



RESULT ORIENTED REPORT:

ENERGY PERFORMANCE CERTIFICATION AND THE DEVELOPMENT OF RENOVATION STRATEGIES IN SOCIAL HOUSING



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RESHAPE

Retrofitting Social Housing and Active Preparing for EPBD

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Project description

The objective of the RESHAPE project, which has been conducted in the framework of the Intelligent Energy Europe Programme, is to contribute to the implementation of the EU buildings directive (EPBD) and to assess in practice how the EPBD can contribute to overcome barriers for renovation of social housing.

With the RESHAPE project, a consortium of stakeholders in social housing has:

- Demonstrated preparation for implementation of the EPBD by planning and testing the integration of energy performance certification in operational processes and services.
- Tested and demonstrated added-value opportunities of energy performance certification (EPC). EPC databases of building stocks were tested as management tool for developing renovation strategies. Furthermore the possible added value of EPC was tested in the communication processes to tenants or apartment owners.
- Developed support tools for three geographic regions that can help housing actors to plan the integration of energy performance certification in operational processes, in communication services to tenants/owners and in the planning of renovation actions.
- Disseminated the project outcomes (support tools) to social housing actors throughout the EU.

The project has been conducted with social housing partners from the following EU member states:

- Belgium
- Bulgaria
- Czech Republic
- Estonia
- The Netherlands
- Spain.

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Executive summary

Objectives and overview

Among the objectives of the RESHAPE project are: testing of EPBD energy performance certification in the operational processes of social housing actors and its possible contribution to removing barriers for renovation in social housing.

As part of the RESHAPE project partners in six EU member states (Belgium, Bulgaria, Czech Republic, Estonia, The Netherlands and Spain) have been testing the potential use of energy performance certification as instrument for the development of renovation strategies on a building level, as well as on a building portfolio level. Furthermore they analysed barriers for renovation and how energy performance certification could contribute to removing barriers for renovation in social housing. Based on the experiences throughout the project, the partners compiled a set of recommendation for policy makers.

Country background

In order to understand the different country experiences with regard to EPBD implementation and renovation in social housing it is important to know the different country frameworks. There are large country differences in ownership structure, legal framework and the processes that lead to renovation of housing with regards to responsibilities, decision taking, financing and planning.

One elementary difference is the difference between rental and owner-occupied social housing stock. Large rental social housing stocks, owned and managed by (large) social housing associations or companies, we predominantly find in the Netherlands and Belgium, as well as to a lesser extent in the Czech Republic. Owner occupied social housing we predominantly find in East European countries (Bulgaria, Estonia, Czech Republic) as well as in Spain. The East European owner occupied social housing stock exists of privatised formerly state-owned housing. The level that condominium ownership legislation has reached varies a lot in the East-European countries. In Estonia this legislation is well advanced in Bulgaria proper condominium legislation is still not in force. In Spain the owner-occupied social housing stock is predominantly built by (large) public social housing companies and publically funded.

In addition to these differences also the EPBD implementation throughout Europe is not homogeneous. In every country the directive is translated in a different way. Calculation methodologies, tools, labels, pace of implementation etc. differ from country to country.

Good practice renovation strategies

Within the project barriers for renovations as well as good practice strategies for renovation have been compiled.

On a legal and organisational level good practice projects show that:

- Housing coops and owner associations can function well (Estonia, Czech Republic). Despite the majority consensus that needs to be reached, renovation processes can be planned, financed and realised.
- The application of external insulation enables people to stay in their homes during renovation (Spain).

Furthermore the following good practice strategies have been put forward:

- Suggestions for improvements in the organisation of renovation processes.
- Support mechanisms for owner occupied social housing that help with complex technical, legal and administrative issues and procedures.
- Marketing and communication as mechanism to overcome knowledge barriers for renovation.
- Technical inventory of portfolios as starting point for prioritising renovation needs in the building stock.

On a financial level the following creative financial constructions, which create co-funding for social housing, are applied in projects:

- Roof sold for topping-up with two new flats under the condition that new owners pay for overall façade renovation (Czech Republic).
- Due to ESCO service and mix of commercial functions and social rent, high quality apartments for social rent could be realised (The Netherlands).

Furthermore the following good practice strategies have been put forward:

- Ownership transition from owner-occupier to a housing association as a solution for owner-occupiers with little financial means and a solvency too low for owner-occupied housing (Czech Republic).
- Integral approaches in which the energy measures are part of a larger renovation package that has a high added value for the tenant/owner that enables co-funding of the energy measures (Bulgaria, The Netherlands).
- Several suggestions for improvement of financial support mechanisms.
- Providing tenants with insight in the overall housing cost (rent and energy).

On a technical level practical experiences provide the following recommendations:

- Individual control, metering and payment of heating services (Estonia, Czech Republic).
- Insulation should be combined with renovation of the heating system (Estonia).
- Window replacement should go together with renovation of the ventilation (Estonia).

EPBD and renovation scenarios for social housing

All partners have selected a number of typical reference dwellings/buildings that represent larger shares of building stocks in the respective countries. Reference dwellings have been selected by construction period (age), type (single-family, multi-family) etc. Based on audits for these reference dwellings insight has been gained on the energy quality of larger building stocks. For each of the reference dwelling renovation scenarios have been defined and analysed using the (EPBD) energy performance tools available. This provides insight in the renovation potential and costs for specific buildings or larger building portfolios. This enabled the social housing actors involved to assess to potential use of energy performance tools in portfolio management. The scenario analysis show large potential energy savings of 1 to 55%. Pay back times however also very significantly and range from 1 – 67 years.

EPBD in renovation processes in social housing

With the introduction of the EPBD the energy consumption of a dwelling will become a more important quality of dwelling that will have an impact on the management of social housing. If EPBD energy performance certification is to play a role in renovation planning processes and contribute to lower the energy consumption and energy bills in social housing among others the following issues need to be addressed:

- Availability of appropriate energy performance software tools that support analysis of improvement scenarios.
- Integration of energy performance certification in the renovation planning processes.

With regard to the availability of appropriate tools the large difference in EPBD implementation pace in the different countries is expressed well. Only in the Czech Republic and the Netherlands official tools for energy performance certification and renovation scenario analysis of existing dwellings are available. In the Netherlands also energy performance certification and analysis tools are available for scenario analysis on a portfolio level. In the other countries energy audits and scenario analysis had to be done with official EPBD tools meant for other building categories (new construction in Spain and general buildings in Bulgaria) or with energy audit tools not compliant with legislation on EPBD certification. This delay in EPBD implementation complicates the proper evaluation of the EPBD energy performance certification potential for portfolio management and renovation processes in social housing, Nevertheless in can be concluded that in countries like the Netherlands and Belgium a large potential (and also the appropriate tools) exists for the integration of energy performance certification in portfolio management of social housing (renovation scenario analysis, budget and maintenance planning). In the other countries with predominantly owner occupied housing stock, energy performance certification and auditing will mainly have a function for scenario analysis on a specific building level. Furthermore it will play a role in the dissemination of knowledge on energy issues to flat-owners and in the decision process that flat-owners, united in housing coops or housing associations, need to make on renovation.



Policy recommendations

Based on the experiences throughout the project, all partners compiled a set of recommendation for policy makers, distinguishing recommendations that relate to overcoming barriers for renovation in social housing as well recommendation related to the EPBD implementation in social housing. These recommendations have been compiled in 6 policy papers. An analysis of efforts to address policy makers through meetings, workshops and conferences show that throughout the project period partners realised had a significant reach of policy makers.



Abbreviations and terms

Abbreviations

EP	energy performance
EPA	energy performance audit
EPC	energy performance certification
EPBD	European directive on the energy performance of buildings

Terms and Definitions

Dwelling:	Generic definition for a house, either one single-family house or one apartment/flat.
Apartment / flat:	Single unit within a multi-family-house.
Multi-family-house:	Large residential building containing several apartments / flats occupied by different tenants / owners.
Single-family-house:	Ground-level single family dwelling (free standing, attached or in rows).
Certification scheme:	Defined procedure for building analysis for the purpose of delivering an energy rating and energy certificate for buildings.
Expert:	Person who performs the energy performance certification process. The qualification requirements differ in each countries.
Building inspection:	Inspection of a building with the goal to collect all the required input data necessary for making a legal energy certificate.
Energy certificate:	Result of the analysis and calculation procedure which contains the energy rating and essential building information presented to the building owner.
Energy audit:	More elaborate procedure for analysing the efficiency of a building often performed in the context of an energy advice procedure.
Energy advice report:	More elaborate report explaining the energy efficiency of a building and a building specific advice on improvement measures covering building physics as well as financial aspects (investment costs, pay back time).



1 Introduction

1.1 Reading guide

This report provides a summarised cross country overview of the main results of the RESHAPE project: Energy Performance Certification and the development of retrofitting strategies in social housing. This report is largely based on materials provided by the partners in the project.

The first part, in chapter 2, reports on the existing status for the following topics:

1. A general overview of the social housing sector in the partner countries
2. EPBD implementation status in the partner countries
3. Energy performance certification as means to describe the energy quality of a housing portfolio
4. Energy performance certification and communication to tenants
5. The integration of energy performance certification in operational processes
6. Social housing and renovation processes.
7. Barriers for renovation in social housing.

This second part focuses on the opportunities that energy performance certification offers for the development of retrofitting strategies:

1. Inventory and analysis of best practice solutions and strategies for overcoming prevailing barriers (chapter 3).
2. The use of energy performance audits as basis for the development of retrofitting scenarios for the housing portfolio (chapter 4).
3. Policy recommendations with regard to barriers for retrofitting and EPBD implementation (chapter 5).

1.2 Further reading

We invite all readers to visit the project website www.reshape-social-housing.eu for further materials including the 'tools' in the regional 'toolsets' that can be found under the deliverables section.

2 Current social housing and renovation processes

2.1 Social housing in the partners countries

The 'social rent' share in the housing stock varies significantly in the partner countries. From 3% in Bulgaria to 35% in the Netherlands, see Figure 1. This difference can be explained by the large scale (in Estonia and the Czech Republic, post-communist) privatisation of former public housing in Eastern Europe. These parts of the housing stocks predominantly exist of condominium ownership (owner-occupied apartments) often organised in housing cooperatives or owners unions. On average the energetic quality of this type of housing is poor. This privatised housing, predominantly occupied by low-income groups, is considered as social housing as well. The rental social housing stock in Spain is also very small. In Spain housing policies have been focused on building and sales of subsidised affordable dwelling for low-income groups.

