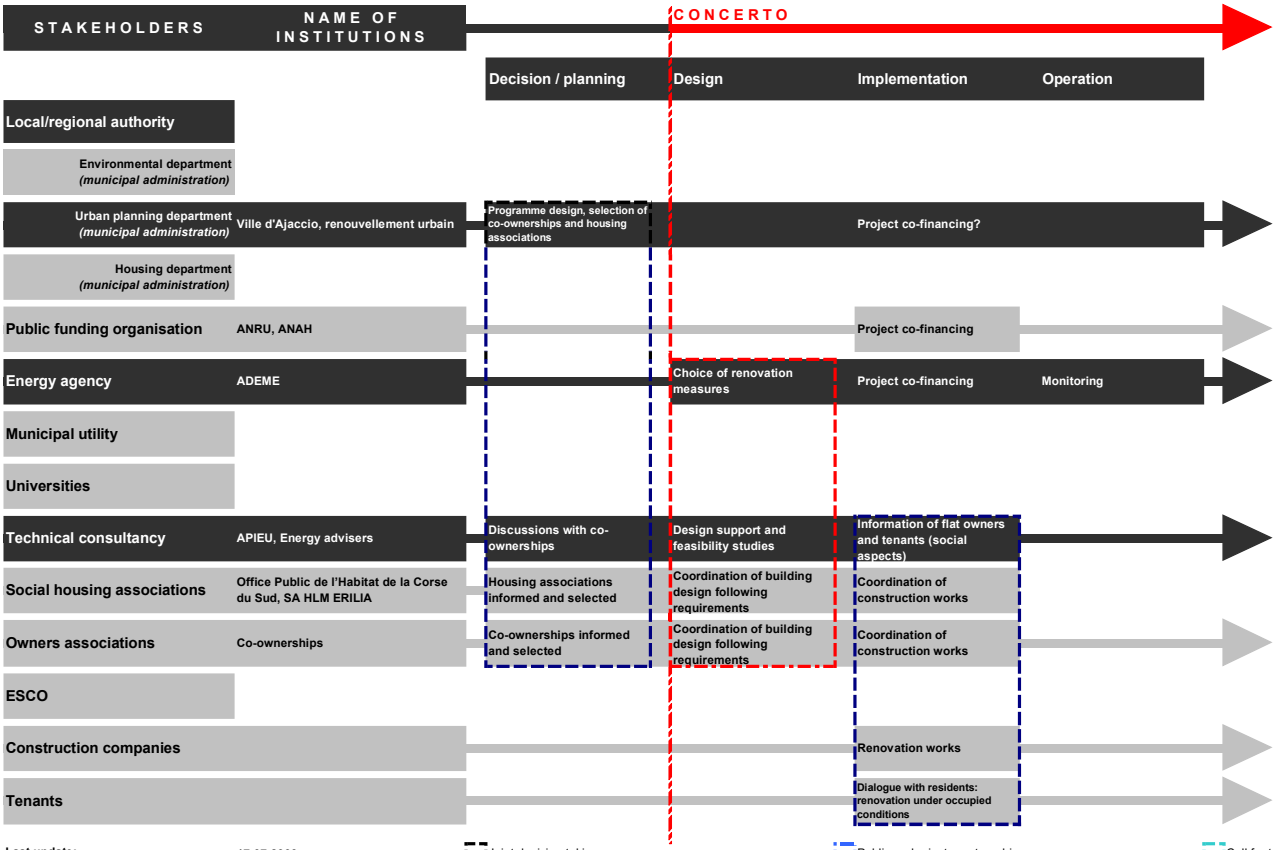

STAKEHOLDERS
CONCERTO
Decision / planning
Design
Implementation
Operation
Environmental department (municipal/metropolitan administration)
Energy department (municipal/metropolitan administration)
Urban planning department (municipal/metropolitan administration)
Housing department (municipal/metropolitan administration)
programme design:
- selection of co-ownerships and housing associations or neighbourhoods
- definition of priorities
- programme coordination
Public funding organisation
Energy agency
- supporting role: project co-financing and consultancy
- monitoring, end users information
Municipal utility
ESCO
- obtaining a "guarantee" of connection
- coordination of construction works
- ensuring quality of construction
- monitoring
Universities / research
Technical consultancy
- prefeasibility studies
- socio-economic studies
- technical design of renovation measures
- socio-economic studies
- monitoring
Housing companies
Social housing associations
Other private/public developers
Owners associations
- housing associations and co-ownerships informed and selected
- coordination of building design following requirements
- information of end users on ongoing works
- coordination of renovation works
- ensuring quality of renovation
- information of end users on living in renovated buildings
Tenants/employees and tenants associations
Facility managers
- participation in decision making (end users interests)
- participation in design process (end users interests)
- end users informed: renovation under occupied conditions
- end users informed on how to handle with renovated buildings
Construction companies
- renovation works

# General_N


STAKEHOLDERS
CONCERTO
Decision / planning
Design
Implementation
Operation
Environmental department (municipal/metropolitan administration)
Energy department (municipal/metropolitan administration)
Urban planning department (municipal/metropolitan administration)
Housing department (municipal/metropolitan administration)
Urban developer
programme design:
- selection of neighbourhoods
- definition of priorities
- possible creation of urban development companies
- definition of masterplan
- programme coordination
- definition of minimal energy performance requirements
- call for developers
- call for tender for district energy system
- coordination of development operations
Public funding organisation
Energy agency
- supporting role: project co-financing and consultancy
- monitoring, end users information
Municipal utility
ESCO
- obtaining a "guarantee of connection"
- creation of ESCO/answering the call for tender
- design of district energy systems
- coordination of construction works
- ensuring quality of construction
- operation of energy systems and monitoring
Developer consultancy: urban / building scale
Design consultancy: urban / building scale
- prefeasibility studies
- definition of criteria for development
- technical design of buildings
- monitoring
Housing companies
Social housing associations
Other private/public developers
- coordination of building design following requirements
- information of end users on future eco-buildings
- coordination of construction works
- ensuring quality of construction
- information of end users on leaving in renovated buildings
Owners associations
- operation of energy systems
Tenants/employees
Facility managers
- end users informed: preparation of arrival in buildings
- end users informed on how to handle with new eco-buildings
Construction companies
- construction works

