

SQUARE - A System for Quality Assurance When Retrofitting Existing Buildings to Energy-Efficient Buildings

Methods to break non-technical barriers in the energy saving retrofitting process

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**WP3 Methods to break non-technical barriers in
the energy saving retrofitting process**

Preface

This report is part of the work carried out within the SQUARE project (EIE/07/093/SI2.466701), which stands for A System for Quality Assurance when Retrofitting Existing Buildings to Energy Efficient Buildings. The project is co-funded by the European Commission, and supported by its programme Intelligent Energy Europe (IEE). The SQUARE project aims to assure energy-efficient retrofitting of social housing, with a good indoor environment, in a systematic and controlled way.

The partners of the SQUARE project are:

- AEE Institute for Sustainable Technologies, Austria
- EAP Energy Agency of Plovdiv, Bulgaria
- TKK Helsinki University of Technology, Finland
- Trecodome, The Netherlands
- TTA Trama Tecno Ambiental S.L, Spain
- Poma Arquitectura S.L., Spain
- SP Technical Research Institute of Sweden, Sweden
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Summary

This report provides a review of experiences non-technical barriers in the energy-saving retrofitting process identified by interviews with stakeholders and literature surveys in Sweden, Finland, Austria, Bulgaria, Spain and the Netherlands. The report contains an overview of the main existing national laws, regulations and policies impacting energy efficiency in social buildings suitable for the retrofitting process. The report also includes a chapter on the decision-making roles of different stakeholders, responsibilities, and the participation stage. The main purpose of this report is to define the common stakeholder groups, drivers of energy-efficiency improvements and a summary of non-technical barriers for different stakeholder groups. The non-technical barriers for different stakeholders groups have been generalized. Also methods to overcome the non-technical barriers for different stakeholders have been suggested based on analyses from each SQUARE partner's national report and previous work done in other projects involving technical barriers.

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1 Introduction

1.1 Purpose

There are many non-technical barriers that have to be overcome in order to get energy-efficient retrofitting and use of social housing. The aims of this work package are to find methods to overcome these barriers. The energy consumption of a building depends not only on the quality of the buildings and the technical installations but also on the behaviour of the owners/tenants. One of the ways to inspire the owners/tenants to reduce their use of energy to a minimum is to design the energy system in such a way that it is adapted to different points of views of the owners/tenants to reduce energy consumption. It is important to involve the tenants early in the retrofitting process to get their opinions on different energy-saving solutions. One of the many barriers is the attitude in the construction industry and the scepticism to new building and energy system concepts. In another case, a lack of knowledge and experience is a barrier.

The main purpose of this work was to:

1. To identify non-technical barriers among owners and tenants of social housing in different countries.
2. To identify non-technical barriers among stakeholders in the construction industries in different countries. This could be carried out by interviews and questionnaires.
3. To suggest methods for overcoming barriers among owners and tenants.
4. To suggest methods for overcoming barriers among stakeholders in the building sector involved in renovating social housing.
5. To disseminate information about different methods to overcome non-technical barriers among stakeholders.

1.2 Objectives and target groups

One of the main tasks in this work package, to identify non-technical barriers among owners and tenants of social housing in different countries, was carried out by interviews and questionnaires. The work in WP3 is also based on previous work done in other projects on technical barriers.

The main target groups:

- Companies owning social housing (private companies or non-profit companies);
- Private owners of flats or co-operative flats in social housing;
- Consultants working with renovation and retrofitting of social housing;
- Contractors and suppliers involved in retrofitting social housing
- Tenants renting flats in social housing and neighbourhood representatives;

- Representatives from municipalities; and
- National authorities providing subsidies for energy-efficient retrofitting of social housing.

The previous projects have not provided the answer to how different types of tenants and stakeholders can overcome technical barriers.

The additional information from interviews and questionnaires from each partner country have been collected and summarized, together with the work done in previous projects.

In this WP3 internal report, selected information from SQUARE WP3 National Reports was analyzed in order to determine the most significant barriers and suggest the main methods to overcome them.

1.3 Scope and limits

The following contents are summary information about specific non-technical barriers, which have been identified by each of the SQUARE partners in their national reports. High priority was given to inquiry on owners, developers, tenants and, building management stakeholders' groups.

Due to identical type of ownership in Sweden, Finland, the Netherlands and Austria determined non-technical barriers for owners, developers and, tenants are similar for corresponding stakeholders' groups. In Spain, Bulgaria the non-technical barriers for owners, developers and tenants are more similar, because of high percentage of private ownership in these countries.

The barriers for building management identified by Sweden, Finland, The Netherlands, and Austria are depended accordingly of the traditional structure of this sector in each country. In Bulgaria and Spain there are still no well developed structures of building management.

In several partners countries the inquiry investigation has been fulfilled with inadequate stakeholders' groups such as investors, designers/planners/architects/engineers, and constructors/suppliers and therefore same methods for overcoming several barriers for these groups are not based on general conclusion.

Suggested strategies to overcoming non-technical barriers in SQUARE countries, described in this report, would be applicable for similar stakeholders groups involved in energy efficiency retrofitting process in other European countries.

2 Review on current regulation impacting energy efficiency in social buildings

The survey includes a review of existing national laws and regulations, references local/regional laws and reference national or regional policies.

2.1 Reference National laws and regulations concerning retrofitting of buildings, energy efficiency and indoor environment

In **Sweden** and **Austria** existing legislative frames are more adapted for application the Quality Assurance System when Retrofitting Existing Buildings to Energy Efficient Buildings. In Sweden the existing Act on Energy performance Certification of Buildings, Ordinance on Energy performance Certification of Buildings and General guidelines on Energy performance Certification of Buildings are based on the European Energy Performance of Buildings Directive. Housing Act regulates the responsibilities of the owner, and the rights and duties of the tenants and Law on housing co-operatives regulates responsibilities for keeping the building and apartments in good conditions and how financial means will be allocated for maintenance.

In **Austria** Law on submission of energy certificates 2006 (EAVG) - based on the European Energy Performance of Buildings Directive - states, that even without comprehensive retrofit of a building, an energy performance certificate still has to be issued. Existing Low of tenancy regulates responsibilities or owners and Non profit housing act with the addition to the rent: building owners can levy a maintenance and enhancement contribution.

In **Finland** at the moment there is no special regulation impacting energy efficiency in social buildings. The biggest non-profit social housing company in Finland VVO has announced that their will apply class B in the future in all renovation projects dealing with social buildings. In Finland legislative frame of the several Acts embraced the owner occupied housing, rental housing, Housing Fund of Finland and State-subsidised Housing Loans. In Finland there are wole guidelines and official methods for building and energy inspections, guidebook for healthy apartment building and mandatory service manual for apartment.

In **Bulgaria** the main Acts are: The Energy Efficiency Act corresponded with the requirements of Directive 2002/91/ U that determine the energy characteristics of buildings with 5 basic Regulations to it; Low for Organization of the Territory and Regulations, and new accepted Property Law /01.05.2009.

Spain presents the energy certification of new buildings, according to the Transposition of the European Energy Performance of Buildings Directive (2002/91/CE); CTE (Building Technical Code) (2007) and RITE (Thermal Installations Regulations) (2007).

The Netherlands has implemented an energy labelling systems for existing buildings. There has been an obligation to all social housing organizations to label all houses within their stock within the year 2008. The results of the inventory are now used to have promotional campaigns to achieve two label step improvements in existing social housing

schemes. Also a covenant between the government and the overarching organization of social housing associations has signed a covenant to achieve 20% CO₂ reduction within their stock by 2020.

There are no formal energy requirements for existing buildings, except that when a renovation must project apply for a building permit. In this case each component that will be renovated must comply with minimum requirements in the Building Code for new construction. In practice this means the application of a minimum U value for renovated components of 0.4 W/m²K.

Table 1 Reference National laws/regulations

Sweden		Finland		The Netherlands	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
The Planning and Building Act (1987:10), PBA	The National Board of Housing, Building and Planning – “Boverket” – is the central government authority for planning, the management of land and water resources, urban development, and building and housing under the Ministry of the Environment. The Act on Planning and Building came into force in 1987, and states that careful renovation is a requirement: “Changes of a building shall be performed with care so that the characteristics of the building are taken into consideration and that the architectural, historical, cultural, environmental and artistic values are protected.” Regarding maintenance it is stated that the buildings’ exteriors should be maintained in a good condition. Regarding maintenance it is stated that the buildings’ exteriors should be maintained in a good condition	Land Use and Building Act 132/1999	Impact assessment in connection with planning, monitoring land use, planner’s qualification, local building supervision authority, National Building Code of Finland, drawing up building ordinances, preparation of land use objectives	MER	Spatial planning environmental assessment of major spatial planning developments
The Planning and Building	This ordinance contains provisions on the	Housing Companies Act (1991); Act on	Owner-occupied housing. New version will be in use in	Building Code	Regulations and minimum requirements for construction

Sweden		Finland		The Netherlands	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
Ordinance (1987:383)	implementation of the Planning and Building Act (1987:10).	Interest Subsidy for Housing Company Loans (1996); Act on Interest Subsidy for Owner-Occupied Housing Loans (1993)	2010.	(latest version 2003, and updates on energy efficiency in 2006)	works in The Netherlands. This includes requirements in the field of Safety, Health Functional requirements Energy efficiency Environment
Act on Technical Requirements for Construction works etc. (1994:847)	This Act contains provisions on technical requirements for construction works (buildings and other civil engineering works) and construction products. It states that "Constructions which are erected or altered shall, on the assumption of normal maintenance, during of economically reasonable time of use, comply with essential technical requirements concerning, among other things, energy economy and thermal insulation.	Act on joint management of rental buildings (1990); Act on residential leases (1995)	Rental housing:	Energy Performance Requirements for new buildings [integrated in Building Code]	The Netherlands has introduced energy performance requirements as early as 1996. A calculation method resulting in a artificial factor, called EPC has been devised and used since. The level of the EPC factor is part of the national building code. There are EPC factors for domestic buildings as well as for a number of non-residential building functions.
The Ordinance on Technical Requirements for Construction works etc. (1994:1215)	This ordinance contains provisions on the implementation of the Act (1994:847) on Technical Requirements for Construction Works, etc. The	Right-of-Occupancy Housing Act (1990); Act on Right-of- Occupancy Associations (1994)	Right-of-occupancy housing	Energy certification Staatscourant 29 december 2006, nr. 253	Requirement to have energy certificates for buildings older than 10 years, at the time of sales, letting and renting. Energy certificates are not

Sweden		Finland		The Netherlands	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
	<p>General Requirements state:</p> <p>“A construction and its heating, cooling and ventilation installations must be designed and built in such a way that the amount of energy required in use shall be low, having regard to the climatic conditions of the location and the occupants.” (section 8)</p> <p>Regarding alterations to buildings, it is stated that “If a building is extended or it is altered in some other way, the (general) requirements” (stated above)...and the requirements on new buildings “shall be satisfied in regard to the part added or altered.”</p>			(MG-circulaire 2007-05)	<p>required for new buildings, because the EPC calculation required for new construction is accepted as a valid replacement. Regarding existing buildings since 1 January 2008 every sold or rented property must have an energy certificate. The Dutch energy certificate is based on the EPA method, and it displays the Energy Index of a property. The Energy Index is comparable to the EPC value, but calculated in a slightly different way. The energy certificate provides insight in the energy characteristics of the building and includes possible measures to improve its energy performance. The energy certificate addresses building related energy use for space heating, domestic hot water, lighting, ventilation and cooling. The certificate is valid for a period of 10 years.</p>

Sweden		Finland		The Netherlands	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
The Ordinance (1991:1273) on Obligatory Ventilation Inspection(OVK)	For multifamily houses there is since 1993 a requirement on inspection of the ventilation system at given intervals. For houses with mechanical ventilation this also means measuring and adjusting the ventilation rate to the originally designed values. This has probably also led to an improvement of the indoor air quality in many of the houses from the “million program.”	Act on the Housing Fund of Finland (1989)	Housing Fund of Finland (ARA). Since 1.1.2008 The Housing Finance and Development Centre of Finland (ARA loans)	Arbo	Health and Safety guidelines for workers
General guidelines for alteration of buildings (BÄR, Allmänna råd 1996:4)	These guidelines are published by the National Board of Housing, Building and Planning and include recommendations for existing buildings on energy economy and thermal insulation as well as maintenance by referring to the requirements stated in the building regulations for new buildings (BBR 15).	Act on State-subsidised Housing Loans (ARAVA Act) (1993) Decree on State-subsidised Housing Loans (ARAVA Decree) (1993) Act on the Use, Assignment and Redemption of State-subsidised (ARAVA) Rental Dwellings and Buildings (1993)	State-subsidised housing loans (ARAVA loans)		
Act on Energy performance Certification of Buildings (2006:985) The Ordinance on Energy performance Certification of Buildings (2006:1592)	These laws are based on the European Energy Performance of Buildings Directive. They state that an energy certificate has to be provided in case of selling, renting and letting buildings and	Act on Interest Subsidy for Right-of-Occupancy Housing Loans (1993)	Interest-subsidy loans		

Sweden		Finland		The Netherlands	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
Regulations and General guidelines on Energy performance Certification of Buildings (BFS 2007:4)	apartments. For existing buildings an energy inspection has to be carried out in order to establish a certificate.				
Housing Act ("Hyreslagen" from Jordabalken (1970:994) chapter 12)	Regulates the responsibilities of the owner, and the rights and duties of the tenants. The owner is responsible for the maintenance and repairs of the building and apartments. Before any "major changes" are made, the tenant/s must give their approval.	<p>A1 Supervision of construction work Regulations and guidelines (R&G)2006</p> <p>A2 Building designers and plans (unofficial translation).R&G 2002</p> <p>A4 Maintenance manual for the care and use of buildings. R&G 2000</p> <p>C1 Sound insulation and noise abatement in building. R&G 1998</p> <p>C2 Moisture. R&G 1998</p> <p>C3 Thermal insulation in a building Regulations 2003</p> <p>C4 Thermal insulation Guidelines 2003</p> <p>D1 Water supply and drainage installations for buildings.</p>	<p>National Building Codes - R&G</p> <p>C3 Thermal insulation in a building. Regulations – Update 2010 is published.</p> <p>D2 Indoor climate and ventilation of buildings. R&G 2010 published</p> <p>D3 Energy management in buildings.R&G2010 published</p>		

Sweden		Finland		The Netherlands	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
		<p>R&G 2007</p> <p>D2 Indoor climate and ventilation of buildings. R&G 2003</p> <p>D3 Energy management in buildings. R&G 2007</p> <p>D5 Calculation of power and energy needs for heating of buildings. Guidelines 2007</p> <p>D7 Efficiency requirements for boilers. Regulations 2007</p> <p>F1 Barrier-free building (unofficial translation). R&G 2005</p> <p>G1 Housing design. R&G 2005</p> <p>G2 Subsidized housing. R&G 1998</p>			
Law on housing co-operatives	The housing co-operative is responsible for keeping the building and apartments in good conditions, including all repairs. The rules of the co-operative must state how financial means will be allocated for maintenance.	Act on Energy performance Certification of Buildings (2007:487)	These laws are based on the European Energy Performance of Buildings Directive. They state that an energy certificate has to be provided in case of selling, renting and letting buildings and apartments. For existing buildings an energy inspection has to be carried out in order to establish a certificate.		

Sweden		Finland		The Netherlands	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
		Acceptance of plans and construction costs in State Housing Fund 2000	ARA Guidelines		
		Cleaning of ventilation systems 805/2001	Ministry of the Interior		

Spain		Bulgaria		Austria	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
CTE (Building Technical Code) (2007)	Application to new or refurbished buildings. Important reduction of thermal transmittance of the envelope of buildings. Mandatory Solar Thermal installation for hot water. Mechanical ventilation is mandatory in both single-family and multifamily buildings. Its aim is to improve the indoor air quality. Mandatory maintenance programme of building envelope and installations No reference to energy efficiency for the ventilation installation (no heat recovering from extract air is mandatory)	Law for Energy	The Law for Energy was developed on the basis of the Energy Strategy of Bulgaria. It is based on the comparative analyses of normative order of the European countries, on the Agreement to the European Charter and others Legal causes, in combination with special requirements of the National Legislation. The Law of Energy is according to Directives of European Union, which defines general rules of indoor stock of the electricity, energy and gas.	Law on submission of energy certificates 2006 (EAVG)	Based on the European Energy Performance of Buildings Directive the EAVG; regulates that in Austria from 1 st of January in 2008 an energy certificate has to be provided in case of selling, renting and letting buildings and apartments. From 1 st of January 2009 this regulation also has to be applied to existing buildings (buildings for which building permission was issued before 1 st of January 2006). This law states that even without comprehensive retrofit of a building, an energy performance certificate still has to be issued.