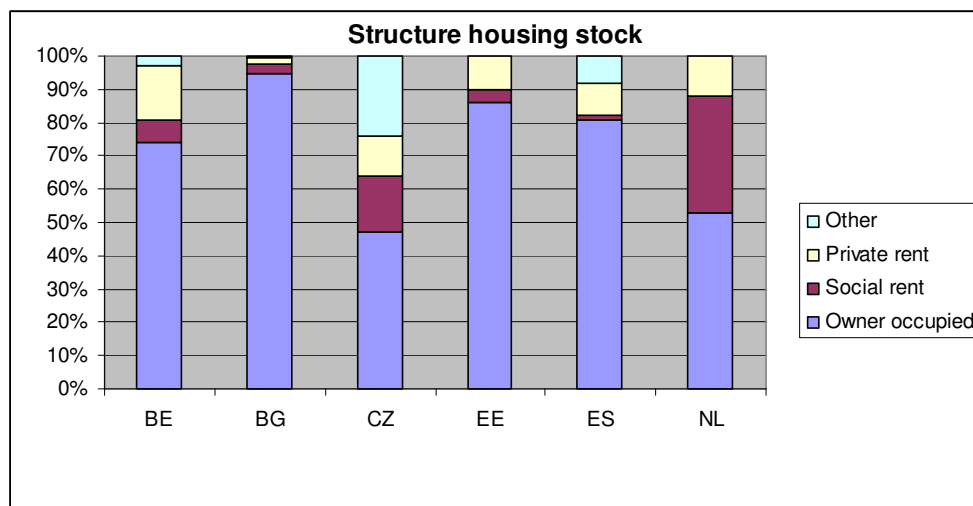


Figure 1: Structure of housing stock (Social Housing in the EU 2005, CEB, 2005)

In the Table 1 some key data are given on housing and social housing in the RESHAPE partner countries.







Key figures housing stock		 BE	 BG	 CZ	 EE	 ES	 NL
Dwellings per 1000 inhabitants	/1000 inhabit.	462	465	na	460	513	419
Dwellings completed per 1000 inhabitants	/1000 inhabit.	3.9	0.8	2.7	1.8	11.3	3.7
Social housing stock (% of total dwelling stock)	%	7%		17%	4%	1%	35%
Housing cost as % of total household consumption	%	23.6%	14.5%	23.5%	22.9%	31.4%	21.4%

Table 1: Key data housing and social housing in RESHAPE countries (Housing developments in European countries, The Housing Unit, 2004 and Social Housing in the EU 2005, CEB, 2005)

The share of housing costs varies from 14-31%. In all countries the share of energy costs as part of the housing cost is growing due to rising energy prices. In Estonia energy cost can make up 80% of the overall housing cost. This is due to the fact that no mortgage payments are due for the privatised housing and expenditures on maintenance are low.

The age distribution of housing stocks is comparable (Figure 2). In average terms the oldest building stock can be found in Belgium. The age distribution in the social housing stocks is different, though hard to compare due to the availability of statistical data for different time periods.

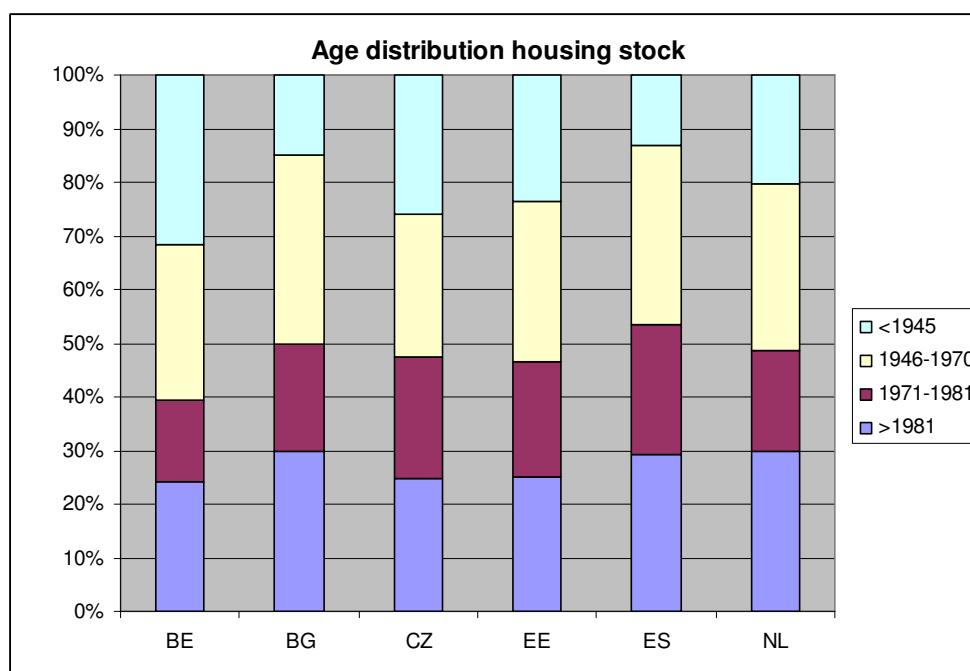


Figure 2: Age distribution housing stock (Housing developments in European countries, The Housing Unit, 2004 and Social Housing in the EU 2005, CEB, 2005)

The social housing sector in the partner countries throughout Europe show a large variety in the national legal and institutional framework:

Belgium

Social housing is decentralised and the competence of the regions. Regional governments decide on budgets for new construction and improving the quality of the existing housing stock. In Flanders the legal framework for social housing is described a code, 'De Vlaamse Wooncode'. Based on this code the federation for social housing (VMSW) has a formal supervisory, as well as financing, role towards the 120 local social housing companies that own the social housing stock in Flanders.

Bulgaria

Due to the almost fully privatised housing sector dedicated social housing institutions as such do not exist. In 2004 a national housing strategy was adopted by the government aiming at: halting the process of deterioration of the existing building stock and to introduce a mechanism for the provision of new accessible dwellings (owned and rented). In 2005 a National program for renovation of the Housing Stock was approved by the government foreseeing budget subsidies for large scale renovation activities of condominium housing.

Czech Republic

The central government defines the general legal and economic framework for housing. Main aim is to secure adequate housing, appropriate to its need and financial situation. The Ministry of Regional Development distinguishes 3 categories of subsidised dwellings: 'protected' dwellings (rent dwellings for special groups that need home care services like elderly people), 'halfway' dwellings (rental dwellings for people with social problems) and 'entry-level' dwellings (rental dwelling for people that do not have access to adequate housing). At a local level local authorities are responsible. Next to the municipal rent segment, a share of the housing stock is owned by (large) housing cooperatives. Since 2000 the privatised condominium building stock owners can register as legal entities as 'owner association' which are entitled to enter legal contracts with 3rd parties.

Estonia

In the post communist process large-scale privatisation of former public housing took place. The key objectives of housing policy in Estonia are set out in the Estonian housing development plan for 2003-2008 which is implemented by local governments and the Estonian Credit and Export Guarantee Fund (KredEx). For the neediest households basic rental municipal shelter housing is provided. Unlike other East European countries Estonia was early with the introduction of legal structures for condominium ownership. EKYL is a national federation of Estonian housing associations and co-operatives with more than 1300 members.

Spain

Due to the political and administrative independence of the regions, under the national State Housing Plan, social housing is a responsibility of the autonomous regions. Housing policy involves subsidised housing: protected housing (with a limited

floor space and limited price per m²) for rent or sale. Social housing actors are publicly owned companies that build, sell and rent affordable dwellings and supply management services to low-income groups. The rental social housing sector is very small in Spain.

The Netherlands

The Ministry of Housing, Spatial Planning and the Environment is responsible for housing policies in the Netherlands. The main policy is to accelerate the restructuring of neighbourhoods and housing production especially in cities with the goal to achieve and maintain sound, sustainable living climate, promote home-ownership and ensure that housing is affordable. In 1993 former public housing associations have become private social enterprises with a public task. This task is legally governed by the Besluit Beheer Sociale Huursector (BBSH) regulation. Today approximately 500 housing associations own and manage 2.4 million social dwelling in the Netherland (35% of the overall housing stock). The smallest owning 22 dwellings, the largest more than 80,000.

2.2 Renovation processes

There are large differences between countries in the processes that lead to renovation of housing with regards to: responsibilities, decision taking, financing and planning. One can distinguish different processes related to rental and to owner-occupied social housing stock.

2.2.1 Rental social housing stock

Belgium

In Flanders the local social housing societies (LSHS) are primarily responsible for maintenance and renovation of the social housing portfolio. They receive technical, financial and administrative support from the Flemish Social Housing Society (VMSW). The VMSW also supervises and controls (technically, financially, socially and administratively) the renovation activities executed by the LSHS's. The legal code which is the basis for social housing in Flanders (Vlaamse Wooncode) requires that LSHS's provide and maintain affordable and qualitatively sound housing for low-income groups.

Czech Republic

In the Czech Republic local authorities (municipalities) are responsible for the provision and maintenance of subsidised social dwellings. Three categories can be distinguished ('protected' dwellings with care services, 'halfway' dwellings for people with social problems) and 'entry-level' dwellings for low-income people). Next to the municipal rent segment, a share of the rental housing stock (approximately 650.000 flats)

is owned by housing cooperatives (owning tens to thousands of flats) responsible for renovation and maintenance.



Figure 3: Social housing in Spain (deferred property)

Spain

In Spain the share of rental social housing sector is small. In principle the responsibility for renovation and maintenance in this sector lies with the public social housing companies (like ADIGSA in Cataluña). The initiative for renovations often comes from the tenants who can send a call for action to the ADIGSA manager of their building. ADIGSA evaluates the request and decides on the renovation works.

The Netherlands

Housing associations are responsible for renovation and maintenance of their housing portfolio. Most housing associations work with long-term strategic portfolio management plans. In these plans the housing stock is categorised and labelled according to target group, building quality, popularity and market value. Dwellings receive labels like: improve, maintain, sell, demolish/new construction. The strategic portfolio management plans form the basis for building improvement planning. In addition they develop long term maintenance plans. Based on typical maintenance intervals and yearly inspections long term maintenance budgets are reserved and kept up to date. Typical intervals for regular maintenance are: roofs 36 years, windows 30 year, kitchen 20 year, painting 6 year. Regular maintenance activities have no impact on rents and are decided by the housing association.

