

**ClearSupport
Clearinghouse Facilitation
Paving Way for Better Energy Building Performance**

**Observations and Recommendations
Of the Clearinghouse/PSF mechanism
in a EU Perspective**

Project EIE-06-189 ClearSupport
Clearinghouse Facilitation

Paving Way for Better Energy Building Performance
in European regions

WP2 Organisational aspects

**D 2.5:
Recommendations on Regional/Local Clearinghouse Operations (for EC
use)**

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Appendix 1: ClearSupport Replication Potential – ITALY

Appendix 2: ClearSupport Replication Potential – CROATIA

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Introduction

ClearSupport is a project supported by the Intelligent Energy for Europe programme that has aimed at developing a mechanism for enabling energy efficient building investments. This has been done via Project Service Facilities/PSFs operating in Latvia, Lithuania, Poland (Pomeranian region), Czech R. and Crete) in conjunction with efforts on improving the investment framework.

ClearSupport has turned very successful in that the PSFs have succeeded in generating 230 energy efficient building investments in the course of action (three years from January 2007), of which many have been implemented or in the state of having the project financing in place.

In the last stage of action the ClearSupport project team evaluated these efforts in terms of how the experience from the ClearSupport achievements can help to support the European goals on energy and climate change (notably the '2020' goal) and boosting of the European economy following the financial crisis.

The present report provides the project team's recommendations for decision-makers in the European Commission and related stakeholders.

A key message of ClearSupport is that Europe need a 'delivery mechanism' in order to make the policy goals materialize. ClearSupport has proved that by putting in place entities that can support the identification and implementation in a competent way, not least by helping project owners in real need of assistance and assisting on both the technical and financial aspects of the investments, much can be gained. Consequently, the first part of this report draws up ClearSupport's recommendations in this respect.

1 ClearSupport Recommendations on a ‘Delivery Mechanism’

1.1 The problem

We know that buildings today can be designed and constructed with very little energy use. We know that existing buildings can be altered towards such energy efficient status. Unfortunately most of our building stock does not have these properties. They are on the contrary very energy-demanding.

Thus the built environment is the crucial element in the change of the energy system towards sustainability. It is so because the lifetime of the buildings is long. Once they are there, they will occupy the space for decades and even centuries. They will surely change several times over during their existence, but all the changes have to be consistent and dedicated so that every opportunity is used and no opportunity is lost.

Policies and measures shaped on all levels have a tendency towards fragmentation. This is often because they have identified a certain “barrier” or a certain technology issue as a part of the problem/solution, and sometimes because the ideological and overriding ideas prefer or rejects some solutions. Whichever is the case most policies and measures can be fitted into a comprehensive policy package for delivery.

1.2 The remedies

This also implies that all involved have to gather and combine their skills towards a common goal, be they designers, engineers, architects, owners, tenants, bankers, janitors, care-takers, servicemen, policymakers, etc. ALL have to act in coherence towards this common goal in such a way that the existing buildings eventually are low-energy buildings.

- Existing buildings is an asset with a **huge potential** for improvements
- Long lead-time for investments and a need to **keep focus for a long time**
- Implementation requires **combination of issues and skills**

1.3 Combining resources for delivery

ClearSupport (CS) has shown that there is no lack of technology knowledge and no lack of financial resources to define the solutions needed. What lacks is the combination of them and the confidence from the parties that on one hand has the technological knowledge and on the other those who have the financial resources.

There is a need to develop a **DELIVERY MECHANISM** that provides:

- Technology and financing in one package
- A one-stop shop with advice on reliable technologies that deliver a functional result.

ClearSupport has made a pilot effort on this via Project Support Facilities/PSFs and made remarkable achievements in the targeted regions. It just has to be multiplied.

1.4 A draft EU-strategy for PSFs

1.4.1 Short term (S):

- In the very short term (XS) we(hvem er we)? should try to incorporate this view (bør defineres) in the EPBD-implementation in different countries. In order to achieve this we have to disseminate CS examples and in particular show how the combination of engineering and financing works.
- Secondly we should make use of the Sustainable Business week events to present the PSF's and their experiences
- Thirdly we should make use of the Social networks with a base on our web-site and try to make others link to this. We should also produce You-Tube films that give different aspects
- Seeking contact with the IEA DSM-task XX "Energy Efficiency Branding"

1.4.2 Mid term (M):

- We (bør ændres) should try to find a way to widen the work in a CS 2.0 with some support from the EU. Preferably in the context of the new financing mechanisms (regional and others)
- We (bør ændres) should try to find connections to the (few) banks that presently are working with special conditions in connection with energy efficiency improvements
- Connections should be made with IEA DSM-task XVI "Competitive Energy Services" as PSF's also should use the ESCO-concept as a relevant financial tool.

1.4.3 Long Term (L):

- Forming an association of PSF's and/or incorporate them with similar organisations.

Burde denne strategi ikke integreres med de forskellige activity levels, som er beskrevet i næste afsnit ?