Spain		Bulgaria		Austria	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
RITE (Thermal Installations Regulations) (2007)	<p>Thermal, humidity, draught, etc. indoor conditions in buildings have been established by the RITE.</p> <p>The quality of indoor air is guaranteed by mandatory renovations.</p> <p>Mandatory heat recovery from extract air when $>0,5 \text{ m}^3/\text{s}$. Mandatory free cooling when refrigeration unit power is $> 70 \text{ kW}$. Individual energy consumption metering (hot water, heating and cooling) in centralized installations</p>	The Energy Efficiency Act/ 14.11.2008	The Energy Efficiency Act creates an administrative system for realization of the policy for increasing Energy Efficiency, combining the powers of the Central and the Regional authorities. The Act corresponds with the requirements of Directive 2002/91/EC that determines the energy characteristics of buildings. After the adoption of the Energy Efficiency Act, an Energy Efficiency Fund was established.	Policy No. 6 on “Energy savings and thermal protection” of the Austrian Institute of Construction Engineering (OIB RL 6)	The OIB RL 6 and its complementary documents specify requirements on the thermal characteristics of a building and the energy efficiency of the building service systems. Further, they describe the methodology of the energy certificate calculations. The OIB RL 6 and its complementary documents are implemented in the building codes of the nine Federal States of Austria.
Energy certification of new buildings (RD 47/07)	Transposition of the European Energy Performance of Buildings Directive (2002/91/CE). From 19 of July 2007 an energy certificate has to be provided in case of selling, renting and letting new or refurbished buildings and apartments.	Law for Organization of the Territory	In this Law are definite essential requirements to the Building processes, one of which is economy of thermal energy and heat-supplying in the building construction. Persons who are practicing construction monitoring of the building construction assume the responsibility for valuation of the energy trust in objects.	Law of tenancy	<p>The law of tenancy is valid for around 30% of all households in Austria. It includes mainly apartment buildings constructed before 1939 and apartment buildings in the ownership of municipalities or public companies. Building owners are responsible for:</p> <ul style="list-style-type: none"> • Maintenance of all common parts of the building; • Maintenance of the apartments in special cases (extreme damage);

Spain		Bulgaria		Austria	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
					<ul style="list-style-type: none"> • Maintenance of common equipment; • Retrofit based on magisterial obligations; • Implementation of measures serving energy savings; • Enhancement of the building, if adequate financial reserves exist. Principally, the building owners have to use the rent reserves of the past 10 years for the funding of these measures. The rent reserves consist of the rent income minus the maintenance costs during this period. In case these reserves are not sufficient, the expected rent reserves for the coming 10 years can be used. In case even this is insufficient, an increase in the rent can be conducted (§ 18 law of tenancy). This increase has to be approved by the arbitration board (www.rosh-project.eu).

Spain		Bulgaria		Austria	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
		Property Law 01.05.2009	This Law arranges the public relations with management of shared parts in a building, in accordance with the regime of floor property, owner's rights and duties in the floors or floor parts and for other dwellers. Management, order, control in buildings and support of shared parts of buildings are carried out by a general meeting of owners or by a general meeting of the Owners Association.	Non profit housing act	The non-profit housing act is comparable to the law of tenancy, except for one big difference: In addition to the rent, building owners can levy a maintenance and enhancement contribution. This contribution has an upper limit, which is defined by law depending on the year of construction. For buildings older than 20 years the contribution is 1,32 Euros per m ² living floor space per month. 0,33 Euro per m ² per month of this amount is reserved for ordinary maintenance issues; the rest can be used for enhancement measures – for example, comprehensive retrofit (www.rosh-project.eu).
		Regulation 7/15.12.2004 for Energy Characteristics of objects	Regulation 7/15.12.2004 regulates conditions and rules for determination of the Energy Consumption Indexes and Energy Characteristics of objects (buildings and industrial systems), combined methodology for forming of Energy Consumption Index/year and Energy Characteristics of objects, methods for comparison.	Condominium Act	The borderline between ordinary and extraordinary administration is not always a straight line, since both areas are regulated completely. For the distinction usually an economic point of view is used. The term "maintenance" can definitely lead to improvements, without the need to assume extraordinary administration. In general, this

Spain		Bulgaria		Austria	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
			Regulation is an obligatory part of packet, which regulate the energy investigations and certification of buildings.		requires a constraint in functionality, viability or an existing defect. In this regard, measures to reduce energy demand are to be seen as common ordinary maintenance costs, to which purpose also the building of appropriate reserves and the rise in a maintenance credit belong) (www.rosh-project.eu .)
		Regulation RD -16-295 /01.04.2008 . for Certifications of Builds according Energy Efficiency	Regulation RD -16-295 defines rules and order for certification of buildings for Energy Efficiency, kind of certificates and requirements for contents, requirements for training of the persons performing certificating and monitoring of activity for building certification		
		Regulation RD-16-294/ 01.04.2008 Energy Efficiency Audits	Regulation RD-16-294 determines the terms and conditions for carrying out energy efficiency audits of energy consumers and objects. The purpose of Energy efficiency audits is: 1. To determine the potential		

Spain		Bulgaria		Austria	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
			<p>possibility for decreasing energy consumption.</p> <p>2. To offer requirements of energy saving measures in order to increase energy efficiency.</p> <p>3. To create the technical and energy passports of the buildings and their certification</p>		
		Regulation № RD-16-296/0.04.2008 №. for the Energy Characteristics of objects	<p>Regulation № RD-16-296 defines:</p> <p>1. Conditions and order for determination of the Energy Consumption and Energy Characteristics of objects;</p> <p>2. Combined methodology for forming the Energy Consumption Index/year and the Energy Characteristics of objects; and</p> <p>3. Technical rules and methods for comparison of the Energy Characteristics of objects.</p>		
		Regulation № 15/28.07.2005 №. for the technical rules and norms of the design, construction and exploitation of objects and equipments	Regulation № 15 /28.07.2005 for the Technical rules and norms for the designing, construction and use of objects, supplying and distribution the thermal energy. Regulation		

Spain		Bulgaria		Austria	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
			determines requirements for designing all kinds of thermal energy installations: stream, warm water for dwellings and industry; indoor climate and ventilation of buildings.		

2.2 Reference Local/Regional laws – if any

Sweden

As many of the one million program houses are owned by municipal housing co-operatives/associations, the work on regional/local level can be of large relevance for the retrofitting of these houses.

Austria

The Australian example for Federal Building codes of the Federal State Styria reflects the implementations of the European Energy Performance of Buildings Directive. Concerning building retrofit the changes included in Table 2 are valid from 01. 04. 2008:

Spain

Many Spanish autonomous regions and even municipalities have local laws, by-laws or ordinances on energy conditions for new buildings or retrofitted buildings. An example is included in Table2:

Finland, Bulgaria and the Netherlands have no identified reference local or regional laws.

In **the Netherlands** building regulations have been established at national level, since 1993, though some local regulations indirectly influence the energy performance of buildings, such as zoning plans, and ‘architectural’ assessments of building plans.

Table 2 Reference Local/Regional laws

Sweden		Austria /Federal State Styria		Spain/Catalonia	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
Local/regional laws	<p>As many of the one million program houses are owned by municipal housing co-operations/associations, the work on regional/local level can be of large relevance for the retrofitting of these houses.</p> <ul style="list-style-type: none"> <i>The Ordinance on financial means for advice on energy and climate issues on a regional/local level (municipalities) (1997:1322)</i> <p><i>Law on energy planning for municipalities (1977:439)</i> covers supply, distribution and use of energy</p>	Building codes of the Federal State of Styria (as example)	<p>The implementation of the European Energy Performance of Buildings Directive also leads to essential changes in the building codes. Concerning building retrofit the following changes are relevant, valid from 01. 04. 2008:</p> <ul style="list-style-type: none"> Differentiation between comprehensive and partial refurbishment: <p>For buildings with a total living floor area of more than 1.000 m² retrofit is considered comprehensive for continuous retrofit measures, if</p> <ul style="list-style-type: none"> the total building costs (construction costs, fees and auxiliary costs) exceed 25% of the building value (not considering land value), or if at least 25% of the building envelope of the conditioned gross volume is refurbished, or if at least 3 of the following parts of the building shell and building services are replaced or largely modernized: windows, roof or upper floor ceiling, facade, HVAC-system. <ul style="list-style-type: none"> Besides the U-value boundaries, there also exist additional energy concerning requirements: <p>U-values are obtained in a stricter form and are also valid for retrofit projects (comprehensive as well as partial refurbishments). Additional requirements exist – for residential buildings -- concerning heating energy demand, final energy demand and parts of the building service system in case of comprehensive retrofit.</p>	Eco-efficiency decree	<p>Published before the Building Technical Code (CTE), this technical rule on new and retrofitted buildings involves many main areas like energy, water, construction materials, and wastes.</p> <p>The most important items on energy are:</p> <ul style="list-style-type: none"> reduction of thermal transmittance of the building envelope solar protections on S-SW façades solar thermal for all buildings covering from 50 to 70% of the hot water demand <p>Each project must to attain 10 points of several sustainability parameters.</p>

Sweden		Austria /Federal State Styria		Spain/Catalonia	
Laws/regulation	Description	Laws/regulation	Description	Laws/regulation	Description
			<ul style="list-style-type: none"> Registration of energy performance certificates: Energy performance certificates for the overall energy efficiency of residential buildings have to be issued for comprehensive retrofit. 		
				Solar ordinances	Before the Building Technical Code (CTE) many Spanish municipalities approved a solar ordinance; 20% of the Spanish population is living in municipalities with a solar ordinance (60% in Catalonia).

2.3 Reference National/Local/Regional policies

Table 3 Reference National/Local/Regional policies

Sweden		Finland		The Netherlands	
Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description
<p>National Energy Efficiency Action Plan (appendix to the governmental public investigation SOU 2008:25)</p> <p>(according to the Directive 2006/32/EC on energy end-use efficiency and energy services)</p>	<p>The investigation (SOU 2008:25) and the Action plan state a number of measures to be taken in order to meet the target of the directive.</p> <p>A number of incitements have been identified, such as information activities, e.g. <i>Forum for energy efficiency</i>, where knowledge about low energy houses and passive houses is disseminated to actors in the building industry.</p> <p>Further identified incitements include: Energy performance certification, Energy classification of buildings (Swedish Standard Institute, SIS, is developing the classification scheme), Requirements on energy economy for retrofitting of buildings.</p> <p>The National Board of Housing, Building and Planning have investigated suitable measures to be taken for energy efficiency in existing buildings. It has been suggested that building legislation should be developed to support this. The Board further suggests that relevant building products with large impact on energy use should be energy labelled. Another suggestion is to introduce a requirement on individual metering of domestic hot water in case of refurbishment or new houses.</p>	Energy audit program 1995	The goal is to have 80% of total building stock audited by year 2010.	Covenant 2020	Agreement between Aedes (social housing organizations), Woonbond (tenant representatives) and Ministry of Housing, Environment and Spatial Planning, containing actions to achieve 24 PJ reduction in the social housing sector. This equals 20% CO ₂ reduction in this sector by 2020
The Environmental Quality Objective “A Good Built Environment”	<p>“A Well Built Environment” is one of the 16 national Environmental Quality Objectives.</p> <p>It states that “Cities, towns and other built-up areas must provide a good, healthy living environment and contribute to a good regional</p>	The Governmental Program for Ecologically	Principles of sustainable development will be implemented in the construction	Schoon en Zuinig	Policy Plan by the Ministry of Housing Spatial Planning and the environment, addressing CO ₂ reduction strategies in all

Sweden		Finland		The Netherlands	
Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description
	<p>and global environment.....“</p> <p>The objective is intended to be achieved within one generation.</p> <p>Two of the interim targets state:</p> <p>“Interim target 6, 2020/2050</p> <p>Total energy consumption per unit area heated in residential and commercial buildings will decrease, with target reductions of 20% by 2020 and 50% by 2050, compared with consumption in 1995. By 2020 dependence on fossil fuels for the energy used in the built environment sector will be broken, at the same time as there will be a continuous increase in the share of renewable energy.”</p> <p>“Interim target 7, 2010/2015/2020</p> <p>By 2020 buildings and their characteristics will not have adverse impacts on health. It must therefore be ensured that</p> <ul style="list-style-type: none"> all buildings in which people frequently spend time or spend extended periods of time have ventilation of documented efficiency by 2015, radon levels in all schools and pre-schools are below 200Bq/m³ air by 2010 and that radon levels in all dwellings are below 200 Bq/m³ air by 2020.” 	Sustainable Construction 1998	and repair of buildings and in property maintenance.		societal sectors.

Sweden		Finland		The Netherlands	
Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description
General guidelines from the Swedish National Board of Health and Welfare ("Socialstyrelsen") on ventilation (SOSFS 1999:25) and moisture and micro-organisms (SOSFS 1999:21)	The Swedish National Board of Health and Welfare has put up some guidelines for minimum values that should apply to the indoor environment. If these guidelines are to be followed most of the multifamily buildings from the "million program" would need a thorough refurbishment.	National actions against moisture damages and mould in buildings 2009-2013.	Established on 24 th of February 2009.	Meer met Minder	The existing building energy programme within Schoon en Zuinig, aiming at achieving two label steps improvement, or 30% better energy performance in 2.4 million houses in 12 years.
Energy actions/activities on regional/local level	As many of the one million program houses are owned by municipal housing co-operations/associations, the work on regional/local level can be of large relevance for the retrofitting of these houses. The purpose is to promote an effective and environmentally friendly use of energy and to decrease the effect on the climate by an advice service. Municipalities can apply for financial means to provide their populations with this service (include advice on energy use in buildings).			Actieplan Binnenmilieu	Policy programme to address indoor air quality in buildings

Spain		Bulgaria		Austria	
Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description
Program of subsidies to finance strategically projects of investment energy saving and efficiency in the framework of the Action Plan 2008-2012 "Energy Saving and Efficiency Strategy in Spain"	An important part of this program of subsidies is focused on existing buildings. 1) Investments Promotion of thermal envelope refurbishment on existing buildings, with the aim to reduce heating and cooling demand The subsidy levels look in Chapter 4.	National Long-Term Programme for Energy Efficiency to 2015	The programme fully corresponds with the Energy Efficiency Act, Clause 10, Section 3. General objective of the programme is decreasing the energy intensity of the Gross domestic product (GDP) through decreasing the energy intensity in all economic branches.	Government Program 2007-2010	[...] <ul style="list-style-type: none"> Improvement of energy intensity of at least 5% by 2010, at least 20% by 2020 Energy-checks in all Austrian households by 2010 Increase of the retrofit quota in the residential building sector, retrofit of after-war building (1950-1980) by 2020 [...]
Different energy efficiency programs on national level.	The programs address directly and indirectly the uptake of EERM in social buildings.	National Programme for Refurbishment of Dwelling Buildings in BG	The panel buildings as a part of the Housing Stock of Bulgaria are priority purpose in this Programme	<u>Energy Efficiency Action Plan 2008 – 2016</u> (according to the Directive 2006/32/EC on energy end-use efficiency and energy services)	Measures stipulated in this action plan refer to programs, energy services and other measures which improve the energy efficiency in households (especially heating, including auxiliary energy, domestic hot water, cooling, electric equipment) and have an effect in 2008 - 2016 Measures to enforce the retrofit of the building stock according the energy efficiency action plan: <ul style="list-style-type: none"> adaption of the housing legislature market stimulation through housing subsidies for retrofit actions shifting of housing subsidies from new build to retrofit activities (depending on minimum energy requirements)

Spain		Bulgaria		Austria	
Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description
					<ul style="list-style-type: none"> • additional housing subsidies for insulation and use of renewable energy sources • use of ecological building materials • obligatory minimum requirements for the energy efficiency of retrofitted building independently from the floor area • prevention / minimization of cooling demand • obligatory energy consultation <p>creation of an initial consultation service for building retrofit based on a rough analysis of the building as decision support for building owners / building managers</p>
		Operative Programme “Regional Development” 2007-2013; Operation 1.2: ”Dwellings’ Policy”	Programme has been developed from Ministry of Regional Development and Public Works. The purpose of Operation 1.2 is renovation of multi-family blocks and increasing its energy efficiency.	National Environment and Climate Fund 2007-2010 (kli.en Fonds)	500 million Euros for climate and energy relevant projects and research activities

Spain		Bulgaria		Austria	
Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description	Policies (name of programs, initiatives, etc)	Description
				Federal State Styria local programs: Thermographics and consultation campaign of Styria www.thermografieaktion.at	<p>This campaign supports building managers in defining the energy-saving potential of existing residential buildings by using thermographic records. Further, it provides the basis for decision making concerning the retrofit of the buildings. The thermographic analysis helps to illustrate weak points of the building from a thermo-technical point of view for building owners and users.</p> <ul style="list-style-type: none"> - Inspection and assessment of the building - Thermographic records of the building and evaluation <p>Report on weak points, comparison of energy demands with other residential buildings, suggestions for retrofit measures, information about subsidies</p> <ul style="list-style-type: none"> - Consultation through qualified experts within two consultation meetings <p>Support during tenants /owner meetings and awareness raising</p>

3 National market structure

3.1 Ownership

Sweden

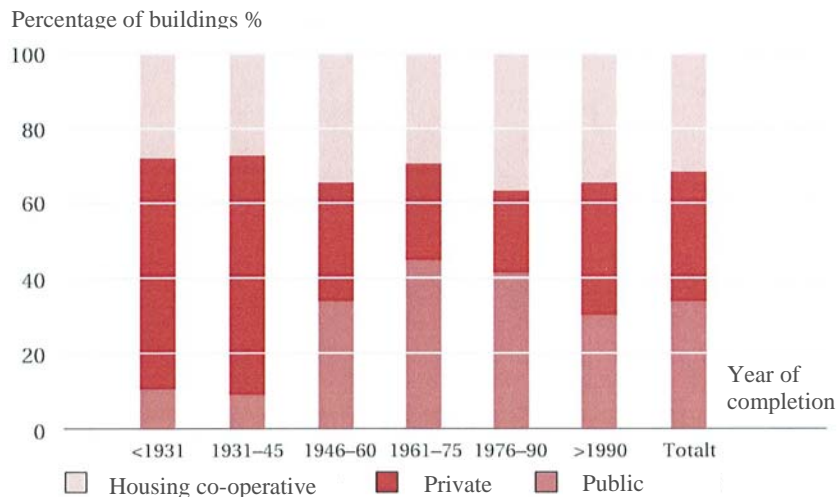


Figure 1 Percentage of multifamily houses owned by housing co-operatives, private housing companies and public housing companies (municipalities) (Original source: Boverket, 2003)

Finland - The largest owner group of social housing is cities and counties. They include a total of 300 000 apartments. The largest owners are the city of Helsinki (50 000), the city of Tampere, the city of Turku, the city of Espoo, the city of Vantaa, the city of Lahti, the city of Kuopio and the city of Oulu. At least 300 cities and counties have social dwellings. The smallest counties each have fewer than 100 dwellings.