Large scale renovations that improve the housing quality require a rent increase; approval of the rent increase by the tenant is required. In the case of apartments buildings collective renovation can be done if a minimum of 70% of the tenants agrees on the renovation and the related rent increase. Sometimes with disapproval by the tenant, the housing association may still decide to renovate without rent increase. The pay-back on investment by a rent increase does not start until the next tenant change. For a new tenant the rent can be adjusted without approval as long as the rent stays

does not exceed the maximum allowed level. The housing association always makes the investment decision.

2.2.2 Owner occupied social housing stock

Belgium

The local social housing societies (LSHS) also buy, renovate, build and subsequently sell social housing to low income groups. Additionally they support social homebuyers with mortgage credits. Before sales they are responsible for renovation to the appropriate quality as far as needed.

Bulgaria

During the totalitarian government in the period 1945-1989 the state as a main developer used to build houses which property was immediately transferred to the residents. Therefore Bulgaria has a very high owner occupancy share.

The decision process for renovation is entirely depending on the apartment owners of the building. Existing legal regulations for condominium housing in Bulgaria do not provide efficient procedures for decision taking at the building level – in some cases for renovation activities 100% majority consent of apartment owners is required. Also the low income level and the lack of financing opportunities for homeowners prevent renovation activities. A new “Condominium Law” is currently under consideration by the Bulgarian Parliament. It is expected that it will endorse management of condominium buildings and will stimulate housing renovation.



Figure 4: Owner occupied condominium buildings in Bulgaria

Czech Republic

A large share of the Czech housing stock (currently more than 420 thousand flats) consists of owner occupied flats, originally owned as property by a municipality or a housing co-op, and privatised after the introduction of the law on the ownership of flats in 1994. That introduced a new form of ownership for apartment buildings, in which the common parts are in co-ownership of owners of the flats in the building. The so-called (flat) owners associations (SVJ) are legal entities, according to the law on ownership of flats and its amendment in 2000. However, besides the owner associations registered as legal entity (SVJ), today also owners associations exist that are not registered as legal entity. They can not enter into legal acts in their name, which means for example, they cannot conclude contracts with third parties (for renovation activities). Within the legal flat owner associations (SVJ) a majority of 75% is required for decisions on renovation.

Estonia

The definition of social housing in Estonia is still based on fact that 96% of living stock is privatised and social housing is just in the beginning. Some bigger local governments are or planning to built social houses. Based on this situation privatised flat owners associations are considered as social housing companies, because they are dealing with similar problems as social housing companies, having a role in renovation processes and energy efficiency in housing. Promotion and support for renovation activities to flat owner associations is provided by the Estonian Union of Flat Owners Associations (EKYL). They disseminate on energy efficiency and renovation practice in housing by organizing seminars and training courses and publication of a periodic magazine.



Figure 5: Panel building Estonia

Decisions on renovation should be agreed by the general meeting of the flat owners association. Usually it is not easy to come to a consensus on renovation. Some times energy audit results can help to convince flat owners to take decisions.

Spain

Al large share of social housing in Cataluña exists of owner occupied housing. One can distinguish 2 major categories:

- Dwellings in deferred property: public social housing that was promoted by the Central Government between 1940 and 1980. After some years, the inhabitant of a deferred property can obtain the property rights of the dwelling (depending on the ruling legislation).



- Social housing destined to sell: dwellings built by governmental or private companies which are sold at a maximum price (lower than free market price). Only people that meet specific social/economic criteria are able to buy these dwellings.

In principle in both categories the owner-occupier is responsible for maintenance of the property. The condominium ownership associations are responsible for decisions on the common areas and the roof of these properties, because owners are responsible for maintenance of all the building.

2.3 Information systems

Housing portfolio databases mainly exist in countries with large rental building stocks. By incorporating energy as a building quality (i.e the energy label and/or the average energy cost) in these systems portfolio renovation strategies can be developed aimed at improving the energy quality of the portfolio. These systems also offer opportunities for storage and maintenance of data needed for energy performance labelling.

Belgium

The database of VMSW (formerly known as VHM) is used to classify the buildings. The database is composed of almost all the 136.000 dwellings of the VMSW. The main figures are the number of dwellings per building, the type of dwelling (single family house or apartment), the number of building layers, type of roof, type of heating (collective or individual, energy source), the state of the façade and the glazing (single or double glazing). The information is used to classify the buildings and to develop strategies for improvement (select building on quality).

The Netherlands

Social housing associations often have more information systems that support their processes. The primary system contains the basic information on all dwellings, rents and tenants. Secondary databases often contain additional information on installations, status of maintenance etc. Specific databases can be used for maintenance planning and strategic portfolio management. Renovations are mostly planned as a result of a desired quality improvement dictated by the strategic portfolio management plan.

Spain

In Spain, housing databases exist although they do not contain energy information. Existing databases are incomplete and most of the time lack technical information. The rental social housing sector is small in Spain, so within the country there is no ample experience in the management of rental housing.

2.4 Financing and recurrence of investment costs

Belgium

Public funding for projects is available through the Flemish Social Housing Society (VMSW) and through local social credit associations. Maximum rent prices are determined by:

- Initial investment costs and renovation costs, with corrections for income, family composition and housing quality. In this system the savings are for the tenants, whereas the investment is for the housing society.
- The rent price law will change and instead of initial investment costs the potential 'equivalent market rent' will be used as parameter, besides income, family composition and energy performance! That means that investment in energy saving enable higher rents and recurrence of investments.

Czech Republic

Local authorities are responsible for social housing sector and subsidise it. By the Act No. 177/2006 Col. Energy Management Act and Decree No 148/2007 Col. Energy Performance in Buildings of the Ministry of Industry and Trade of the Czech Republic, these houses need to have a certificate as from 1 January 2009 in case of planned major renovation. Financing and planning of the refurbishment depends on the statement of the auditor and the value of the label.

Housing co-ops and owners associations (SVJ) that decide to refurbish or modernise their building(s) need to realise a label class C if they want to apply for state subsidy from the PANEL programme. The label is part of the documentation which characterizes the state before and after the reconstruction.

Spain

The social housing sector is publically financed. Through the Plan for the right to a home 2004-2007 (Decree 454/2004) which regulates public aid charged to the Government of Cataluña for the financing of land purchase and social housing development.

The State Housing Plan 2005-2008 (Decree 801/2005) facilitates access to housing for the public, through financial aids (loans agreed, direct) and non-financial (maximum prices of sale and rental, generation of building land, etc).

The investment of renovations are paid by public funds and they are not translated to a rise of the rents. There is not a lot of experience on this issue because social housing for rent in Spain is mostly recently built.

The Netherlands

In 1993 former public housing associations have become private social enterprises with a public task. They do not receive public support and are responsible themselves for attracting financial means for renovations. They can attract low interest loans (with a guarantee fund from the social housing sector), pay renovations from their own equity capital, finance renovations or new construction by sales of existing dwellings (normally to tenants). In principle housing associations try to recover their invest-

ments by rent increases as far as allowed by the rent laws ('Besluit Huurprijzen Woonruimte – woningwaarderingstelsel'). Currently energy is not included in the rent price laws. The government is preparing a change that includes the energy label as parameter for determining the maximum rent, thus creating a stimulus for improvements.

2.5 Barriers for renovation in social housing

The barriers encountered for renovation for social housing in each country are often country specific. Nevertheless, also common elements can be found. The different barriers have been grouped around the following themes: legislative, institutional/organisational/-social, financial and technical.

Table 2 provides an overview of legislative barriers. On a legislative level one can distinguish 2 major barriers:

- The (lack of) proper housing property laws for condominium ownership in Eastern-Europe (except Estonia) do not provide a proper legal framework for collective renovation of buildings. In Estonia condominium ownership by home-owner housing co-operatives is legally well established.
- For rental social housing a common barrier found is the fact that the investments cost cannot be recovered by (legally maximised) rent increases.







LEGISLATIVE BARRIERS							
		BE	BG	CZ	EE	ES	NL
Current legislation on ownership does not provide ground for the establishment of home-owner associations (HOA)	housing property laws		X				
Existing condominium legislation does not provide framework for collective renovation			X				
Necessity for unanimous agreement in decision-making about reconstruction in the case of associations of flat owners					X		
Regulation on individual heat and electricity supply contracts for individual flats hamper collective approach	energy supply laws		X				
The current regulation on energy efficiency does not cover existing dwellings, only new construction	building code					X	
The rent of dwellings can not be increased according to the energy quality	rent laws					X	
Social housing societies invest, tenants profit from savings; rent laws limits return on investment		X					
Rent increases that could enable the recurrence of the investments are legally regulated and maximised.							X
Investing in energy efficiency or renewable energy systems may lead to rents above the rent cap for state rent subsidies for low income people							X
Undesirable legislative changes in setting prices of housing in the rental sector					X		
Exclusion of non-panelled buildings from access to state support	financial support			X			
Arbitrariness and inertia of treatments of building permits	institutional administrative	X					
Lack of uniformism between different (governmental) institutions (interpretations, procedures, etc.)		X					
Privacy law makes it difficult to evaluate results concerning energy for building projects	other laws	X					
Law on government contracts makes it difficult to involve builders/coontarctors in the design stage		X					

Table 2. Legislative barriers for renovation in social housing.

On an institutional, organisational and social level also common barriers are found in different countries (Table 3). For example, players in both Spain and the Czech Republic experience that the administrative work to get state support is very demanding. In Spain and Belgium, moving tenants during the renovation period is considered as an important barrier and insufficient building stock data are available for analysis and prioritising dwellings that need to be renovated. Both the Netherlands and the Czech Republic bring forward that the main interest for tenants are improving comfort, health and safety and that energy savings are not the main interests. However this might change with rising energy prices.