2 Technical and Organisation Aspects

The Problem

There is a huge potential for reducing the energy consumption in existing buildings. The building sector is – representing around 40% of the final energy consumption – one of the largest energy consuming sectors in the European Union. At the same time this represents also the largest source of environmental pollution (CO₂ and other emissions, but also waste). The main fields of energy consumption here are heating, cooling, hot water supply, ventilation, and electricity.

In many of the selected countries in this project the building stock is generally in poor condition and therefore the saving potential is of course substantial.

One of the keys to success is formation of a firm **technical, logistical and financial basis** for implementation of sustainable renovation works. Therefore this was one of the key objectives of the ClearSupport project and subsequent the establishment of Project Service Facilities.

EU Regulation

By cutting the energy use in buildings by about 30 %, Europe's energy consumption would fall by 11%, more than half of the 20-20-20 target (20% less carbon dioxide by 2020, with 20% renewables in the energy mix). It is of course important to acknowledge that the execution of these measures would also have already mentioned multiple other positive effects.

The building stock in the EU amounts to 21 billion m². The annual production of new buildings is 1%, demolition rate about 0.5%, and retrofit about 1.8 %. At that rate it will take a very long time to improve energy efficiency. A comprehensive and aggressive approach will be needed to reach the above mentioned target of 30%.

EU has so far prepared many strategic documents and directives aimed also at improving energy efficiency in the building sector. The most relevant one is the Directive on energy performance of buildings (EPBD; 2002/91/EC). This Directive requires all EU countries to enhance their building regulations and to introduce energy certification schemes for buildings. All countries are also required to have inspections of boilers and air-conditioners. EPBD contains a range of provisions aimed at improving energy performance of residential and non-residential buildings, both new-build and existing.

In 2010 a recast of the EPBD is to be adopted, in which requirements for further strengthening of national legislative criteria for buildings will be set. Member states will again have to adjust their legislation. All this is in adjustment with EU Commission policy,

which calls upon member states to develop and perform urgent actions also to boost renovation of existing renovation building stock.

But it is difficult to reach the targets. Recent analyses have shown that a reduction of energy consumption alongside current trends would reach only 11% instead of planned 20%. In 2020. In October 2009 a draft document titled »7 Measures for 2 Million New EU Jobs« came into public discussion.

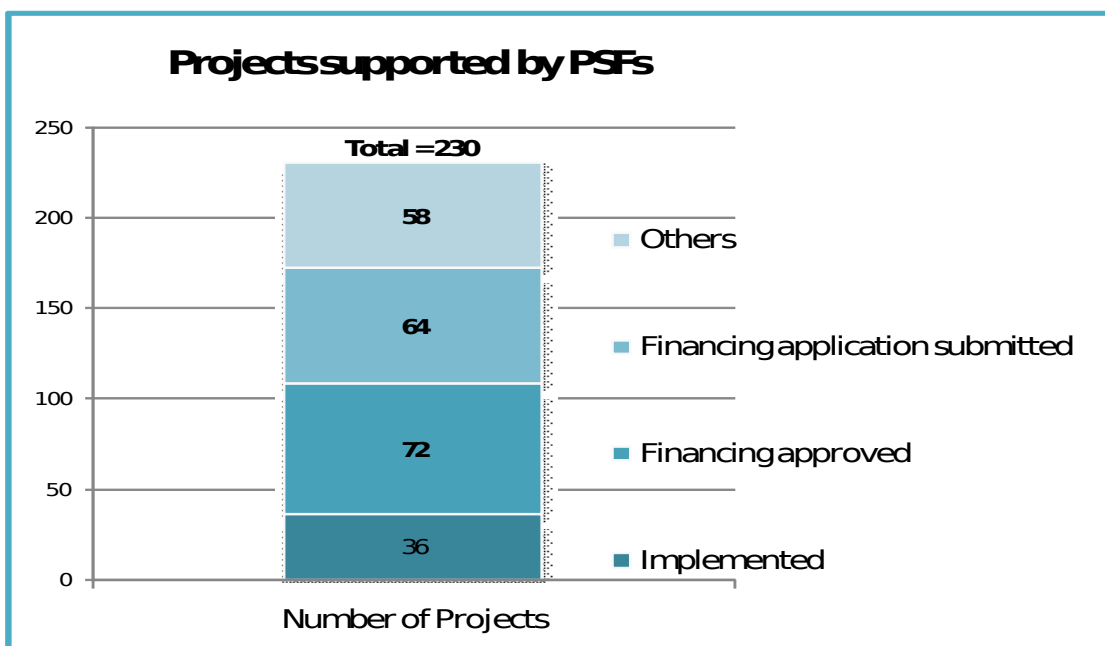
One of the seven measures covers the existent building stock. An energy renovation of 15 million buildings in EU is anticipated until 2020, which would not only reduce CO₂ emissions by 66 tons per year, but also generate 300.000 direct and 1,1 million indirect work jobs.