# Ajaccio

PI_mechanisms_OP_v8



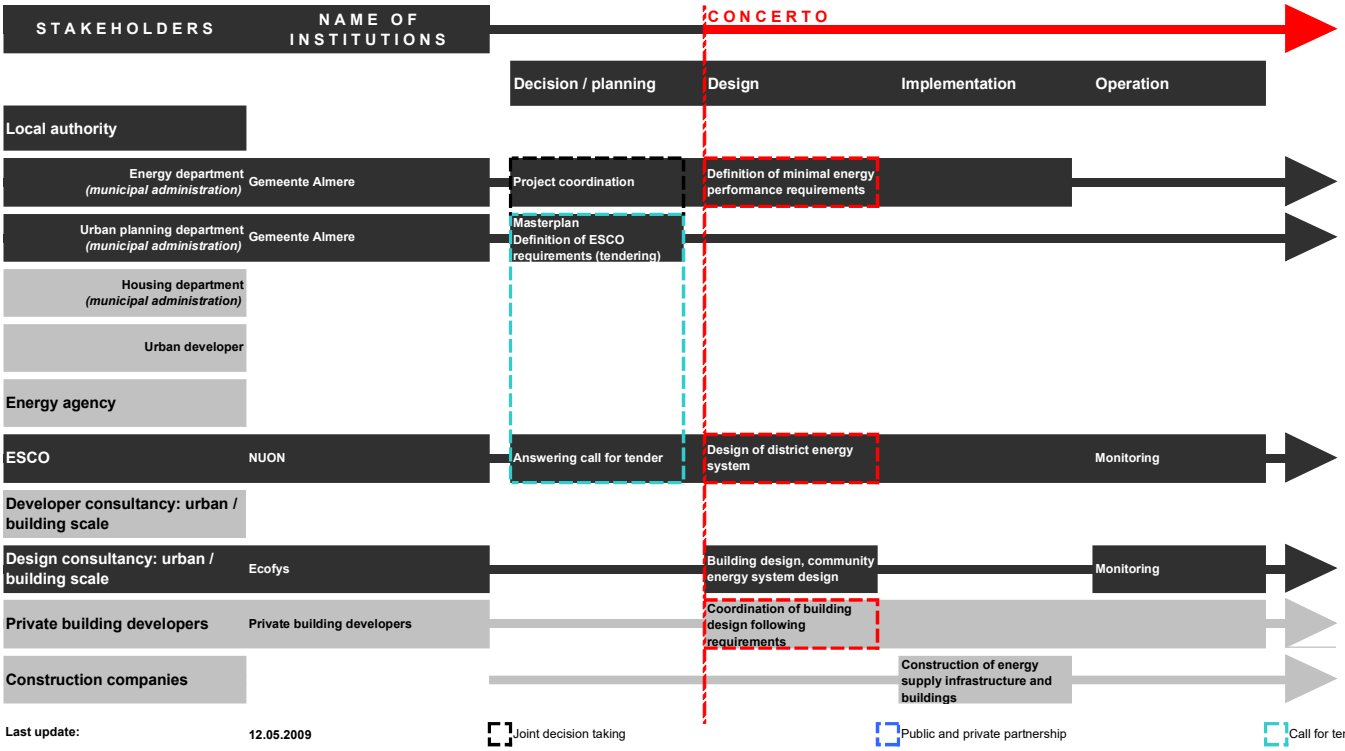

**Last update:** 17.07.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Almere

PI_mechanisms_OP_v8



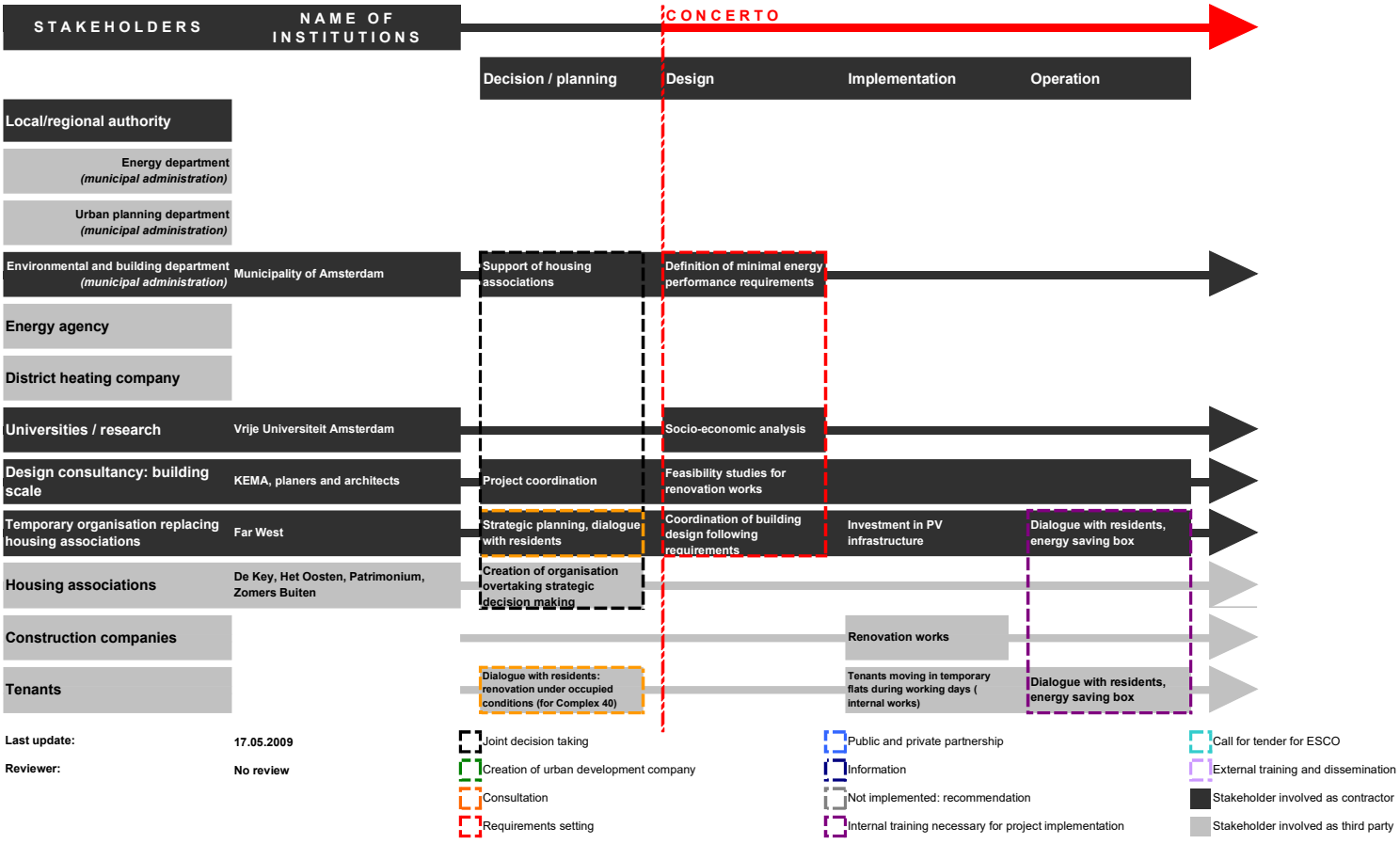

**Last update:** 12.05.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

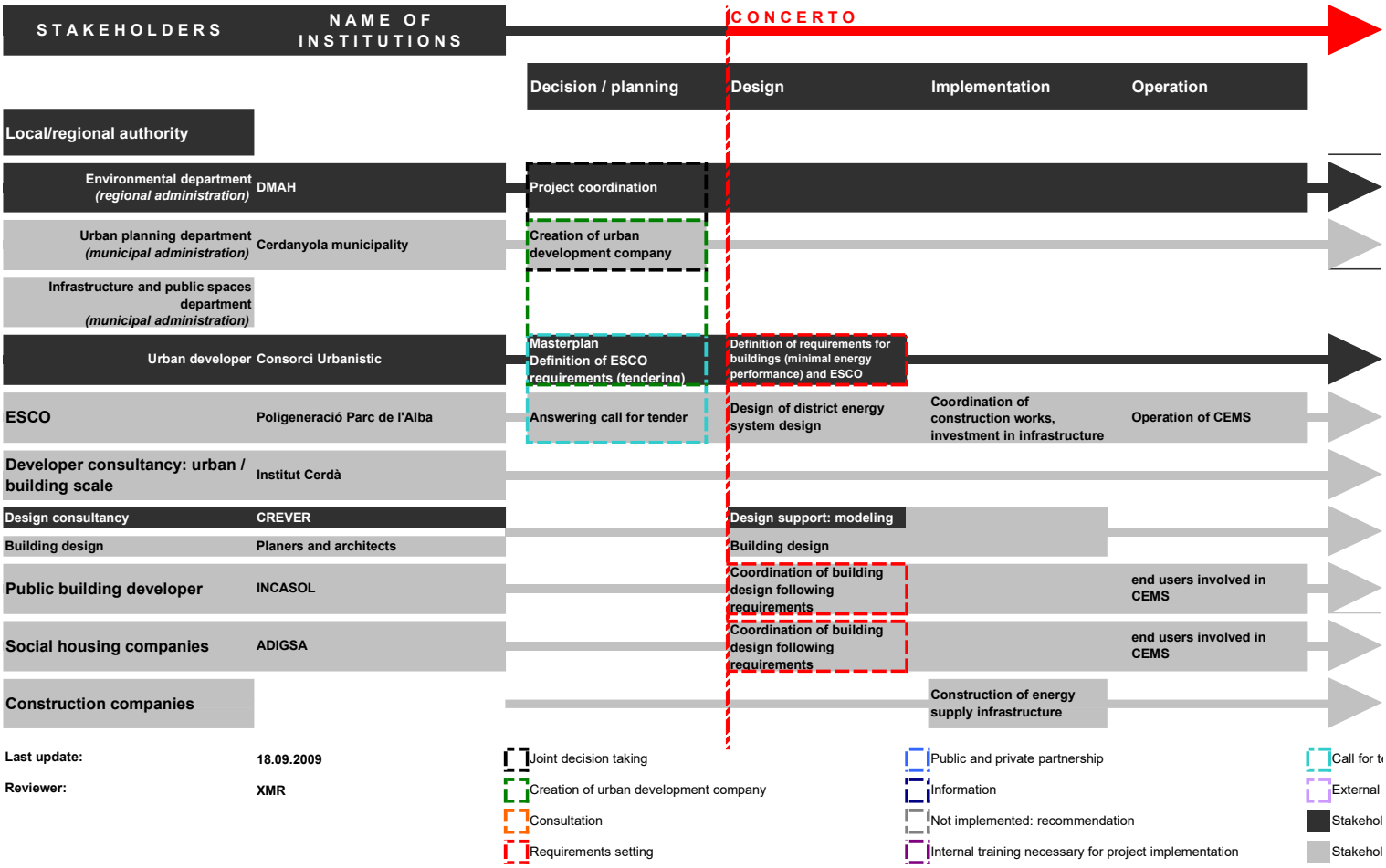
# Amsterdam

PI_mechanisms_OP_v8



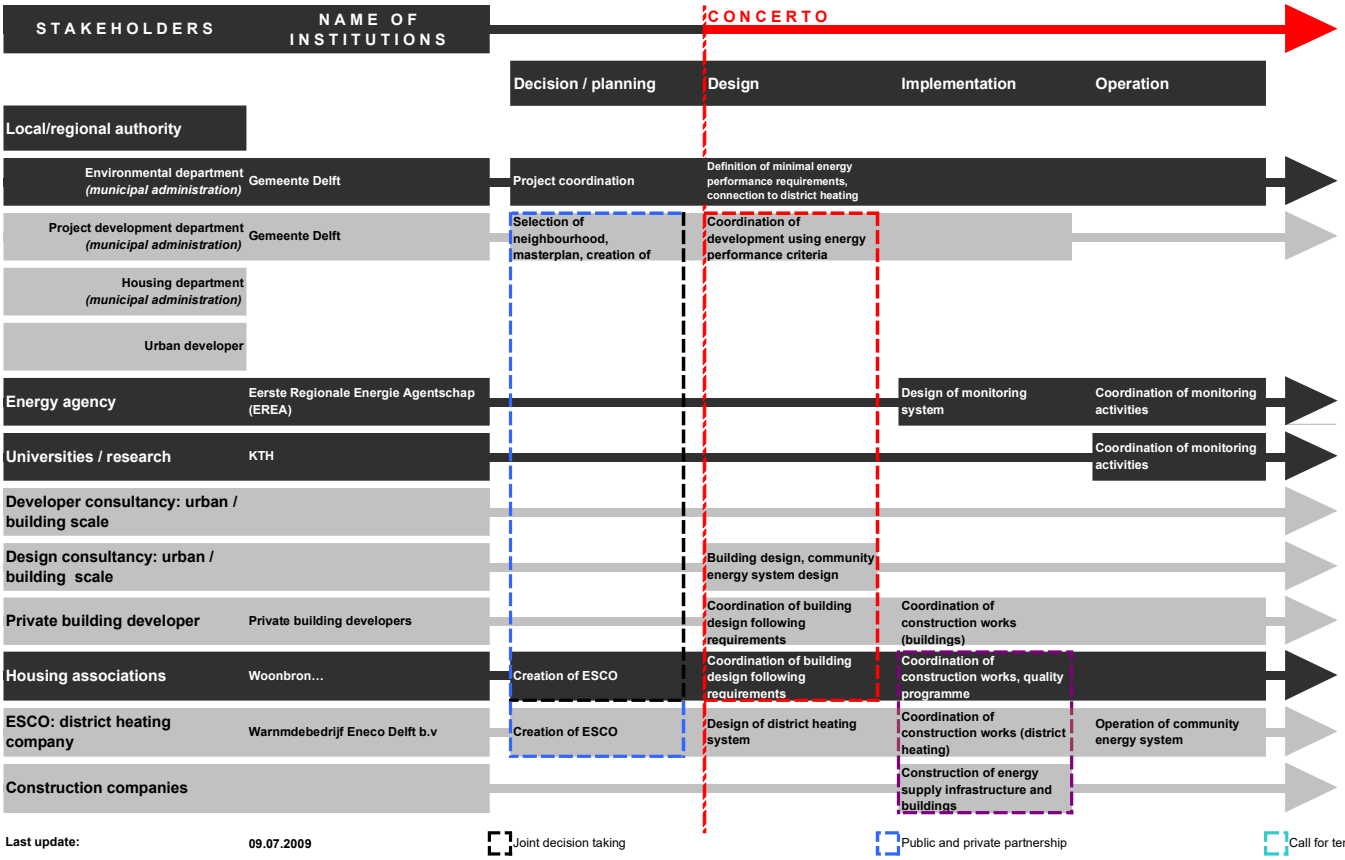
# Cerdanyola

PI_mechanisms_OP_v8



# Delft_H

PI_mechanisms_OP_v8



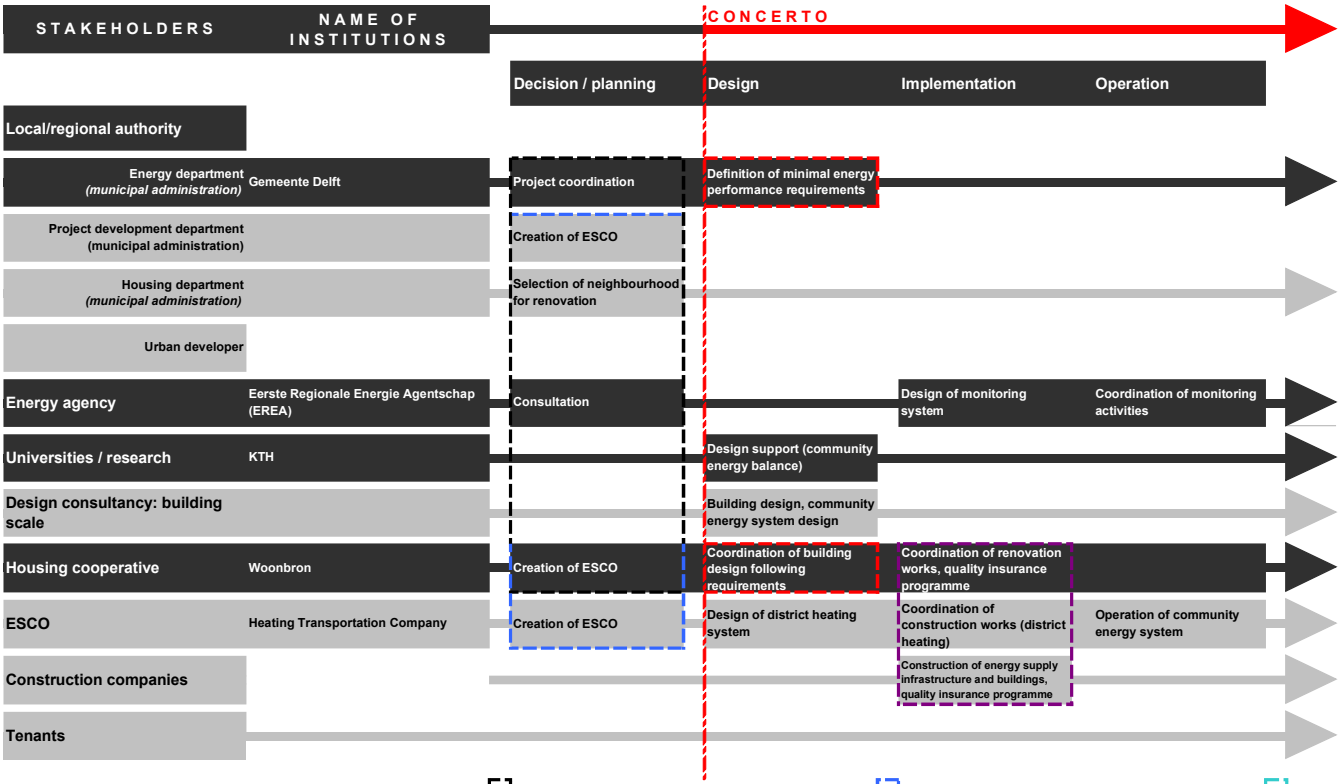

**Last update:** 09.07.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Delft_P

PI_mechanisms_OP_v8



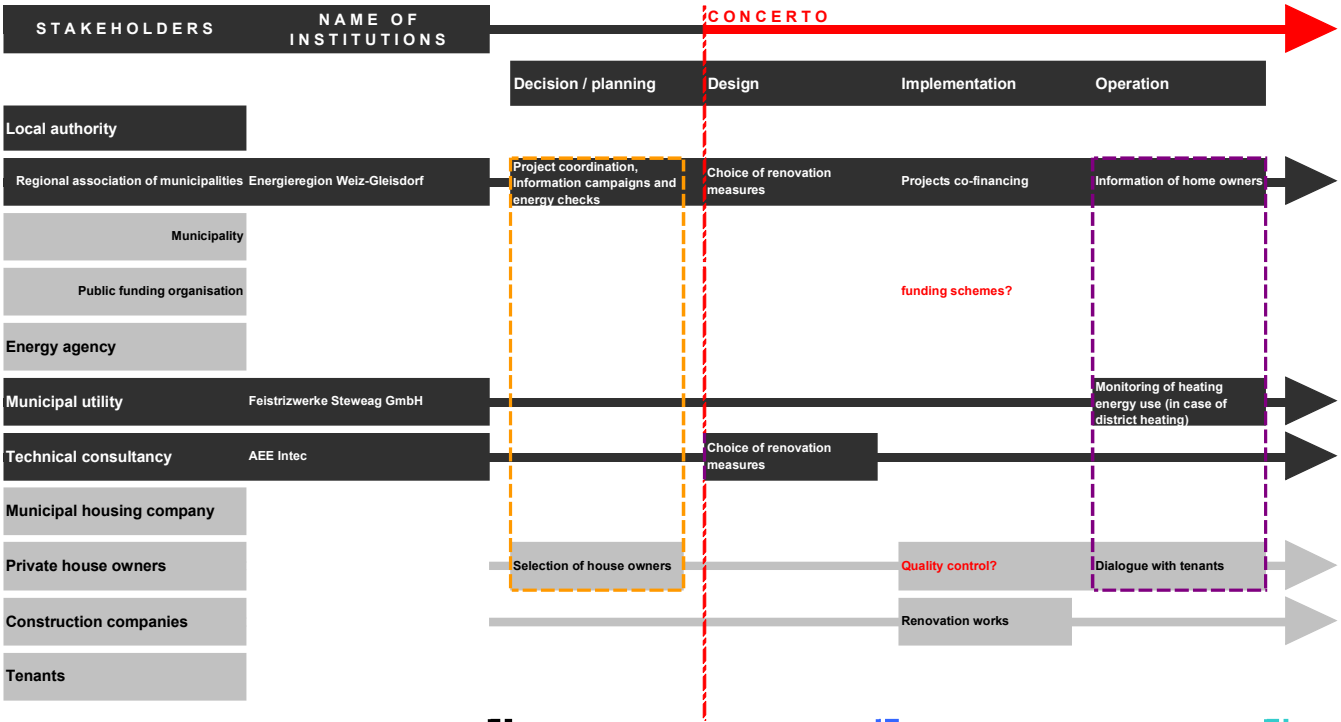

**Last update:** 12.05.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# ERWG

PI_mechanisms_OP_v8



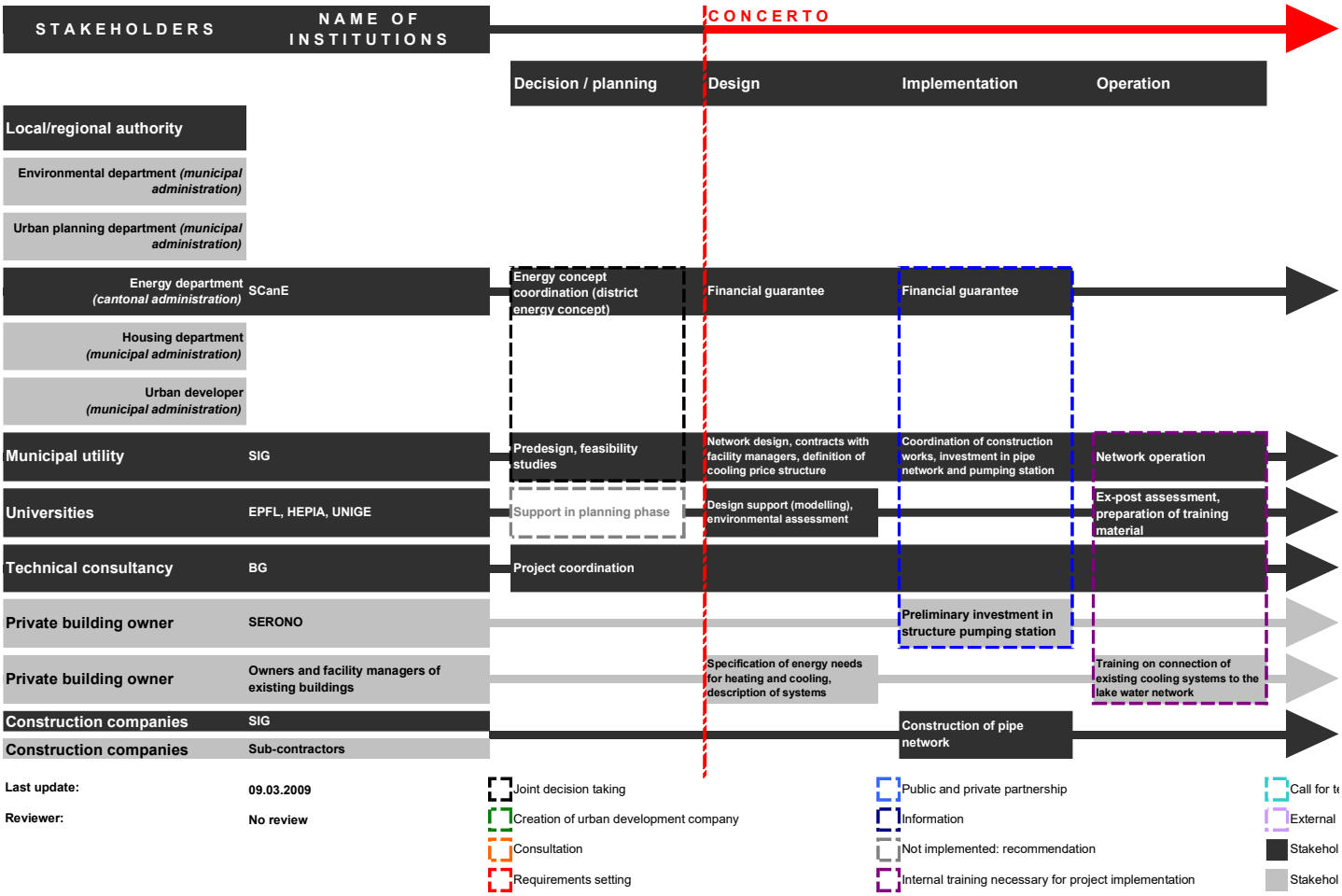

**Last update:** 20.05.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

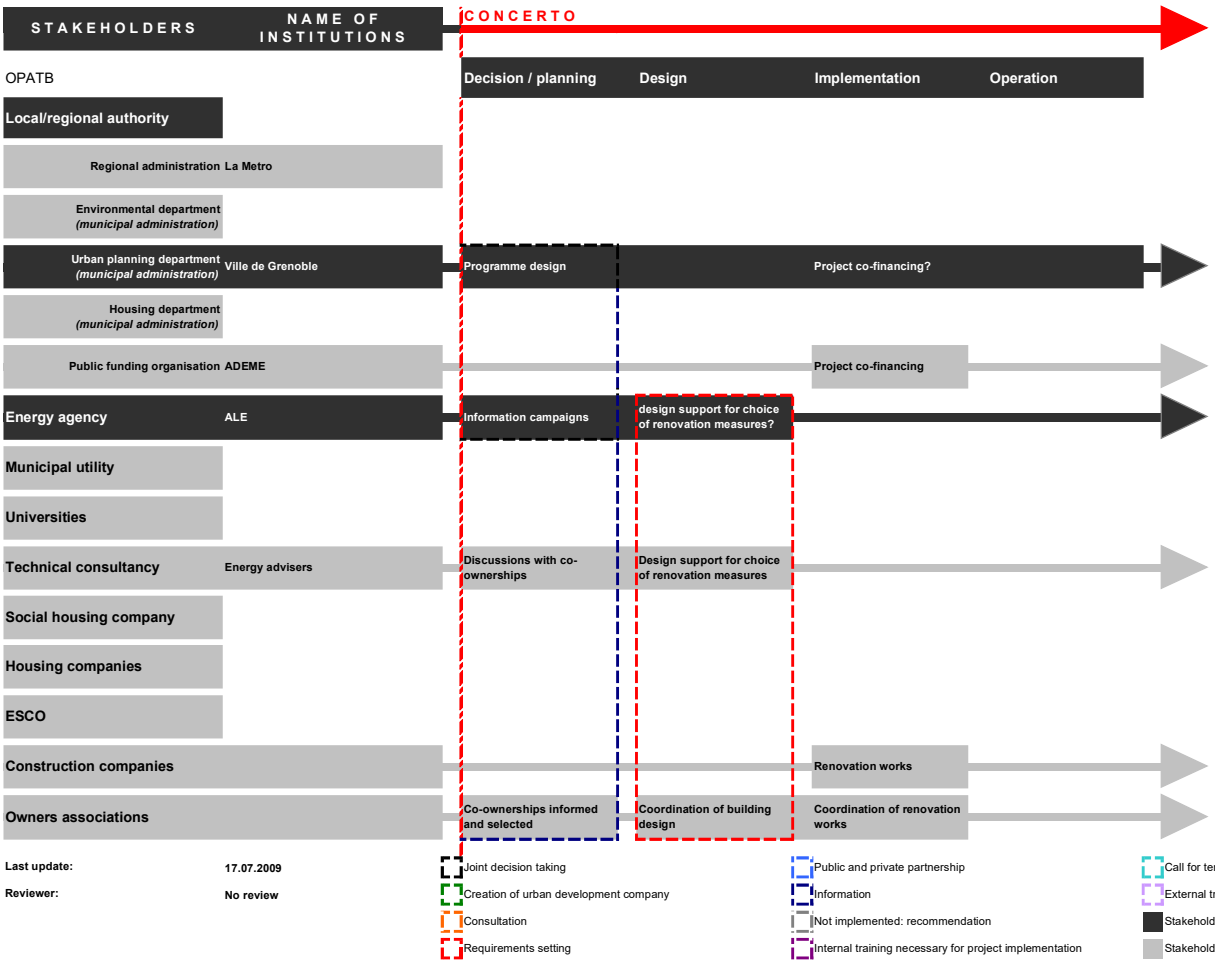
# Geneva

PI_mechanisms_OP_v8



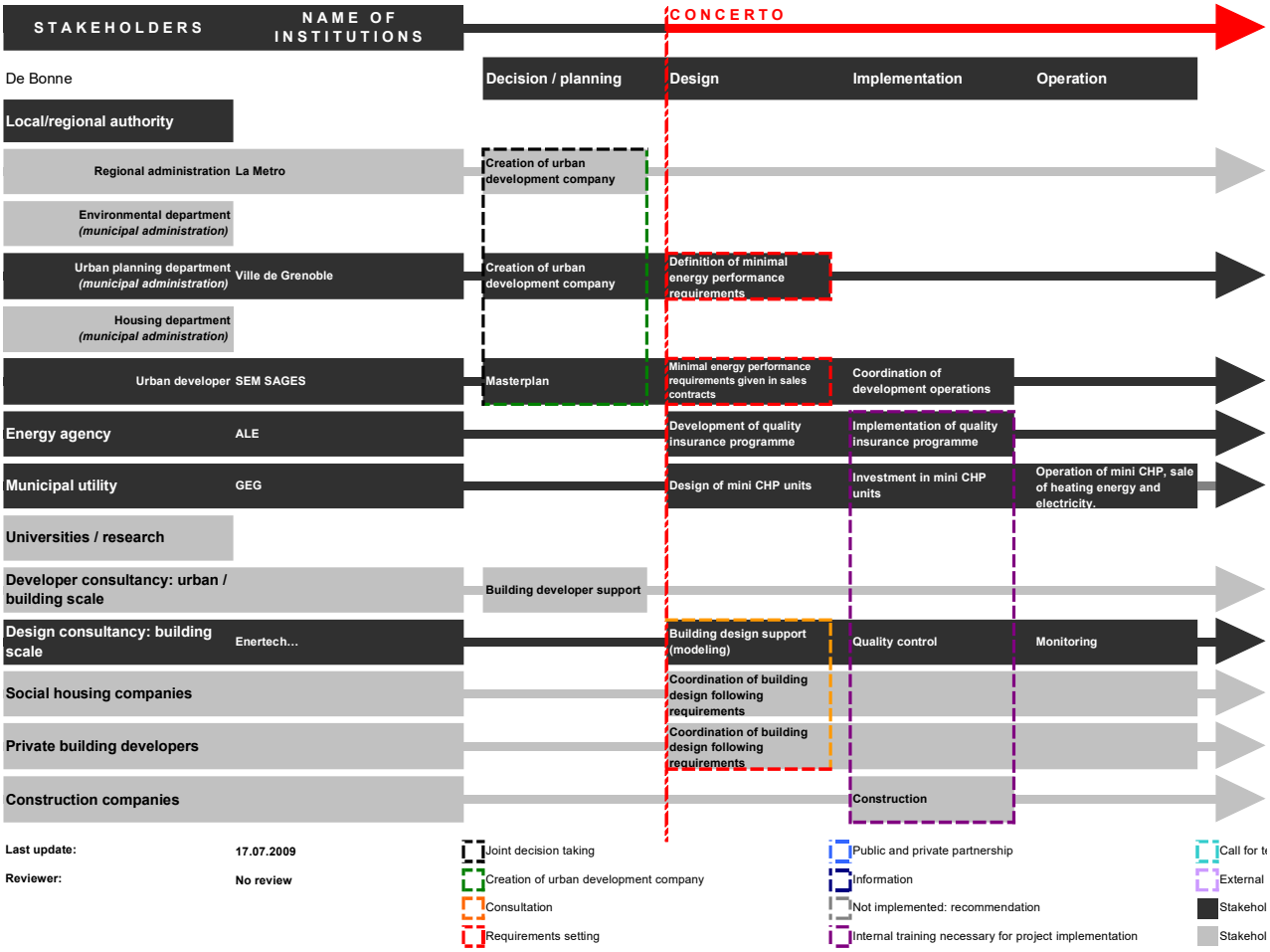
# Grenoble_R




STAKEHOLDERS
NAME OF INSTITUTIONS
CONCERTO
OPATB
Decision / planning
Design
Implementation
Operation
Local/regional authority
Regional administration La Metro
Environmental department (municipal administration)
Urban planning department (municipal administration) Ville de Grenoble
Programme design
Project co-financing?
Housing department (municipal administration)
Public funding organisation ADEME
Project co-financing
Energy agency ALE
Information campaigns
design support for choice of renovation measures?
Municipal utility
Universities
Technical consultancy Energy advisers
Discussions with co-ownerships
Design support for choice of renovation measures
Social housing company
Housing companies
ESCO
Construction companies
Renovation works
Owners associations
Co-ownerships informed and selected
Coordination of building design
Coordination of renovation works
Last update: 17.07.2009
Reviewer: No review
Joint decision taking
Creation of urban development company
Consultation
Requirements setting
Public and private partnership
Information
Not implemented: recommendation
Internal training necessary for project implementation