INSTITUTIONAL / ORGANISATIONAL / SOCIAL BARRIERS							
Energy supply is contracted and paid at apartment level. No energy management at condominium building-level	institutional		X				
Lack of medium to longterm policy		X					
Fragmentation of energy policy		X					
Agreements on max. rents for low income groups between local authorities and housing associations impede quality investments (that raise rents).	institutional						X
The high demand for social housing leads to a focus on new construction instead of renovation		X					
Cooperation between administrations and home owners is limited and in initial stage	cooperation		X				
No integral approach or teamwork for building and renovation		X					
Insufficient administrative support for homeowners to get involved in energy saving retrofitting process	complex procedures		X				
Demanding administrative work in meeting the requirements for state support				X		X	
Low professional level of management and administration of small housing coops and associations of flat owners	knowledge			X			
Not enough detailed and current data available to evaluate the buildingstock		X				X	
Different level of understanding about energy systems and saving possibilities					X		
The combination of co-operative ownership and an association of flat owners makes it very difficult to come to an agreement on renovations.	social			X			
Moving tenants during renovations		X				X	
Different social background of general meeting members					X		
Main interests of tenants are not focused on energy savings but in improving comfort, health and safety related building qualities				X			X
Motivation to renovate a building is not present for a variety of reasons among (some) owners of a dwelling stock				X			
Different objectives and interests		X					

Table 3. Institutional, organisational and social barriers for renovation in social housing.

On a financial level one can again distinguish owner-occupied social housing and rental social housing (Table 4). For owner-occupied social housing the limited financial capacity is a major barrier for renovations. In rental social housing the recovery of the investment costs is a difficult due to social rent legislation. The investment is for the housing association, the savings are for the tenants. Increasing the rent may be maximised or need to be done with consent of the tenants who may not want to be because of a lack of trust in the promised energy saving.







FINANCIAL BARRIERS								
		BE	BG	CZ	EE	ES	NL	
Renovation costs exceed the limited financial capacity of home-owners / housing coops	lack of financial capacity		X	X	X	X		
Insufficient credibility of small housing cooperatives and associations of flat owners for gaining loans				X				
Lack of well established and properly functioning system of indirect housing subsidies	limited financial support mechanisms		X					
Lack of proper financial support mechanisms for renovation of condominiums			X					
Affordability of present credit instruments provided by banks or specialized funds is still not at a level that would stimulate and support to undertake investment in energy efficient housing refurbishment				X				
High transaction costs for small housing cooperatives and associations of flat owners for receiving support from state programs and funds					X			
Due date for available credit instruments creates pressure on planning, preparation and design			X					
Tenants may not agree on higher rents in return for lower energy costs because of lack of trust in the promised energy saving	no investment recovery			X			X	
The investments are for the housing association, the savings for the tenant		X					X	
Actual rent is lower than basic rent		X						

Table 4. Financial barriers for renovation in social housing

On a technical level (Table 5) one can conclude that the lack of technical solutions does not form the major barrier that impedes renovations. More important seems to be the lack of specialised knowledge among professionals and the lack of appropriate information.







TECHNICAL BARRIERS							
		BE	BG	CZ	EE	ES	NL
Leading professionals in process of building design need training in energy efficient approaches	knowledge		X				
Lack of suitable information and training materials for energy efficient design and practical examples		X	X				
Lack of professional and practical knowledge, tools, objective data and code of good practice		X					
Lack of understanding energy saving measures						X	
Availability of qualified personnel		X					
Deficiencies in existing social housing stock	hardware					X	
Difficulty with complying to the demand of complex repairs				X			

Table 5: Technical barriers for renovation in social housing

3 Good practice renovation strategies

3.1 Inventory of good practice strategies

Having identified the barriers for renovation, the next step is to collect good practice examples and possible solutions proposed to overcome existing barriers. The different good practice strategies have been grouped around the following themes: organisational/-social, financial and technical.

Table 6 provides an overview of good practice examples and strategies with regard to the organisational aspects of renovation processes. As main categories we can distinguish:

- Improvements in the organisation of renovation processes
- Support mechanisms for owner occupied social housing that help with complex technical, legal and administrative issues and procedures
- Marketing and communication as mechanism to overcome knowledge barriers for renovation
- Technical inventory of portfolios as starting point for prioritising renovation needs in the building stock







ORGANISATIONAL							
		BE	BG	CZ	EE	ES	NL
Involve and organise all owners in a homeowner association	organisational / proces		X				
Define clear goals up front		X					
A dedicated team who's members support the stated goals		X					
Analyse building in full context (both technical, social, financial etc)		X					
Constant monitoring, evaluation and analysis throughout design, implementation and user phase		X					
Embed energy measures in regular maintenance schedules							
Professional support for home-owner associations to facilitate, organise and consult during all stages of renovation	support		X				
Public managers helps with complex procedures for support and subsidy applications						X	
Consulting centres providing support with complex technical, legal, administrative issues				X			
Professional experts that help building owners to properly manage their building				X			
Technical inventory studies for the housing stock that help to prioritise actions	portfolio management					X	
Active marketing of renovation	marketing / communication			X			
Communicate energy cost and integral housing cost to tenants in stead of rent only				X			X
Educate flat owners on energy use and renovation issues in order to achieve a more homogeneous common understanding					X		
Make clear, objective and correct information available for all stakeholders at the right time		X					

Table 6: Good practice strategies on an organisational / social level.

Table 7 provides an overview of good practice examples and strategies proposed to overcome financial barriers. As main categories we can distinguish:

- Financial mechanisms, like subsidies, tax incentives and guarantee mechanisms (BG, CZ, ES, NL).
- Ownership transition in the Czech Republic from owner-occupier to housing association as a solution for owner-occupiers with little financial means and a solvency too low for owner-occupied housing.
- Integral approaches in which the energy measures are part of a larger renovation package that has a high added value for the tenant/owner or that enables co-funding of the energy measures (BG, NL).
- Energy Service Companies (ESCO) that provide an energy service (i.e. heating) and substitute costs rent into service costs (NL).







FINANCIAL								
		BE	BG	CZ	EE	ES	NL	
Flexibility of financing institutions when giving loans for renovation projects	financial mechanism		X					
Availability of subsidies is crucial			X			X		
Reservation of specific budgets for energy renovation so the money cannot be spent on deficiencies in existing housing stock.							X	
Tax measures for investments in energy renovations like inclusion in a lower income tax base or exclusion from real estate taxes					X			
Expansion of loan guarantees to private funds and bank guarantee programmes					X			
Introduction of insurance products for low solvency owners as part of the loan product for renovation of panel buildings					X			
Use of integral housing costs (rent and energy costs) in rent covenants with municipalities								X
Communicate overall housing cost (rent + energy) to tenants								X
Guarantee by housing association that energy cost savings will be met and compensate financially if the savings aren't met								X
Introduction of reverse mortgages that facilitate a transitions from ownership back to rental arrangements		ownership transition			X			
The creation of a national/regional associations that buys flats and takes over debts from owners that are not able to meet the financial requirements of owner-occupied housing. Former owner-occupiers can continue renting the flat. This could strengthen the ownership sector and help accelerate and ease the process of renovation					X			
Cover (part of) the costs of energy efficient refurbishment by an extension of the building (i.e. an extra floor)	integral approach		X					
Combined social and commercial development. Profits in commercial part co-finance measures taken in the social housing (Robin Hood principle)							X	
Rent increases for renovation are more easily accepted if the renovation combines an overall improvement of comfort with a lower energy bill							X	
The social housing association provides collective heating as an ESCO. As no heating installation is provided in the dwelling, the rent can be kept relatively low (below the rent cap for rent subsidy)	ESCO service						X	
Outsourcing of energy supply to an ESCO that is eligible for profit tax deduction schemes that are only available for the profit sector							X	

Table 7: Financial good practice examples or solutions proposed¹.

¹ ESCO = Energy Service Company







TECHNICAL		 BE	 BG	 CZ	 EE	 ES	 NL
Integral design that optimises the interaction between building components		X					
Individual measuring and accounting of energy consumption and costs on a flat level					X		
Renovation of facades only, instead of complete building, so the dwellings can stay occupied						X	

Table 8: Technical best practice examples

In Table 8 a number of technical good practice strategies are summarised ranging from integral design (Belgium), individual measurement and payment of energy cost in Estonia to renovation of facades only to prevent the necessity of people leaving their flats during renovation in Spain.

3.2 Good practice renovation examples

This paragraph provides short descriptions of typical good practice renovation projects in RESHAPE countries in which different barriers (legal, financial, organisational, technical) were overcome and provides insight into the solutions found in practice.

Belgium

The social housing association ‘Zonnige Kempen’ renovated 42 dwellings in Laakdal (location Kabinestraat, Figure 6). These dwellings were monitored before and after the renovation that took place at the end of 2007. The following measures were taken:

- insulation of the roof (12 cm)
- insulation of the side wall (6 cm)
- insulation of thermal bridges on the first floor
- replacing the windows by double glazing ($U=1,1 \text{ W/m}^2\text{K}$)

The EPB software predicts a theoretical energy saving of almost 40%. Before renovation we had an annual energy consumption of 225 kWh/m²y and after the measures we expect about 140 kWh/m²y. The monitoring results will show the real energy savings.



Figure 6 : Location Kabiensstraat before and after renovation

Bulgaria

Location, address:	Block 10, district Zaharna Fabrica, Sofia
Region:	Western Bulgaria
Surroundings:	City
Climate:	Mild continental
Year of construction and renovation:	1947 (constructed); 2004 (renovated)
Typology:	Multi-dwelling building
No of dwellings:	13
Total floor area:	1100 m ² living area before renovation; 1160 m ² living area after renovation
Owner:	Owner occupied flats
Costs of energy saving measures:	104 750 BGN (approx. 52 375 Euros)

Renovation concept and key renovation features:

- Thermal insulation of external walls;
- Whole reconstruction of the attic;
- Water proofing and thermal insulation of roof;
- New double glazed windows with PVC frames;

Before renovation	After renovation
<i>Constructions [U-values: W/m²K]</i>	<i>Constructions [U-values: W/m²K]</i>
▪ Roof	▪ New insulated roof 0,5
▪ Non-insulated basement	▪ Insulation of basement ceiling 0.52
▪ Non-insulated external brick walls	▪ Insulation of external brick walls 0,52
▪ Double glazed wooden windows 2,9	▪ New double glazed windows with PVC frames
<i>Installations</i>	<i>Installations</i>
▪ Heat substation supplied by district heating	▪ Improvement of the heating system (balance, insulation of pipes)

Commonly existing financial, administrative and organisational barriers preventing successful implementation of energy efficient renovation in Bulgaria could be overcome in this project because of collaboration with housing association Woonbron from The Netherlands. The financial obstacles were removed by provision of a soft

loan with favourable repayment conditions by Dutch International Guarantees for housing. The legal, organisational and administrative barriers were removed by creation of a tailor made pilot scheme. This was possible due to the special attention paid to this pilot and available resources for extensive consultancy work. However it should be stressed that implementation of large scale renovation activities will be impossible without intervention of the National and local authorities in term of subsidies and organisational assistance.