But it is still difficult to transfer the content of the directives of EU to the actual implementation of relevant projects on the local level in the national countries of EU. The ClearSupport Project has shown that the PSF´s have been very effective in solving this transfer problem.

Experience from 'PSF' as enabler of investments

In the EU countries there are many important barriers for implementing relevant projects - like e.g. lack of awareness, lack of financing possibilities and lack of knowledge of technical possibilities of increasing the energy efficiency in buildings. During the ClearSupport Project it has been possible to carry out important activities in respect of awareness raising, better financing possibilities e.g. by using the ESCO-concept and several training courses focusing on the specific needs of the different stakeholders.

It can therefore be concluded that the ClearSupport Project has shown that the implementation and use of the PSF´s has been a great success. A lot of projects have been identified and many of these projects have been implemented or reached the stage of financing during the project period, cf. the figure below.



Number of projects supported by the five ClearSupport Project Service Facilities (as per December 2009)

All of the persons responsible for the 5 PSF´s have close connection to potential energy reducing projects in the building sector, which made the actual identification of the projects easier, and the activities of the PSF could therefore first of all focus on finding optimal implementation measures to secure the actual implementation of the identified projects.

To reach the EU targets it will also be necessary to use more general planning concepts both in respect of defining relevant projects in the building sector, but also to improve the activities of the PSF´s.

International Energy Agency (IEA) estimates that the total feasible potential for energy savings by renovation and refurbishment is 55-80% depending on the building type and region.

This figure is useful when we are talking about the general situation in EU. But when they represent uniform average conditions, a certain dose of caution must be present. Variations from country to country can be quite substantial, and this can originate from many reasons. So, coming from the general EU to national, regional and local boundary conditions, using only average EU values to describe the existent state can in some cases mean a serious overestimation and in other cases a substantial underestimation.

To add to the above, there are usually significant differences to be found also within the building stock in a particular country or region. This depends on several influential factors, among other climate zone, building type, and building age (i.e., physical characteristics).

It is very useful if one is able to compare the existing state of an individual building to figures typical for the same category of buildings ("benchmarking"). In this way a qualitative description is possible, for example, "consumption below average", "consumption twice the average", and similar, which helps to roughly estimate already beforehand the extent of renovation measures needed. But, this can be done only if and when reliable databases exist, which comprise comparable buildings.

It is therefore relevant to use general guidelines or planning concepts to define the most relevant projects of increasing the energy efficiency in the building sector, but it is also important to use knowledge of the local , specific situation in the building sector and such information can be collected by the PSF´s.

It is necessary to organise the activities of the PSF's. A general action plan/Guideline has therefore been developed in the ClearSupport Project. The action plan includes several planning steps inspired by the project cycle.

It is suggested that the activities of the PSF's can be organised in respect of different activity levels, where activity level 1 includes activities related to creation and collection of important relevant data for development and implementation of relevant projects, which could be carried out together with facilitation of already known project proposals and new ideas coming from external stakeholders.

Activity Level 2 includes a more active role in visiting or contacting potential project owners to help defining the projects.

Activity Level 3 includes discussion with the national level about the preparation of the national plan based on the EU-directives.

And activity level 4 includes activities of initiating local energy planning in respect of other types of sources, plants and consumption.

3 Financial aspects

Introduction

It is a fact that Energy Efficiency Refurbishment (EER) reduces the energy demand in the building sector. This saves energy sources and helps to reduce CO₂ emissions. Hence, on one hand EER measures often require higher efforts in planning, material and personnel, which support the job market and the economy. On the other hand, financing projects poses a major barrier to realising EER measures and has to be addressed. While different institutions offer credit lines, these have to be complemented by appropriate and sustainable financing instruments.

3.1 Financing tools on overcoming investment barriers

3.1.1 Local conditions

Local financing conditions are often costly, if at all available for EER-measures. Unfortunate credit ratings are reflected in long amortisation periods and high interest rates. What is more, not all existing tools are available, for instance forfeiting. As such credit terms are unfavourable and a clear barrier and deterrent from realising EER-measures.

3.1.2 Communication difficult due to different expertise

Different experts are involved in the process of planning EER-measures and financing them, including bankers, planners, technicians and investors. An interdisciplinary approach is often required but not taken. Also needed is a proper understanding of the different disciplines, in order to assess the economic and energetic benefits from EER-measures. For instance long amortisation periods and related risks, as well as technical feasibility are clear areas that require a better understanding or special financing instruments that address specific services, as for instance EER-measures.

3.1.3 Appropriate public policies are needed

Instead of the aforementioned special financing instruments, it is often unspecified credits that are being offered. As a consequence provided funds are not provided to technically complex and, hence, for banks unattractive EER-measures. A further problem is the blurred focus.

3.2 Country observations/recommendations based on ClearSupport activities

3.2.1 Negative findings

ClearSupport has supported the creation of PSF, which do provide both technical and financing advisory to project implementing actors. Based on the findings, a complementary approach to special financing instruments facilitates greatly EER-measures.