In Finland are **three main private companies** which own social dwellings. The largest one, VVO, owns 37 000 dwellings; the second-largest, Sato, owns 23 000; and the third-largest, Avara, 12 000 dwellings. The social housing business is non-profit.

Student associations own housing for students. The student association of Helsinki University of Technology owns 2 000 apartments for students.

In Finland there are 300 000 private rented dwellings. Private rented dwellings are mainly owned by individuals owning 1-2 dwellings. VVO, Sato and Avara have also blocks of flats serving as private rental housing. Rent levels are higher than in social housing.

Non-profit organizations - These include organisations whose primary function is to build and maintain rental and right-of-occupancy housing, on socioeconomic grounds. The forms of activity of a non-profit organisation are restricted.

Their shares, for example, may not be publicly traded. The right of non-profit organizations to incur financial or other obligations and to take risk is also limited to that which is necessary for providing low-cost housing.

The major sub group of non-profit borrowers consists of non-profit units of big property investment companies that provide social housing. Secondly, there are a number of so-called special-purpose associations, established with the objective of providing rental housing for their members or for specific population groups. Housing associations for students and the elderly are the most significant of these. Typically, student housing associations are foundations or limited liability companies established by one or more municipalities and/or student unions.

Housing associations for the elderly are either associations or foundations set up to build sheltered housing for the elderly.

Other owners - Other owners include insurance companies, financial institutions and construction and industrial companies that have under previous legislation taken out Housing Fund loans, in order to assist with the provision of rental housing for employees, for example. These are no longer directly eligible for borrowers, and they have to establish non-profit units for providing new social housing.

The Netherlands - In the Netherlands, a main part of the housing stock is owned by social housing cooperatives providing housing to low- and middle-income households.

Table 4 The housing stock in the Netherlands, 2006. (Source: Woningvoorraadgevens 2006, ABF Research)

Construction year	Owner- occupied		Private private		Social rent		Total		Total
	single family	multi-family	single family	multi-family	single family	multi-family	single family	multi-family	
- 1906	249,6	37,2	52,2	59,2	34,0	47,4	335,9	143,8	479,6
1906-1930	282,1	36,2	45,3	58,2	98,7	65,8	426,1	160,3	586,4
1931-1944	249,8	28,6	34,8	48,0	29,9	24,7	314,5	101,2	415,7
1945-1959	271,0	49,1	32,0	38,3	206,0	175,6	508,9	263,0	771,9
1960-1970	464,0	71,9	46,7	68,6	244,9	274,1	755,6	414,6	1170,2
1971-1980	619,1	77,8	49,8	43,8	262,7	155,6	931,6	277,2	1208,8
1981-1990	508,0	56,3	55,2	49,8	215,3	213,3	778,5	319,4	1097,9
1991-2000	518,9	79,3	25,6	28,8	81,4	117,9	625,9	226,0	851,9
2001-2010	209,2	53,2	9,4	12,2	24,3	22,9	242,9	88,3	331,1
Total	3371,7	489,7	351,0	406,8	1197,1	1097,3	4919,8	1993,8	6913,6
%	56%		11%		33%		71%	29%	

In **Austria** the following structure of national ownership has been identified

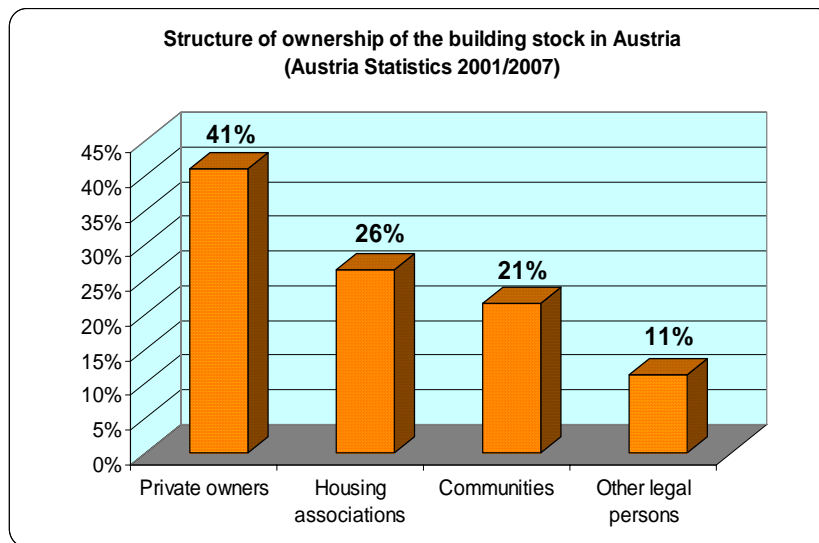


Figure 2 Structure of ownership in Austria

Spain - The ownership of the social housing stock of Spain can be divided into buildings owned by private owners, usually the users of the apartments, and housing companies and public companies (of regional or municipal ownership).

Spain is a home property lover's country. More than 80% of principal dwellings are owned by its users. Only 11% of principal dwellings and apartments are rented. Only 1% of the building stock is owned by public administrations (data of 2001).

Bulgaria- The housing stock amounts to 3 688 802 dwellings. In Bulgaria 97% of the dwellings are privately owned and only 3% of the dwellings are owned by state institutions or municipalities. The average number of inhabitants per dwelling is 2,1 (but it is very difficult to determine the real number of inhabitants because of migration and the mobility of the population).

3.1.1 Type of social housing

Sweden

The ownership of the social housing stock of Sweden can be divided into houses owned by *housing companies* with apartments that are rented, and houses that are jointly owned by *housing companies* with apartments that are rented, and houses that are jointly owned by *housing co-operatives*. Houses with apartments that are rented can be either publicly or privately owned. The public housing companies are almost always owned by the municipality. In a housing co-operative you own the right to use (live in) an apartment for an unlimited period. The user of the co-operative apartment owns a share in the housing co-operative, and then it is the co-operative that owns the actual building.

Finland

Statistics on Social Housing in Finland

The following statistics provide information on dwellings financed with loans or interest subsidy loans of the Housing Finance and Development Centre of Finland, and contain information on the number and type of dwelling.

Rental dwellings - There are 428 000 rental dwellings, i.e. social housing, in Finland that have been built since 1949 by state-subsidised loans. More than 70% of those dwellings were built between 1949 and 1990; another part of such dwellings were built between 1991 and 2006 and have now reached 29%, or 124 000. Most of them are located in blocks of flats. Detached houses for rental purposes have been built since 1970.

Due to interest subsidy loans in 1981-2006, a total of 66 500 rental dwellings, consisting of rental houses and right-of-occupancy dwellings, were built in Finland.

Owner-occupied dwellings - The majority of these dwellings are single-family houses, while about one-third are in housing corporations, housing companies, row houses and blocks of flats.

Since 1948, 182 000 *single-family houses* have been built with social housing loans. One-third are in housing corporations, housing companies, row houses and blocks of flats. These houses are social housing. Also 260 000 *private apartments in blocks* have been built. These apartments drop automatically out of the social housing category when state loans are amortized.

Austria

Private apartment owners - Among private apartment owners are those who possess one apartment each, several apartments, and parts of residential buildings or entire residential buildings. Private owners or private owner associations are obligated to charge an authorized professional building manager with the management, maintenance and technical service of the building. The building manager has to provide for the proper maintenance and care of the building. In contrast to private apartment owners, the building manager is entitled and obligated to take up issues concerning the ordinary building management (see point “Decision makers”) without separate decisions by the apartment owners. Issues concerning the extraordinary building management (see point “Decision makers”) can be implemented only through a majority decision of the private apartment owners.

Housing associations (non-profit) originate from “self-help-consortia”, on the one hand, and from corporations to implement the housing policy of the government, on the other hand. Initially the construction activities were financed by governmental subsidies for social housing, funding by apartment suitors, and credits from financial institutions. Today 60% of the erected apartments are sold, 40% are rented. One requirement for potential purchasers or tenants is a limited total household income. In both cases the housing association performs the management of the building. The total expenses for financing, operating costs and maintenance of the building can be shifted to the tenants.

Apartments of municipalities are owned and managed by the administrative bodies of the municipality. There are several requirements (Austrian nationality, at least 18 years old, working place in the municipalities, no real estate ownership, limited household income, etc.) for tenants that are allowed to rent apartments of municipalities.

Bulgaria

There is no definition of social housing in Bulgaria. The definition of social housing describes the typical situation in Bulgaria, as many owners of flats have low incomes. These people live in most cases (approx. 90%) in buildings erected with concrete panels or in old single houses in cities and villages. The total number of the housing stock in Bulgaria is 3 688 802. After 2001 Bulgarian statistics identify three main types of building construction: panel (pre-fabricated) buildings, 31,4 %; reinforced concrete, 56,3%; and others (stable multifamily buildings), 12,3%. The number of panel (pre-fabricated) buildings is 1 158 384, and these buildings are considered as *typical Bulgarian social buildings*. Some of the reinforced concrete and stable multifamily buildings are treated as social buildings. The process of retrofitting residential buildings in Bulgaria is also determined by the specific structure of the ownership: 97% private. Following this, the decision for refurbishment depends on private initiative. Many buildings have been refurbished during the last 10 years, and the trend is increasing. The decision for retrofitting and the energy saving measures implemented depend on the interests of the owners.

Spain

The equivalent of social housing in Spain is *protected housing*. These buildings are granted, by a public administration, of any kind of public aid in order to reduce its cost. Its useful surface and final price are limited by law.

The number of protected dwellings built or refurbished per year during the last 15 years is showed in the tables below.

Table 5 Protected dwellings build per year

Total	1991	1992	1993	1994	1995	1996	1997	1998
	44 514	35 695	45 795	67 639	71 141	77 544	85 028	74 597
	1999	2000	2001	2002	2003	2004	2005	2006
915 689	55 972	52 318	53 413	37 544	40 994	54 630	60 608	58 257

Table 6 Refurbished protected dwellings

Total	1991	1992	1993	1994	1995	1996	1997	1998
	12 906	11 065	9 648	13 227	16 743	19 729	25 312	17 409
	1999	2000	2001	2002	2003	2004	2005	2006
503 800	22 312	36 408	54 112	47 249	62 470	55 111	47 687	52 412

* This table can be compared with the free dwellings built in the same period.

Table 7 Free dwellings build per year

New free dwellings	1991	1992	1993	1994	1995	1996	1997	1998
	227 970	178 501	170 403	174 793	155 902	194 871	224 332	226 631

per year	1999	2000	2001	2002	2003	2004	2005	2006
	296 250	362 940	452 252	480 729	462 730	509 293	528 754	597 632

Only about 15% of the new or refurbished dwellings between 1991 and 2006 are *protected* housing.

3.2 Decision making-roles of stakeholders, responsibilities, participation

In **Sweden** there are for the moment no special financial funding or grants for retrofitting of multi-family houses from the “million program”. For installation of a thermal solar heating system, mainly for production of sanitary hot water in the summertime, it is possible to get a subsidy of SEK 5 000 (or 540 EURO) per flat, up to a maximum of SEK 250 000 (or 27 000 EURO) per multifamily house.

It is also possible to get a 30% subsidy of the cost for converting from a direct electric heating system to a hydronic heating system, up to a maximum of SEK 30 000 (or 3 200 EURO) per flat. This is, however, applicable only to the 5% of the multifamily houses from the “million program” having direct electric heating.

In **Finland** within an approved authorization in the State Budget, repair and energy grants can be made by The Housing Finance and Development Centre of Finland for improvements in the condition and quality of individual apartments and apartment buildings. The purpose of the grants is to improve the energy economy of residential buildings. Grants are aimed at reducing both energy consumption and emissions of greenhouse gases. Grants are awarded for conducting independent energy audits, for external repair work as defined in legislation, for improving the ventilation and heating systems, and for implementing renewable energy sources. The grant covers 40% of the actual costs of the audit and 10-15% of the other measures. Grants are awarded by the local authority. Examples:

- exchange windows - 15-30 €/m² (window area);
- external insulation- 10 €/m² (wall area);
- heat recovery from exhaust air: 10 % of total costs.

The Finnish government announced that grants for energy saving were to be increased in 2009. It is providing tax reduction for people living in single-family houses for energy saving investments beginning in 2009. Increased grants will be given for people, such as retired persons, living in single-family houses and with low incomes. No such benefits will be introduced for people living in housing associations.

During 2009 a 10% grant for renovation costs is being given to all multifamily building renovation starting in 2009. One-third of the private condo's are now planning energy saving investments.

The following institutions play role in Finland in regards with the renovation process in the social buildings:

The Housing Finance and Development Centre of Finland is a governmental agency of the Republic of Finland operating under the supervision of the Ministry of the Environment. ARA

is an agency to implement social housing policy. ARA's main task is to finance state-subsidised rental housing production. The Centre also has other obligations such as to make grants for housing repairs and to supervise the granting of state guarantees on loans for owner-occupied housing.

The Centre's target is to promote well-planned quality housing at reasonable housing cost, to promote housing development, and to produce information concerning the housing market. Properties to be constructed must be located in comfortable and safe areas in municipalities with housing demand.

ARA has a Board of Directors appointed by the Council of State for a period of four years. ARA's operations are managed by a Director General, and ARA has a staff of 70.

The Housing Fund of Finland, an off-budget Government agency, is the tool for providing financial support for eligible individuals and organizations. The Fund operates under the supervision of the Ministry of the Environment, and has a Board of Directors appointed by the government for a period of four years.

The main task of the Fund is to provide financing for state-subsidized rental housing production. The Fund's other tasks are discussed below.

The Fund's principal functions are as follows:

- Granting state-subsidized loans (ARAVA loans).
- Approving interest subsidies and granting guarantees on commercial loans for social housing.
- Supervising state guarantees on housing loans to private individuals.
- Monitoring the price and quality of state-subsidized housing construction and renovation.
- Ensuring fair competition in social housing projects.
- Monitoring the need for new housing and renovation, and allocating funds accordingly.
- Allocating grants for housing.
- Designating and monitoring approved borrowers for social rental housing.

The state Treasury, a governmental agency, administers and manages the housing loans on behalf of the Housing Fund. Its roles include cash collection and disbursement, account management, enforcement, maintaining the charges register, general loan administration, and funding in accordance with decisions made by the Board of Directors of the Housing Fund of Finland.

Local real estate companies- Although almost all social housing is controlled by cities and counties, the management of social houses is separated from city organizations. Normally all social blocks of flats are controlled by real estate companies owned by a city or county. In Helsinki there are several such local companies.