Czech Republic

The house in Ostružinová 50, Prague 10 with 22 flats, built in 1970 is formed like a co-operation (“co-op”). The building is occupied by young people with small children and by nearly retired older people. The first renovation step was maintenance of the roof.

The flat roof was leaking, moist problems occurred at the top floors and four flats needed much more heat than others. The roof was sold to two owners who have built up two new flats. The new owners promised to renovate the balconies of the whole building and to apply a uniform colour on the facade. All of the expenses were paid by the new owners. Most of the residents agreed to this solution (except for 5). The house obtained a better appearance, the heat savings were 5%, moist problems were solved and no additional expenses had to be made for renovation of the balconies. The second step was replacement of old wooden windows for new plastic ones. Extensive discussions took place. At the end only two people did not accept replacement of the windows. 15% was paid from the building budget for neglected maintenance, part was paid by the fund for repairs and the rest was paid by the residents. Some people wanted to pay cash and the rest have paid monthly for two years. The whole sum of investment was 1260 thousand CZK (€50.5 thousand). The energy savings amounted to approx. 15%.

The third step is planned during these days: reconstruction of the heating system which will be completed with thermostatic valves and individual heat metering and payment. In general one can say that retired residents do not like changes. They are afraid of any activity in their flat and the management of a coop does not have the opportunity to offer a spare flat during renovation.



Figure 7: Renovated housing co-operative Estonia

Estonia

Renovation of a nine storey block house with 72 flats took place in Tallinn. In 1999, the apartment owners founded an association. The buildings renovation was started in 2000 with basic refurbishment measures that were financed by the apartment owners'. In 2003 a more complex renovation was started with a bank loan. All decisions were made in the flat owners association meetings.

The measures implemented were:

- Renovation of the heating system renovation (modern district heating substation)
- One-pipe heating system replaced by a two-pipe system
- Hot and cold water pipes replaced by new ones
- Thermostatic valves installed on all radiators
- Individual measurement and payment of heat used
- Renovation of the electricity system
- Windows replaced by plastic double glazed windows with ventilation-grid
- Old soviet metal radiators replaced by new metal radiators
- Gable roof renovated and insulated.
- Side walls externally insulated with plastered polystyrene blocks (EPS) 100 mm
- Front and back facades insulated with polystyrene blocks (EPS) 100 mm
- Balconies repaired and insulated with polystyrene blocks (EPS) 50 mm
- Balconies were glazed with sash windows

Today the apartment owners association of Sütiste tee 45 has already invested more than 6.3 million EEK or Eur 403,000. The loan (4.6 million EEK or Eur 294,000) is included in these investments. The heat consumption has dropped with nearly 50% (corrected for degree days).

Conclusions of the project

- External wall insulation should be made in combination with renovation of the heating system to avoid overheating after renovation.
- It is very important that together with windows replacement, the ventilation system is renovated as well. If there are no channels for fresh air through the new windows construction, natural ventilation stops. This may cause serious health problems.
- Good results have been made with the introduction of individual accounting of heat used. This gives the users the motivation to use thermostatic valves and pay for their actual consumption.

Spain

In 2003 an energy refurbishment was realised in the Pomar neighbourhood in Barcelona. Within the project three buildings were refurbished.

The measures included:

- Façade insulation
- Roof insulation
- Solar thermal water heater
- Photovoltaic installation (PV)

Barriers	Overcoming barriers	Implementation comments
There were not owners associations to work with	ADIGSA has assessed neighbours in order to create it	Owners associations have been created.
Neighbours could not leave their homes during the renovation	External insulation	Refurbishment has been done with neighbours inside without problems.
ADIGSA had not enough knowledge in solar thermal and PV technologies	ADIGSA contracted an expert company in solar energies to develop the project.	
Neighbours did not know about solar technologies. They did not trust on these technologies.	Several information meetings had been done. All installation was cost free for owners Energy for water heating was for free Buildings common spaces energy supply is for free	Owners did no maintenance of installation. ADIGSA is under negotiations with owners to solve this aspect.
Municipalities did not want to collaborate with the project	ADIGSA invest 100% cost of the project (although they were deferred property buildings)	Part of investment is slowly returning due to PV energy generation
Limited knowledge of renewable energy consultants and installers:	ADIGSA is going to contract another expert company to detect possible problems	

Barriers	Overcoming barriers	Implementation comments
<ul style="list-style-type: none"> Solar thermal installations were not very well designed. There were a lot of complains by owners. PV installation is not working at the expected efficiency. 	and solve them.	

Note: Finally, the insulation project was replicated to all neighbourhoods. On the other hand, the PV and solar thermal installations were not replicated to the rest of the buildings because an important investment was needed and quality and economical results were not as ADIGSA and the neighbours expected.



Figure 8: Renovation project Pomar neighbourhood in Barcelona

The Netherlands

Housing association WEL developed an apartment building 'De Wachter' in the city centre of Etten-Leur with 40 apartments of which 27 senior people apartments, 3 penthouses and 10 special apartments with (health) care services. The overall building cost amounted to Eur 9 million. The ground level consists of commercial retail spaces and the entrance of the garage. All apartments are equipped with heating and cooling services provided by a ground source heat-pump. The energy service company of the housing association provides heating and cooling to the units. The depreciation costs for the heat pump are not included in the rents as these costs are recov-

ered from the heat and cold service tariffs. The project contains a mix of commercial functions, commercial rent and social rent. Because of this unique mix and the energy service concept it was possible to include 20 high quality apartments for social rent with rents below the rent cap for state rent subsidies. The project has been opened in January 2008. It should be mentioned that the proper commissioning of the heat-pump based HVAC system and the low temperature heating systems are still ongoing as complaints on comfort and control exist.



Figure 9: The 'De Wachter' project in Etten-Leur

3.3 Analysis of good practice strategies

On a legal and organisational level the good practice projects show that:

- Housing coops and owner associations can function well (Estonia, Czech Republic). Despite the majority consensus that needs to be reached, renovation processes can be planned, financed and realised.
- The application of external insulation enables people to stay in their homes during renovation (Spain).

Furthermore the following good practice strategies have been put forward:

- Suggestions for improvements in the organisation of renovation processes.
- Support mechanisms for owner occupied social housing that help with complex technical, legal and administrative issues and procedures.
- Marketing and communication as mechanism to overcome knowledge barriers for renovation.

- Technical inventory of portfolios as starting point for prioritising renovation needs in the building stock.

On a financial level the following creative financial constructions, which create co-funding for social housing, are applied in projects:

- Roof sold for topping-up with two new flats under the condition that new owners pay for overall façade renovation (Czech Republic).
- Due to ESCO service and a mix of commercial functions and social rent, high quality apartments for social rent could be realised (The Netherlands).

Furthermore the following good practice strategies have been put forward:

- Ownership transition from owner-occupier to a housing association as a solution for owner-occupiers with little financial means and a solvency too low for owner-occupied housing (Czech Republic).
- Integral approaches in which the energy measures are part of a larger renovation package that has a high added value for the tenant/owner that enables co-funding of the energy measures (Bulgaria, The Netherlands).
- Several suggestions for improvement of financial support mechanisms.
- Providing tenants with insight in the overall housing cost (rent and energy).

On a technical level practical experiences provide the following recommendations:

- Individual control, metering and payment of heating services (Estonia, Czech Republic).
- Insulation should be combined with renovation of the heating system (Estonia).
- Window replacement should go together with renovation of the ventilation (Estonia).

4 EPBD demands and renovation scenarios for social housing







4.1 Introduction

Depending on the level of detail energy performance audits provide insight in the energy quality of dwellings, as well as on the possibilities and costs to improve the energy quality of a dwelling. This information can be used by social housing portfolio managers for the (long term) planning of renovation activities and renovation investment budgets. Federation of housing co-operatives or owner associations can use the information as basis for the development of effective dissemination strategies on energy efficiency and/or for the development of specific renovation support services for members. Energy performance information aggregated on a building stock level provides social housing company's also strategic information that can be used for assessing the attractiveness (housing/energy costs) and (future) value of their building portfolio.

4.2 Energy quality housing stock







In the RESHAPE project, energy performance certification has been tested on typical reference dwellings. The results can be extrapolated to building stock level. This can be either by extrapolation to an overall rental building stock owned by a social housing company/association or extrapolation to the national social housing stock in the case of owner occupied social housing.

Table 9 and Table 10 give an overview of the energy certification tests done in work package 2 and the extrapolation to overall building stock level.

Energy performance building stock	 BE	 BG	 CZ	 EE	 ES	 NL
Nr. of reference buildings selected for EP audits	10	6	205	20	4	190
Nr. of flats/dwellings covered by audited reference buildings	553	204	5611	1293	8631	3882
Representative coverage of overall social housing stock (%)	51%	60%	1% *	55%	14%	92%
National social building stock (N), regional (R) or local building stock owned/managed by Reshape partner (L)	R (Flanders)	N	N	N	R	L
Construction period	1950 - 2002	1950-1989	1961-1990	1960-1985	1954-1975	1948-2006

* Actual coverage, not representative coverage

Table 9: RESHAPE energy performance certification tests.

Energy label distribution housing stock	 BE	 BG	 CZ	 EE	 ES	 NL
National, Regional or Local building stock	R	N	N	N	L	L
A		0%	0%			1%
B		0%	0%			7%
C			3%			30%
D	*		30%	***	****	28%
E		**	42%			22%
F			24%			9%
G			0%			3%

* No official energy label scale defined yet in Flanders - Belgium

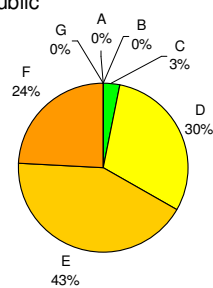
** Only label A and B exist in the Bulgarian norms (the audited buildings did not meet the requirements for these categories)

*** Energy labeling will start in 2009 (currently no official calculation tools are available)

**** It wasn't possible to produce reliable results and data for existing buildings with the official EPBD certification tools.

Table 10: Energy label distribution in housing stock (extrapolation of pilot results for reference dwellings).