The following has been noted:

- Problem: funds are not specific enough, capital flows into projects that are easier to realize
- Problem: funds are too specific, the options for investments are too limited, it is difficult to fit projects into the funding programme
- Problem: funds exist, lack of technical expertise at bank for passing capital to the investor (capital flow interrupted)
- Problem: funds capital too small, number of realized projects too low

3.2.2 Positive findings

Revolving funds

- Capital is available to investors
- investment only in special projects with specific aims
- capital is not drying out, because it's revolving, number of supported projects is higher
- specialized expert with technical expertise enable correct judgement and capital flow

Energy Performance Contracting

- planning and realization by specialist
- repayment of investment by energy savings, no equity capital needed
- customer and contractor both are interested in saving energy
- risk is on side of contractor

Good practice examples

KfW: Energieeffizient Sanieren

- Effizienzhaus KfW-100, interest subsidy for renovation of existing building up to standard of new building defined by EnEV 2009 and EEWG (German law)

KfW: Energieeffizienzhaus

- Effizienzhaus KfW-70, 55... building of new houses on improved standard,

International good practice

- Implementation of rev. Funds in EE

4 Replication Aspects

4.1 Overall Findings

Part of the ClearSupport strategy work has been to investigate the prospects of replication the PSF concept in other European countries/regions. The countries investigated are: Estonia, Denmark, Slovakia, Slovenia, Croatia and Italy.

The overall findings are:

- A general conclusion is that there is a lack of competence in these countries to identify and prepare investments of sufficient quality – that would be a natural key focus in considerations on putting in place a PSF instrument
- Nevertheless, there are a number of initiatives in each country that a replication effort could build on. In terms of financing a general conclusion is that there are many financing schemes where the potential for financing of energy renovations of buildings is not fully exploited. A key challenge of a replication effort will be how to interact with such existing initiatives
- It is essential that the replication efforts is done in close interaction with the relevant stakeholders and that the PSF instrument is well anchored in society
- Naturally a main challenge is to find the resources to run the PSF services; a barrier that can be difficult to overcome in many countries. It is to be reckoned that public support is needed to ‘make it fly’, but gradually private funding can be integrated. Experience from ClearSupport shows that it has been possible to ensure viable PSF entities via the IEE ‘seed money’

The tables on the following pages draw up the observations to be made in each country and as appendix 1 and 2 is given additional information on the situation in Croatia and Italy.

4.2 Prospects of Replication in Selected Countries

4.2.1 Estonia

Estonia	
Interest and relevance	In Estonia there has for several years been made efforts on promoting energy savings in the building sector in conjunction with introduction of an energy performance certification system. Prioritising this area has become even more relevant with the increased policy attention and need for creating jobs in the period of economic slow-down
Existing activities and experience to build on	An initiative of special importance concerns a revolving fund that combine funds of EU Structural Funds with commercial funding and this way provide an attractive financing scheme for the building owners. The scheme is managed by the institution KredEx
Key scope of services for a Clearinghouse/PSF mechanism	Even though the revolving fund scheme is successful and helped to generate more than 50 energy renovations of multi-apartment buildings, there are still barriers to be confronted. As expressed by representative of KredEx at the final ClearSupport event in Kaunas, Nov. 2009: "preparation of documents takes time, terms are complicated, people are careful". Thus a PSF entity could help to pave way for optimal use of the revolving fund
Prioritised measures	A natural focus of a PSF in Estonia could be on multi-apartment buildings oriented towards those building owners in most need for taking advantage of the revolving fund and similar facilities
Organisational aspects (type of organization, operational resources)	This is to be clarified further in dialogue with the relevant authorities and associated key actors (like KredEx)

4.2.2 Slovakia

Slovakia	
Interest and relevance	<p>Could help to overcome barriers like:</p> <ul style="list-style-type: none"> <input type="checkbox"/> Lack of personal capacities in public institutions <input type="checkbox"/> Insufficient technical background in public institutions and residential sector <input type="checkbox"/> Very low technical quality of applications for funding – a lot of applications rejected only because of technical reasons <input type="checkbox"/> Proposed technical solutions usually reflects the press of technology and material providers / dealers <input type="checkbox"/> Non-conceptual approach in reaching energy efficiency
Existing activities and experience to build on	<ul style="list-style-type: none"> <input type="checkbox"/> Outcomes from assessment of Structural funds <input type="checkbox"/> SLOVSEFF II – planned repetition of EBRD credit line <input type="checkbox"/> Possible introduction of JESSICA in Slovakia <input type="checkbox"/> Commercial funds of SPP (Slovak natural gas provider) and EON (Electricity provider) <input type="checkbox"/> Involvement of municipalities via CITENERGO – association of municipalities towards sustainable energy
Key scope of services for a Clearinghouse/PSF mechanism	<ul style="list-style-type: none"> <input type="checkbox"/> Providing information about financing schemes and conditions of financing <input type="checkbox"/> Technical assistance by preparation of application for funding <input type="checkbox"/> Promotion of EPC and support to public institutions with this form of financing
Prioritised measures	<ul style="list-style-type: none"> <input type="checkbox"/> Providing information about financing schemes and conditions of financing <input type="checkbox"/> Technical assistance by preparation of application for funding <input type="checkbox"/> Promotion of EPC and support to public institutions with this form of financing
Organisational aspects (type of organization, operational resources)	<p>This is to be clarified further in dialogue with the relevant authorities and associated key actors</p>