Call for tender for ESCO
External training and dissemination
Stakeholder involved as contractor
Stakeholder involved as third party

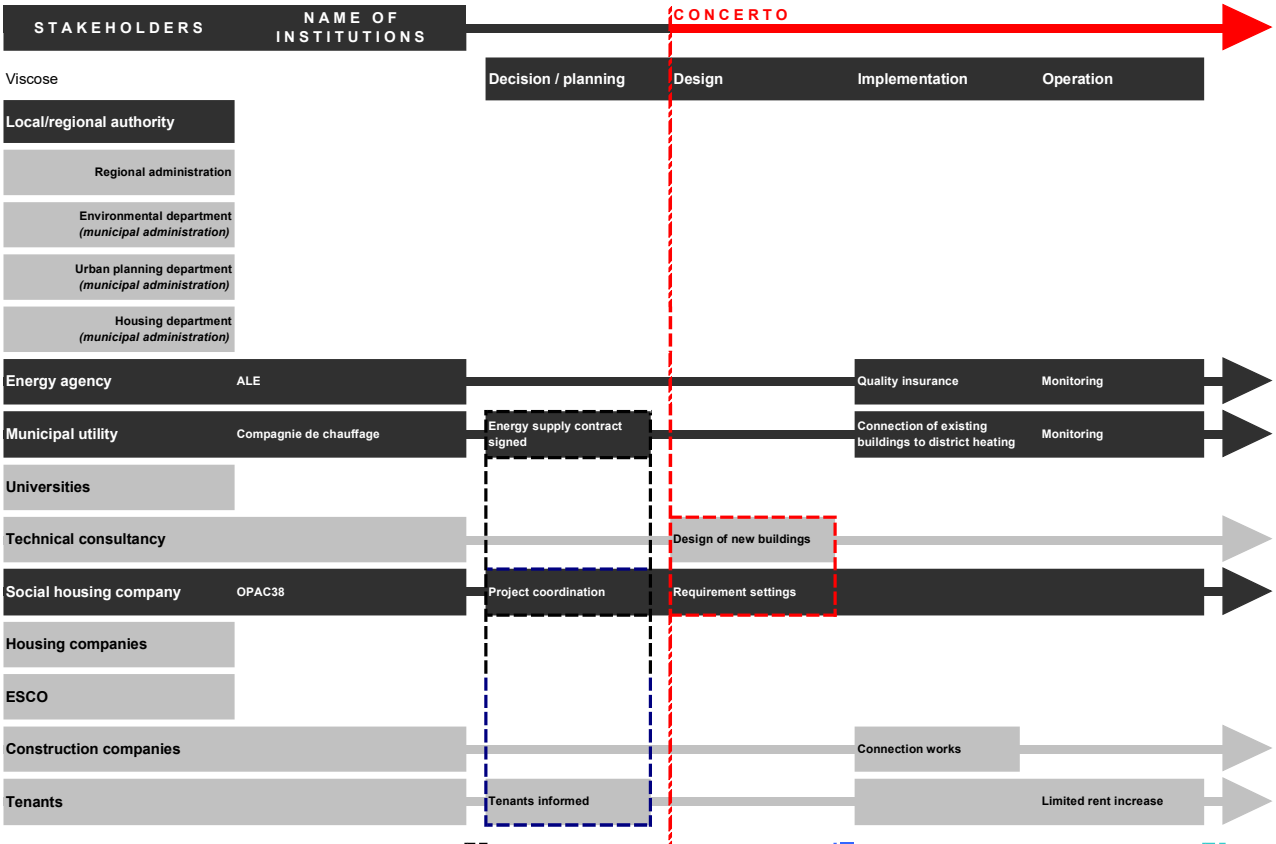
# Grenoble_D




STAKEHOLDERS
NAME OF INSTITUTIONS
CONCERTO
De Bonne
Decision / planning
Design
Implementation
Operation
Local/regional authority
Regional administration
La Metro
Creation of urban development company
Environmental department (municipal administration)
Urban planning department (municipal administration)
Ville de Grenoble
Creation of urban development company
Definition of minimal energy performance requirements
Housing department (municipal administration)
Urban developer
SEM SAGES
Masterplan
Minimal energy performance requirements given in sales contracts
Coordination of development operations
Energy agency
ALE
Development of quality insurance programme
Implementation of quality insurance programme
Municipal utility
GEG
Design of mini CHP units
Investment in mini CHP units
Operation of mini CHP, sale of heating energy and electricity.
Universities / research
Developer consultancy: urban / building scale
Building developer support
Design consultancy: building scale
Enertech...
Building design support (modeling)
Quality control
Monitoring
Social housing companies
Coordination of building design following requirements
Private building developers
Coordination of building design following requirements
Construction companies
Construction
Last update:
17.07.2009
Reviewer:
No review
Joint decision taking
Creation of urban development company
Consultation
Requirements setting
Public and private partnership
Information
Not implemented: recommendation
Internal training necessary for project implementation
Call for t
External
Stakehol
Stakehol

# Grenoble_V

PI_mechanisms_OP_v8



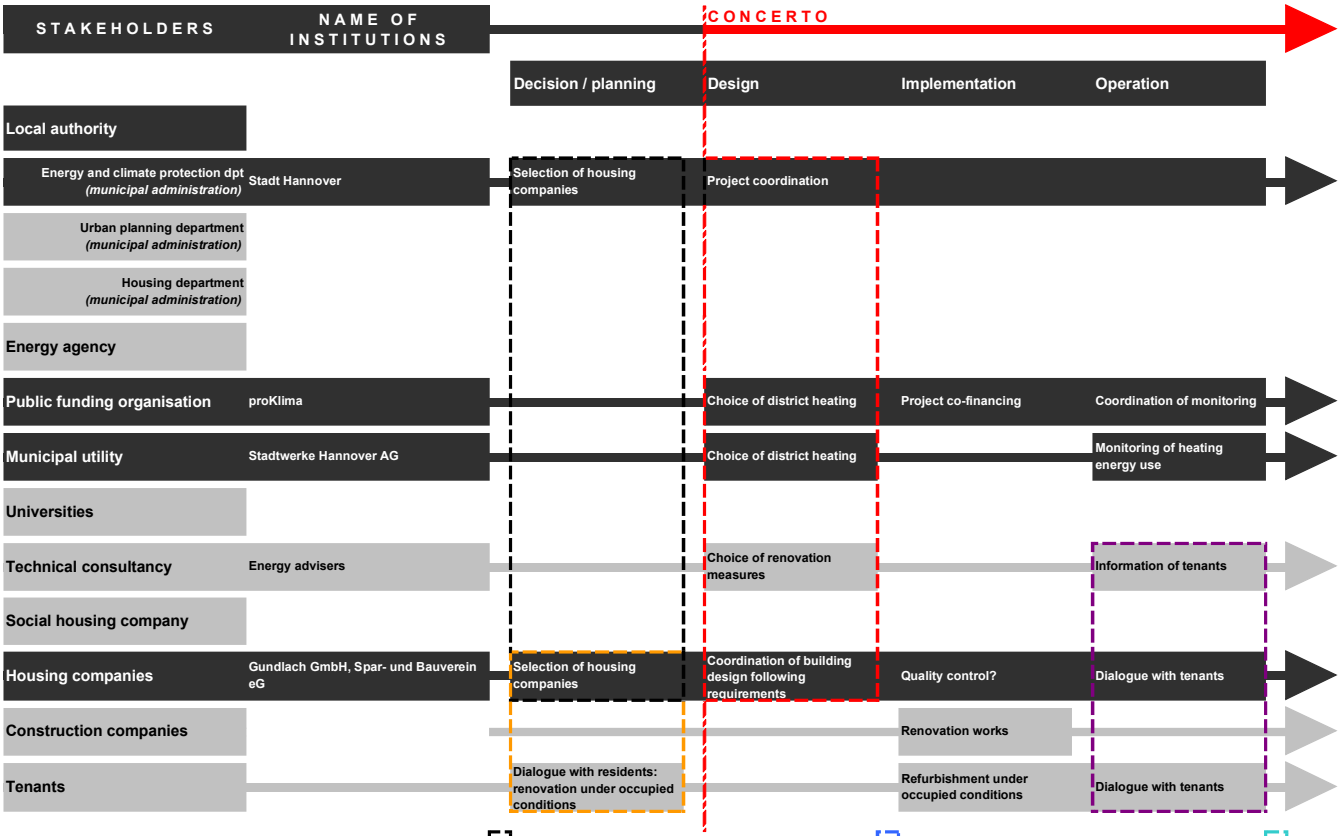

**Last update:** 24.11.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Hannover

PI_mechanisms_OP_v8



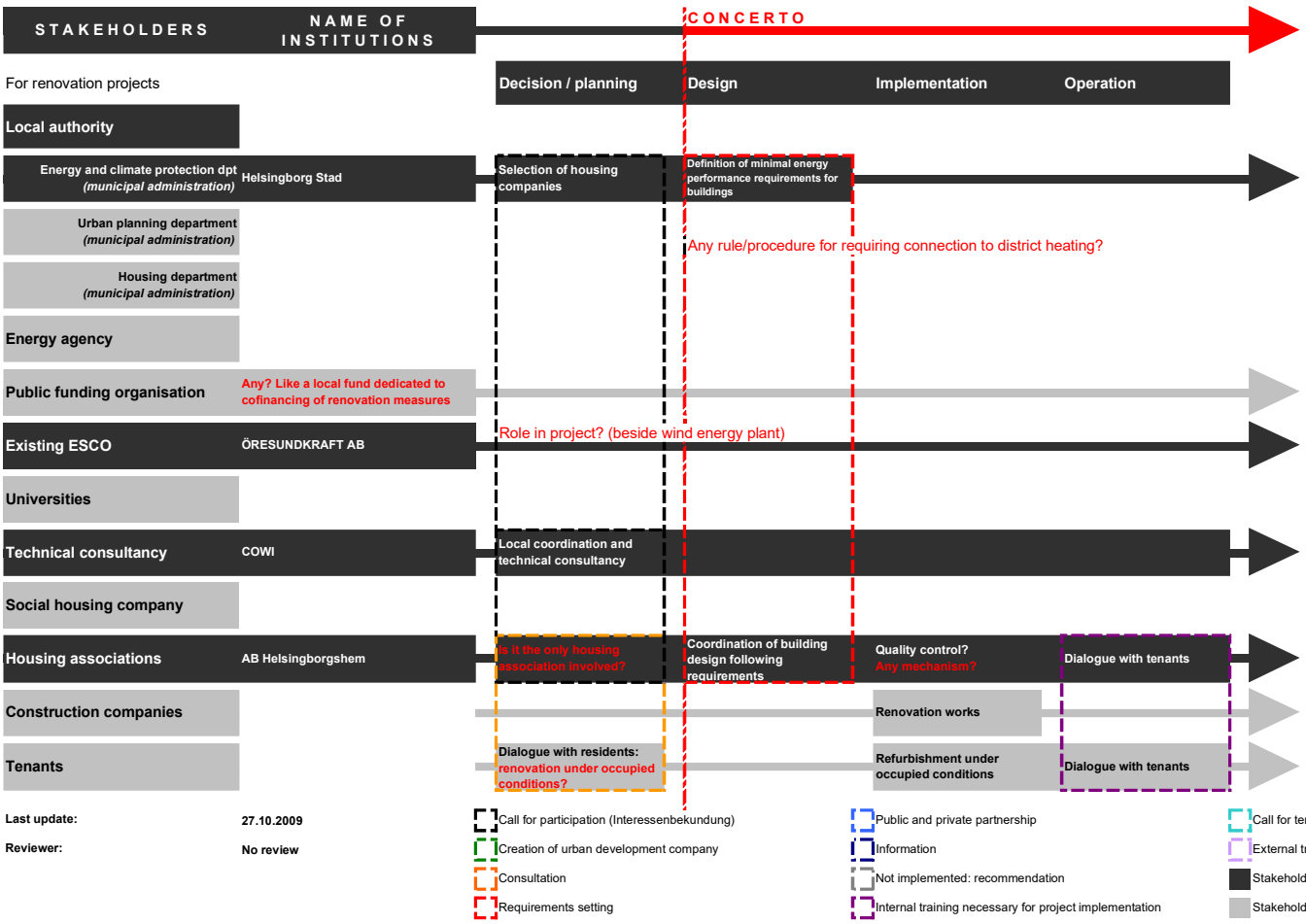

**Last update:** 20.05.2009

**Reviewer:** No review

- Call for participation (Interessenbekundung)
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Helsingborg_R