One of the most important missions of these companies is to control new buildings and renovation of existing social housing buildings.

Individual rental House Company- Each block of flats consists of an independent economic unit. It has its own board that includes representatives of tenants (a minority of members of the board). The residents of a building or buildings belonging to a rent determination unit set up to

determine a State-subsidized (ARAVA) rent and other holders of apartments shall exercise their decision-making power at a residents meeting. A residents meeting must be convened at least once per calendar year. A residents meeting is convened by the residents committee or, if no such committee exists, by the owner. The residents' meeting is entitled to elect an inspector to monitor and review the handling of a rent determination unit's finance and management. If the owner has buildings belonging to several rent determination units, a cooperation body between the owner and the various residents committees can be set up to handle the matters related to joint management and concerning the said owner's entire housing stock.

In Austria the following actors are taking decisions about major investments in the buildings (stated for each type of ownership):

Private apartment owners - Decisions on major investments are made by the majority of the private apartment owners, who charge the building manager with their implementation. Major investments among extraordinary building management, which includes issues, exceed the issues of ordinary building management. From a technical point of view, ordinary building management consists of:

- the proper maintenance of the common parts of the building (according the MRG §3), including construction changes which do not exceed the purpose of maintenance, as well as
- the prevention of serious damage to the building.

Proper maintenance, according §3 of the MRG, amounts to:

- actions which are necessary for the maintenance of the common parts of the building;
- actions which are necessary for the maintenance of the apartments in case of serious damages, danger to human health or an unsuitable status of an apartment;
- actions on shared equipment necessary for the operation of the building (e.g., central heating systems, elevators, laundry rooms);
- modernisation or changes according legal obligations (e.g., connection to water pipes or sewer systems, installations of measuring devices for energy consumption);
- installation of common building service devices in order to reduce energy consumption, if the necessary costs are in reasonable proportion to the common state of the building and the planned savings.

Housing associations - Housing associations are apartment owners and building managers all in one. They make the decisions on major investments themselves.

Municipalities - Larger municipalities usually have their own construction and building service departments. Small municipalities, which do not have a complex administration body, charge housing associations or building managers with the operation of their apartments.

Decisions on maintenance work in the buildings (stated for each type of ownership) in Austria are the following:

Private apartment owners - As maintenance works are classified among ordinary building management, the building manager (as a representative of the apartment owners) has to decide.

Housing associations - Housing associations decide for themselves about maintenance work.

Municipalities, which have their own building service departments, decide themselves about maintenance work. Housing associations or building managers, which are charged by smaller municipalities, have to decide about maintenance work in the frame of ordinary building management.

Decisions on the operation of buildings are taken by:

Private apartment owners - The apartment owners usually charge a caretaker with responsibility for the building. This person has to perform the cleaning of the public areas, the winter weather service, etc. The accounting for the operation costs usually is done by the building manager. The accounting for the energy costs can be done by the building manager or by the energy suppliers directly.

Housing associations - Housing associations have their own caretakers for their buildings, who perform the cleaning of the public areas, the winter weather service, etc. The accounting for the energy costs can be done by the housing association or by the energy suppliers directly.

Municipalities - The municipalities as apartment owners usually charge a caretaker with responsibility for a building. The caretaker can be selected by a housing association or a building manager charged with the building management.

The Netherlands

Decisions on major renovation and improvements works are primarily taken by the building owners, which are

- owner occupiers
- private rental organizations
- social housing associations

Since many years municipal organisations owning houses have been converted in social housing organizations.

Major renovations also include decisions from municipalities, as these renovations are often part of larger programmes to improve communities and neighbourhoods. Also changes in zoning plans, and changes in the appearance of buildings in many cases require involvement and approval from municipalities.

Other involved parties are social housing banks, traditional banks, investment funds etc, in order to secure project finance.

Tenants play an important decisive role since there must be agreement with at least 70% of the tenants when major improvements and rent increase is necessary.

There are no subsidized renovation programmes, since ten years ago social housing associations got full responsibility about their own financial performance.

On the other hand there are many specific programmes on the restructuring and improvement of specific neighbourhoods throughout the country supporting social and infrastructural improvements.

In the field of energy measures, there are subsidies for certain technologies, but these subsidies may vary year by year, depending on political choices. Generally spoken it is difficult to count on energy subsidies during a design process, since these sources may have run out, by the time one does need it, or the subsidy may not exist in the year, once executes the project.

In **Bulgaria** there are currently three financial opportunities schemes available for housing refurbishment in Bulgaria.

1. *The Energy Efficiency Fund (EEFB)* provides low-interest loans to the owners who are organized as association of owners and intend to entire building renovation.
2. *The Residential Energy Efficiency Credit Line (REECL)* established by the EBRD has extended loans to four private Bulgarian banks for lending to the residential sector for individual improvement in energy efficiency, both in blocks of flats and individual houses.
 - Eligible sub-projects include the following energy efficiency improvements:
 - Energy efficient windows;
 - Thermal insulation on walls, roofs, slabs;
 - Efficient biomass boilers;
 - Solar water heaters;
 - Efficient gas boilers.

The program has provided a grant component of about 20% of the total amount of the loan taken.

3. *The National Programme for Refurbishment of Dwelling Buildings - I sub-programme (2005-2015) and II sub-programme (2008-2020)* in Bulgaria also foresees grants for the refurbishment of dwelling buildings. The direct state subsidy amounts to 20% of the basic package of measures necessary for refurbishment of the buildings.

- The programme foresees the refurbishment of 684 683 dwellings.
- The necessary funds for the first phase (2006-2015) are 670 000 000 Lv;
- The necessary funds for the second phase (2008-2020) are 3 480 000 000 Lv;
- The total necessary funds are 4 150 000 000 Lv;
- The subsidies amount to 830 000 000 Lv.

Spain

1. *The Programme of subsidies in accordance with Action Plan 2008-2012 “Energy Saving and Efficiency Strategy”* to finance strategically projects of investment energy saving and efficiency. An important part of this program of subsidies is focused on existing buildings.

1) Investment Promotion of thermal envelope refurbishment on existing buildings, with the aim of reducing heating and cooling demand

The subsidy level could be:

- 22% of eligible cost if CTE rules are accomplished
- 27% of eligible cost if Energy Qualification B is attained

- *35% of eligible cost if Energy Qualification A is attained

With a maximum amount of:

- 10.000 € /dwelling (single family);
- 300.000 € per multifamily building (minimum 30 apartments per building).

2) *Investments Promotion of thermal installations on existing buildings*

- 22% of eligible cost if a 20% saving vs RITE-07 rules is attained
- 27% of eligible cost if Energy Qualification B is attained
- *35% of eligible cost if Energy Qualification A is attained

3) *Investments Promotion of Indoor lighting*

- 22% of eligible cost if a 25% of savings vs CTE rules is attained
- 27% of eligible cost if Energy Qualification B is attained
- *35% of eligible cost if Energy Qualification A is attained

The owners and the owner's communities can apply for these financial aids.

3.3 The retrofitting process

3.3.1 Main stages

The building/retrofitting process is quite complicated. It consists of different stages and different stakeholders.

The **building process** can be described by a series of stages. The **brief (planning) stage** starts off with a need/idea expressed by the client, which is translated into a number of requirements on the building and its systems. The frames for costs, time and the organisation are set at this point as well as an application of a building permit to the local authority. If a design-build contract is used the contractor is responsible for the next step, the **design stage**, where the "vision" of the client is converted into specifications and drawings. If a traditional general contract is used, contractors produce tenders based on the design documents provided by the client. The client employs consultants (designers, architects and engineers) to produce these necessary documents and to coordinate the different actions needed. When the procurement is finalised the **actual construction (production) stage** takes place. During this stage the contractor employs subcontractors and material suppliers and the work also includes coordination, detail planning, construction meetings, follow-ups, rectifications, reporting, etc. At the end of the construction stage the contractor produces the basis and frames for the instruction documentations of the operation and maintenance. When the construction phase is completed there is the commissioning of the building and the **management stage** follows.

The building process can be described by a series of stages, from the structural survey stage and design to management. In summary the main stages and its stakeholders are described in the following table:

Table 8 The main retrofit stages and concerned stakeholders according to (reference)

Retrofit stages	Activities	Concerned stakeholders
Structural survey stage	Structural survey	<ul style="list-style-type: none"> • building owner/investor/developer; • designers; • planners; • architects; • engineers; • construction and/or energy consultants
Development of the retrofitting concept	Definition the targets	<ul style="list-style-type: none"> • building owner/investor/developer; • designers; • planners; • architects; • engineers; • construction and/or energy consultants
Building permission stage	Necessary documents for verifying a project (accomplishment of rules, requirements, etc.), construction authorisation	<ul style="list-style-type: none"> • building owner/developer; • local/municipal authority
Appliance for subsidies	Provide financial availability to owner/developer	<ul style="list-style-type: none"> • building owner/investor/developer; • local/municipal authority
Planning stage	Exact structural survey, planning according retrofit concept, planning supervision	<ul style="list-style-type: none"> • building owner/developer; • designers; • planners; • architects; • engineers; • construction and/or energy consultants
Supplying	According retrofit concept and energy targets	<ul style="list-style-type: none"> • planners; • engineers; • construction and/or energy consultants; • construction/supplying companies
Construction (production)/ stage	Construction management, construction site protocol, claim management	<ul style="list-style-type: none"> • planners; • architects; • engineers; • construction and/or energy consultants; • construction/supplying companies
Quality control	Quality check, verify installations, energy certification, measuring of pressure, moisture measurement, etc.	<ul style="list-style-type: none"> • construction and/or energy consultants; • quality control companies

3.3.2 Description of the retrofitting process in different countries

Finland

The primary reason for the existence of rules applying to borrowers is to ensure that the benefits related to government loans, interest rate subsidies and the cost control carried out by the Housing Fund are channelled to residents living in rental or owner-occupied dwellings in full.

The following conditions apply to non-profit organisations providing low-cost housing:

- The primary function of the organizations is to build rental and right-of-occupancy housing, and rent it out on socio-economic grounds or offer it as right-of-occupancy dwellings.
- Vacant housing must be declared open for application.
- State-subsidized rental housing must remain primarily in rental use.
- The organizations are permitted to pay out only a moderate dividend.
- The shareholder structure must enable rent equalisation and allow the company to take over the commitments of rental housing units in cases of financial difficulty.
- Risk-taking must be limited; the organisation must not take any financial risks other than those associated with the construction, leasing and maintenance of low-cost housing.
- Any shares or holdings in the organisation may not be traded publicly.

Sweden

For rented apartments, the owner of the building is responsible for the maintenance and repairs of the building and apartments. The owner needs the approval of tenants in order to make major changes to the building/apartments.

The housing co-operative is responsible for keeping the building and apartments in good condition, including all repairs. The rules of the co-operative must state how financial means will be allocated for maintenance.

Austria

If the majority of private apartment owners or housing associations and municipalities by themselves decide to start a retrofitting process, they charge one general contractor (apartment owners) or their own department/s (housing associations and municipalities) with the planning and construction works. They all pass through the stages of Table 12, different only in a few things like architects are mostly involved with works down to planning stage and building contractors with the works after that. The commissioning stage, missing in Table 12, is much more important in Austria as the “change of responsibility” from building contractor to building manager or owner if retrofit is finished.

The Netherlands

For rented apartments, the housing association is responsible for maintenance and repairs. If major changes are needed, and in particular if this includes a rent increase, a minimum of 70% of the tenants needs to agree. Since years there are no subsidized renovation programmes anymore for social housing. Therefore the tradition to have a significant renovation every 30 years has been replaced by a maintenance mode, where actions are taken when necessary.

The number of houses which still undergo major renovation is not enough to achieve the energy reduction targets. Therefore additional energy saving programmes are needed to implement the potential measures

Bulgaria

The renovation of the Bulgarian housing stock has not yet developed. The problem with the whole retrofitting of these buildings is the diverse social status of the owners of flats. Because of this, it is very difficult to bring all owners together and to find a solution that is suitable to all of them. Therefore, single dwellings in multifamily buildings are often refurbished individually by their owners. However, only a few multi-family dwelling buildings have been completely refurbished. Most of these buildings have been refurbished in the framework of pilot projects or other state or EC supported programmes.

Spain

Housing and Refurbishment Plan (2009-2012)

This Plan foresees 996 000 actions over the next four years in order to make it easier for citizens to have access to a dwelling (by ownership or rental), to promote subsidised housing construction, and to improve the energy efficiency of existing buildings. It establishes measures to enhance rentals (the main aim is introducing 40% of the newly built subsidized houses into the rental market). It establishes subsidies up to 410 Euros per square meter to promote rentals, and it strengthens the leasing option. It promotes refurbishment (470 000 actions), focusing on housing improvement, on the improvement of the surroundings and on the improvement of energy efficiency in buildings. The Plan includes the so-called Renove Programme, which focuses on the refurbishment of specific buildings and on actions aimed at improving energy efficiency, renewable energy use and the implementation of access devices for people with disabilities.

This Plan is endowed with 10,188 million Euros, and it will mobilise loans amounting to nearly 34,000 million Euros.

The plan was approved in December 2008, and implementation was to have begun by the end of 2009. The process for agreement subscription with the Autonomous Regions has already started. The Royal Decree 9/2008 dated 28 November approved an extraordinary endowment of 110 million euros for refurbishment as part of this plan; the funds will be provided by the Special State Fund for the Stimulation of Economy and Employment.

3.3.3 Type of contracts

Usually the National Laws of Procurement defines the main procedures with regard to procurement.

For example, the **Austrian** Law of Procurement (2006) defines the following *award procedures*: the “open” award procedure; the “non-open” award procedure with/without previous announcement; the negotiation award procedure with/without previous announcement; the direct award; the electronic auction with/without limited participants; the general agreement; the dynamic procurement system and competition dialog.

1. Traditional general contract is a very common form of contract used in **Sweden, Finland, Austria, Bulgaria, Spain, and the Netherlands.**

Traditional general contract consists of the following main sections:

- Objects of contract between contractor and client regarding:
 - Conditions and terms of supply;
 - Price and methods of paying;
 - Rights and duties of contractor and client;
- Guarantees and legislative decrees

When a traditional general contract is signed between the client and the contractor, the specification (the detailed description that is referred to in construction contracts) often contains details of the technology to be used and the precise choice of the materials. Subcontractors carry out parts of the contract. Under the general contract, the client carries the responsibility for design. It is not unusual that the client employs consultants for briefing and design work.

2. Divided contract is another current form of contracts used in **Sweden, Spain and The Netherlands** - The client may wish to increase his influence and control of the project by using a shared contract. This means that the client employs the subcontractors and material suppliers himself (or a group of subcontractors/suppliers). Usually the client is responsible for the design stage.

3. Public contract use in **Spain and Sweden** – It is carried out by public administrations or public companies, by means a call for tenders. In **Sweden** there are special regulations that apply to **public procurement**, which is when governmental authorities act as clients (such as municipalities and county councils). The purchase of goods and services by local and central governments is regulated by the **Swedish Public Procurement Act**.

4. Design-build contract (or **design and construction contract**) is used in **Sweden** – The client may choose to write the specifications in less detail and also use performance requirements so that contractors are encouraged to use their skills in selecting technology and materials. A design-build contract means that the contractor carries the responsibility for both the design and the construction

5. Special contracts: In **Sweden** the form of working in the construction industry is **partnering**. This is a structured form of cooperation that enables the clients, contractors and consultants to jointly solve construction projects through honest cooperation (as a team) and transparent operations. The areas of expertise complement each other throughout the process. The key factors of partnering are: common goals, common activities and common economy.

In **Austria** private apartment owner associations do not have construction project management skills, while the charged building managers are not specialised in comprehensive construction work. Therefore the owner association usually makes one contract with a general contractor, who has the responsibility towards his principal concerning all construction work done by himself or his subcontractors.

Housing associations with their own construction departments usually do the project management within their own organizations and have contracts with different professionals doing the construction works.

Municipalities have their own construction departments and do the project management themselves, while charging different professionals for the construction work, or make a contract with a general contractor as mentioned above.

In **Austria special contract** form especially for energy efficiency measures is the so-called “*energy-contracting*”. Energy-contracting is an agreement by contract about a model to finance energy services by a third party. The contract is made between the building owner and an external service company (contractor). Contractors can be specialized companies, energy suppliers, producers of building service components, building service companies, operator associations, control technology companies, service provider companies.