4.2.3 Denmark

Denmark	
Interest and relevance	<ul style="list-style-type: none"> <input type="checkbox"/> Increasing general interest on energy efficient buildings, mainly driven by goals of the climate change policy <input type="checkbox"/> Lack of appropriate linkage between central and regional/local administration in terms of exploiting the potential
Existing activities and experience to build on	<ul style="list-style-type: none"> <input type="checkbox"/> Some municipalities have taken a systematic approach on building measures and this is currently being expanded to regional authorities and new initiatives like PPP
Key scope of services for a Clearinghouse/PSF mechanism	<ul style="list-style-type: none"> <input type="checkbox"/> A main need is to put in place a national mechanism that can help fostering investments around the country, including helping to coordinate the growing activities <input type="checkbox"/> This is to be accompanied by assistance on developing financial schemes; e.g. establishing of an energy (revolving) fund and overcoming existing investment barriers
Prioritised measures	<ul style="list-style-type: none"> <input type="checkbox"/> Supporting municipal initiatives on both municipal owned buildings and other type of buildings <input type="checkbox"/> Helping municipalities and regions on taking advantage of the ELENA facility <input type="checkbox"/> Could have a thematic approach like addressing buildings in the social housing sector <input type="checkbox"/> Supporting adoption of new instruments in the Danish context like ESCO and revolving funds
Organisational aspects (type of organization, operational resources)	This is to be clarified further in dialogue with the relevant authorities and associated key actors

4.2.4 Slovenia

Slovenia	
Interest and relevance	<ul style="list-style-type: none"> <input type="checkbox"/> Providing additional support to national actions regarding increased energy efficiency in all sectors, especially buildings <input type="checkbox"/> Helping identify and exploit energy saving potential in private and public building sector <input type="checkbox"/> Representing an operational support to individual and public investors to execute projects in a technically and economically/financially feasible manner (green procurement) <input type="checkbox"/> Providing information and support for shaping innovative financial mechanisms <input type="checkbox"/> Providing technical background and support to public officers in the framework of Green Public Procurement (GPP)
Existing activities and experience to build on	<ul style="list-style-type: none"> <input type="checkbox"/> Activities of the national Energy Advisory Network (since mid-1990s) <input type="checkbox"/> State subsidies for energy efficiency measures (since late 1990s) <input type="checkbox"/> Eco-loan scheme run by the national Eco-Fund <input type="checkbox"/> Involvement of municipalities (or, municipal housing funds) – energy efficiency strategies, PPP schemes, Covenant of Mayors, Display etc. <input type="checkbox"/> Activities of regional energy agencies
Key scope of services for a Clearinghouse/PSF mechanism	<ul style="list-style-type: none"> <input type="checkbox"/> National info-point for comprehensive support in planning and execution of energy efficiency projects <input type="checkbox"/> Assistance in development of new financing schemes <input type="checkbox"/> Technical assistance for preparation of applications for funding (private sector) and of calls for tender (GPP in public sector)
Prioritised measures	<ul style="list-style-type: none"> <input type="checkbox"/> Providing technical and other (e.g. financing-related) support to private and public sector <input type="checkbox"/> Assisting municipalities' activities (esp. public housing sector, input to local energy concepts, ...) <input type="checkbox"/> Supporting conception and adoption (or, fostering practical activities) of modern financial and project-realisation mechanisms (loan schemes, contracting, ESCO, ...)
Organisational aspects (type of organization, operational resources)	This is to be clarified further in dialogue with the relevant authorities and associated key actors