PI_mechanisms_OP_v8



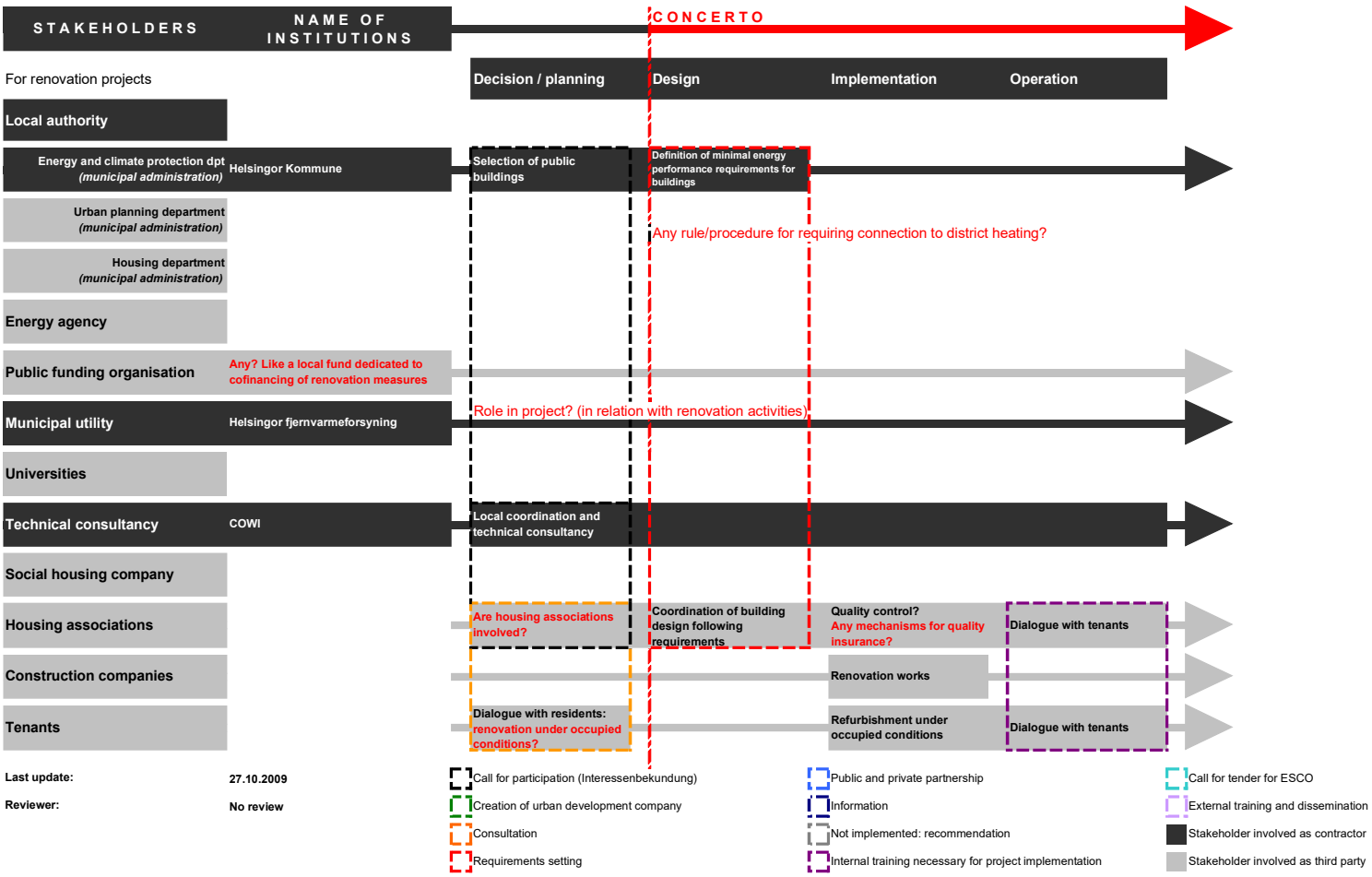

**Last update:** 27.10.2009

**Reviewer:** No review

- Call for participation (Interessenbekundung)
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

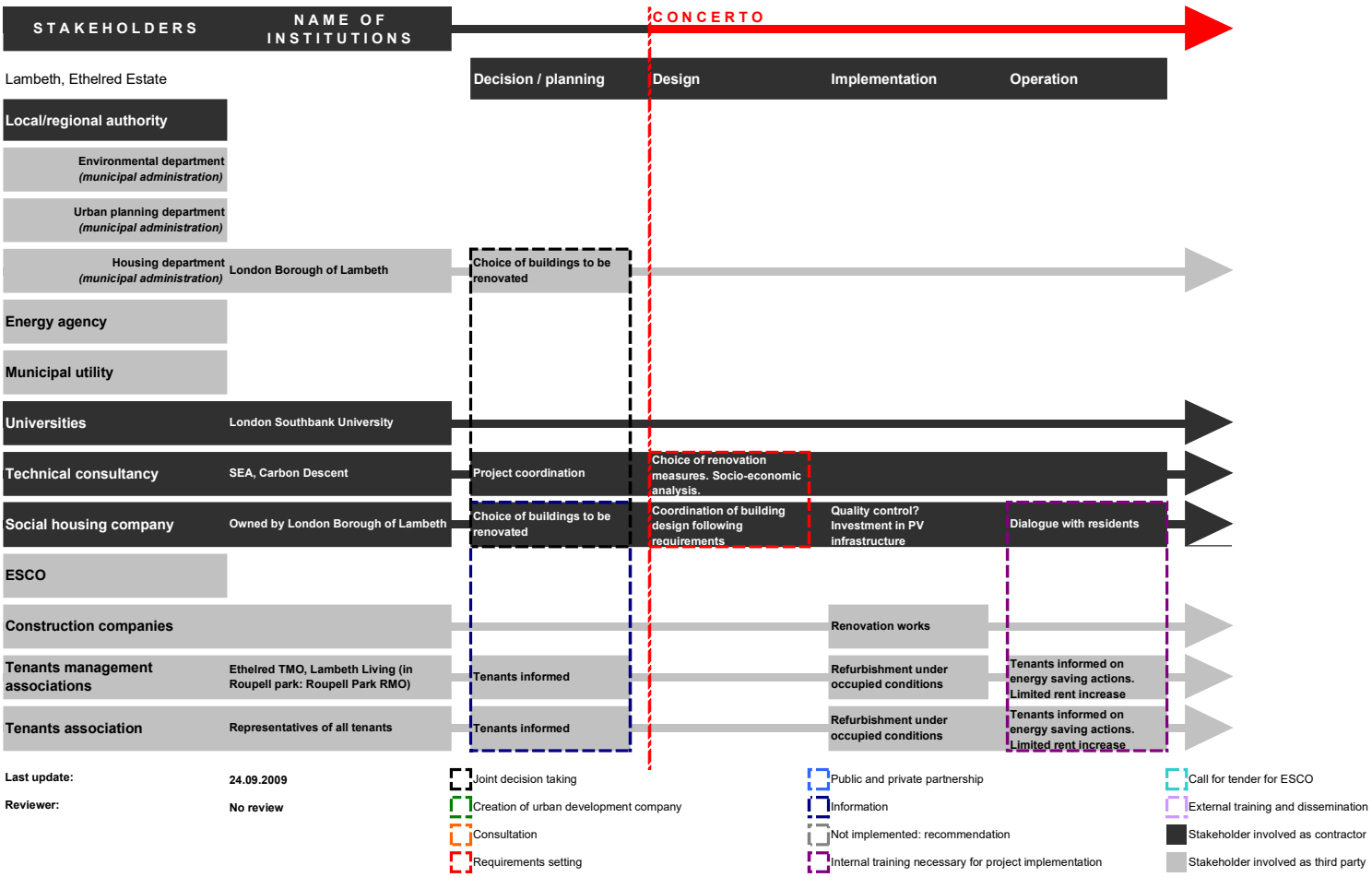
# Helsingor

PI_mechanisms_OP_v8



# London

PI_mechanisms_OP_v8



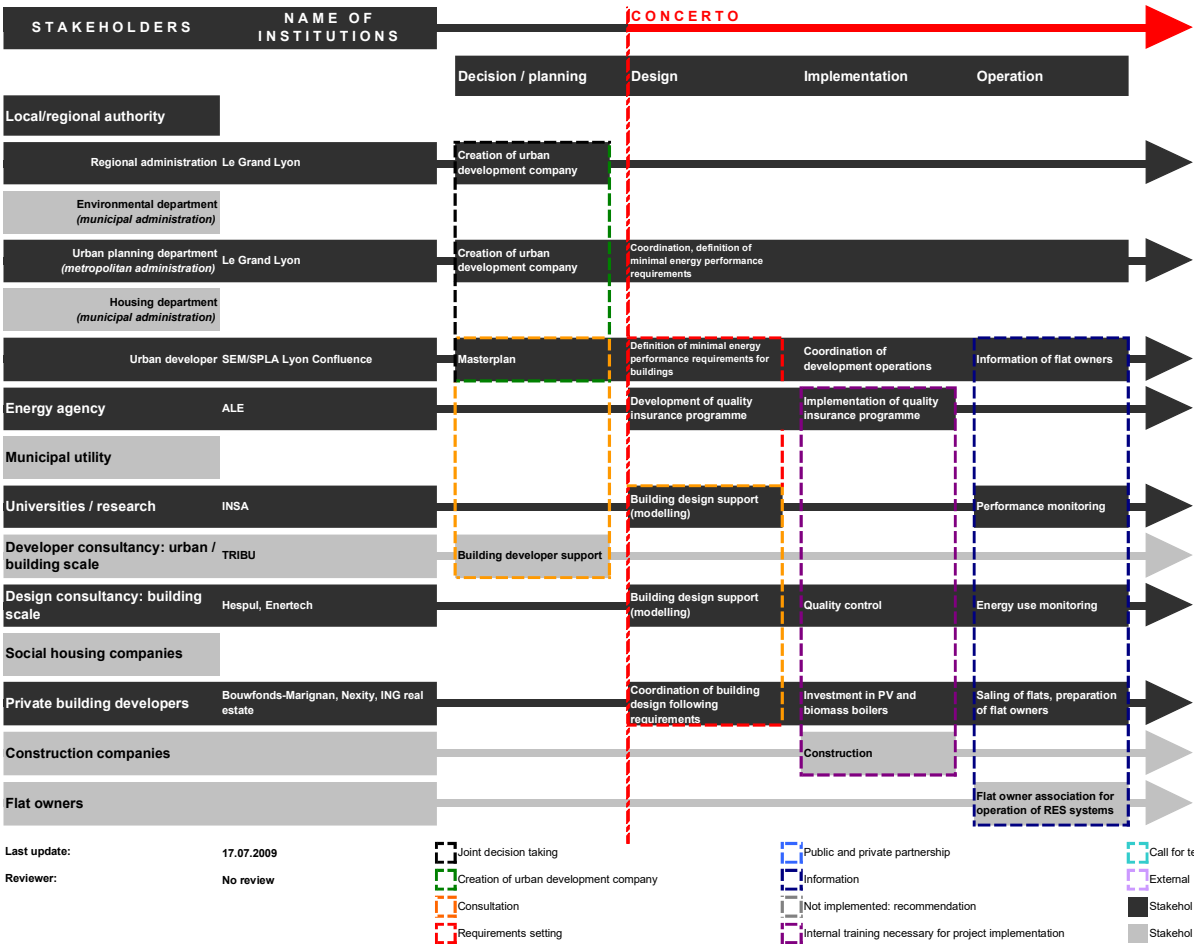

**Last update:** 24.09.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

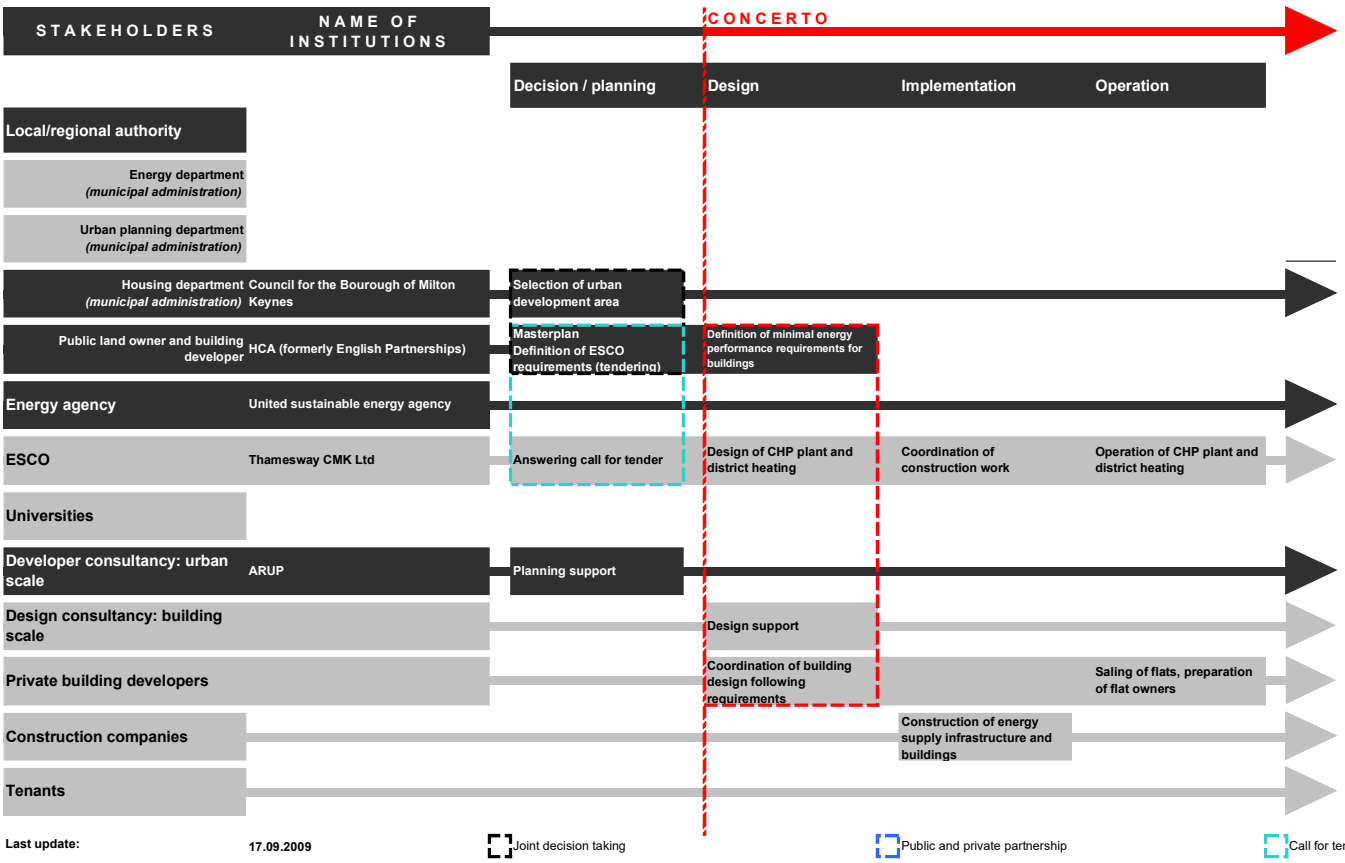
# Lyon




STAKEHOLDERS
NAME OF INSTITUTIONS
CONCERTO
Decision / planning
Design
Implementation
Operation
Local/regional authority
Regional administration
Le Grand Lyon
Creation of urban development company
Environmental department (municipal administration)
Urban planning department (metropolitan administration)
Le Grand Lyon
Creation of urban development company
Coordination, definition of minimal energy performance requirements
Housing department (municipal administration)
Urban developer
SEM/SPLA Lyon Confluence
Masterplan
Definition of minimal energy performance requirements for buildings
Coordination of development operations
Information of flat owners
Energy agency
ALE
Development of quality insurance programme
Implementation of quality insurance programme
Municipal utility
Universities / research
INSA
Building design support (modelling)
Performance monitoring
Developer consultancy: urban / building scale
TRIBU
Building developer support
Design consultancy: building scale
Hespul, Enertech
Building design support (modelling)
Quality control
Energy use monitoring
Social housing companies
Private building developers
Bouwfonds-Marignan, Nexity, ING real estate
Coordination of building design following requirements
Investment in PV and biomass boilers
Saling of flats, preparation of flat owners
Construction companies
Construction
Flat owners
Flat owner association for operation of RES systems
Last update:
17.07.2009
Reviewer:
No review
Joint decision taking
Creation of urban development company
Consultation
Requirements setting
Public and private partnership
Information
Not implemented: recommendation
Internal training necessary for project implementation
Call for te
External
Stakehol
Stakehol