Czech Republic



Netherlands

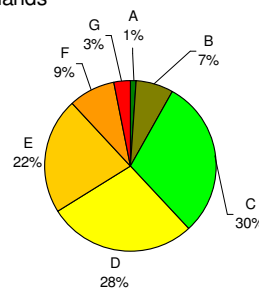


Figure 10: Energy label distribution in housing stock (extrapolation of pilot results for reference dwellings).

Belgium

The 10 audits realised were used to extrapolate the energy efficiency of more than 50% of the dwellings in Flanders. The result was an E-level, which reflects a theoretical energy consumption of a dwelling. An E100 level is considered to be the energy consumption of a reference building. In Flanders, new buildings must be better than the E100 level. At this moment there is no energy-label linked yet to this E-level. So no classification could be made by energy-label.

Bulgaria

In the Bulgarian EPBD legislation only energy labels class A and B exist. The reference buildings selected did not meet the minimum requirements for label A or B (minimum required specific energy consumption 148 kWh/m²). This is due to the fact that these buildings were built in a time with lower energy performance requirements.

Estonia

Energy audits of 20 buildings were analysed. These audits represent the typical multi-storey prefabricated panel building stock in Estonia. In all buildings the energy audit was followed by investments in energy savings. Mostly parts of the walls (side walls)

have been insulated and windows have been changed. The typical space heat consumption is close to 200 kWh per m². No energy labels have been assessed as no official EPBD calculation tool is available yet in Estonia. It is currently (2008) being developed.

Spain

It was planned to execute a pilot certification test for part of the ADIGSA housing stock. It appeared however impossible to do the audits as planned due to delays in the EPBD implementation process in Spain:

- There is no regulation, neither an official tool available for existing buildings.
- The official tool for new buildings (LIDER+CALENER) is not designed for and applicable to existing buildings.
- At the start of the RESHAPE project the official tools versions available (LIDER + CALENER) were not finalised yet and not bug-free. As a result many problems occurred with the use of the software. Finally, the results of the first 40 audits done by 10 technicians from ADIGSA and an energy expert (Ecofys) were not reliable even though technicians had spent more than 30 hours for each building to introduce all the data needed for the calculations.
- Based on this experience, ADIGSA has developed a methodology for introduction of data from existing buildings to the official tools that reduces possible mistakes.
- Finally, with far more time than planned, ADIGSA has realized a technical effort to introduce 4 existing buildings in the official tools and obtained reliable results. They cover the most repetitive typologies in the building stock and represent about 14% (8,631 dwellings) of ADIGSA's housing stock (deferred property stock).

4.3 Definition of renovation scenario's

As part of work package 2 energy performance audits have been made for typical reference dwellings that enable extrapolation to the overall building stock. As part of the energy performance audit process, the assessors also analysed possible improvement measures for all reference dwellings. The results of this type of analysis can be used to develop scenarios for the overall building stock.

Within the partner countries different approaches have been chosen for the renovation scenario's, regarding number of scenario's studied and type of scenario.

Bulgaria

Three scenarios have been defined:

1) Basic level

Basic level consists of minimum energy efficiency quality required by national legislation (building envelope insulation). The package includes 6 cm external wall insulation (expanded polystyrene), replacement of windows with PVC

ones with double glazing, roof and basement insulation, Minimum energy label class B

2) Basic+ level

The minimum energy efficiency quality required by national legislation (building envelope insulation) plus replacement of heating installation parts. Minimum energy label class B

3) Optimal package

All measures which are technically and financially feasible, excluding renewable energy. Minimum energy label class A

Belgium

In Belgium 2 renovation scenarios have been calculated for 2 common types of typical reference dwellings: single family dwellings and apartments. The renovation scenario for the single family dwellings comprised the following measures:

- insulation of the roof (12 cm)
- insulation of the side wall (6 cm)
- insulation of thermal bridges on the first floor
- replacing the windows by double glazing ($U=1,1 \text{ W/m}^2\text{K}$)

The renovation scenario for the apartments comprised the following measures:

- thermal insulation 8 cm in external walls
- double glazing $U=1,1 \text{ W/m}^2\text{K}$
- mechanical ventilation with heat recovery
- glazed balconies to clear the cold bridges
- solar thermal system (25m^2)
- condensing gas boiler

For scenario development at a regional (Flanders) level the Flanders federation of local social housing societies VSMW suggests 3 standard scenarios that, in combination with safety, health and comfort requirements and information on local social housing demand, could help to better develop well prioritised short and medium term renovation policies:

S1 - Energy performance calculation as basis for the energy correction in the rent.

The barrier that Social Housing Companies invest and tenants have the benefits can be softened by raising the rent with half of the tenant savings on energy costs.

S2 - Energy performance calculation as basis for optimisation of the housing stock

Lack of correct information on the (energy) quality of the building stock and potential improvements are barriers to adequate investments. When collecting data for energy performance certification, other relevant building characteristics can be added at the same time to compose an extended database of the building stock. This data can be analysed and interconnected from the energy point of

view but as well as an indicator of overall and differentiated needs for quality improvement. On this base renovation policies can be set out on federal level and local Social Housing Companies can improve their maintenance strategies.

S3 - Optimisation of collective heating installations

Energy performance certification combined with detailed audits (and monitoring) of large heating installations will indicate the potential of energy saving measures. Relative small investments can produce substantial energy saving.

Czech Republic

The Czech standards require a minimum energetic quality with energy class C for both new construction and major renovation of public buildings with a floor area of more than 1000m². This is valid from 1/1/2009. The package includes: repair of the building envelope, wall insulation, high-efficiency glazing, roof insulation and a more efficient heating system. An analysis has been done for the building stock built in the period 1959-1998 of which 80% needs to be refurbished.

Estonia

For Estonian multi-storey buildings with prefabricated panels (building period 1975 – 1990) typical scenarios are:

- Additional insulation of existing walls (U value ~1 W/m²/K) with at least 10 cm insulation, roofs with at least 20 cm of insulation. Average savings about 15%.
- Renovation of the heating system and installation of thermostatic valves. Additional savings 10 – 15%, because of individual control possibility.
- Individual measurement and payment of heat used per flat may lead to an additional 10% savings.
- Windows are part of the natural ventilation system and changing them should be combined a renovation of the ventilation system.

Two scenarios have been studied: wall and roof insulation and window replacement in combination with, as well as without, a renovation of the heating system.

Spain

Building renovations scenarios analysed were:

- Passive measures: insulation of external wall and roof, windows frame improvement (two different quality requirements) and double glazing (two different quality requirements).
- Active measures for heating and domestic hot water systems (four different quality requirements).

The Netherlands

In order to assess renovation scenario's for the building stock a first set of 8 defined improvement packages have been defined for the scenario analysis:

1. Basic level: The minimum energetic quality that housing association WEL requires for their entire portfolio. The package includes cavity wall insulation, high-efficiency glazing, roof insulation, high-efficiency boiler, water saving shower head, demand controlled mechanical ventilation.
2. Basic+ level: The minimum energetic quality that housing association WEL requires for senior people dwellings.
3. Optimal package: All measures that are technically and financially feasible, excluding renewable energy.
4. Optimal +RES package: All measures that are technically and financially feasible, including renewable energy.
5. Package with a maximum pay back time of 15 years
6. Package with a minimum energy label class C
7. Package with a minimum energy label class B
8. Package with a CO₂ reduction of 15%







In order to get a better overview of impact and cost of specific measures the nr. of different scenarios has been extended to 14.



Figure 11: Single family social housing in the Netherlands, terraced dwellings.

4.4 Renovation scenario's for the housing portfolio

As part of the energy performance process, the assessors also analysed possible improvement measures for reference dwellings based on the renovation scenarios described before. The results of this analysis can support the development of renovation strategies for the overall building stock. An overview of results is given in Table 11.

Renovation strategies	 BE	 BG	 CZ	 EE	 ES	 NL
Nr. of renovation scenario's	2	3	1	2	9	14
Nr of flats/dwellings covered	97	900000 *	838810 */**	1293	8631	3882
Representing coverage of overall social housing stock (%)	16%	60%	39%	40%	14%	92%
National, regional or local building stock (N/R/L)	R	N	N	N	R	L
Energy savings - range (%)	30 - 50%	35% (basic+)	32% (20-55%)	10-45%	11-40%	3-41%
Simple pay back time - range (years)	--	20	22	1-30	--	1 - 67
Including subsidies or other financial support mechanism (y/n)	--	y	n	n	--	n
Average CO ₂ reduction per house (ton CO ₂ /a)	2.0 - 2.7	0.58	0.5	0.25 - 1.7	0.12 - 1.0	0.1 - 1.5
CO ₂ reduction in building stock (kton CO ₂ /a)	80	523 (basic)	335	90-600	1.1 - 8.6	0.5 - 6

* National building stock coverage

** Non renovated panel flat buildings

Table 11: Renovation scenarios developed based on energy performance certification test.

The main conclusions per country are given below.

Belgium

For 2 types of reference dwellings renovation scenarios were analysed (single family housing and multi-family apartment buildings). The renovation packages for the 2 building types show calculated energy savings between 40 and 70%. After realisation and monitoring of the projects we see an actual measured energy saving between 30 and 50%. The 2 reference types represent approximately 16% of the total Flemish building stock. The total CO₂ reduction per dwelling range from 2 to 2.7 ton CO₂/year.

Bulgaria

The renovation scenarios show that for residential condominium buildings in Bulgaria the payback period is relatively long; even for the basic energy saving scenario. This is due to the fact that:

- At the time of construction, energy savings were totally ignored
- During the lifetime the buildings have nor or poorly been maintained (lack of management).

Czech Republic

In the Czech Republic, many of the panel buildings have already been partially renovated (roof, roof insulation, modernisation of lifts, replacement of windows, installation

of thermostatic valves etc.). These activities were done to remove real or potential damages. In order to apply for state subsidies, buildings should be completely renovated (thermal insulation of walls and roofs, windows replacement, reconstruction of heating system (heat substation, new boilers or new technology for hot water preparation etc.). The main tasks for all the involved parties (auditors, consultants, banks etc.) are to realise the complete reconstruction and reach at least **C** class certification. The state subsidy is derived from the quality of the future quality of a building.