There are **two different forms of energy-contracting**:

1. Energy-saving-contracting or performance-contracting - Energy efficiency measures (on a building or building service system) financed by the contractor are refinanced through the achieved energy costs savings within 7-15 years. The energy savings are granted by the contractor towards the building owner. The amount the building owner has to pay to the contractor for energy consists of the real energy costs plus an agreed “contracting-rate” in the amount of the granted energy savings. Through less energy savings the contractor is charged. In the case of comprehensive retrofit measures, where the payback period would be too long, it can be useful to share the investment costs between the building owner and the contractor. Following energy efficiency measures can be implemented:

- production of space heating and domestic hot water (change of boilers; optimization of heating system control, usage of renewable energy);
- ventilation (optimization of ventilation, cooling, heat recovery);
- energy efficiency lighting;
- energy controlling (optimization of room temperatures, optimization of energy tariffs);
- insulation of the walls, top ceiling, cellar ceiling

2. Plant-contracting - The contractor finances the installation of an energy plant in the building of the building owner, who pays a contractually agreed amount for energy according to the contractor. In the case of plant-contracting long-term contracts are made. After the contract period the ownership of the energy service plant is transferred to the building owner. There are two examples for plant-contracting:

2.1 Biomass-contracting - A non-central biomass heating plant is financed by a heat supply association (contractor), which sells the heat to the building owners. The contractors usually are agricultural associations with own woods. The contractor operates and maintains the biomass heating plant.

2.2 Solar-contracting- The contractor designs, installs, maintains and operates the solar plants. The energy price is agreed by contract with the building owner for the refinancing period. This contracting form can be applied for plants with more than 100 m² solar panels for hot water conditioning and space heating support.

In addition, usually a mixture of contracts exists within one building project. One **Swedish** example is a traditional general contract intermixed with design-build contracts.

4 Stakeholders – objectives and interests, attitude of different stakeholder groups – drivers of energy efficiency improvements – experiences from Sweden, Austria, the Netherlands, Finland, Spain and Bulgaria

One of the tasks in this work package is to identify non-technical barriers among tenants and owners as a main stakeholder group of social housing in different countries. The summary information from interviews and questionnaires in **Sweden, Austria, Finland, the Netherlands, Spain, and Bulgaria** is included in this Chapter.

The **Swedish** inquiry investigation was carried out by in-depth interviews with eight organizations, namely:

- One management organisation of a housing co-operative
- Two regional supportive organisations for building management of housing co-operatives
- One national “umbrella association” for housing co-operatives
- One national organisation for public housing associations
- Three public housing association

In **Bulgaria and the Netherlands** the main interviews were carried out with certain organizations. In **Bulgaria** interviews were made with different national stakeholders, as follows:

- Bulgarian Housing Association;
- Owners’ Associations Union;
- State Efficiency Energy Agency;
- Two National Energy Centuries;
- One Association for Renovation of Multifamily Property;
- Demonstrative Project for the Renovating of Multifamily Buildings in Bulgaria – the joint initiative of the Ministry of Regional Development and Public Work (MRDPW) and the United Nations Development Programme (UNDP);
- Designers, architects, engineers working with energy efficiency renovation of multifamily buildings

The investigation in **Swedish, Bulgaria, and The Netherlands** covered the following topics:

- Main challenges (barriers and possibilities)
- Energy certification and energy efficiency
- Requirements of governments/society
- Size of state subsidises – necessary level
- Owners
- Tenants
- Successful renovation projects; same as good examples!
- Preliminary consideration for the indoor environment
- Working with energy efficiency
- Incorporating energy issues in renovation projects
- Conditions for increasing the investment costs of energy efficient measures
- The use of external expertise (possibilities for using)

- Necessary education level and knowledge
- Good examples
- Types of contracts and responsibilities
- Investment costs of energy efficiency measures (possibilities and conditions)
- Follow-ups of what and in what way
- Quality assurance systems (national conditions to apply the QA System)
- Choice of energy saving measures
- Handing over the building and important aspects of the building management phase
- The important place of building management in renovation process
- The building process – shortcomings
- Influence of ownership type on the retrofitting process
- National legislative frames
- Different national laws, regulations, methods and instructions (possibilities to synchronise legislative frames)

In Spain some interviews were made with different kinds of stakeholders in order to know the opinions of the major stakeholders involved in new buildings construction and refurbishment of the existing: owners and users of the building; tenants not owners; municipalities and other administrations; architects; builders; energy service companies.

In Finland main building stakeholders was determined: developers; banks; architects; building services; consults; municipal technical service; contractors; quality control companies.

The **Austrian** stakeholders' drivers of energy efficiency improvements: real estate developers; owners/ real estate companies; tenants/purchasers; planners/architects, constructors/energy providers; building managers; government and public authorities.

The methodology used was policy analyses, feedback –focus groups, workshops, interviews, lessons learned, surveys.

The main summary objectives and interests of the stakeholders groups based on **Austrian** frame of conclusion and determined by SQUARE partners in **Sweden, Finland, Bulgaria, the Netherlands and Spain**, are as follows:

Table 9 Objectives and interests of different stakeholders group – summary table

Stakeholders	Objectives and interests in retrofitting process	Interaction/mutuality
Investors, state and public authorities	<ul style="list-style-type: none"> • Participation in public authority's initiatives; • Interest in finance schemas; • Participation in design and retrofit planning stages; • Regulations; • Subsidies 	Public authorities; owners; developers; planners/architects/designers/engineers.
Developers	<ul style="list-style-type: none"> • Implementation of national laws, EPBD; • Influence on real estate assessment; • Improved real information for energy costs; • Operating; • Decision energy consumption and energy 	Public authorities; owners; users; tenants; purchasers; planners; architects; designers; engineers.

Stakeholders	Objectives and interests in retrofitting process	Interaction/mutuality
	<ul style="list-style-type: none"> costs; • Training within the scope of energy efficient retrofitting of buildings. 	
Owners/real estate companies	<ul style="list-style-type: none"> • Interest in Energy Performance Certificate; • Interest in raising of the price when retrofitting dwelling/building in order to energy efficiency; • Investments to the tenants' comfort/raising the rent. 	Developers; users; tenants; purchasers; planners; architects; designers; engineers; constructors; supplier; energy providers; building management/operators.
Tenants/users/ purchasers	<ul style="list-style-type: none"> • Operating- and energy costs; • Decision of energy consumption. 	Owners; developers; building management/operators.
Planners, architects, designers, engineers	<ul style="list-style-type: none"> • Implementation of the retrofitting conception into design stage; • Issue an Energy Performance Certificate. 	State/public authorities; developers; owners; users.
Constructors/supplier /energy providers	<ul style="list-style-type: none"> • Interest in successful fulfilment of the building/retrofitting stage. 	Developers; planners/architects/designers/engineers; owners; tenants/users.
Building management/ operators	<ul style="list-style-type: none"> • Interest in Energy Performance Certificate; • Further training within the scope of thermal retrofitting of buildings; • Increase the technical qualification of staff 	Developers; owners; users; tenants; constructors; designers and others

5 Barriers for different stakeholders (specific barriers for different stakeholders) – National experiences

There are many non- technical barriers, such as attitudes of different stakeholders, cultural tradition, lack of knowledge and motivation that have to be overcome in order to introduce energy efficiency retrofitting and the use of social housing. In this Chapter of this work package the most significant barriers are collected, which have been identified by each of the SQUARE partners in their national reports, in order to find summary methods of overcoming these barriers.

Specific barriers for different stakeholders are divided into legislative, financial, barriers related to the tax initiatives, and organizational, which are subdivided into behavioural, cultural, and institutional.

5.1 Owners/developers

Summary barriers to owners/developers:	Description of barriers:
Legislative barriers	<ol style="list-style-type: none"> 1. No requirements on energy efficiency in some regulations for existing buildings (SE); 2. Lack of skilled experts in the fields of EPBD (SE); 3. Same partners' national laws give opportunity for partial or only “cosmetic” measures regarded as standard-raising measures, and consequently allow a rise in the rent (SE); 4. The ownership of multifamily buildings is fragmented. Sometimes there is more than one owner of dwelling (ES, BG); 5. Lack of regulations on uninhabited dwellings in some countries (BG,ES); 6. There are no concrete definitions for the terms “cost effectiveness” and “cost-benefit-ratio” (AT, see Annex A- Austrian Law of Tenancy (MRG)
Financial barriers	<ol style="list-style-type: none"> 1. Short-term thinking (SE);

Summary barriers to owners/developers:	Description of barriers:
	<ol style="list-style-type: none"> 2. High investment costs (SE); 3. Long payback period (SE); 4. High costs of realisation of the retrofitting project (ALL); 5. Subsidies for certain technologies vary year by year, depending on political choices (NL); 6. Insufficient clear rules for applying the existing forms of subsidies and loans to owners/developers with regard to retrofitting (BG); 7. External factors, such as changes in energy prices, are difficult to influence, and to take into account (SE); 8. Due to low level of financial possibility usually owners/ developers cannot implement the energy efficiency measures prescribed after issue of the energy certificate (BG); 9. Contracting as important financing solution is not a very effective way of financing comprehensive retrofit, because of the legal problems within the contracts, normally made between the owner and an external service company: the owner is not the user and has less influence on energy use (AT); 10. Until now was easier to obtain loans for new buildings projects than refurbish existing buildings (ES).
Barriers related to the tax initiatives	<ol style="list-style-type: none"> 1. After renovation municipal taxes of the building are increased in some countries (BG); 2. Insufficiency of tax initiatives related to the stimulation of high-technology application (solar and biomass, heat pumps, etc.) (BG).
Organizational/behavioural barriers	<ol style="list-style-type: none"> 1. Slow/lack of “translation” of interest and concern for environmental/climate/energy issues among tenants in actions (SE); 2. Energy savings are not a priority for many owners (ES, BG); 3. There is no demand and developers are not offering the right solutions because of: <ol style="list-style-type: none"> a. owners (landlords) cannot afford (no direct benefit) (NL); b. tenants are depending on owners (landlords) (NL); 4. In daily practice energy issues are not treated in an integrated method (NL); 5. External factors, such as changes in energy prices, are difficult to influence, and to take into account (SE); 6. In case of disagreement in the owner’s community, single apartment renovation is only partially effective in terms of energy consumption reduction (ALL); 7. Consensus among owners in big blocks of social housing is practically impossible because of:

Summary barriers to owners/developers:	Description of barriers:
	<ul style="list-style-type: none"> a. mixture of low- and high-income owners (BG, ES); b. high percentage of uninhabitable dwellings in blocks (BG, ES); <p>8. Lack of owners trust in institutions and municipalities (BG);</p> <p>9. There is a lack of trust between the owner and the tenants' association (SE);</p> <p>10. Lack of owners trust among themselves (BG);</p> <p>11. Lack of owners' associations as legal organized groups (BG);</p> <p>12. Previous experience is not utilised (not learning from mistakes) (SE);</p> <p>13. Lack of competence of clients (SE);</p>
Organizational/cultural barriers	<p>1. Requirements on preserving buildings from the '60s/'70s as a "cultural heritage" (SE).</p>
Organizational/institutional barriers	<p>1. A large number of buildings are in need of renovation at the same time (ALL), leading to:</p> <ul style="list-style-type: none"> a. lack of resources (SE); b. lack of legal requirements for existing buildings in place to achieve above society and state targets: 20-30% CO2 reduction by 2020 (NL); c. no access to well- educated craftsmen (SE); <p>2. A barrier for energy certification: calculation method behind the energy label is limited to standard measures, and not able to cope with good technologies(insulation $U=0,2W/m^2K$; triple glassing; airtightness) (NL);</p> <p>3. The decision horizon about existing buildings is generally no longer than 5 -10 years. Renovation projects are often developed for a period of another 15 years (NL);</p> <p>4. Lack of competence in the building industry, e.g., well-educated craftsmen (SE);</p> <p>5. Lack of technical/renovation solutions available (SE);</p> <p>6. Barriers regard to evaluating:</p> <ul style="list-style-type: none"> a. To evaluate (follow-up) on the impact of specific energy efficient measures is very difficult to do in a correct way (SE); b. Renovation projects can be difficult because you don't know how the buildings actually are constructed (SE); c. Different people and departments are responsible for projects in different stages of a building (NT);

Summary barriers to owners/developers:	Description of barriers:
	<p>7. QA systems is not a priority as a question:</p> <ul style="list-style-type: none"> a. the staff is fragile in cause of change (SE); b. Many product assurances are based on national systems, hinders the application of technologies from other EU states - it is major barrier (NT); <p>8. Barriers in building process: Lack of quality and it is an ineffective process: no responsibility aspects (SE);</p> <p>9. Barriers in building management phase are (incl. the hand over of the building):</p> <ul style="list-style-type: none"> a. no clearly known how to operate the buildings and its technical systems (SE); b. no toll (system) for this today (SE); c. not certain that there is a folder with instructions (SE); d. no handing over to the tenants. (SE); <p>10. Lack of developers interest to change building schemes and introduce changes on materials, systems and energy efficient solutions or renewable energies (ES);</p> <p>11. Fewer drivers for comprehensive renovation, including quality assurance needs within developers (real estate companies) (AT);</p> <p>12. Lack of specialized organization providing technical and administrative support to the thousands of owners association (communities)/ units (SE);</p> <p>13. Lack of procedures for showing good practices from other countries with such cultural models and types of properties (BG);</p> <p>14. The multifamily building's fragmented ownership makes retrofitting project management difficult for a developers (ES, BG);</p> <p>15. Insufficient synchronization between different local regulations for developers from different regions of the state (FL);</p>

5.2 Tenants/users:

Summary barriers to designers, planners, architects, engineers:	Description of barriers:

Summary barriers to designers, planners, architects, engineers:	Description of barriers:
Legislative barriers	<ol style="list-style-type: none"> 1. Unclear regulations allow the partially retrofitting or “cosmetic” measures, and consequently allow a rise in rent, causing scepticism toward renovation (AT); 2. Criteria for rent increase procedures are not clear (AT); 3. No concrete definitions for the terms “cost effectiveness” and “cost benefit ratio” (AT) - see Annex A: Austrian specific barrier - Austrian Law of Tenancy (MRG); 4. Right of the “by-passed” minority who prevents qualitative retrofitting measures - they are legally able to give no payments for decided measures (AT) – see Annex A: Austrian specific barrier –Austrian Condominium Act (WEG); 5. Lack of regulation for tenants’/users responsibilities in energy efficient retrofitting process (BG) –see Annex A: Bulgarian specific barrier - Law of Property.
Financial barriers	<ol style="list-style-type: none"> 1. Tenants receive no benefits from their investments in renovation (AT, BG); 2. Energy renovation does require a higher rent and energy savings are normally expected but not guaranteed for tenants (NL); 3. Social disadvantage: Rented apartments often are owned by municipalities and low-income tenants/ users – after financing of the retrofit measures, increased rent would lead to social problems (AT); 4. The old private owners or owners who let their apartments to low-income tenants or users have no benefit in retrofitting process, which prevent comprehensive retrofitting actions (AT); 5. No economic benefit to older tenants and (old-age) pensioners and invalids (AT, BG); 6. Contracting as important financing solution is not a very effective way of financing comprehensive retrofit, because of the legal problems within the contracts, normally made between the owner and an external service company: the owner is not the user (AT); 7. Subsidies can be asked for only by the apartment owner (ES, BG).
Related to the tax initiatives	<ol style="list-style-type: none"> 1. Lack of tax initiatives from state authorities regarding tenants in multifamily buildings (BG).
Organizational/behavioural barriers	<ol style="list-style-type: none"> 1. Low level of awareness of the involved persons very often raises suspicions in energy efficiency activities (AT); 2. The energy savings is not priority for many tenants/ users (ES, BG); 3. Lack of respect for the vote of owners who let their apartments to low- income tenants/users (AT);

Summary barriers to designers, planners, architects, engineers:	Description of barriers:
	4. Low/lack of interaction of interests in energy issues among tenants (SE).
Organizational/cultural barriers	1. Part of tenants in municipal dwellings is low-income people or vulnerable social groups, who are not interested in energy efficient retrofitting (BG).
Organizational/institutional barriers	<ol style="list-style-type: none"> 1. The tenants have no voting rights in owners associations (ES); 2. Lack of rental agreements that include individual usage with separate metering of energy consumption (SE); 3. Lack of dissemination of information about energy saving actions and how appropriate action would increase actual behaviour of tenants/users (SE); 4. Lack or insufficient number of tenant associations - one reason is difficulty for organisation of tenants because of: <ol style="list-style-type: none"> a. inertia against change (BG); b. fragmented location of tenants in multifamily areas (BG).