# MiltonKeynes

PI_mechanisms_OP_v8



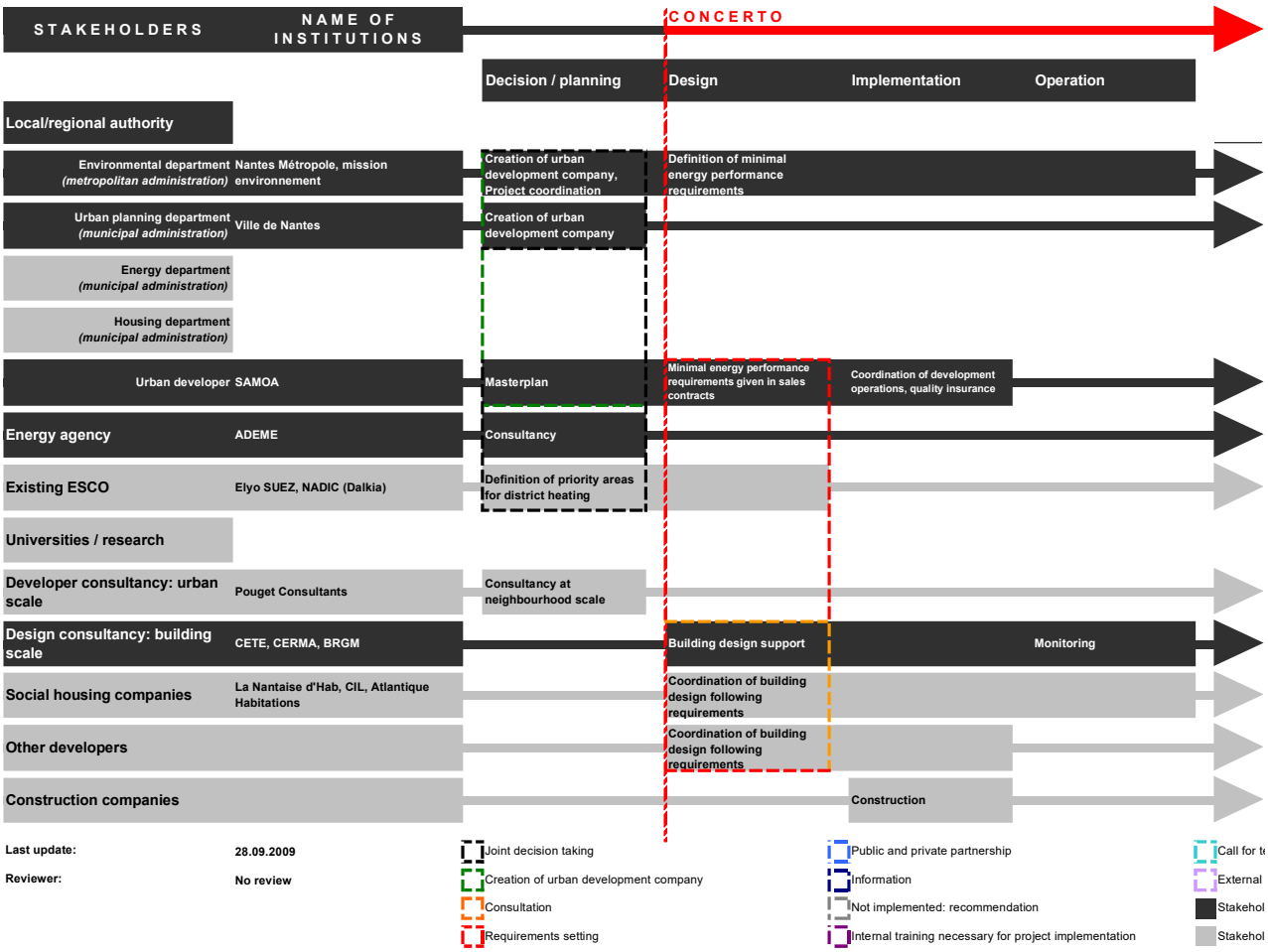

**Last update:** 17.09.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

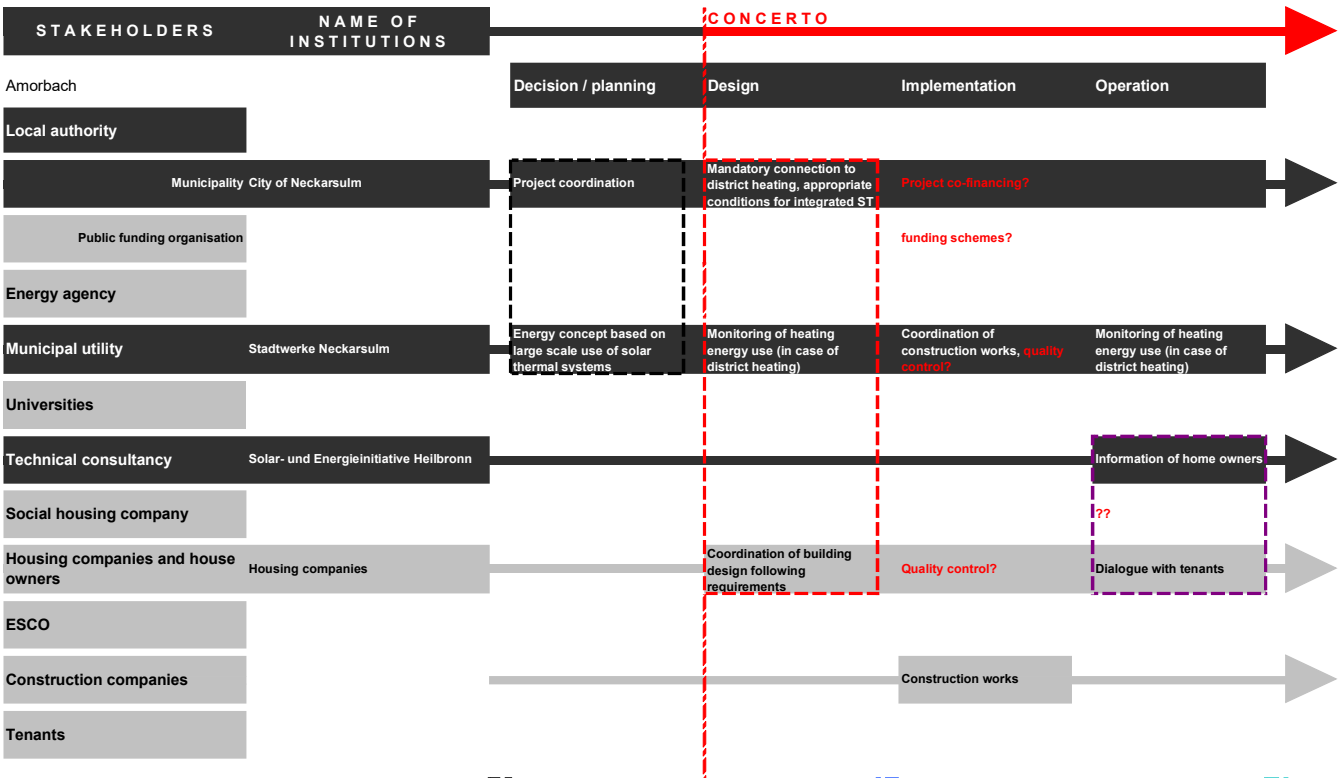
# Nantes_N




STAKEHOLDERS
NAME OF INSTITUTIONS
CONCERTO
Decision / planning
Design
Implementation
Operation
Local/regional authority
Environmental department (metropolitan administration)
Nantes Métropole, mission environnement
Creation of urban development company, Project coordination
Definition of minimal energy performance requirements
Urban planning department (municipal administration)
Ville de Nantes
Creation of urban development company
Energy department (municipal administration)
Housing department (municipal administration)
Urban developer
SAMOA
Masterplan
Minimal energy performance requirements given in sales contracts
Coordination of development operations, quality insurance
Energy agency
ADEME
Consultancy
Existing ESCO
Elyo SUEZ, NADIC (Dalkia)
Definition of priority areas for district heating
Universities / research
Developer consultancy: urban scale
Pouget Consultants
Consultancy at neighbourhood scale
Design consultancy: building scale
CETE, CERMA, BRGM
Building design support
Monitoring
Social housing companies
La Nantaise d'Hab, CIL, Atlantique Habitations
Coordination of building design following requirements
Other developers
Coordination of building design following requirements
Construction companies
Construction
Last update:
28.09.2009
Reviewer:
No review
Joint decision taking
Creation of urban development company
Consultation
Requirements setting
Public and private partnership
Information
Not implemented: recommendation
Internal training necessary for project implementation
Call for t
External
Stakehol
Stakehol

# Neckarsulm_A

PI_mechanisms_OP_v8



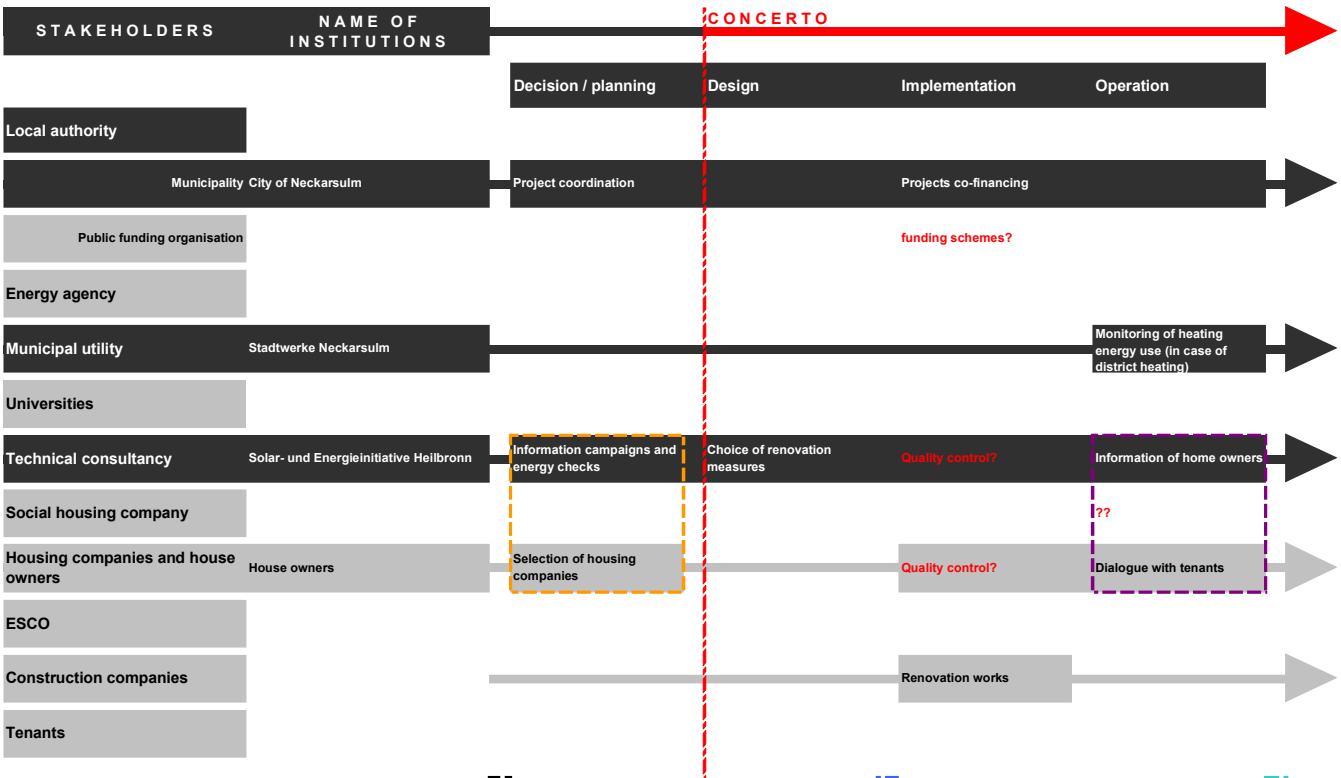

**Last update:** 20.05.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Neckarsulm_R

PI_mechanisms_OP_v8



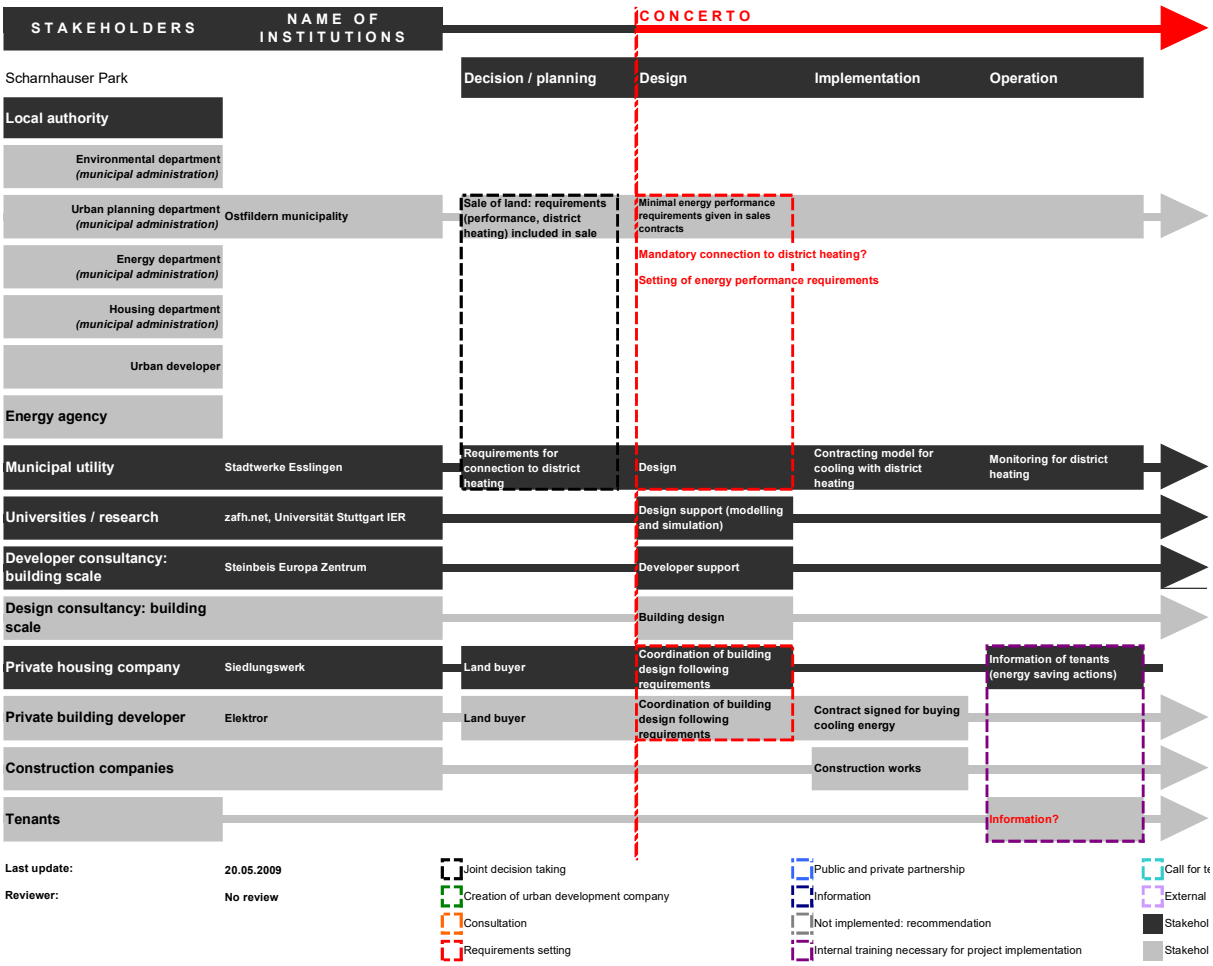

**Last update:** 20.05.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Ostfildern




STAKEHOLDERS
NAME OF INSTITUTIONS
CONCERTO
Scharnhauser Park
Decision / planning
Design
Implementation
Operation
Local authority
Environmental department (municipal administration)
Urban planning department (municipal administration)
Ostfildern municipality
Energy department (municipal administration)
Housing department (municipal administration)
Urban developer
Energy agency
Municipal utility
Stadtwerke Esslingen
Universities / research
zafh.net, Universität Stuttgart IER
Developer consultancy: building scale
Steinbeis Europa Zentrum
Design consultancy: building scale
Private housing company
Siedlungswerk
Private building developer
Elektror
Construction companies
Tenants
Sale of land: requirements (performance, district heating) included in sale
Minimal energy performance requirements given in sales contracts
Mandatory connection to district heating?
Setting of energy performance requirements
Requirements for connection to district heating
Design
Contracting model for cooling with district heating
Monitoring for district heating
Design support (modelling and simulation)
Developer support
Building design
Land buyer
Coordination of building design following requirements
Information of tenants (energy saving actions)
Land buyer
Coordination of building design following requirements
Contract signed for buying cooling energy
Construction works
Information?
Last update:
20.05.2009
Reviewer:
No review
Joint decision taking
Creation of urban development company
Consultation
Requirements setting
Public and private partnership
Information
Not implemented: recommendation
Internal training necessary for project implementation
Call for te
External
Stakehol
Stakehol