4.2.5 Croatia

Croatia	
Interest and relevance	<ul style="list-style-type: none"> <input type="checkbox"/> Lack of relevant professional capacities in public institutions <input type="checkbox"/> Support to national actions and goals re. energy efficiency (Croatia in pre-accession period) <input type="checkbox"/> Scattered present range of activities <input type="checkbox"/> Lack of integral approach and supporting mechanisms for energy efficiency measures <input type="checkbox"/> Vast technical potential for energy savings, but poor practical realisation (technical competence and funding possibilities)
Existing activities and experience to build on	<ul style="list-style-type: none"> <input type="checkbox"/> A network of info-points in major municipalities (advice on energy efficiency measures) <input type="checkbox"/> EIE project INTENSE (from 2008) – transfer of technical best practice to CE EU countries <input type="checkbox"/> Local energy efficiency activities and plans in certain municipalities <input type="checkbox"/> Activities of regional energy agencies (e.g. HEP ESCO)
Key scope of services for a Clearinghouse/PSF mechanism	<ul style="list-style-type: none"> <input type="checkbox"/> Establishment of a (national) body to assist planning, realisation and coordination of energy efficiency investments <input type="checkbox"/> Providing technical support and other relevant (e.g. financial) information to private and public sector <input type="checkbox"/> Assisting in development of modern financial support mechanisms <input type="checkbox"/> Support to public sector (calls for tender, contracting, PPP ...)
Prioritised measures	<ul style="list-style-type: none"> <input type="checkbox"/> Providing technical support and other relevant (e.g. financial) information to private and public sector – technical planning aspects, application for funding, project logistics <input type="checkbox"/> Assisting in development of modern financial support mechanisms <input type="checkbox"/> Support to public sector (calls for tender, contracting, PPP ...)
Organisational aspects (type of organization, operational resources)	This is to be clarified further in dialogue with the relevant authorities and associated key actors

4.2.6 Italy

Italy	
Interest and relevance	<ul style="list-style-type: none"> <input type="checkbox"/> Activation of energy saving potential in existing buildings <input type="checkbox"/> Increasing common interest in energy efficiency measures <input type="checkbox"/> Support to national actions and goals re. energy efficiency (EPBD-related legislative; refurbishment and new construction)) <input type="checkbox"/> Providing a link between regional and national authorities and supporting mechanisms for energy efficiency measures
Existing activities and experience to build on	<ul style="list-style-type: none"> <input type="checkbox"/> Esp. some municipal/regional strategic plans and activities re. energy efficiency <input type="checkbox"/> Activities of regional agencies <input type="checkbox"/> RES and RUE programmes and legislative criteria <input type="checkbox"/> Financial mechanisms (mainly regional level) – tax-deduction and financial support for energy renovation and use of RES
Key scope of services for a Clearinghouse/PSF mechanism	<ul style="list-style-type: none"> <input type="checkbox"/> Establishment of a (national or regional) body to assist planning, realisation and coordination of energy efficiency investments <input type="checkbox"/> Establishment of a mechanism to assist implementation of EPBD-related and other strategic plans <input type="checkbox"/> Assisting in development of modern financial support mechanisms <input type="checkbox"/> Supporting private (planning, identification of financing possibilities) and public (calls for tender, contracting, PPP ...) sector
Prioritised measures	<ul style="list-style-type: none"> <input type="checkbox"/> Supporting municipal and regional initiatives for energy efficiency actions and investments <input type="checkbox"/> Supporting private sector in planning and realisation of energy efficiency projects, and in acquisition of most appropriate financial support <input type="checkbox"/> Assisting in development and/or adoption of modern financial support mechanisms
Organisational aspects (type of organization, operational resources)	This is to be clarified further in dialogue with the relevant authorities and associated key actors

Appendix 1: ClearSupport Replication Potential - ITALY

(data and information kindly provided by:

Ms. Claudia Carani, AESS Modena and Ms. Marina Varvesi, Adiconsum Rome;

additional sources: State of the art in Italy (report), Roberto Di Giulio & Silvia Brunoro, University of Ferrara, Faculty of Architecture -Biagio Rossetti; COST C23 Carbon Atlas (report))

Building stock in Italy: Constructional features

After the Second World War problems related to reconstruction initiated an intense building activity. During the war, of 30.000.000 dwellings in Italy about 1.900.000 were destroyed and 5.000.000 damaged. A fundamental role for the reconstruction was developed by public housing institutes, by the promotion of several public and half public (by grant) building interventions.

In the second post-war period the first act of public interventions in the residential construction was the promulgation of the law n. 43 28/02/1949 that instituted the National Plan INA-CASA: by this law the government promoted setting up of a building society aimed to build up houses intended for the tenancy or the lease option of the state employers.

Several legislative measures were promoted and issued in the 1945-48 period, which provided financial support for public works among which grant-in-aid like to 50% of the house-building costs supported by INCIS, IACP and the municipalities. This period is characterized by the large application of multi-storey buildings, of different typologies, mainly block and tower, erected according to the urban principles in parallel or perpendicular blocks. Buildings erected during the second post-war period represent the most part of the whole building stock in Italy.

Between 1951 and 1976 an improvement of the building activity can be recorded. Moreover, the private intervention was greater than the public one. Afterwards, the production of homes in the eighties shows a drop of roughly 48% of the overall annual production recorded during the seventies.

From 1949 to 1956 (the first seven-year period) the most diffused typology were building blocks and terraced buildings frequently in the so-called "mixed development". The second seven-year period of INA CASA production was characterized by the large use of tower dwellings, typical of high-density headquarters.