Estonia

In Estonia the audited buildings were renovated and the results have been analysed. It was found that the potential savings calculated by the auditors were too optimistic (compared to the actually realised savings). Some auditors predict 90% savings on heating. Sometimes the predicted remaining consumption drops to “passive house” level, which appeared rather unrealistic.

The renovation experiences in Estonia learn that insulation measures should be complemented with renovation of the heating system in order to prevent overheating and discomfort. The introduction of thermostatic valves on radiators can increase the individual comfort in flats. Proper end-user information should however be provided on the use of thermostatic valves in order to prevent an increase of the energy consumption after installation. Without individual heating control the savings are unpredictable. Some examples shows, that the consumption even increases after renovation, because there is no technical possibility to avoid overheating. The introduction of individual accounting and payment of heating costs has shows good results with regard to energy savings. As windows are part of the natural ventilation system, changing them can lead to a lack of air quality. Windows replacement should always be done in conjunction with renovation of the ventilation system.

Spain

Retrofitting scenarios were evaluated in order to classify good practice on energy refurbishment. The conclusions have been compiled in a brochure and have been presented to owners with other recommendations on energy use. Furthermore, the calculation results on energy consumption from the ADIGSA refurbishment practices (done or to be done on a short term) have shown good results (average energy savings 30%).

The scenarios evaluated achieve between 11% and 40% of energy savings. The values depend on the initial building quality and type and number of improvements done. The most important improvements relate to the efficiency of heating system as well as to passive measures (insulation).

The Netherlands

Analysis of the building stock shows that the major challenges for housing association WEL are focused on houses with label E, F and G (34% of the building stock). These are mainly terraced dwellings. Bringing the overall portfolio to label D or better implies an investment of €2.7 million and will reduce the CO₂ emission of the portfolio with 1695 tonnes CO₂ per year. Bringing the overall portfolio to label C or better implies an



investment of €8.4 million and will reduce the CO₂ emission of the portfolio with 3216 tonnes of CO₂ per year.

4.5 EPBD and renovation of social housing

With the introduction of the EPBD the energy consumption of a dwelling will become an important quality of dwelling that will have an impact on the management of social housing and on the communication to tenants/home owners. If EPBD energy performance certification is to play a role in renovation planning processes and contribute to lower the energy consumption and energy bills in social housing among others the following issues need to be addressed:

- Integration of energy performance certification in the renovation planning processes.
- Availability of appropriate energy performance software tools that support analysis of improvement scenarios.

4.5.1 EPBD in renovation planning process

Belgium

The Flemish federation of housing societies VMSW suggests that certification and its potential role in developing strategies for improvements in the building stock could be optimised by centralised management through the VMSW using its central social housing database and an adapted version of the official EPC-tool. Analyse of the energy quality of the Flemish building stock, in combination with safety, health and comfort requirements and information on local social housing demand, could help to better develop well prioritised short and medium term renovation policies.

Bulgaria

The renovation scenario calculations for the national building portfolio could be used as a basis for precise calculation of the costs needed for implementation of the National Renovation Program that is to be implemented by the Bulgarian Government including the required state subsidy budget. Scenario calculations could further facilitate renovation processes by providing insight into potential energy savings from renovation activities. There is however a need for elaboration of a tool based on the findings of the RESHAPE project. This should be a part of the National Renovation Program curricula and bylaws.

Czech Republic

The EPBD and its devolvement into the Czech conditions enable better planning of investment activities in the building stock. It gives a better insight into the real needs for the municipality. Co-ops and owner associations (SVJ) utilize certificates to demonstrate energy quality and neglected maintenance of their housing stock to owners/tenants. Management can operate with real numbers and the outputs are based



on the real state of the building. The Start of a reconstruction process can be accelerated.

Estonia

The EPBD implementation in Estonia foresees in an official audit report including the analysis of at least two renovation packages based on the audit results. The EPBD calculation tools are not available yet, but are under preparation.

Spain

Integration of energy performance certification in the renovation planning processes nowadays it is not possible yet in Spain and for ADIGSA. Some improvements on the integration of energy performance in the ADIGSA activities have been realised however due to the RESHAPE project. These are also interesting for other Social Housing Managing Companies in Spain and for policy makers. These are:

- Addition of energy information in retrofitting building projects of the company.
- Adaptation of retrofitting projects, including minimum energy requirements as defined in Spanish new building legislation.
- Evaluation of improvements on energy efficiency from refurbishment projects, calculating energy savings.
- Recommendations on potential savings of other refurbishment performances and improvements addressed to owners of social housing.
- An active attitude on EPBD implementation in Catalonia: periodic meetings with Energy Agency and Housing Department of Catalonia, who are in charge of EPBD implementation in Catalonia.
- An active attitude on EPBD implementation in Spain: ADIGSA has become a permanent member of the experts' platform on energy efficiency in the Spanish Association of Public Promoters of Housing and Land (AVS).
- An active attitude on EPBD implementation in EU (for example answering Position Paper on the recasting of the EU Energy Performance of Buildings Directive).

The Netherlands

Housing association WEL will link energy performance certification to its portfolio management at different levels:







- At a strategic level EP results will be linked to long term portfolio policies. Energy labels provide an insight into the energy quality distribution in the building stock. Minimum energy labels will be added to minimum quality demands for specific categories in the building portfolio. This will assure upgrading of the energy quality through future refurbishments or maintenance activities.
- For the long term budget planning scenarios will be made for the cost-effective upgrading of the portfolio's energy quality in relation to the available budgets.
- At refurbishment and maintenance level EP audits are used to analyse and select specific refurbishment measures.

- Energy consumption and costs will be communicated to (prospective) tenant as part of an overall housing quality information system.

WEL has selected an appropriate energy performance software system that facilitates the functionalities required for these purposes.

4.5.2 EPBD software tools

With regard to the use of EPBD software calculation tools available in each country and the functionality to support the development of renovation scenarios at building level as well as housing stock level, Table 12 gives an overview for the RESHAPE countries.

EPBD and renovation strategies	 BE	 BG	 CZ	 EE	 ES	 NL
Official EPBD audit includes proper analyse of improvement/renovation strategies	-	--	+	(+)	--	-
EPBD calculation tools are available that include proper analysis of improvement / renovation strategies	+	--	+	(+)	--	+
The EPBD tools available function well and are practically applicable	+	--	+	--	--	+
Are EPBD tools applied in practice for developing renovation strategies	+	--	+	--	--	+
EPBD tools available for analysing renovation strategies at building stock level	-	--	--	--	--	+
Integration of EPBD tools with housing portfolio databases is available	-	--	--	--	--	+

(+) will do so in future

Table 12: EPBD, available tools and the development of renovation scenarios

Belgium

The official Flemish EPDB-tool is still under development and training for energy experts started mid 2008. The official EPBD-tool automatically provides some very general measures for improving the energy use.

There also exists an official and more detailed audit tool which however is not compatible with EPDB regulations.

The aim of the VMSW is to develop a database tool that enables a better analysis for (groups of similar) buildings that will enable analysis of energy related improvement measures as well as other upgrading measures (from imperative security measures to suggestions on the improvement of comfort and/or accessibility).

These tools are still to be developed under the supervision of the VMSW. Therefore the data from the official EPDB databases should be transferred or connected to the social housing database; consultation between policy makers, administrations and tool developers just started.

Bulgaria

The existing norms regarding EPBD application in Bulgaria do not anticipate on the specific demands for energy performance certification of residential buildings and moreover to multi-storey condominium buildings. The calculation tools adopted by Bulgarian legislation are considering buildings in general. There is a need to further



specification of the norms when it comes to residential buildings in order to get prepared for large scale renovation activities in the Bulgarian housing sector. No tools are available for analysing renovation strategies at building stock level.

Czech Republic

The national calculation tool **NKN v-2.05** can be used for the display of Energy Certificate to the intent of Act No. 177/2006 Col. (update of Energy Management Act) and Decree No. 148/2007 Col. Energy Performance of Buildings of the Ministry of Industry and Trade of the Czech Republic. At the end of the certificate, there are recommendations for improvement of the energy quality of the building. This tool is in wide national use.

Estonia

The EPBD implementation in Estonia foresees an official audit report including the analysis of at least two renovation packages based on audit results. EPBD calculation tools are not available yet, but are under preparation.

Spain

In Spain the official certification tools:

- Do not include proper analyse of improvement/renovation strategies.
- Do not work well and are not practically applicable. The tools are quite inflexible and still contain a lot of bugs which makes an audit much more time consuming than expected. Data introduction takes more than 30 hours for 1 project and the calculation process takes up to 1 hour time (some computers are even not able to execute the calculation).
- Are not adapted for existing buildings (yet).

The Netherlands

In the Netherlands the official EPBD procedure does not provide a proper improvement analysis. Standard procedures however for this analysis exist that can be applied on a voluntary basis. Certified EPBD software development is done by commercial market actors. Several well functioning and practical software packages are available with varying functionalities, ranging from very basic (providing only the certificate) to very extensive (including portfolio databases and portfolio scenario analysis functionality). Most Dutch housing associations are currently in the process of getting their portfolios certified, choosing certified auditor companies and software that meets their requirements.

5 Policy recommendations

Based on the experiences by RESHAPE partners policy recommendations have been made regarding the legislative and institutional framework for renovation and EPBD implementation in social housing. This chapter provides a selection of recommendations done for the different countries.

5.1 Improving the energy quality of social housing

For each of the RESHAPE countries, the following suggestions were made to improve the energy quality of social housing.

Bulgaria

- Approval of a modern Condominium Law, regulating relations between apartment owners in condominium building and their organisations (HOA).
- Amendment of Law on Local Self-Government and Local Administration in order to regulate the new functions, rights and obligations of municipalities in connection with energy efficient refurbishment of condominium buildings and restructuring of housing estates.
- Creation of financial incentives for renovation of housing by changes in tax legislation and providing regulations for targeted subsidies.
- Further development of the National Renovation Program with bylaws and securing budget allocations according to the Program for each Program year.

Czech Republic

- The 70% participation requirement for renovations should be lifted if a demonstrable saving on energy cost can be realised.
- Increase the power of statutory organs within owner occupied accommodation in apartment houses
- Possibility to transfer costs of reconstruction to renters
- Expand the PANEL programme to non-panelled buildings
- Motivate instead of demanding complex repairs within the PANEL-programme
- Introducing specialised programs aimed at ensuring complex technical, legal, administrative and other help in administration of dwelling stock

Belgium

- Efficient approach to energy savings is only possible within a global and sustainable renovation vision.
- Rules and regulations should go hand in hand with codes of good practise and communication.