# Trondheim

PI_mechanisms_OP_v8

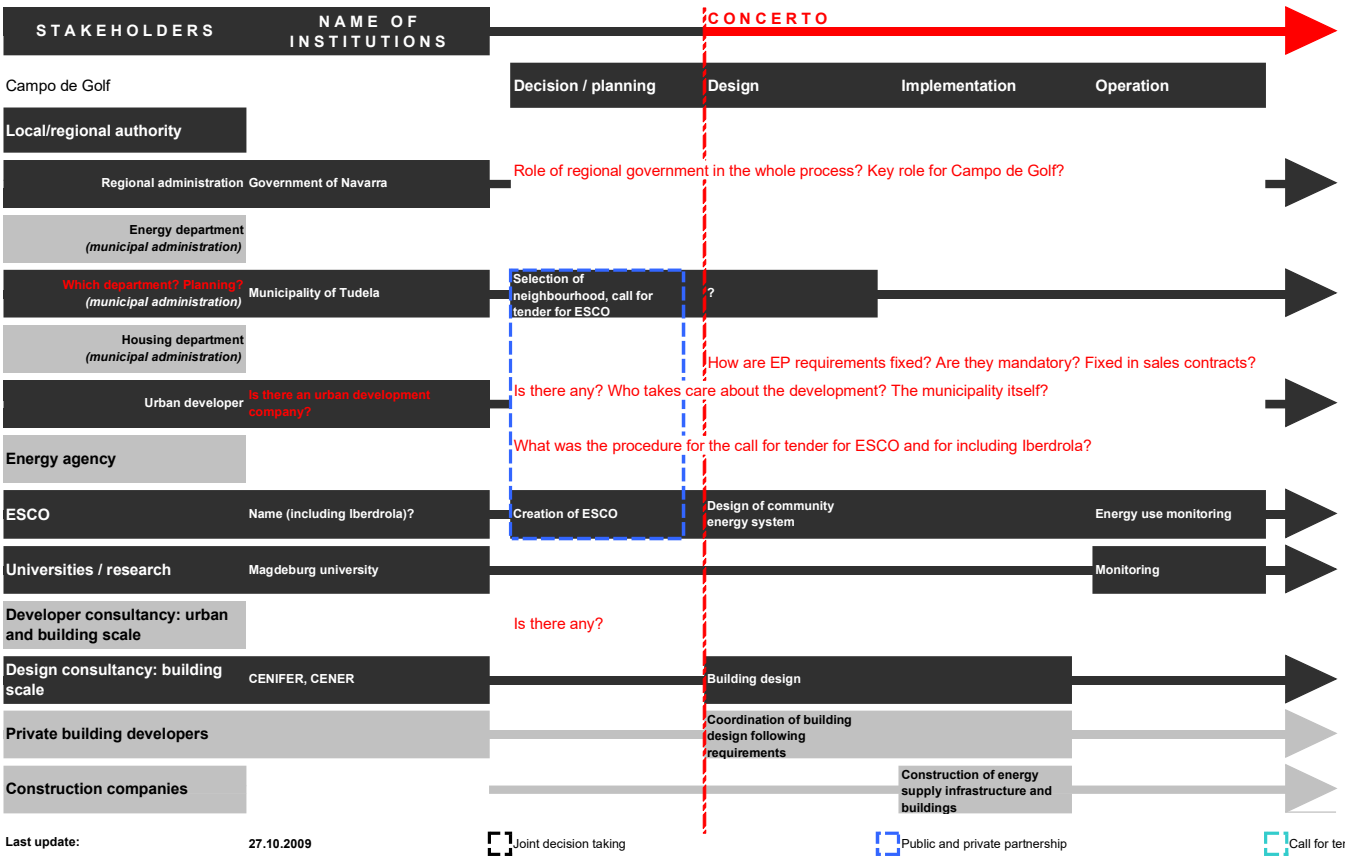

**Last update:** 27.10.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

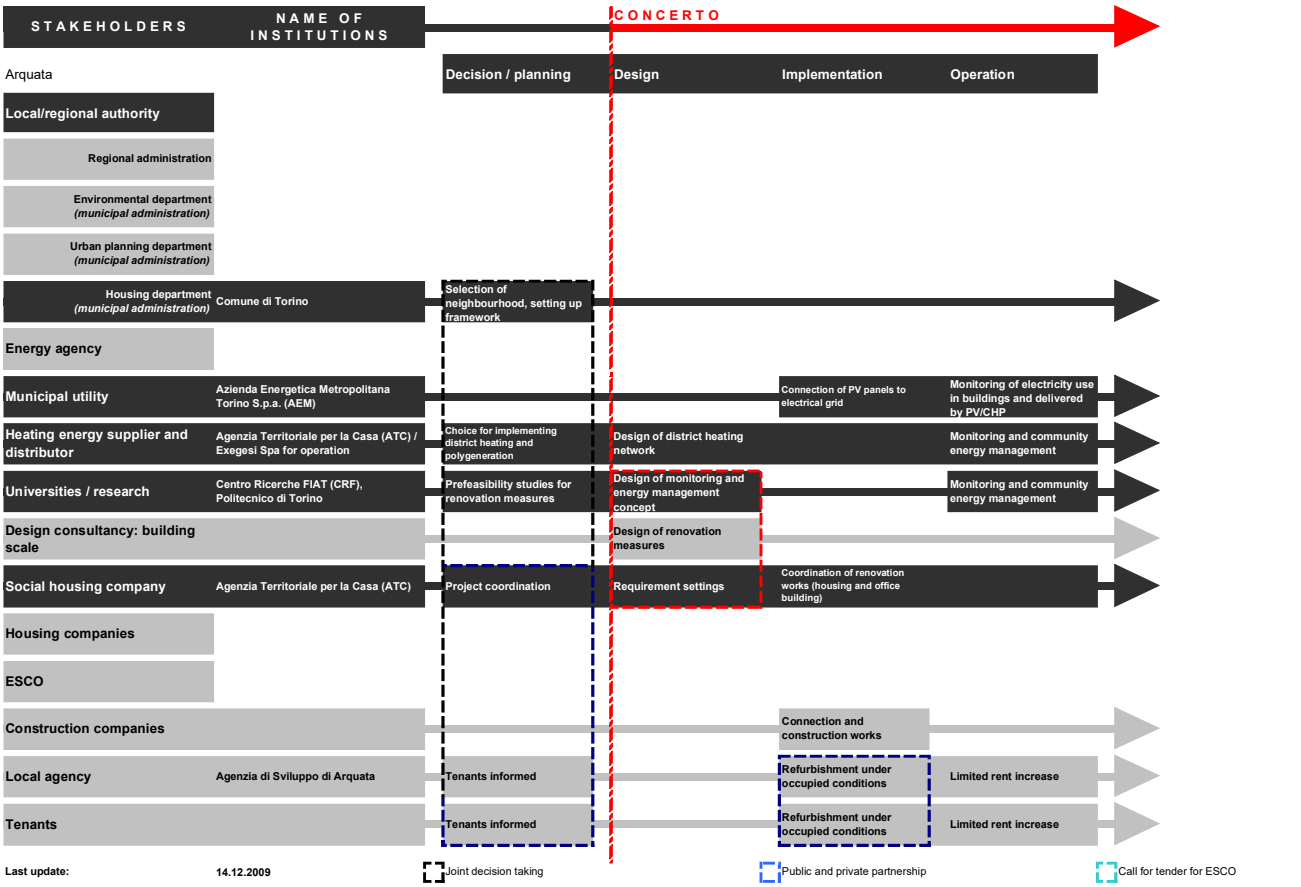
# Tudela

PI_mechanisms_OP_v8



# Turin





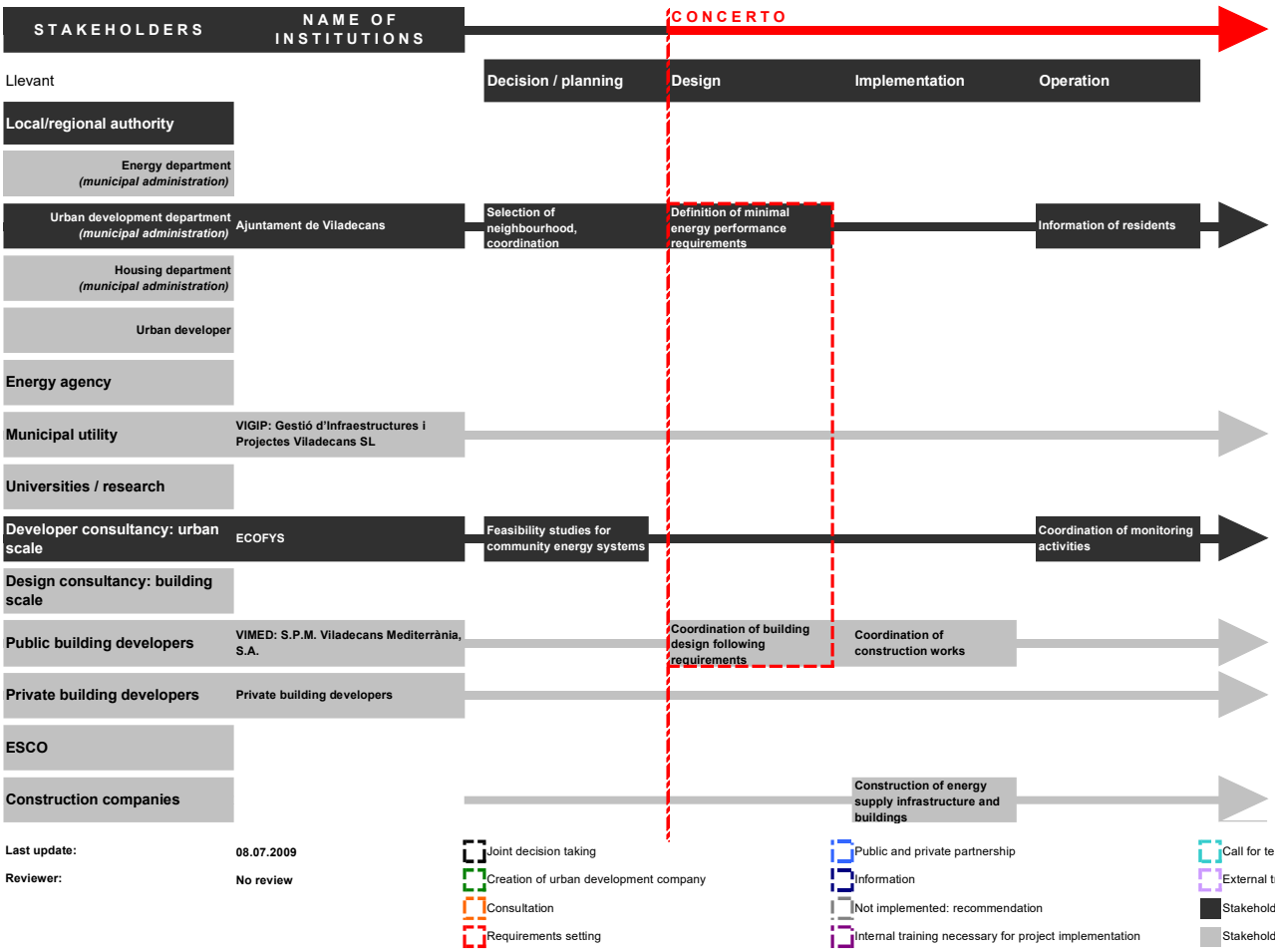

**Last update:** 14.12.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Viladecans

PI_mechanisms_OP_v8



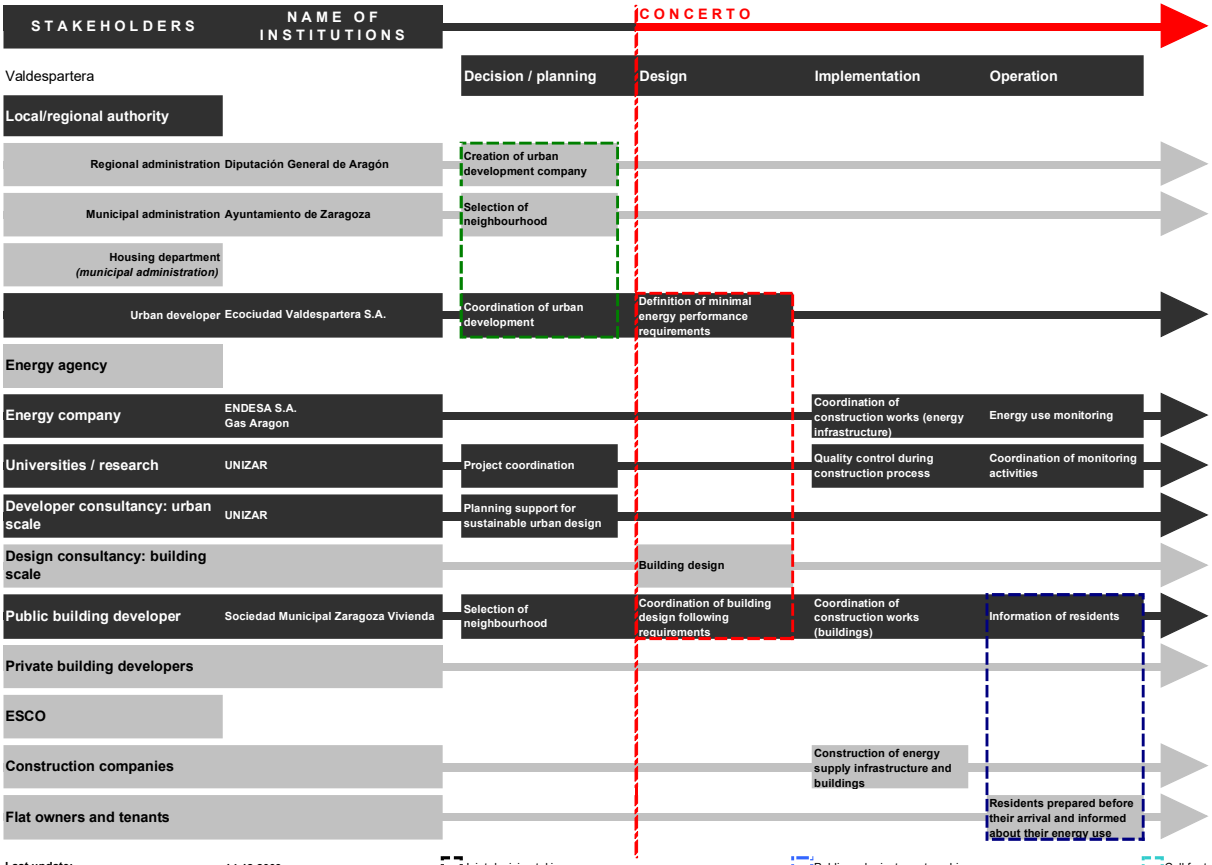

**Last update:** 08.07.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Zaragoza_V





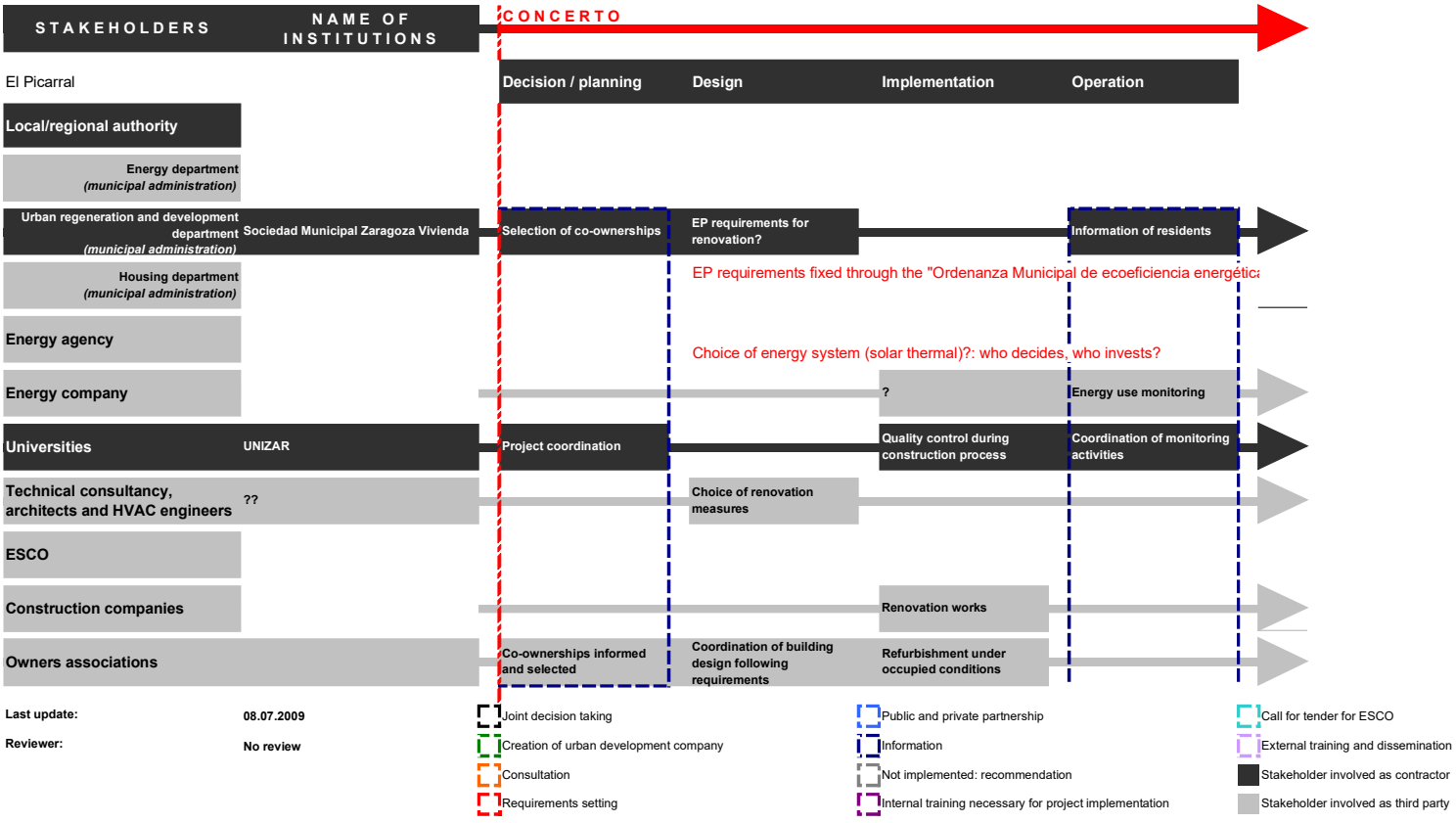

**Last update:** 14.12.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Zaragoza_P

PI_mechanisms_OP_v8

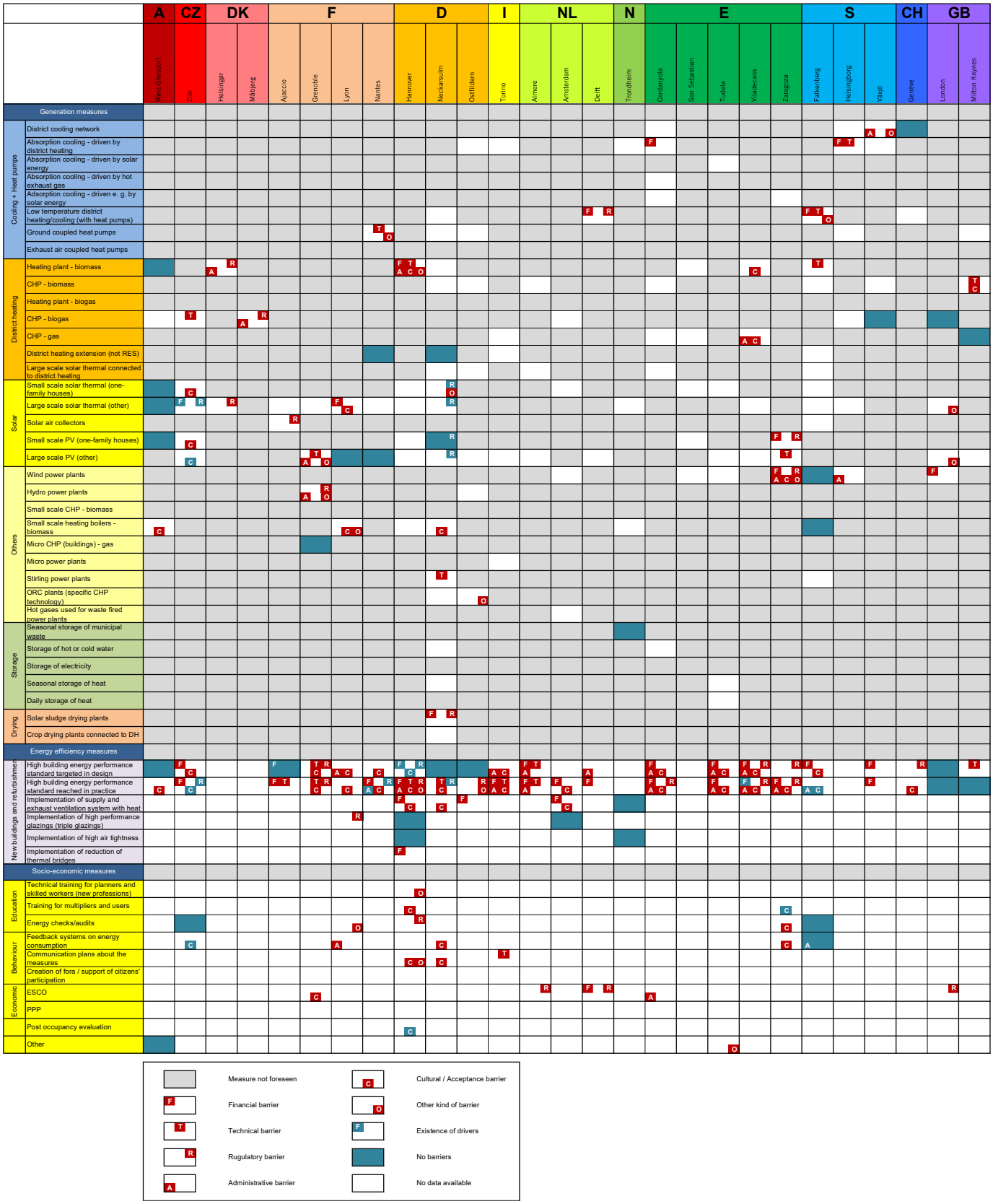



**Last update:** 08.07.2009

**Reviewer:** No review

- Joint decision taking
- Creation of urban development company
- Consultation
- Requirements setting
- Public and private partnership
- Information
- Not implemented: recommendation
- Internal training necessary for project implementation
- Call for tender for ESCO
- External training and dissemination
- Stakeholder involved as contractor
- Stakeholder involved as third party

# Annex 2 to Planning and implementation process assessment report: Planning and implementation matrix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Hannover
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Ostfildern
Torino
Almere
Amsterdam
Delft
Trondheim
Cerdanyola
San Sebastian
Tudela
Viladecans
Zaragoza
Falkenberg
Helsingborg
Växjö
Genève
London
Milton Keynes
Generation measures
Cooling + Heat pumps
District cooling network
Absorption cooling - driven by district heating
Absorption cooling - driven by solar energy
Absorption cooling - driven by hot exhaust gas
Adsorption cooling - driven e. g. by solar energy
Low temperature district heating/cooling (with heat pumps)
Ground coupled heat pumps
Exhaust air coupled heat pumps
District heating
Heating plant - biomass
CHP - biomass
Heating plant - biogas
CHP - biogas
CHP - gas
District heating extension (not RES)
Large scale solar thermal connected to district heating
Solar
Small scale solar thermal (one-family houses)
Large scale solar thermal (other)
Solar air collectors
Small scale PV (one-family houses)
Large scale PV (other)
Others
Wind power plants
Hydro power plants
Small scale CHP - biomass
Small scale heating boilers - biomass
Micro CHP (buildings) - gas
Micro power plants
Stirling power plants
ORC plants (specific CHP technology)
Hot gases used for waste fired power plants
Storage
Seasonal storage of municipal waste
Storage of hot or cold water
Storage of electricity
Seasonal storage of heat
Daily storage of heat
Drying
Solar sludge drying plants
Crop drying plants connected to DH
Energy efficiency measures
New buildings and refurbishment
High building energy performance standard targeted in design
High building energy performance standard reached in practice
Implementation of supply and exhaust ventilation system with heat
Implementation of high performance glazings (triple glazings)
Implementation of high air tightness
Implementation of reduction of thermal bridges
Socio-economic measures
Education
Technical training for planners and skilled workers (new professions)
Training for multipliers and users
Energy checks/audits
Behaviour
Feedback systems on energy consumption
Communication plans about the measures
Creation of fora / support of citizens' participation
Economic
ESCO
PPP
Post occupancy evaluation
Other
Measure not foreseen
Financial barrier
Technical barrier
Rugulatory barrier
Administrative barrier
Cultural / Acceptance barrier
Other kind of barrier
Existence of drivers
No barriers
No data available

act2 | Hannover

| Measures | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| **Specific technical measures** | | | | | | | | | | | | | | | | | | | |
| District heating: CHP - biomass | | ■ | ■ | ■ | | ■ | | ■ | ■ | | | | | | | | | 67 | 64 |
| Solar: Small scale solar thermal (one-family houses) | | | | | | | | | | | | | | | | | | 74 | |
| Solar: Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 74 | |
| Solar: Small scale PV (one-family houses) | | | | | | | | | | | | | | | | | | 74 | |
| Solar: Large scale PV (other) | | | | | | | | | | | | | | | | | | 74 | |
| Others: Small scale heating boilers - biomass | | | | | | | | | | | | | | | | | | 67 | |
| **Specific technical measures (energy efficiency)** | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment: High building energy performance standard targeted in design | ■ | ■ | | ■ | ■ | | | | ■ | | | | | | | | | | |
| New buildings and refurbishment: High building energy performance standard reached in practice | | ■ | ■ | ■ | ■ | ■ | ■ | ■ | | ■ | | | | | | | | | |
| New buildings and refurbishment: Implementation of supply and exhaust ventilation system with heat recovery | | ■ | | ■ | | | | | | ■ | | | | | | | | | |
| New buildings and refurbishment: Implementation of high performance glazings (triple glazings) | ■ | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment: Implementation of high air tightness | ■ | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment: Implementation of reduction of thermal bridges | | ■ | | | | | | | | | | | | | | | | | |
| **Specific SE measures** | | | | | | | | | | | | | | | | | | | |
| Education: Technical training for planners and skilled workers (new professions) | | | | | | | | ■ | | | | | | | | | | | |
| Education: Training for multipliers and users | | | | ■ | | | | | ■ | | | | | | | | | | |
| Education: Energy checks/audits | | | | | ■ | | | | | ■ | | | | | | | | | |
| Measures to affect consumers' behaviour and: Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and: Communication plans about the measures | | | | ■ | | | ■ | ■ | ■ | ■ | | | | | | | | | |
| Measures to affect consumers' behaviour and: Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and: Post occupancy evaluation | | | | ■ | | | | | ■ | | | | | | | | | | |
| Measures to affect consumers' behaviour and: Other | | | | | | | | | | | | | | | | | | | |
| **Creation of ESCOs** | | | | | | | | | | | | | | | | | | | |
| **PPP** | | | | | | | | | | | | | | | | | | | |

act2 | Nantes

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| District heating | Ground coupled heat pumps | | | | | | | | | | | | | | | | | | 58 | 61 |
| | District heating extension (not RES) | | | | | | | | | | | | | | | | | | N/A | |
| Solar | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 60 | |
| | Large scale PV (other) | | | | | | | | | | | | | | | | | | 60 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumer behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

cRRescendo | Ajaccio

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Idex for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Solar | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 60 | 61 |
| | Solar air collectors | | | | | | | | | | | | | | | | | | 60 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures (information on planned and running activities) | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

cRRescendo | Almere

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastucture |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| District heating | CHP - biomass | | | | | | | | | | | | | | | | | | 40 | |
| | Large scale solar thermal connected to district heating | | | | | | | | | | | | | | | | | | 45 | 49 |
| Solar | Large scale PV (other) | | | | | | | | | | | | | | | | | | 45 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

cRRescendo | Milton Keynes

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Idex for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Geoth. + Heat | Ground coupled heat pumps | | | | | | | | | | | | | | | | | | 62 | 64 |
| District heating | CHP - biomass | | | | | | | | | | | | | | | | | | 58 | |
| | CHP - gas | | | | | | | | | | | | | | | | | | N/A | |
| Solar | Large scale PV (other) | | | | | | | | | | | | | | | | | | 50 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumer behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

cRRescendo | Viladecans

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Idex for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| District heating | Heating plant - biomass | | | | | | | | | | | | | | | | | | 57 | 73 |
| | CHP - gas | | | | | | | | | | | | | | | | | | N/A | |
| Solar | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 71 | |
| | Large scale PV (other) | | | | | | | | | | | | | | | | | | 71 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumer behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**ECO-city | Helsingborg**

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | District cooling network | | | | | | | | | | | | | | | | | | 52 | 53 |
| | Adsorption cooling - driven e. g. by solar energy | | | | | | | | | | | | | | | | | | 52 | |
| | Ground coupled heat pumps | | | | | | | | | | | | | | | | | | 52 | |
| District heating | CHP - biogas | | | | | | | | | | | | | | | | | | 52 | |
| Solar | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 44 | |
| Others | Wind power plants | | | | | | | | | | | | | | | | | | 52 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consument behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

ECO-City | Helsinge