5.3 Investors (based on Bulgarian, Austrian, and Spain studies)

Summary barriers to investors	Description of barriers:
Legislative barriers	<ol style="list-style-type: none"> 1. Investors are not integrated into renovation process because of lack of suitable model for them (BG); 2. Owners cannot or do not wish to transfer to investors their rights to property or land under the block (BG); 3. Insufficient legislative frame for the investments needed to refurbish thermal systems and the building envelope (ES) – see Annex A – Spanish specific barriers - Law of Horizontal Ownership.
Financial barriers	<ol style="list-style-type: none"> 1. High investments are made difficult by inaccessible financial schemes (BG); 2. Contracting as important financing solution is not a very effective way of financing comprehensive retrofit (AT) (see description of legislative barriers for owners/developers);

Summary barriers to investors	Description of barriers:
	<ul style="list-style-type: none"> 3. Comprehensive retrofit actions are only made if there is a generation change during the usage of a building or if the building is on sale (AT); 4. No concrete definitions for the terms “cost effectiveness” and “cost benefit ratio” (AT) - see Annex A- Austrian specific barrier - Law of Tenancy (MRG); 5. Right of the “by-passed” minority who prevents qualitative retrofitting measures - they are legally able to give no payments for decided measures (AT) – see Annex A- Austrian specific barrier - Condominium Act (WEG).
Related to the tax initiatives	1. Lack of initiatives regarding tax concessions (BG).
Behavioural barriers	1. Partial external insulation of the separate dwelling or floor in the middle of the facade from some owners is obstructive to investors/others owners, because after that it will be difficult to ensure consensus among owners to receive access to financial funds (BG).
Cultural barriers	<ul style="list-style-type: none"> 1. Historic budget allocations have not been not decided (BG); 2. Not used to comprehensive renovation actions (AT).
Institutional/organizational barriers	1. Lack of municipal stimulation for investors for retrofitting existing municipal blocks and constructing new buildings on municipal land BG).

5.4 Designers, planners, architects, engineers

Summary barriers to designers, planners, architects, engineers:	Description of barriers:
Legislative barriers	<ol style="list-style-type: none"> 1. Differing state building regulations or codes (AT, BG, NL, FL, ES); 2. Insufficient of regulations for improvement of energy performance (SE); 3. Mechanical ventilation system and heat recovery are not obligatory and not regulated for residential buildings in several countries (BG); 4. The existing national values for heating design exceed several times the values that EC Directives have defined for passive and energy efficiency buildings (BG); 5. The actual national building rules are not exigent in terms of thermal conditions (ES).
Financial barriers	<ol style="list-style-type: none"> 1. Difficulty in total implementation of retrofitting projects due to low income level of owners/tenants and lack of benefits to investors (BG); 2. High cost of general renovation projects - the thermal improvements risk to drop off the projects (ES, BG); 3. Difficulties to count on energy subsidies during a design process, since the sources may have run out, by the time one does need it (or the subsidy may not exist in the year, once executes the project (NL).
Related to the tax initiatives	<ol style="list-style-type: none"> 1. Lack of initiatives for tax concessions for designers, planners, architects and engineers who take part in retrofitting process (BG).
Organizational/behavioural barriers	<ol style="list-style-type: none"> 1. There is a barrier for designers/architects if constructors don't certify insulation materials when partial improvements are completed (BG); 2. Lack of necessary project documentation for multifamily (panel) buildings from '60s/70s' and same others (BG) - see Annex A – Bulgarian specific barriers.
Organizational/cultural barriers	

Summary barriers to designers, planners, architects, engineers:	Description of barriers:
Organizational/ institutional barriers	<ol style="list-style-type: none"> 1. Lack of skilled experts familiar with the EPBD's requirements (ALL); 2. Energy efficiency needs are lacking or only part of experts' professional training (AT); 3. Not enough information on new Regulations from EU; Energy efficiency requirements are quickly developing in the EU countries compared to same partners' countries (BG); 4. Lack of information on requirements and standards for projects for energy effective and passive buildings (BG); 5. There is no synchronizing between designers, planners, architects, engineers (BG); 6. Lack of elaboration of typical retrofitting projects for identical multifamily buildings (BG); 7. Lack of showing good practices from countries with such cultural/social models in order to inform interested technical experts (ALL); 8. Lack of necessary project documentation and plans for multifamily buildings from '60s/70s' and same others what was finally lost in municipal archives (BG).

5.5 Constructors/suppliers

Summary barriers to constructors/ suppliers:	Description of barriers:
Legislative barriers	<ol style="list-style-type: none"> 1. Different existing state building regulations/codes - the existing legislative frame does not sufficiently define requirements for retrofitting buildings (AT, BG, FL); 2. Lack of regulations on improvement of energy performance (SE); 3. Insufficient experience in implementing new energy efficiency and indoor environment quality established by new construction rules (ES).
Financial barriers	<ol style="list-style-type: none"> 1. Difficulty of total implementation of renovation work because of low income level of owners/tenants in social housing (BG,

Summary barriers to constructors/ suppliers:	Description of barriers:
	ES).
Related to the tax initiatives	1. Participation in retrofitting process is not financially stimulated (BG).
Behavioural barriers	<ol style="list-style-type: none"> 1. Partial retrofitting orders from owners/developers (insulation or exchanging windows only) lead to inefficient retrofitting activities (BG); 2. Lack of necessary project documentation and plans for multifamily buildings constructed long ago - lost from owners (BG); 3. Low level of problem awareness (AT).
Cultural barriers	1. Lack of information on good practices in countries with similar cultural models (ALL).
Organizational/ institutional barriers	<ol style="list-style-type: none"> 1. Lack of expertise (AT, BG); 2. Lack of information about standards and technical /EE retrofitting solutions available (new methods for implementation of modern exterior insulation) (BG); 3. Energy efficiency needs are rarely part in constructors'/suppliers' professional training (AT, BG); (training for quality inspection crews in thermal improvements of building envelope, general systems, etc (ES); 4. Lack of information about energy effective and energy passive buildings (BG); 5. This group of stakeholders is not accustomed to using QA procedures during project implementation (ES); 6. Few experience in implementing the new energy efficiency and indoor environment quality established by the new construction rules (ES).

5.6 Building management/operators

Summary barriers to bulging management/operators:	Description of barriers:
Legislative barriers	<ol style="list-style-type: none"> 1. The measures suggested in the certification protocol are not compulsory but could be an input to the maintenance plan. As long as the measures are voluntary, it is not certain that the measures will be implemented (according to EPBD)(SE); 2. No requirements on energy efficiency in the national building regulations for existing buildings (SE); 3. The deadlines for the EU targets are too far away in the future (year 2020 and 2050) (SE); 4. The opinion of housing cooperatives (through them board) regarding energy issuers is overweight on regional supportive organisation for building management (SE) - according to the Swedish Law on Housing Co-operatives; 5. Boards of housing co-operatives have the mandate to take decisions, without an approval from all the members, on issues related to the running of the “joint” properties/installations. The boards cannot take too large decisions without the approval of the members and not decisions that mean changes inside the apartments (SE) -according to the Swedish Law on Housing Co-operatives; 6. Lack or insufficient regulation for establishment of legal (or voluntary) organizations for building management (BG).
Financial barriers	<ol style="list-style-type: none"> 1. Short term thinking/ long payback period/high investment costs (SE); 2. External factors, such as changes in energy prices, are difficult to influence, and to take into account (SE); 3. Existing contracting as important financing solution is not a very effective way of financing comprehensive retrofit in multifamily buildings – in cases in which owner is not the user of the building and has less influence on energy use (AT); 4. Existing financial schemes don’t stimulate the creation of building management (BG).
Related to the tax initiatives	<ol style="list-style-type: none"> 1. Lack of tax concessions for building management in energy retrofiting process (BG).
Behavioural barriers	<ol style="list-style-type: none"> 1. Occupants behaviour/lack of separate metering (SE); 2. Slow/lack of “translation” of interest and concern for environmental/climate/energy issues among members of housing co-operatives into actions (SE); 3. There might not be a substantial interest to be the first organisation on the market to try new technology (SE);

Summary barriers to bulging management/operators:	Description of barriers:
	<ol style="list-style-type: none"> 4. Part of owners/tenants believe that expenses of maintenance was included in the total price of their property; they don't have the habit of separating the expenses of building management and maintenance (BG); 5. Lack of technical education of building administrators (usually they are lawyers or such) and need for information on energy renovation of existing multifamily buildings (ES).
Cultural barriers	<ol style="list-style-type: none"> 1. Lack of necessary knowledge among board members of housing co-operatives who make decisions (SE).
Organizational /institutional barriers	<ol style="list-style-type: none"> 1. Practically the long term maintenance programmes within social housing associations do not exist or not include the long term energy strategies (NL); 2. Lack of technical/renovation solutions available and good examples (SE); 3. Lack of specialised organizations for management and maintenance of buildings (BG, ES); 4. Lack of knowledge of the building managers/operators about energy efficiency (AT); 5. Incompetence of external administrators (who manage maintenance, community costs administration, etc.) to manage an energy renovation of the building (ES); 6. Small companies may not see the benefits in their company when introducing of QA systems (SE); 7. Difficulty to make a decision for maintenance the QA system after its introduction (SE); 8. Difficulty to find the right level of documents/paper work (and there are other helpful documents available also) (SE).

6 Strategies for overcoming non-technical barriers for different stakeholders

Based on the SQUARE countries' national reports and the overview of summary barriers a number of methods to overcoming of those barriers can be suggested. These suggestions are related to methods for overcoming barriers among owners and tenants and other stakeholders in the building sector involved in renovation social housing.

6.1 Summary strategies for owners/investors/developers

Barriers:	Strategies:
Legislative	Summary strategies for overcoming legislative barriers
1. No requirements on energy efficiency in several national building regulations for existing buildings (SE).	1.1. Formulate compulsory requirements for existing buildings in line with new buildings in order to synchronise with EU targets that encourage low energy use (SE).
2. Same partners' national laws give opportunity for partial or only "cosmetic" measures regarded as standard-raising measures, and consequently allow a rise in the rent (SE + ALL).	2. Updating national legislations in regards to restriction the opportunity for partial retrofitting existing buildings or only "cosmetic" renovation, which not included energy measures (ALL).
3. Speculative reasons (AT).	3. Thermal retrofit should be obligatory for buildings with high energy consumption. There should be clear regulations according to EPBD or similar to this (AT).
4. Criteria for rent increase proceedings are not clear (AT).	4. Clarify the definition of maintenance measures: thin insulation is, for example, state of the art and needs not to be verified as cost effective, but more insulation thickness needs an economic verification. So "cost effectiveness" should have clear definitions to get simple guidelines for its verification (AT).
5. Lack of regulations on uninhabited dwellings	5. Updating national legislations related to responsibilities of owners of uninhabited dwellings when

Barriers:	Strategies:
(BG, ES).	retrofitting buildings (BG).
Financial	Summary strategies for overcoming financial barriers
1 Short-term thinking/ long payback period/high investment costs (SE + ALL)	<p>1.1. One aspect to consider is “the timing” of the implementation of energy measures – how they coincide with an organisation’s maintenance/renovation plan (SE);</p> <p>1.2. One suggestion is to look at a “package solution”, where more profitable measures cover less profitable ones. The less, or non, profitable measures are included as it is seen as (public) housing companies responsibility to the society to decrease their energy use (significantly) (SE);</p> <p>1.3. Triggers for more retrofit measures are following: high energy costs, building damages and committed building managers -they increase the benefit of these measures (AT);</p> <p>1.4. If there were a possibility to differentiate the rents to a greater extent, this would decrease the payback period for an investment (SE).</p>
2. Insufficient clear rules to apply existing forms of subsidies and loans to owners /developers (SE, BG, AT).	<p>2. The sizes of subsidies need to be in proportion to the payback periods of the energy saving measures:</p> <ul style="list-style-type: none"> - Those with long payback periods should receive larger subsidies (SE); - In several cases the size of state subsidies should be increased to 30-50%, (bigger than VAT) because the existing level of subsidies is equal to the existing value of VAT (BG); - Very difficult with general subsidies, but subsidies are the one way to reach 50% lower energy use by 2050 (SE).
3. Not used to comprehensive actions (AT).	<p>3.1. Subsidies should be concentrated to provide incentive for more than single actions (AT).</p> <p>3.2. The local economy benefits from comprehensive retrofit of buildings – that fact should be promoted more (AT).</p>
4. High costs of realisation of the retrofiting	4.1. Projects/measures should substantially decrease energy use and at the same time be economically

Barriers:	Strategies:
project (ALL).	acceptable (SE); 4.2. There should be promotion of energy saving initiatives from housing owners by changing tax regulations, terms of loans, maintenance fees, etc..(SE).
5. Contracting as financial solution (AT).	5. Contracting measures have only 10 years to obtain a return. Subsidies are much more useful in giving an impact to comprehensive renovation. (AT).
6. Due to low level of financial possibility usually owners/ developers cannot implement the energy efficiency measures prescribed after issue of the energy certificate (BG).	6. In several countries after issue the energy certificate state should regulate the financial incentive to implement energy efficiency measures prescribed to the owners/developers (BG).
7. Existing practice of providing subsidies for heating to low-income people does not encourage comprehensive retrofitting actions (BG).	7. In several countries existing practice of providing subsidies for heating to low-income people can be developed to incorporate schemes for energy efficiency measure implementation (BG).
Related to the tax initiatives	Strategies for barriers related to the tax initiatives
1. Not used to comprehensive actions (AT).	1. Tax breaks in order to encourage more than single actions (AT).
2. Insufficiency of tax initiatives related to the stimulation of high-technology application (solar and biomass, heat pumps, etc.) (BG).	2. It is necessary to bring make tax concessions in order to stimulate the use of high technology in dwellings (BG).
3. Social housing associations are mainly financially driven, and current assessment methods do not include energy issues as a variable	3. Energy issues should be included in current assessment methods as a variable for financial performance. Common activities to change the understanding that advanced energy renovation could be beneficial to all

Barriers:	Strategies:
for financial performance (NL).	parties involved in buildings (NL).
4. Lack of initiatives regarding tax concessions regard to investors/developers (BG).	4. State or municipal activities to tax initiatives for investors/developers regarding energy efficiency retrofitting process (BG).
Organizational/behavioural barriers	Strategies for overcoming organizational/behavioural barriers
1. Slow/lack of “translation” of interest and concern for environmental/climate/energy issues among owners into actions (SE).	1 Strategies for motivation owners: - The companies that succeed with their projects, from an energy point of view, are those that educate their staffs internally regarding energy issues, etc. (tailor-made courses to meet the needs of the company) (SE); - It can be difficult to give courses that are of interest to a broad audience, without the courses being too general (and not being very useful in the everyday work of the companies). Another way is to instead organise meetings where experiences can be exchanged among different companies (SE).
2. In daily practice energy issues are not treated in an integrated method (NL).	2&3 The needs for better understanding the relation between investments, energy performance, CO2 performance, renovation plus maintenance, and quality of building stock and living conditions should be met (NL).
3. Difficulties in understanding the cost-benefit balance and foreseen energy cost increase (ES).	
4. Partial external insulation of the separate dwelling or floor in the middle of the facade from some owners is obstructive to investors/others owners, because after that it will be difficult to ensure consensus among owners to receive access to financial funds (BG).	4. Integration of new texts into national legislation related to restriction the opportunity for partial retrofitting existing buildings or only “cosmetic” renovation not included energy measures (BG).
Organizational/cultural barriers	Strategies for overcoming organizational/cultural barriers
1. Lack of spreading good practices. (ALL)	1. It is necessary to disseminate good practices in order to inform interested stakeholders: owners,

Barriers:	Strategies:
	constructing managers, developers and technical experts (ALL).
2. Lack of dissemination of good examples. (SE + ALL)	2. Visit the sites of good examples (It is important to see what kind of products exist on the market and how solutions/techniques work in reality before you try for yourself or promote them to building owners. Especially for small building owners it is good, as they don't have the competence themselves) (SE).
Organizational/institutional barriers	Strategies for overcoming organizational/ institutional barriers
1. Lack of competence in the building industry, e.g., well-educated craftsmen (SE).	1.1. General, national, employment strategies have also been mentioned regard to qualifications and knowledge among craftsmen is a difficult barrier to overcome (one association employed retired craftsmen who already know the profession (SE).
2. Lack of technical/renovation solutions available. Renovation projects can be difficult because you don't know how the buildings actually are constructed. (SE).	2.1. Main strategies for technology/measures: <ul style="list-style-type: none"> ○ First do all "minor" measures such as adjustments of heating and ventilation systems, then the "major" measures (SE); ○ Mechanical ventilation with heat exchanger is necessary to be included in a renovation project in order to be able to reach the EU targets of lowering energy use in buildings (SE); ○ Alternative heat exchangers are needed as the ones today increase the electricity consumption.(SE).
3. To evaluate (follow-up) on the impact of specific energy efficient measures is very difficult to do in a correct way (SE).	3. Strategies for evaluating: <p>3.1. One way of evaluating a chosen solution and to actually find out the construction of the building is to first implement it in a few test apartments before renovating larger parts of the building stock. This is especially effective when there are many similar apartments/buildings that are to be renovated. There might be some problems with this procedure when it comes to the procurement process and pricing (SE);</p>

Barriers:	Strategies:
	<p>3.2. The whole building process is important:</p> <p style="text-align: center;">needs - design – construction – follow up.</p> <p>Experiences of follow-ups could be collected in a data base (SE).</p>
<p>4. Regard to building process:</p> <p>Lack of quality and it is an ineffective process-</p> <ul style="list-style-type: none"> - no responsibility aspects; - lack of competence of clients, - previous practices are not utilised (not learning from mistakes) (SE). 	<p>4. Strategies for building process:</p> <p>4.1. The roles must be well defined (with clear responsibilities), and the client must be active and actually state requirements on energy efficiency (SE);</p> <p>4.2. System “thinking” is needed when considering different measures (SE).</p>
<p>5. Regard to building management phase (incl. the handover of the building):</p> <ul style="list-style-type: none"> - no clearly known how to operate the buildings and its technical systems; - no toll (system) for this today; - not certain that there is a folder with instructions; - no handing over to the tenants (SE). 	<p>5. Strategies for important aspects of the building management phase are (incl. the handover of the building):</p> <ul style="list-style-type: none"> ○ Important to measure and follow-up energy use of buildings (SE); ○ Involvement from all parties needed (during the construction phase) so that it is clearly known how to operate the buildings and its technical systems, but there is no toll (system) for this today. It is also not certain that there is a folder with instructions; here a change is needed. Today there is no handing over to the tenants; here as well a change is needed (SE); ○ Education, training and motivation are some important ingredients. Self controls and check lists are as important at the building management phase as during the construction phase. This is probably neglected by a lot of companies/persons (SE); ○ The installations must work when handed over (SE);

Barriers:	Strategies:
	Competent and committed building management people. For example, visit apartments when there are complaints. (SE).
6. Fewer drivers within real estate companies /developers/investors (AT, BG).	6.1 Trainings for the staff of the building sector are very important to close information deficits – they should be promoted by public authorities (AT); 6.2. Elaboration of suitable national models in order to integrate investors into retrofitting process (BG); 6.3. Work out of standard cost-benefit analyses (BG).
7. Lack of owners' associations as legal organized groups (BG).	7. More municipal activities to help creating the public housing associations- owners associations, registered as legal bodies (BG).