- EPDB must be a surplus value

Estonia

In principle the framework conditions for renovation are good. Proper legislation with regard to collective ownership is in place. Flat owners associations are organised as legal entity for renovation and loans. Banks are ready to give renovation loans. Currently the state aid is 10% of the loan. This state contribution however should be raised because the average payback period for renovation of the building envelope normally is still more than 20 years. Nevertheless with rapidly rising energy prices pay-back periods will drop. Increased state aid could also contribute to the creation of entrepreneurs in energy efficient renovations.

Spain

- Define policies to solve energy refurbishment barriers in social housing taking into account the energy invoice increase which will help to promote energy refurbishment practices in energy refurbishment.
- Develop legal framework to promote refurbishment practices including energy performance criteria in a standard way.
- Involve all key actors who work in energy item in dwellings, to achieve a common strategy for energy improvements in housing stock built.
- Look for new strategies for financing of energy refurbishment (energy suppliers, bank entities,...)
- Work with countries whose renovation management in social housing context is the same, and also with countries whose climate is similar to Catalonia and Spain for retrofitting strategies in social housing.

The Netherlands

- Tenants may not agree on higher rents in return for lower energy costs because of lack of trust in the promised energy saving. The 70% minimum participation requirement for renovations should be lifted if a demonstrable saving on energy cost can be realised.
- Rent increases that could enable the recurrence of the investments are legally regulated and maximised. The maximum rent legislation system should better take into account the energy quality and thus the energy costs of a dwelling. Energy labelling could be included in the rent legislation for this purpose.
- Investing in energy efficiency or renewable energy systems may lead to rents above the rent cap for state rent subsidies for low income people. The maximum rent cap for state rent subsidies for low income people should no longer be linked to the rent only but to the overall housing costs (rent and energy costs).

5.2 EPBD implementation in social housing

Besides policy recommendations for improving the energy quality of social housing, policy recommendations on the EPBD implementation for each country have been made.

Bulgaria

- The certification of residential buildings should be included in the package of housing renovation measures that are subsidized by the state under the National Renovation Program.

Amendments are needed in the Energy Efficiency Act:

- Aimed to regulate that every building is subject to mandatory energy certification when the owners and legal entities under Article 151 of the Energy Act apply for preferential treatment and tax concessions under the provisions of Paragraph 5 of the Energy Efficiency Act or for project financing under the provisions of Article 31 of the Energy Efficiency Act.
- Introducing a mandatory certification of newly constructed residential buildings and renovated existing buildings with use of state subsidies.
- And bylaws for regulating the energy certification procedure for condominium housing.

Czech Republic

- Create national strategy for improving energy efficiency in construction industry.
- Accelerate preparation of Green Investment Scheme (GIS) and utilize yield for subsidies in the reconstruction of social houses.
- Create program of low energy and passive energy construction of building
- Create program for rentable buildings to enable their reconstruction with the accent on energy savings.

Belgium

- Make a link between rent and energy performance of a dwelling.
- Adjust methods and tools to social housing.
- Support the policy for upgrading the 'patrimonium' (the building stock of housing associations).

Estonia

No recommendations on EPBD implementation can be made so far as EPBD implementation is still ongoing in Estonia. The transition period for Estonia ends in 2008. An energy audit quality control system, training for energy auditors and a license structure for auditors are currently being developed.

Spain

- Implement EPBD step by step and with tested and validated schemes and methodologies.
- Provide aid and support to housing sector to help EPBD implementation by all agents involved.
- Develop, test and validate a certification tool for existing buildings before using it and before making the use obligatory by law.







The Netherlands

- It is recommended to make the publication and communication of energy labels for housing mandatory, at the moment when housing is offered through websites, advertisements or housing magazines.
- Within the communication of the energy certificate and label the expected average energy consumption of the dwelling should be communicated as well.
- Make sure the quality of the energy audits is guaranteed by a proper quality control system.

5.3 Addressing policy makers

The RESHAPE policy recommendation aim at addressing policy makers and make them aware of legislative and institutional framework barriers with regard to renovation in social housing and EPBD implementation in this sector. The recommendations also aim at giving hints for solutions and approaches that can help to remove these barriers.

In Table 13 an overview is given of activities executed by RESHAPE partners aimed at addressing policy makers.

Addressing policy makers	 BE	 BG	 CZ	 EE	 ES	 NL
Nr of events	2	13	4	3	4	4
Type of events						
conference/congres (nr)	1	1		1	0	1
workshops (nr)	1	4	4	1	2	2
meetings (nr)		8		1	2	1
mailings (nr/amount)		300	450	7		
Type of policy makers						
national authorities		20	50	10	1	40
regional authorities	3 *	10	100	10	7 *	3
local authorities	5	90	300	80	6	16
Total nr. of policy makers addressed	8	120	450	100	14	59

* In Belgium and Spain the EPBD implementation is a responsibility of the regional authorities

Table 13: Addressing policymakers

5.4 Country highlights

From several partner countries, some highlights were noted.

Belgium

The intentions of the VMSW with regard to the EPDB were announced at the annual meeting / congress with Social Housing Companies and local authorities in Antwerp in spring 2008.

The needs for a structured implementation has been discussed at the annual Flemish forum / workshop Climate Plan in autumn 2007 in presence of a large representation of institutions involved in different aspects of social housing.



There have been several informal meetings between VMSW, administrations and cabinets of involved ministers of the Flemish Government.

All involved ministers, administrations and local actors have been informed of the needs, barriers and possible scenario's (some on a more informal basis).

The Netherlands

A major event was the RESHAPE contribution by housing association WEL director Karo van Dongen and WEL RESHAPE project manager Charel Wouters in the plenary discussion at the national conference on energy labelling on 23 October 2007. At the conference with 369 participants all target groups were represented among which more than 50 policy makers from national, regional and local level.

In the Netherlands one of the RESHAPE recommendations to include energy labelling in the rent legislation has been implemented recently.

6 Conclusions

Good practice renovation strategies

On a legal and organisational level good practice projects show that:

- Housing coops and owner associations can function well (Estonia, Czech Republic). Despite the majority consensus that needs to be reached, renovation processes can be planned, financed and realised.
- The application of external insulation enables people to stay in their homes during renovation (Spain).

Furthermore the following good practice strategies have been put forward:

1. Suggestions for improvements in the organisation of renovation processes.
2. Support mechanisms for owner occupied social housing that help with complex technical, legal and administrative issues and procedures.
3. Marketing and communication as mechanism to overcome knowledge barriers for renovation.
4. Technical inventory of portfolios as starting point for prioritising renovation needs in the building stock.

On a financial level the following creative financial constructions, which create co-funding for social housing, are applied in projects:

- Roof sold for topping-up with 2 new flats under the condition that new owners pay for overall façade renovation (Czech Republic).
- Due to ESCO service and mix of commercial functions and social rent, high quality apartments for social rent could be realised (The Netherlands).

Furthermore the following good practice strategies have been put forward:

1. Ownership transition from owner-occupier to a housing association as a solution for owner-occupiers with little financial means and a solvency too low for owner-occupied housing (Czech Republic).
2. Integral approaches in which the energy measures are part of a larger renovation package that has a high added value for the tenant/owner that enables co-funding of the energy measures (Bulgaria, The Netherlands).
3. Several suggestions for improvement of financial support mechanisms.
4. Providing tenants with insight in the overall housing cost (rent and energy).

On a technical level practical experiences provide the following recommendations:

1. Individual control, metering and payment of heating services (Estonia, Czech Republic).
2. Insulation should be combined with renovation of the heating system (Estonia).
3. Window replacement should go together with renovation of the ventilation (Estonia).

EPBD and renovation scenarios for social housing

All partners have selected a number of typical reference dwellings/buildings that represent larger shares of building stocks in the respective countries. Reference dwellings have been selected by construction period (age), type (single-family, multi-family) etc. Based on audits for these reference dwellings insight has been gained on the energy quality of larger building stocks. For each of the reference dwelling renovation scenarios have been defined and analysed using the (EPBD) energy performance tools available. This provides insight in the renovation potential and costs for specific buildings or larger building portfolios. This enabled the social housing actors involved to assess to potential use of energy performance tools in portfolio management. The scenario analysis show large potential energy savings of 1 to 55%. Pay back times however also very significantly and range from 1 – 67 years.

EPBD in renovation processes in social housing

With the introduction of the EPBD the energy consumption of a dwelling will become a more important quality of dwelling that will have an impact on the management of social housing. If EPBD energy performance certification is to play a role in renovation planning processes and contribute to lower the energy consumption and energy bills in social housing among others the following issues need to be addressed:

- Availability of appropriate energy performance software tools that support analysis of improvement scenarios.
- Integration of energy performance certification in the renovation planning processes.

With regard to the availability of appropriate tools the large difference in EPBD implementation pace in the different countries is expressed well. Only in the Czech Republic and the Netherlands official tools for energy performance certification and renovation scenario analysis of existing dwellings are available. In the Netherlands also energy performance certification and analysis tools are available for scenario analysis on a portfolio level. In the other countries energy audits and scenario analysis had to be done with official EPBD tools meant for other building categories (new construction in Spain and general buildings in Bulgaria) or with energy audit tools not compliant with legislation on EPBD certification. This delay in EPBD implementation complicates the proper evaluation of the EPBD energy performance certification potential for portfolio management and renovation processes in social housing,



Nevertheless it can be concluded that in countries like the Netherlands and Belgium a large potential (and also the appropriate tools) exists for the integration of energy performance certification in portfolio management of social housing (renovation scenario analysis, budget and maintenance planning). In the other countries with predominantly owner occupied housing stock, energy performance certification and auditing will mainly have a function for scenario analysis on a specific building level. Furthermore it will play a role in the dissemination of knowledge on energy issues to flat-owners and in the decision process that flat-owners, united in housing coops or housing associations, need to make on renovation.

Policy recommendations

Based on the experiences throughout the project, all partners compiled a set of recommendation for policy makers, distinguishing recommendations that relate to overcoming barriers for renovation in social housing as well recommendation related to the EPBD implementation in social housing. These recommendations have been compiled in six policy papers (that can be found on the project website). An analysis of efforts to address policy makers through meetings, workshops and conferences show that throughout the project period partners realised had a significant reach of policy makers.



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