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastucture |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| District heating | Heating plant - biomass | | | | | | | | | | | | | | | | | | 46 | 61 |
| Solar | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 44 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**ECO-City | Trondheim**

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + heat pumps | Absorption cooling - driven by district heating | | | | | | | | | | | | | | | | | | 48 | 53 |
| Solar | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 32 | |
| Others | Small scale heating boilers - biomass | | | | | | | | | | | | | | | | | | 48 | |
| Storage | Seasonal storage of municipal waste | | | | | | | | | | | municipal utility | | municipal utility | | | | | N/A | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | Norway | school | high | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and awareness | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

ECO-City | Tudela

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | Absorption cooling - driven by solar energy | | | | | | | | | | | | | | | | | | 71 | 73 |
| Solar | Small scale solar thermal (one-family houses) | | | | | | | | | | | | | | | | | | 71 | |
| | Large scale PV (other) | | | | | | | | | | | | | | | | | | 71 | |
| Others | Wind power plants | | | | | | | | | | | | | | | | | | 70 | |
| Storage | Seasonal storage of heat | | | | | | | | | | | | | | | | | | N/A | |
| | Daily storage of heat | | | | | | | | | | | | | | | | | | N/A | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | ■ | | | | ■ | ■ | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | ■ | | ■ | | ■ | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | ■ | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

ECOSTILER | Amsterdam

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Space heating | CHP - biogas | | | | | | | | | | | | | | | | | | 48 | 49 |
| Solar | Small scale solar thermal (one-family houses) | | | | | | | | | | | | | | | | | | 45 | |
| Others | Wind power plants | | | | | | | | | | | | | | | | | | 48 | |
| | Hot gases used for waste fired power plants | | | | | | | | | | | | | | | | | | 48 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumer behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

ECOSTILER | London

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Space heating | CHP - biogas | ■ | | | | | | | | | | | | | | | | | 62 | 64 |
| Solar | Large scale solar thermal (other) | | | | | | | | ■ | | | | | | | | | | 50 | |
| Solar | Large scale PV (other) | | | | | | | | ■ | | | | | | | | | | 50 | |
| Others | Wind power plants | | ■ | | | | | | | | ■ | | | | | | | | 63 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | ■ | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard reached in practice | ■ | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| Education | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| Education | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | ■ | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

ECOSTILER | Mábjerg

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors\stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| District heating | CHP - biogas | | | | | | | | | | | | | | | | | | 49 | 61 |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**energy in minds! | Falkenberg**

| Measures | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific, general) | Index for infrastructure |
| **Specific technical measures** | | | | | | | | | | | | | | | | | | | |
| District + local heating and cooling | Low temperature district heating/cooling (with heat pumps) | | | | | | | | | | municipal utility | | municipality | abandoned | not implemented | | | 52 | |
| District heating | Heating plant - biomass | | | | | | | | | | municipal utility | | households | none | implemented | | | 53 | |
| | CHP - biomass | | | | | | | | | | | | | | | | | 53 | |
| | District heating extension (not RES) | | | | | | | | | | | | | | | | | N/A | |
| | Large scale solar thermal connected to district heating | | | | | | | | | | | | | | | | | 44 | |
| Solar | Small scale solar thermal (one-family houses) | | | | | | | | | | | | | | partly implemented | | | 44 | 53 |
| | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | 44 | |
| | Solar air collectors | | | | | | | | | | | | | | | | | 44 | |
| Others | Wind power plants | | | | | | | | | | municipal utility | high | municipal utility | | implemented | | | 52 | |
| | Small scale heating boilers - biomass | | | | | | | | | | households | high | households | exceeded | implemented | | | 53 | |
| | Stirling power plants | | | | | | | | | | | | | | | | | 52 | |
| **Specific technical measures (energy efficiency)** | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | housing company | high | households | none | partly implemented | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | |
| **Specific SE measures** | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | households / commerce / | | households / offices / | | implemented | | | | |
| Motivation of private consumers and tenants | Feedback systems on energy consumption | | | | | | | | | | housing company | high | households | none | implemented | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | |
| **Creation of ESCOs** | | | | | | | | | | | | | | | | | | | |
| **PPP** | | | | | | | | | | | | | | | | | | | |

Last update: 09/07/09 (BI)

energy in minds! | Neckarsulm

| | Measures | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastucture |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | Low temperature district heating/cooling (with heat pumps) | | | | | | | | | | | | | | | | | | 66 | |
| | Ground coupled heat pumps | | | | | | | | | | | | | | | | | | 66 | |
| District heating | Heating plant - biomass | | | | | | | | | | | | | | | | | | 67 | |
| | CHP - biomass | | | | | | | | | | | | | | | | | | 67 | |
| | District heating extension (not RES) | | | | | | | | | | | | | | | | | | N/A | |
| | Large scale solar thermal connected to district heating | | | | | | | | | | | | | | | | | | 74 | |
| Solar | Small scale solar thermal (one-family houses) | | | | | | | | | | | households | high (info campaign) | households | only 50% will be realised | partly implemented | | | 74 | |
| | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 74 | |
| | Small scale PV (one-family houses) | | | | | | | | | | | households | high | households | | implemented | | | 74 | 64 |
| | Large scale PV (other) | | | | | | | | | | | | | | | | | | 74 | |
| Others | Small scale heating boilers - biomass | | | | | | | | | | | households / public buildings | | | | partly implemented | | | 67 | |
| | Stirling power plants | | | | | | | | | | | | | | | | | | 66 | |
| | ORC plants (specific CHP technology) | | | | | | | | | | | | | | | | | | 66 | |
| Storage | Storage of hot or cold water | | | | | | | | | | | | | | | | | | N/A | |
| | Seasonal storage of heat | | | | | | | | | | | | | | | | | | N/A | |
| Drying | Solar sludge drying plants for use in CHP plant | | | | | | | | | | | | | | | | | | N/A | |
| | Crop drying plants connected to DH | | | | | | | | | | | | | | | | | | N/A | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | households | low | households | 4 of 20 | partly implemented | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| | Avoidance of electrical cooling devices in flats | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | households | 390 checks | households | | partly implemented | | | | |
| Measures to affect occupants' behaviour and comfort | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| District heating | Heating plant - biomass | ■ | | | | | | | | | | households | | | | | | | 48 | 49 |
| | CHP - biogas | | | | | | | | | | | | | | | | | | 35 | |
| Solar | Small scale solar thermal (one-family houses) | ■ | | | | | | | | | | households | high | households | exceeded | implemented | | | 48 | |
| | Large scale solar thermal (other) | ■ | | | | | | | | | | households | | | | | | | 48 | |
| | Small scale PV (one-family houses) | ■ | | | | | | | | | | households | | | | | | | 48 | |
| Others | Small scale heating boilers - biomass | | | | ■ | | | | | | | households | | | | | | | 48 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | ■ | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | ■ | | | ■ | | | ■ | households | high | households | exceeded | implemented | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | ■ | auditors | 800 checks | households | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | ■ | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| District heating | CHP - biogas | | | | | | | | | | | | | | | | | | N/A | |
| Solar | Small scale solar thermal (one-family houses) | | | | | | | | | | | households | high | households | | | | | N/A | |
| | Large scale solar thermal (other) | | | | | | | | | | | municipal utility | | | | | | | N/A | N/A |
| | Small scale PV (one-family houses) | | | | | | | | | | | households | high | households | | | | | N/A | |
| | Large scale PV (other) | | | | | | | | | | | commercial | | | | | | | N/A | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | households | | households | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**POLYCITY | Cerdanyola**