From 1965 began the period of the GESCAL plan and the heavy standardization: headquarters were characterized by their large extension and by the use of more extended building blocks and tower buildings. In the second seven year period began

also the first prefabrication era, with the consequently use of framework structures and complex formwork technologies.

PERIOD	TYPE OF DWELLING	TECHNOLOGY
FIRST SEVEN – YEAR 1949-1956	Building blocks 4-6 floors high Terraced buildings 1-2 floors	Load – bearing masonry Concrete frames cast on site
SECOND SEVEN – YEAR 1957-1963	Building blocks 10-15 floors Terraced buildings 1-2 floors Tower buildings 6-9 floors	Complex formworks (Tunnel) Prefabricated concrete frames
1965-1980	Building blocks 8-15 floors high Terraced buildings 2-4 floors Tower buildings 8-19 floors	Complex formworks (Tunnel) Prefabricated concrete frames Structural panels Tridimensional elements

The most common building technologies for the facades can be listed as follows:

- perforated brickwork facades;
- prefabricated concrete panels.

Total building stock in Italy – shares regarding period of construction:

Period of construction	Percentage (%)
before 1919	19,15
1919 - 1945	12,33
1946 - 1961	14,78
1962 - 1971	17,53
1972 - 1981	17,67
1982 - 1991	11,50
after 1991	7,05

According to the census from 2001 the building stock situation in Italy is as follows:

- residential buildings: 92,88%
- hotels, offices, commercial and industrial buildings, ...: 3,65%
- other types: 3,47%

Generally, perforated brickwork facades are used in pillar/beam frames systems. Brick walls are single or, rarely, double layer with 4 cm air cavity. Dimensions range between 27 (single) to 32 (double) cm. There is no thermal insulation incorporated in the outer walls. External and internal layer is for the most part plaster. External concrete panels are more frequently used in complex formwork technologies. Elements are single or multi layer (“sandwich”) with insulating layer interposed.

Buildings and energy

The housing stock built in the second post-war period generally did not respect insulating standard values. For perforated brick or concrete panels facades, global

thermal transmittance (U value) ranges between 0.6 and 1.5 W/m² K. Windows are in the most cases single-layer or 4/12/4 double paned, and sometimes the wall parts under the windows are thinner, therefore the heat transfer coefficient of the façade is much bigger than prescribed. Building deterioration furthermore increases negative consequences both in terms of health of the residents and increased energy consumption.

In Italy, housing field accounts for 40.7% of the overall energy consumption. Of this percentage, about 57% is used for heating systems, 25% for hot water production and 11% for electric household appliances. The high Italian need of energy is due to the unreserved use of the electrical and heating equipments which frequently are in poor conditions.

High energy consumption is result mainly of the following causes:

- inadequate thermal insulation of the building envelope;
- poor heating plant performances;
- poor air tightness of doors and window frames.

Some numbers concerning energy use in the building sector (2000):

- Energy consumption in the building sector (manufacturing process): 7.2 Mtoe of combustible and electricity, 11 Mtoe of primary consumption.
- Primary consumption for the building use: 70.1 Mtoe = 38% of the national primary energy needs.

In the residential sector, the greatest wasting of energy is due to the very poor quality of the building envelope. More or less the 2/3 of existing buildings have been built before the law 373/76 about thermal insulation and energy systems. Even nowadays there are 13 millions of autonomous heating systems (a lot of them are electric boilers even if 400 thousand of them are replaced every year), consuming a vast amount of energy compared to the centralized ones.

Existing situation can be deduced from the Enea Report 2006 (Italian National Agency for New Technologies, Energy and the Environment). First of all, in 2005 there has been a limited increase of total energy use, among which the total request of oil-derived energy has reduced even if it remains the main energy source. But the use of natural gas is increasing while coal and imported energy is decreasing. Unfortunately, even use of renewables is decreasing, but this is due to the fact that more than 80% is hydro, and it depends on seasonal factors.

Heating and cooling needs are increasing, the last one especially in the last 3 years (with a peak in 2003) due to longest hottest period and to the change in comfort habits.

Legislation and financial instruments

Contemporary Italian legislation follows EU directives and other relevant documents through harmonization and national adaptation. In practice the situation is changing slower, with a huge energy saving potential still having to be activated.

Several national and regional instruments have been developed to foster introduction of energy saving measures and reduction of environmental impact.