6.2 Summary strategies for of tenants/users

Barriers:	Strategies:
Legislative	Summary strategies for overcoming legislative barriers
1. No clear definition in national laws-(Criteria for rent increase proceedings are not clear) (AT)	1. "Cost effectiveness" should have clear definitions to get simple guidelines for its verification (AT)
2. No definition of the tenants' responsibilities in national laws (BG)	2. Clear definition of the tenants' responsibilities in energy efficient retrofitting process (BG)
Financial barriers	Summary strategies for overcoming financial barriers
1. Social disadvantage: rent increases (AT)	1&2. The government should offer subsidies to eliminate social disadvantages and to get thermally

Barriers:	Strategies:
2. Tenants are lower-income stakeholder group and find it difficult to access bank loans (AT)	comfortable dwellings, although those people have little income (AT)
3. No economic interest of elder tenants(AT)	3. Thermal retrofit should be obligatory for buildings with high energy consumption. There should be clear regulations according to EPBD or similar to this (AT)
Organizational/ behavioural barriers	Strategies for overcoming organizational/ behavioural barriers
1. Slow/lack of “translation” of interest and concern for environmental/climate/energy issues among tenants into actions. No motivation for tenants (SE)	1. Motivation the tenants/end-users: 1.1. To disseminate informational material about energy saving actions - one method to reach the residents, but there seems to be an uncertainty as to how effective this kind of activity is in the actual behaviour of occupants. (SE) 1.2. It is important to hand over information about a certain measure that has been taken in order to “maintain” the benefits of the measure (SE)
2. Fewer drivers within real estate companies (AT)	2. Training for the staff of the building sector is very important to close information deficits – it should be promoted by public authorities(AT)
3. The energy savings is not priority for many tenants/ users. (ES, BG)	3. Spreading word of good practices in order to inform the interested stakeholders: owners and tenants/end-users construction managers, developers and technical experts (BG)
Organizational/cultural	Strategies for overcoming organizational/cultural barriers
1. Lack of disseminating good practices and information. (AT, BG)	1. It should be easy to get independent consultants and to provide counselling activities for the interested majority to come to comprehensive retrofit of buildings (AT)
Organizational/institutional barriers	Strategies for overcoming organizational/ institutional barriers
1. Lack of motivation of the tenants/end-	1.1. To have rental agreements in which the occupants actually pay for their individual usage would be useful.

Barriers:	Strategies:
users(SE)	<p>(SE)</p> <p>1.2. To split energy metering regarding electricity is an easy measure. (To have separate metering for domestic hot water in new buildings) (SE)</p> <p>1.3. Individual metering and payment are thought of as good way to visualise the consumption;</p> <p>-The tenants association (for public housing associations) can be used to spread information. (SE)</p>
2. Lack or insufficiency of tenants' associations(BG)	2. It is necessary that municipal assistance activities create representative organizations of the tenants (for public housing associations) –tenants associations (SE), registered as legal bodies (BG)

6.3 Summary strategies for stakeholders' group of designers/planners/architects/engineers

Barriers:	Summary strategies:
Legislative barriers:	Strategies for overcoming legislative barriers
1. Insufficient of regulations for improvement of energy performance. (SE)	1. State /municipal activities to add to current laws/regulations the requirements on energy efficiency or additional regulations with clear definition of compulsory requirements for existing buildings in line with new buildings (SE)
2. Different state building regulations or codes. (SE, AT, BG, FL, NT, ES)	<p>2. 1.State work for synchronization between laws and many different regulations, instructions, methods in the field of renovation process (BG)</p> <p>2.2. There should be less redundancy in regulations within a country (BG). They have to be discussed and should be kept in spacious bounds to give way to e.g. thick exterior insulation by public building authorities (AT).</p>

Barriers:	Summary strategies:
	<p>2.3 It is recommended to internationally recognize product quality certificates across Europe, in order to harmonize the European construction market (NL).</p> <p>2. 4. The building rules should be more flexible with the details or solutions and more exigent with the results (ES).</p>
3. Mechanical ventilation system and heat recovery are not regulated for residential buildings in all countries (BG).	3. Mechanical ventilation with heat exchanger is necessary to be included in national regulations in order to reach the EU targets of lowering energy use in buildings (BG).
Financial barriers	Strategies for overcoming financial barriers
1. High cost of the renovation - the thermal improvements risk to drop off the projects. (ES, BG)	1&2 Create Owner's Reserve Funds to pay experts working in field of renovation (designers, architects, engineers) (BG).
2. Difficulty in total implementation of retrofitting projects due to low income level of owners/tenants and lack of benefits to investors (BG).	
Organizational/behavioural barriers	Strategies for overcoming organizational/behavioural barriers
1. Lack of knowledge of energy efficiency in buildings There is some tiredness to learn about these items. (ES).	1. There is need for elaboration and implementation of typical and pilot projects, scientific researches and demonstration programmes supported and coordinated by the state and municipal authorities (BG).
2. Difficulties for designers/architects if suppliers offer unknown non-certified insulation (BG).	2. Municipalities' activities for the sanctioning schemes for non correct suppliers, who do not respect energy efficiency requirements and products certification (BG).
3. Lack of synchronization between designers,	3. It is necessary to creating specialized state or municipal institutions/organizations to synchronize the

Barriers:	Summary strategies:
planners, architects, engineers (BG).	works between designers, planners, architects, engineers (BG).
Organizational/institutional barriers	Strategies for overcoming organizational/institutional barriers
1. Lack of information about standards and technical /renovation solutions available (SE).	<p>1.1 Initiatives of state and municipal authorities to integrate and renew energy efficient building standards (SE).</p> <p>1.2 First do all “minor” measures such as adjustments of heating and ventilation systems, then the “major” measures (SE).</p> <p>1.3 Mechanical ventilation with heat exchanger is necessary to be included in a renovation project in order to be able to reach the EU targets of lowering energy use in buildings (SE).</p> <p>1.4 Alternative heat exchangers are needed, as the ones today increase electricity consumption (SE).</p>
2. Partial retrofitting done by constructors’ organizations (external insulation or exchanging windows only) without certificates is barrier for planners/designers to further planning or design (BG).	<p>2..1.Municipal/local authorities should take control of constructors/suppliers who are responsible for carrying out the retrofitting projects (BG).</p> <p>2.2. Higher level of control and sanctioning schemes from the state and the Municipalities for retrofitting measures lacking certification (BG).</p>
3. There is no synchronizing between designers, planners, architects, engineers (BG).	3. It is necessary to create specialized state or municipal institutions/organizations to synchronize the works of designers, planners, architects, engineers (BG).
4. Lack of elaboration of typical retrofitting projects for identical multifamily buildings (BG).	4. Elaboration of a typical projects and methods for helping to evaluate a chosen solution for existing buildings that are constructed with equal standards at the same time (BG).
5. Lack of dissemination of good examples; Lack of showing good practices from countries	5. 1 Exchange of good practices and solutions of type retrofitting projects within chambers of architects and engineers or specialized state or municipal institutions/organizations, NGOs (BG).

Barriers:	Summary strategies:
with such cultural/social models in order to inform interested technical experts (ALL).	5.2 Visit sites of good examples for existing products on the market and solutions/techniques working in reality before promoting them to building owners/developers (SE). 5.3. Initiatives from municipal authorities, state, NGOs to inform technical experts.
6. Energy efficiency needs are lacking or only part of experts' professional training (AT). Not enough information on new Regulations from EU; Energy efficiency requirements are quickly developing in the EU countries compared to same partners' countries (BG).	6. There should be plans to integrate energy efficiency into education and trainings, for example into the curriculum of architects, building engineers (AT).
7. Lack of information about standards (AT).	7. Activities of the professional associations (chambers) to integrate and renew energy efficient building standards (AT).
8. Not enough information on new Regulations from EU; Energy efficiency requirements and standards are quickly developing in the EU countries compared to same partners' countries (BG).	8. Initiatives of municipal authorities, state, NGOs about energy effective and energy passive buildings (BG).
9. Lack of necessary project documentation and plans for multifamily buildings from '60s/70s' (BG).	9. Municipalities/local authorities should take a resolution/plan to rehabilitate or recognize last owners' documents in their archives (BG).
10 Lack of clear information for consultants, designers, planners, architects, engineers on financial schemes regarding retrofitting process (BG).	10. Initiatives of state, funds, NGOs, Chambers to inform technical experts on existing financial schemes regarding EE retrofitting process (BG).

6.4 Summary strategies for stakeholders' group of constructors/suppliers

Barriers:	Summary strategies:
Legislative barriers:	Strategies for overcoming legislative barriers
1. Insufficient of regulations for improvement of energy performance (SE).	1.1. Updating national legislations in regards to the requirements on energy efficiency or several further regulations with clear definitions of compulsory requirements for existing buildings in line with new buildings (SE).
2. Different state building regulations and codes (AT, BG, FL).	2. There should be only one regulation for a whole country on a subject; there is great redundancy at present (AT, BG). They have to be discussed and should be kept in spacious bounds to give way to e.g. thick exterior insulation by public building authorities (AT).
Financial barriers	Strategy for overcoming financial barriers
1. Difficulty of total implementation of renovation work because of low-income level of owners/tenants in social housing (BG, ES).	1.1. Creation the Owner's Reserve Funds (BG). 1.2 Visit the sites of good examples (It is important to see what kind of products exist on the market and how solutions/techniques work in reality before promotion them to building owners) (SE).
Organizational/behavioural barriers	Strategy for overcoming organizational/behavioural barriers
1. Partial retrofitting orders from owners/developers (insulation or exchanging windows only) (BG).	1. 1. Updating national legislations in regards to restriction the opportunity for owners related to partial retrofitting of existing buildings or only "cosmetic" renovation not included energy measures (BG). 1.2. Higher level of control and sanctioning schemes from the state and the municipalities for energy efficient retrofitting measures lacking certification. (BG). 1.3. Exchange of good practices and solution of type retrofitting projects within Chambers of constructors or specialized state or municipal institutions/organizations, NGOs (BG).

Barriers:	Summary strategies:
2. Low level of problem awareness (AT, BG, SE).	2. Activities of the professional associations (chambers) to integrate and renew energy efficient building standards (III).
Organizational/cultural barriers	Strategy for overcoming organizational/cultural barriers
1. Insufficient information to constructors/suppliers on good practices in similar countries with similar national structure of retrofitting process (BG).	1. Initiatives of municipal authorities, chambers of constructors, NGOs, organizations for dissemination of good practices from similar countries with similar national structures of retrofitting process (BG).
Organizational/institutional barriers	Strategy for overcoming organizational/institutional barriers
1. Lack of expertise (AT).	1 & 2 Initiatives of municipal authorities, Chambers of constructors to disseminate information about standards and technical /renovation solutions (AT, BG).
2. Lack of information about standards and technical /renovation solutions available (BG).	
3. Partial retrofitting done by rival constructors' organizations (external insulation or windows replacement only) without certificates is barrier to comprehensive retrofitting process (BG).	3. Higher level of control and sanctioning schemes from state and Municipal organization. Elaboration of the good examples and methods for retrofitting for existing buildings with equal technical characteristics (BG).
4. Energy efficiency is rarely part of trainings (AT).	4. There should be plans to integrate energy efficiency into education and training, for example into the curriculum of architects, building engineers and constructors/suppliers (AT).
5. Few experience in implementing the new energy efficiency and indoor environment quality established by the new construction rules (ES).	5. Training for specialized construction workers and for quality inspection crew in the thermal improvements of building envelope, general systems, etc. (ES).

6.5 Summary strategies for stakeholders' group of building managers/operators

Barriers:	Summary strategies:
Legislative barriers	Strategies for overcoming legislative barriers
1. No requirements on energy efficiency in the national building regulations for existing buildings (SE).	1.1. Formulate compulsory requirements for existing buildings in line with new buildings. 1.2. Energy requirements should be proved to be fulfilled in the application of the building permits (by the municipality) (SE).
2. The measures suggested in the certification protocol (regard to EPBD) are not compulsory but could be an input to the maintenance plan. As long as the measures are voluntary, it is not certain that the measures will be implemented (SE).	2. Strategies regard to implementation of energy certifications: -The implementation of energy certifications ought to be a good thing, as the members of co-operatives usually lack the competence of how a building and energy technology work (are dealing with non-professionals) (SE); - Suggested energy efficient measures should be incorporated in maintenance plans (compulsory) (SE).
3. The deadlines for the EU targets are too far in the future (year 2020 and 2050) (SE).	3. EU targets that also encourage those who already have a low energy use and that are closer in time (SE).
Financial barriers	Strategies for overcoming financial barriers
1. Short-term thinking/ long payback period/high investment costs (SE).	1. Strategies are following: (SE) - One aspect to consider is “the timing” of the implementation of energy measures – how they coincide with an organisation’s maintenance/renovation plan. - Create a model bank of different possible energy saving solutions with different payback periods stated. Companies should start with implementing measures with payback periods of 0-3 years. - Highlight more clearly that money can be saved by investing in energy saving measures.

Barriers:	Summary strategies:
	<p>- Desired “characteristics” of subsidies:</p> <p>a. “The timing” of subsidies, i.e. the right subsidy at the right time for a specific company.</p> <p>b. It has to coincide with the maintenance plan of the company.</p> <p>c. The sizes of subsidies need to be in proportion to the payback periods of the energy saving measures. Those with long payback periods should be accompanied by larger subsidies.</p> <p>- Highlight positive “side effects” of energy measures, e.g. better indoor climate - – i.e. present to boards of housing co-operatives that they get more (than energy efficiency) for their invested money.</p> <p>- Try to be modest in economic/energy saving calculations in order to not overvalue savings (SE).</p>
2. Contracting as financial solution (AT).	2. Contracting measures have only 10 years to obtain a return. Subsidies are much more useful to give an impact to comprehensive renovation (AT).
Related to the tax initiatives	Strategies for barriers related to the tax initiatives
	Financial benefits, such as tax abatements and deduction of value-added taxes (VAT) for measures that contribute to lower energy use (that have a decreased impact on climate changes) could be discussed/introduced.
Organizational/ behavioural barriers	Strategies for overcoming organizational/ behavioural barriers
1. Occupants’ behaviour/lack of separate metering (SE).	<p>1&2. Strategies for motivation end-users:</p> <ul style="list-style-type: none"> ○ Individual metering and payment, especially regarding domestic hot water, has been discussed within the organisations and are thought of as good way to visualise the consumption. ○ To disseminate information material about energy saving actions is mentioned as a method to reach the residents, but there seems to be an uncertainty over how effective this kind of activity is on the actual behaviour of occupants.
2. Slow/lack of “translation” of interest and concern for environmental/climate/energy issues among members of housing co-operatives into actions (SE).	