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | District cooling network | | | | | | | | | | | | | | | | | | 64 | 73 |
| | Absorption cooling - driven by district heating | | | | | | | | | | | | | | | | | | 64 | |
| | Absorption cooling - driven by hot exhaust gas | | | | | | | | | | | | | | | | | | 64 | |
| | Adsorption cooling - driven e. g. by solar energy | | | | | | | | | | | | | | | | | | 64 | |
| District heating | CHP - biomass | | | | | | | | | | | | | | | | | | 57 | |
| | CHP - gas | | | | | | | | | | | | | | | | | | N/A | |
| | Large scale solar thermal connected to district heating | | | | | | | | | | | | | | | | | | 71 | |
| Storage | Storage of hot or cold water | | | | | | | | | | | | | | | | | | N/A | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**POLYCITY | Ostfildern**

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | Absorption cooling - driven by district heating | | | | | | | | | | | | | | | | | | 66 | |
| | Ground coupled heat pumps | | | | | | | | | | | | | | | | | | 66 | |
| District heating | CHP - biomass | | | | | | | | | | | | | | | | | | 67 | |
| | Large scale solar thermal connected to district heating | | | | | | | | | | | | | | | | | | 74 | 64 |
| Solar | Large scale PV (other) | | | | | | | | | | | | | | | | | | 74 | |
| Others | Hydro power plants | | | | | | | | | | | | | | | | | | 66 | |
| | ORC plants (specific CHP technology) | | | | | | | | ■ | | | | | | | | | | 66 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | ■ | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | ■ | | | ■ | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | ■ | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumer and behaviour | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**POLYCITY | Torino**

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infrastructure |
| **Specific technical measures** | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | Absorption cooling - driven by district heating | | | | | | | | | | | | | | | | | | 59 | |
| District heating | CHP - gas | | | | | | | | | | | | | | | | | | N/A | |
| | District heating extension (not RES) | | | | | | | | | | | | | | | | | | N/A | 64 |
| Solar | Large scale PV (other) | | | | | | | | | | | | | | | | | | 68 | |
| Others | Micro power plants | | | | | | | | | | | | | | | | | | 59 | |
| **Specific technical measures (energy efficiency)** | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | ■ | ■ | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | ■ | ■ | ■ | | ■ | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| **Specific SE measures** | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | ■ | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| **Creation of ESCOs** | | | | | | | | | | | | | | | | | | | | |
| **PPP** | | | | | | | | | | | | | | | | | | | | |

**RENAISSANCE | Lyon**

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors\stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Solar | Large scale solar thermal (other) | | | | | | | | | | | promoters | tendering process | household/companies | | | | | 60 | 61 |
| | Large scale PV (other) | | | | | | | | | | | | | | | | | | 60 | |
| Others | Small scale heating boilers - biomass | | | | | | | | | | | | | | more | | | | 56 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**RENAISSANCE | Zaragoza**

| | Measures | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infrastructure |
| **Specific technical measures** | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | Absorption cooling - driven by solar energy | | | | | | | | | | | | | | | | | | 71 | |
| Solar | Small scale PV (one-family houses) (El Picarral) | | | | | | | | | | | households | relatively high | households | relatively low | partly implemented | | | 71 | |
| Solar | Large scale PV (Cand. Domingo School) | | | | | | | | | | | | | | relatively low | partly implemented | | | 71 | 73 |
| Solar | | | | | | | | | | | | | | | | | | | | |
| Others | Wind power plants | | | | | | | | | | | | | | high | delayed | | | 70 | |
| **Specific technical measures (energy efficiency)** | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| **Specific SE measures** | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| Education | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| Education | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and habits | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and habits | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and habits | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and habits | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and habits | Other | | | | | | | | | | | | | | | | | | | |
| **Creation of ESCOs** | | | | | | | | | | | | | | | | | | | | |
| **PPP** | | | | | | | | | | | | | | | | | | | | |

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Solar | Large scale solar thermal (other) | | | | | | | | | | | | | | | | | | 60 | 61 |
| Solar | Large scale PV (other) | | | ■ | | | ■ | | ■ | | | | | | | | | | 60 | |
| Others | Hydro power plants | | | | | ■ | ■ | | ■ | | | | | | | | | | 58 | |
| Others | Micro CHP (buildings) - gas | ■ | | | | | | | | | | | | | | | | | N/A | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | ■ | | ■ | | ■ | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard reached in practice | | | ■ | ■ | ■ | | ■ | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Education: Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Education: Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | ■ | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | Low temperature district heating/cooling (with heat pumps) | | | | | | | | | | | | | | | | | | 48 | 49 |
| Solar | Large scale PV (other) | | | | | | | | | | | | | | | | | | 45 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**sesac | Växjö**

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | District cooling network | | | | | | ■ | | ■ | ■ | | | | | | | | | 52 | 53 |
| | Absorption cooling - driven by district heating | | | | | | | | | | | | | | | | | | 52 | |
| District heating | CHP - biomass | | | | | | | | | | | | | | | | | | 53 | |
| | CHP - biogas | ■ | | | | | | | | | | | | | | | | | 52 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | ■ | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | ■ | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

**TetraEner | Geneva**

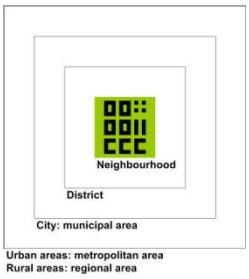
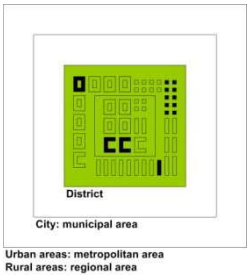
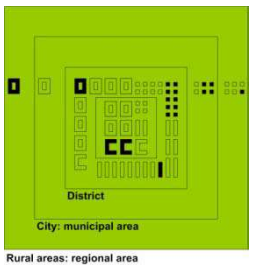
| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| Cooling + Heat pumps | District cooling network | | | | | | | | | | | | | | | | | | N/A | N/A |
| | Low temperature district heating/cooling (with heat pumps) | | | | | | | | | | | | | | | | | | N/A | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and participation | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

TetraEner | San Sebastian

| Measures | | Barriers / Drivers | | | | | | | | Relevance | | Actors/stakeholders involved | Degree of involvement | Target group | Divergence form original planning | Level of implementation (not implemented, implemented, delayed, partly implemented) | Cost | | Attractiveness | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | no barrier | financial | technical | acceptance | regulatory | administrative | cultural | others | community specific | general relevance | | | | | | measure | reference country cost | Index for renewables (specific or general) | Index for Infrastructure |
| Specific technical measures | | | | | | | | | | | | | | | | | | | | |
| District heating | Heating plant - biomass | | | | | | | | | | | | | | | | | | 57 | 73 |
| | CHP - gas | | | | | | | | | | | | | | | | | | N/A | |
| Solar | Small scale solar thermal (one-family houses) | | | | | | | | | | | | | | | | | | 71 | |
| | Small scale PV (one-family houses) | | | | | | | | | | | | | | | | | | 71 | |
| Others | Wind power plants | | | | | | | | | | | | | | | | | | 70 | |
| Specific technical measures (energy efficiency) | | | | | | | | | | | | | | | | | | | | |
| New buildings and refurbishment | High building energy performance standard targeted in design | | | | | | | | | | | | | | | | | | | |
| | High building energy performance standard reached in practice | | | | | | | | | | | | | | | | | | | |
| | Implementation of supply and exhaust ventilation system with heat recovery | | | | | | | | | | | | | | | | | | | |
| | Implementation of high performance glazings (triple glazings) | | | | | | | | | | | | | | | | | | | |
| | Implementation of high air tightness | | | | | | | | | | | | | | | | | | | |
| | Implementation of reduction of thermal bridges | | | | | | | | | | | | | | | | | | | |
| Specific SE measures | | | | | | | | | | | | | | | | | | | | |
| Education | Technical training for planners and skilled workers (new professions) | | | | | | | | | | | | | | | | | | | |
| | Training for multipliers and users | | | | | | | | | | | | | | | | | | | |
| | Energy checks/audits | | | | | | | | | | | | | | | | | | | |
| Measures to affect consumers' behaviour and habits | Feedback systems on energy consumption | | | | | | | | | | | | | | | | | | | |
| | Communication plans about the measures | | | | | | | | | | | | | | | | | | | |
| | Creation of fora / support of citizens' participation | | | | | | | | | | | | | | | | | | | |
| | Post occupancy evaluation | | | | | | | | | | | | | | | | | | | |
| | Other | | | | | | | | | | | | | | | | | | | |
| Creation of ESCOs | | | | | | | | | | | | | | | | | | | | |
| PPP | | | | | | | | | | | | | | | | | | | | |

# Annex 1 to Planning and implementation process assessment report: Synopsis of planning and implementation process diagrams

# Annex 3 to Key elements characterising CONCERTO communities

| | | New neighbourhoods | Existing neighbourhoods | Existing districts | Entire cities |
|---|---|---|---|---|---|
| Key elements characterising CONCERTO communities | |  | |  |  |
| 1) Performance requirements for buildings that are more ambitious than present building codes | No challenge/ favourable conditions | - public building development<br>- 100% private building development by "convinced" developers | - buildings owned entirely by one institution | - public buildings<br>- buildings owned by local authorities (municipal housing company) | - public buildings<br>- buildings owned by local authorities (municipal housing company) |
| | Challenge | **Public coordinated neighbourhood development**<br>Ensure that private building developers observe ambitious energy performance requirements | **Buildings owned by different institutions**<br>- Ensure that all buildings of a given neighbourhood are renovated towards ambitious energy performance standards<br>- Implement ambitious renovation works in occupied conditions | - Ensure that a high number of buildings in a district / city are renovated towards ambitious energy performance | |
| | Lessons for policy | **Use of development briefs**<br>- include precise energy criteria in development briefs:<br>- define targets for building energy performance ratings<br>- specify technical solutions to be used or avoided<br>- include specific organisational and process requirements:<br>- require feasibility studies for alternative technical solutions<br>- require an energy expert accompanying the design process<br>- provide contractual incentives | **Neighbourhood-driven approach**<br>- include energy requirements in existing neighbourhood regeneration programmes<br>- create a temporary organisation overtaking the role of each single housing association/ company | **Stakeholder/target-group-centred approach**<br>- dedicate subsidies and incentives for ambitious renovation activities to targeted stakeholders (housing associations, housing companies, private co-ownerships…) | |
| 2) High degree of integration of renewables in buildings | No challenge / favourable conditions | - public building development<br>- 100% private building development by "convinced" developers | - buildings owned entirely by one institution | - public buildings<br>- buildings owned by local authorities (municipal housing company) | - public buildings<br>- buildings owned by local authorities (municipal housing company) |

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|---|---|---|---|
| | Challenge | **Public coordinated neighbourhood development**<br>Ensure that private building developers integrate renewable energy systems in the buildings | Ensure that a high number of buildings in a district / city use local available renewable energy sources |
| | Lessons for policy | **Use of development briefs**<br>- include precise energy criteria in development briefs:<br>  - define targets for renewable energy systems<br>- provide contractual incentives | **Stakeholder/target-group-centred approach**<br>- dedicate subsidies and incentives for using renewable energy systems in buildings (funding schemes should be coherent with local energy planning )<br>**Market driven approach**<br>- find investors willing to build power plants using RES in urban areas |
| 3) Polygeneration and cascade use of resources (including district heating and cooling) | No challenge/ favourable conditions | - Implementing this aspect is always challenging; there is no situation where implementing polygeneration technologies and cascade use of resources would be "easy". | |
| | Challenge | - While tendering design, construction and operation of district energy systems, difficulty to find an appropriate ESCO<br>- Guarantee that the public interest (sustainability) is taken into consideration in an energy infrastructure project financed by majority by private funds | When district heating infrastructure is available, ensure that a high number of buildings is connected |
| | Lessons for policy | **Shareholder-driven approach**<br>- public-private-partnership<br>- "priority shares" owned by the local public authority (municipality)<br>**Utility driven approach**<br>- invest in new technologies to provide services which are not included in the traditional utility portfolios (utility and municipality strategies should be compatible) | **Subsidy-driven approach**<br>- including district heating connection as a condition for obtaining a specific financial subsidy (e.g. for building renovation)<br>**Shareholder-driven approach**<br>- include potential clients (e.g. large building developers) as shareholders in the district heating company in order to motivate the connection of their housing stock to the district heating network |

| | | |
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| 4) Demand Side Management (DSM)-community energy management system based on real-time optimisation of energy demand / supply and effective approach to technical monitoring | No challenge/ favourable conditions | - Implementing this aspect is always challenging; there is no situation where implementing community energy management and monitoring programmes would be an "easy task". |
| | Challenge | - Monitoring systems are not standardised and the interests and responsibilities for monitoring energy use at community scale are differing from stakeholder to stakeholder<br>- A community energy management system based on real-time data utilisation requires the involvement of many stakeholders (municipal utilities, housing owners, research centres, consultants, etc.) and quite often the responsibility for providing monitoring data and implementing the energy management strategy is not clearly defined.<br>- Real-time community energy management is not a standardised process<br>- Privacy issues and data ownership |
| | Lessons for policy | - Further realise R&D projects to improve monitoring processes and data quality<br>- Display metered energy use as a means to increase awareness of end-users<br>- Make use of analysis and visualisation tools (GIS, detailed statistics…) to present and communicate metering results<br>- Offer platforms and mechanisms (considering data confidentiality issues) to share monitoring data among all involved stakeholders (utilities, local authorities, end users…) |
| 5) Commitment of stakeholders | No challenge/ favourable conditions | - public administrations taking the lead and mobilising actors that can influence the town agenda and therefore maximise stakeholder support for it.<br>- 100% development by public organisations<br>- 100% private building development by "convinced" developers<br>- Good cooperation between municipalities and housing associations. This allows the tenants to be better informed and increases their involvement in the process.<br>- Projects involving municipal utilities face less challenges especially because of their support in negotiating with building owners and developers and to overcome legal and administrative barriers due to the difficulty to enforce the use of community energy systems. |
| | Challenge | - Achieving high commitment at both city and neighbourhood scale and good cooperation among all stakeholders to be involved in spite of conflicting economic interests.<br>- Cooperation with private/public building developers (especially finding ways for formulating requirements and ensure that they will be implemented)<br>- Guaranteeing the implementation of community energy systems (PPP involving housing companies/ developers as shareholders)<br>- to flank political commitment by a strong commitment of departments in the public administration in implementing and realising more advanced goals.<br>- to accompany these endeavours by a timely provision of necessary additional funding.<br>- to implement measures/projects related to issues of which the effects are not directly visible - and which therefore cannot be placed easily on the political agenda. The same applies for implementations of measures for which standard technical solutions are not available. |
| | Lessons for policy | -In order to achieve a better cooperation at city level, prepare a general document signed by all stakeholders in the municipality.<br>-In order to achieve a high commitment at neighbourhood scale, mechanisms provided by national initiatives for neighbourhood improvement (e.g. ZAC, contratto di quartiere) should be promoted.<br>- In order to increase acceptance enhance end-user participation and users´ feedback during the setting of requirements, during the design phase and during the test phase.<br>- In order to render the promotion of sustainable targets more effective, public administrations should promote actions on their own premises. This path allows the achievements of two goals: the improvement of the energy quality of public properties (with significant economic savings) and the lighthouse function with potential replication of energy efficiency in the private sector.<br>- In order to provide further motivation for all involved to proceed with the project and finish it according to initial specifications, stakeholders cooperation should be enhanced and finances should be lined-up.<br>-Further coordination of all contractors and a continued strong project management and leadership |
| 6) Integration of sustainability criteria / socio-economic accompanying activities | No challenge/ favourable conditions | - When a dedicated socio-economic concept is available and experienced project partner in charge of it.<br>- When implementation of measures affecting the inhabitants have been communicated<br>- When tenants have been informed and involved in the activities from the very beginning and throughout all phases of the project<br>- when information campaigns and surveys are commenced even before the demonstration activities start (especially for renovation projects)<br>- when concepts have been comprehensive, tailored from the beginning to the specific characteristics of the project and clearly defined |

| | | |
|---|---|---|
| | Challenge | - Implementing comprehensive renovation activities that ensure significant primary energy savings, but at the same time also guarantee an increased social cohesion, sense of place and identification of the inhabitants in the concerned districts.<br>- Finding a good balance between energy improvement measures and quality of life improvement measures e.g. by increasing local acceptance of measures while renovating under occupied conditions for example by involving tenants (information campaigns prior to projects, metering activities by tenants, training tenants as advisors and potential multipliers)<br>- Finding means to contact and motivate owners of single-family homes<br>- Designing successful support programmes and provide additional financing mechanisms<br>- Identifying problems at an early stage and react to these problems by either adapting the project activities or taking these aspects into account for further activities<br>- Adapting the socio-economic activities to delays in the demonstration |
| | Lessons for policy | - In order to help increasing acceptance, early tenant information on the refurbishment activities, especially concerning changes in rent, energy costs and additional costs to be covered by the tenant and targeted information material should be provided.<br>-Empowering schemes addressing inhabitants acting as liaison with other tenants or establishing district agencies should be enhanced.<br>- Dedicated activities to increase the involvement of inhabitants particularly in the case of renovation programmes under occupied conditions should be supported.<br>-New heating technologies will be accepted better if they are user-friendly, well introduced and explained to the tenants, especially older ones.<br>-Refurbishment of flats and works on the building site put considerable burdens on all tenants, especially with regard to dirt and noise. Special attention should be devoted to tenant liaisons in a modernisation project, running through the entire process from planning to end use.<br>-Local advisers counselling tenants and acting in the CONCERTO district with mediating function should be established. They can be valuable to speed up the construction process, to take the pressure off site supervisors and to increase the social acceptance of the measure.<br>Targeted information should be intensified. This should include dedicated communication plans, awareness raising schemes, activities to increase the involvement of inhabitants and stimulating the participation of relevant decision makers, market actors and user groups. |

# NOTES

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