The actual legislative framework for energy efficiency in building obliges the installation of PV and solar thermal collectors in new buildings. There are a number of policies running at national or regional level, supporting energy efficiency measures and use of renewable energy in existing buildings. Among them:

- National budget law (Budget Law 2007 - Energy efficiency provisions •Financial, •Incentives/Subsidies •Multi-sectoral Policy In force 2007) supports the 55% de-taxation for energy refurbishment of buildings, including the installation of solar collectors and envelope components.
- Conto Energia is an incentives system based on the PV energy production, sold to the electric grid manager at advantageous costs for a 20 years period. This scheme started in 2006.
- Green Certificates. Market scheme dedicated to the electricity producers or importers asked to demonstrate the amount of electric energy coming from renewable energies.
- Programs issued by the Ministry of Environment and Ministry of Industry, dedicated to R&D or to widen the solar application in specific situations (i.e. Sun at School, High Architectural Quality PV Systems in Public Buildings, Sun in the Public Administration). Several of these projects were issued since 2007.
- Financial support for domestic solar application programs, issued at local level. Schedule are up to the responsible local authority.
- Energy STructural FUnDs (total amount 1.600 ML€). Enterprise initiatives in the energy efficiency and renewable energy sectors.
- INDUSTRY 2015 (total amount 200 ML€). Support to industrial initiatives in the energy efficiency and renewable energy sectors. It includes R&D activities supported by research Institutes

Appendix 2: ClearSupport Replication Potential - CROATIA

(data and information kindly provided by:

Ms. Slavica Radic Vukovic and Ms. Nada Mardjetko Skoro, Ministry of Environmental Protection, Physical Planning and Construction, Republic of Croatia)

Building stock in Croatia: Constructional features

There is no comprehensive and detailed buildings' statistics available for Croatia at the moment. The total area of residential buildings is around 133 million m², and non-residential around 72 million m². For non-residential buildings data is available only for new construction, via issued building permits.

A little more data is available for residential building stock. Single family houses represent approximately 65% of the existent residential stock. Main types of construction are to a large extent similar for example to the ones from Slovenia, with the prevailing load-bearing materials being brickwork, modular brick blocks and concrete. Modular brick blocks are typical for single family housing through the last few decades, while in multi-apartment sector concrete plays a strong role. There were considerably fewer panel buildings built compared to some countries from C and E Europe. Double glazing is more or less a standard option, but with relatively slow market penetration of more energy efficient types of windows and glazing.

Buildings and energy

For the housing stock built in the post-2nd WW period poor thermal performance is characteristic. One of the obvious problems is lack of regular maintenance of many multi-apartment buildings, including their heating systems and equipment.

According to census from 2001 more than 82% of existing apartments (i.e. apartment buildings) have unsatisfying thermal insulation standards. This is true also for buildings built after 1987, when first concrete regulation regarding thermal properties of buildings was adopted. In 2005 new regulation followed, which is more in tune with modern construction techniques. Currently, Croatia is aiming at coordination of the national legislation with EU Directives, including EPBD.

As in many comparable countries, the existent building stock represents a huge potential for energy savings. It is estimated in the range of 50-80%, depending on the building type and geographical location.

United Nations Development Programme (UNDP) has been appointed for collecting data and information about buildings owned by the State (technical and energy

characteristics). This includes overall construction condition, condition of mechanical and electrical installations, inventory of interior equipment, and inventory of energy consuming devices.

UNDP has a task to establish a central national registry of public holdings, which will contain also energy-related data. Financial sources for these activities are provided by the Fund for environmental protection and energy efficiency (FZOEU). FZOEU is also responsible for obtaining the financial resources for data collection about the overall housing stock.

The project “Putting your house in order” has been launched by the Government and is aiming at improving energy efficiency in the public building sector (owned by the State and municipalities): administrative buildings, schools, hospitals, public housing etc. (<http://www.ee.undp.hr/>).

Legislation and financial instruments

In spite of Croatia not being an EU-member yet, contemporary Croatian legislation tries to follow EU directives and other relevant documents through harmonization and national adaptation. This includes upgrading of technical regulations for the building sector, with introduction of modern criteria of energy efficiency and environmental protection. Awareness-raising projects go in parallel with these activities.

Most recent legislative documents include: regulation on heating and cooling systems in buildings (2008), regulation on rational use of energy and thermal protection of buildings (2008), regulation on building energy certification (2008), and law on efficient use of energy (2008).

In the framework of promotional activities for energy efficiency (launched by the Ministry of economy and UNDP) in many municipalities local info-centres have been established, where citizens can be provided with advice about energy consumption and measures to increase energy efficiency of their households. Free courses are carried out for local government employees to enable them to provide high-quality energy counseling.

However, there is lack of financial capabilities to execute energy saving measures strongly noticeable on the side of the homeowners. Modern financial instruments are needed to push forward realization of technically viable energy efficiency projects. Also, there is a need for an integral support to investors in all project phases - investigation of technical possibilities, evaluation of economical feasibility and arrangement of most favourable co-financing mechanisms.

In the public sector a positive example of ESCO activities can be observed through the work of the HEP ESCO, an agency active in the Project for energy efficiency in Croatia. This project has been initiated and financially supported by World Bank and GEF, in

cooperation with HEP and HBOR. HEP is the national electricity company which has been engaged in electricity production, transmission and distribution for more than one century, and with heat supply and gas distribution for the past few decades, while HBOR is the development and export bank of the Republic of Croatia with the main task of promoting the development of the Croatian economy. The overall project value (including contribution of domestic banks) is estimated to 40 million USD for a six-year period.