Barriers:	Summary strategies:
	To arrange education/courses for (board) members of housing co-operatives in general as well as a specified comprehensive, well substantiated, presentation material, including balanced cost calculations/savings, to motivate housing co-operatives (SE).
Organizational/ institutional barriers	Strategies for organizational/institutional barriers
1. Practically the long term maintenance programmes within social housing associations do not exist or not include the long term energy strategies (NL).	1. The costs of good energy effective retrofitting can become affordable, when they are part of a maintenance programme. Technically and financially it is necessary to combine renovation and energy (NL).
2. Lack of technical/renovation solutions available (SE).	<p>2.1. Produce an “energy program” for an organisation - energy issues are then recognised as a prioritised questions within the organization (SE);</p> <p>2.2. Could produce standardised industrial solutions, which could lower the costs. The buildings in need of renovation are similar, which is a possibility to utilise. Another “attitude” (priority) is needed among housing manufacturers/suppliers, because they are primarily interested in new production. A switch to the retrofitting market is needed (SE);</p> <p>2.3. The whole building process is important: needs - design – construction – follow up. Experiences of follow-ups could be collected in data base (SE);</p> <p>2.4. First do all “minor” measures such as adjustments of heating and ventilation systems, then the “major” measures. (SE);</p> <p>2.5. Important aspects of the building management phase are (including the handover of the building):</p> <ul style="list-style-type: none"> ○ Consider easy and simple improvements.

Barriers:	Summary strategies:
	<ul style="list-style-type: none"> ○ Try to motivate the end-users (here members/occupants of housing co-operatives) to take their responsibility by increasing their awareness (organise trade fairs and courses). Have internet forum for board members where they inform them about the latest within the energy and environmental field. Sell energy services. Sell energy certification. ○ Important to measure and follow-up energy use of buildings (SE).
3. Lack of good examples (SE).	<p>3. Visit good examples (It is important to see which products exist on the market and how solutions/techniques work in reality before you try for yourself or promote them to building owners. Especially for small building owners it is good with examples as they don't have the competence themselves.)</p> <p>Good profitable examples implemented in the buildings: one housing co-operative usually spread to other co-operatives - very effective way of disseminating technologies/measures (SE).</p>
4. Lack of necessary knowledge among board members of housing co-operatives who make decisions (AT).	4. It should be easy to get independent consulting and to make technical courses. They have to be promoted by public authorities (AT).
5. Lack of specialised organizations for management and maintenance of buildings (BG, ES).	<p>5.1. Need of clear definition for responsibility of building managers /operators in special national regulation or in application to Property Law (BG).</p> <p>5.2. Initiatives from state, municipal authorities, state and non-government organizations (NGOs) to change owner's/tenants' awareness that no necessity of regular additional expenses for building management – needs of dissemination of the good practices of building management from countries with such social mentality (BG).</p>

7 Final Conclusions

Analyses of the main non – technical barriers described in previous Chapters allows to make some final conclusions on general methods to break main non – technical barriers for the high priority stakeholders groups - owners/developers/investors and building management/operators.

7.1 Final conclusion on main non – technical barriers for owners/developers/investors

Main legislative barriers	General methods to break legislative barriers
Lack of requirements on energy efficiency in some regulations for existing buildings.	Formulate compulsory requirements for existing buildings in line with new buildings in order to synchronise with EU targets that encourage low energy use, particularly in Sweden..
Lack of skilled experts in the fields of EPBD.	Training of experts in the fields of EPBD.
The national legislation provides opportunity for partial or only “cosmetic” measures seen as standard-raising measures, and consequently allow a rise in the rent.	There is necessity of additional texts into national legislation for restriction the opportunity for partial retrofitting existing buildings or only “cosmetic” renovation without energy measures.
Main financial and related to tax initiatives barriers	General methods to break legislative and related to tax initiatives barriers
Short-term thinking/high investment costs/long payback period.	<ol style="list-style-type: none"> 1. “The timing” of the implementation of energy measures. 2. Development of guidelines for energy measures integration into concrete organisations renovation/maintenance plan. 3. Checking a “package solution”, where more profitable measures cover less profitable ones. The less, or non, profitable measures are included as it is seen as public/housing companies responsibility to the society to decrease their energy use.

High costs of realisation of the retrofitting project.	<ol style="list-style-type: none"> 1. Retrofitting projects or energy efficiency measures should substantially decrease the energy use and at the same time be economically acceptable. 2. Promotion of energy saving initiatives by housing owners through changing tax regulations, terms of loans, maintenance fees, etc.
Insufficient clear rules to apply existing forms of subsidies and loans to owners/developers.	<ol style="list-style-type: none"> 1. The sizes of subsidies need to be in proportion to the payback period of energy saving measures. Measures with long pay back period should be afflicted with larger subsidies. 2. Subsidies should be concentrated to provide incentive for more than single actions. 3. Subsidies are one the way to reach 50% energy reduction by 2050.
Not used to comprehensive actions.	Promotion of the local economy benefits from comprehensive retrofit of buildings.
Main organizational/ behavioural barriers	General methods to break organizational/ behavioural barriers
In daily practice energy issues are not treated in an integrated way and difficulties in understanding the cost-benefit balance and foreseen energy cost increase.	Information among owners/developers/investors for better understanding the relation between investments, energy performance, CO2 performance, renovation plus maintenance, and quality of building stock and living conditions.
Slow/lack of “translation” of interest and concern for environmental/climate/energy issues among owners into actions.	Organisation of meetings where experiences can be exchanged among different companies
Main organizational/institutional barriers	General methods to break organizational/institutional barriers
Lack of technical/renovation solutions available - renovation projects can be difficult because unknown construction of building.	<ol style="list-style-type: none"> 1. Completion of all minor measures such as adjustments of heating and ventilation systems, then the major measures. 2. Mechanical ventilation with heat exchanger is necessary to be included in a renovation project in order to be able to reach the EU targets of lowering energy use in buildings.

Evaluation (follow-up) on the impact of specific energy efficient measures is very difficult to do in a correct way.	<ol style="list-style-type: none"> 1. Implementation of tests in few apartments before renovating larger parts of the building stock. 2. Needs of understanding that whole building process is important: needs-design-construction-follow up. 3. Collection of experiences of follow-ups in data base.
<p>Lack of quality in building process by the reason of:</p> <ul style="list-style-type: none"> - no responsibility aspects, - lack of competence in the building industry and of clients, - previous experiences are not utilised 	<ol style="list-style-type: none"> 1. The roles in building process must be well defined (with clear responsibilities). 2. Needs of actually state requirements on energy efficiency. 3. Promotion and utilising of previous experiences in order to learn from mistakes. 4. System “thinking” is needed when considering different measures. 5. Initiatives of clients.
Fewer drivers within real estate companies /developers/investors.	<ol style="list-style-type: none"> 1. Elaboration of suitable national models in order to integrate investors into retrofitting process and work out on standard cost-benefit analyses. 2. Public authorities’ promotions of trainings for the staff of the building sector are very important to close information deficits.
Lack of owners’ associations as legal organized groups in new member states.	Municipal initiatives to help creating the public housing associations-owners associations, registered as legal unities.

7.2 Final conclusion on main non – technical barriers for tenants

Main legislative barriers	General methods to break legislative barriers
No definition of the tenants’ responsibilities in national	Updating national legislations in regards to tenants’ responsibilities in energy efficient retrofitting

legislations	process.
Financial barriers	General methods to break financial barriers
Continuous increases of rents	Offering state subsidies to eliminate social disadvantages and to get thermally comfortable dwellings, although those people have little income.
Tenants are lower-income stakeholder group and find it difficult to access bank loans.	
Organizational/behavioural barriers	General methods to break organizational/behavioural barriers
Slow/lack of “translation” of interest and concern for environmental/climate/energy issues among tenants into actions	<ol style="list-style-type: none"> 1. To disseminate informational material about energy saving actions. 2. To provide information about a certain measure that has been taken in order to “maintain” the benefits of the measure.
The energy savings is not priority for many tenants.	Spreading of good practices to inform the tenants/end-users.
Organizational/institutional barriers	General methods to break organizational/institutional barriers
Lack of motivation of the tenants/end-users	<ol style="list-style-type: none"> 1. Signing rental agreements with the occupants to actually pay for their individual consumption 2. To split energy metering regarding electricity is an easy measure. Separate metering for domestic hot water in new buildings. 3. Individual metering and payment should be considered as good way to visualise the consumption - the tenants association can be used to spread information.
Lack or insufficiency of tenants’ associations	Municipal initiatives for creation representative organizations of the tenants –tenants associations.

7.3 Final conclusion on main non – technical barriers for building management

Main legislative barriers	General methods to break legislative barriers
The measures suggested in the certification protocol (in regards to EPBD) are not compulsory but could be an input to the maintenance plan. As long as the measures are voluntary, it is not certain that the measures will be implemented	Incorporation of suggested energy efficient measures into maintenance plans.
Main financial and related to tax initiatives barriers	General methods to break financial barriers
Short-term thinking/ long payback period/high investment costs	<ol style="list-style-type: none"> 1. Implementation of energy measures within organisation's maintenance/renovation plan. 2. Creation of a model database of different possible energy saving solutions with different payback periods. 3. Companies should start with implementing measures with payback periods of 0-3 years. Highlight more clearly that money can be saved by investing in energy saving measures. 4. Desired characteristics of subsidies: <ol style="list-style-type: none"> a. "The right timing" of subsidies, i.e. the right subsidy at the right time for a specific company. b. It has to coincide with the maintenance plan. c. The sizes of subsidies must be in proportion to the payback periods of the energy saving measures. 5. Highlight positive "side effects" of energy measures, e.g. better indoor climate – i.e. present to boards of housing co-operatives that they get more than energy efficiency for their invested money. 6. Financial benefits, such as tax abatements and deduction of value-added taxes (VAT) for measures that contribute to lower energy use (that have a decreased impact on climate changes) could be

	discussed/introduced.
Main organizational/ behavioural barriers	General methods to break organizational/ behavioural barriers
Slow/lack of “translation” of interest and concern for environmental/climate/energy issues among members of housing co-operatives into actions. Lack of separate metering.	<ol style="list-style-type: none"> 1. Individual metering and payment, especially regarding domestic hot water are consider to be a good way to visualise the consumption. 2. Dissemination of information materials for energy saving actions to the residents although there are some doubts about their impact on the actual behaviour of occupants. 3. To arrange education/courses for (board) members of housing co-operatives in general as well as a specified comprehensive, well substantiated, presentation materials, including balanced cost calculations/savings, to motivate housing co-operatives.
Main organizational/ institutional barriers	General methods to break organizational/ institutional barriers
The long term maintenance programmes within social housing associations do not exist or not include the long term energy strategies.	The costs of good energy effective retrofitting can become affordable, when they are part of a maintenance programme. Technically and financially it is necessary to combine renovation and energy.
Lack of technical/renovation solutions available and good examples.	<ol style="list-style-type: none"> 1. Produce an “energy program” for an organization. - energy issues are then recognised as a prioritised issue. 2. Produce standardised industrial solutions, which could lower the costs because the buildings in need of renovation are similar. 3. Important suggestions for the building management phase are (including the handover of the building): <ul style="list-style-type: none"> ○ Consider easy and simple improvements. ○ Try to motivate the end-users (here members/occupants of housing co-operatives) to take their responsibility by increasing their awareness (organise trade fairs and courses). Have

	<p>internet forum for board members where to inform them about the latest in the energy and environmental fields. Sell energy services. Sell energy certification.</p> <ul style="list-style-type: none"> ○ Important to measure and follow-up energy use of buildings <p>4. Visit good practices and products existing on the market. Showing how solutions/techniques work in market before promoting them to building owners.</p>
Lack of necessary knowledge among board members of housing co-operatives/organisations who make decisions.	Promotion of independent consulting. Public authorities should make technical courses for board members of housing co-operatives.

Annex A. The National specific legislative and financial barriers to owners/developers

National barriers to owners/developers:	Country	Description of barriers:
National specific legislative barriers	Sweden	<p>1.No requirements on energy efficiency in the Swedish building regulations for existing buildings; The Swedish Housing Act.</p> <p>2. It is a barrier that all tenants have to approve a renovation;</p> <p>3. Although the Swedish Law on public procurement has a decisive role and may be perceived as a cumbersome process, it was generally not seen as a hindrance as long as you succeed in stating “good” requirements.</p>
	Austria	1.Austrian Law of Tenancy (MRG):

National barriers to owners/developers:	Country	Description of barriers:
		<p>Criteria for rent increase proceedings are not clear:</p> <p>For rent increases a decision has to be found by court or arbitration board. Rent increases are justified, if the investment is cost- effective in relation to the energy savings. There are no concrete definitions for the terms “cost effectiveness” and “cost-benefit-ratio”.</p> <p>2. Austrian Condominium Act (WEG):</p> <p>Right of the “by-passed” minority prevents qualitative retrofitting measures:</p> <p>There is no economic interest in retrofitting actions by owners who let their apartments or by old private owners. They cannot defeat a resolution of the majority, but they are legally able to give no payments for decided measures. So effectively they prevent comprehensive actions because of the high social group pressure to do everything together without any vote against.</p>
	Bulgaria	<p>1. A new Property Law was just adopted, but give not clear methods for creating owners ’ associations/units in order of comprehensive retrofitting.</p> <p>2. Lack of definition for social housing in national laws.</p> <p>3. Generally owners have rights only to construction of the dwelling but have no rights to the land, where the multifamily blocks are built The land under multifamily blocks is the ownership of the state or municipalities.</p> <p>4. Properties in multifamily buildings in 1968-1989 have been gained without clear definition of maintenance and managements for the owners.</p>
	Spain	<p>1. The actual Law of Horizontal Ownership:</p> <p>It is difficult to decide and approve the investments needed to refurbish thermal systems and the building envelope. The</p>

National barriers to owners/developers:	Country	Description of barriers:
		<p>decision needs a consensus of the owners.</p> <p>2. The actual Spanish building rules are not exigent in terms of thermal conditions</p> <p>3. The new building codes are mandatory for the projects of building refurbishment and increase the cost in respect of a conventional one</p>
National specific financial barriers	Sweden	<p>1. Rent control for (public) owned buildings, which means that the cost for energy efficient measures is difficult to get covered by an increased rent since many of the energy efficient measures are not considered a rise in standard of the apartments (Swedish Housing Act)</p>
	Austria	<p>1. High financial returns through the letting of obsolete apartments to foreign people or the increase of land costs in densely populated urban areas are barriers to the thermal retrofit of building.</p> <p>2. Financial solution “contracting”:</p> <p>Contracting as important financing solution is not a very effective way of financing comprehensive retrofit in multifamily buildings, because of the legal problems within the contracts, normally made between the owner and an external service company: the owner is not the user of the building and has less influence on energy use</p>
	Finland	<p>1. It is difficult get money from banks (state loan can cover 75 % of total costs) due to the financial crisis.</p> <p>2. The average repayment period of bank loans is too short (finance crisis).</p> <p>3. The average construction costs without modernization of lift is 1600 €/m² far from big cities and estimated average rent 12 €/m². In big cities renovation costs can be 2000 €/m² or more.</p>
	Bulgaria	<p>1. Problematic finance helping for implementation of prescribing measures of energy efficiently, which must be fulfilled within 3 years after certificate was given to owner, but the date/time are not definite on when such certification must be</p>

National barriers to owners/developers:	Country	Description of barriers:
		<p>carried out.</p> <p>2. Banks grants loans only to organized groups (association) of owners, which still does not exist.</p> <p>3. There are not clear rules to apply existing forms of subsidies and loans to owners /developers.</p>
	Spain	<p>1. Until now was easier to obtain loans for new buildings projects than refurbish existing buildings.</p> <p>2. Subsidies can be asked for only by the apartment owner.</p>

Summary strategies for overcoming national specific legislative barriers to owners/ developers

Legislative barriers:	Summary strategies for overcoming national specific legislative barriers:
<p>1.No requirements on energy efficiency in the Swedish building regulations for existing buildings; The Swedish Housing Act (SE).</p>	<p>1.1. Formulate compulsory requirements for existing buildings in line with new buildings.</p> <p>1.2. EU targets that also encourage those who already have a low energy use.</p>
<p>2. Austrian Law of Tenancy (MRG): Criteria for rent increase proceedings are not clear (AT).</p>	<p>2. Clarify the definition of maintenance measures: thin insulation is, for example, state of the art and needs not to be verified as cost effective, but more insulation thickness needs an economic verification. So “cost effectiveness” should have clear definitions to get simple guidelines for its verification.</p>
<p>3. Austrian Condominium Act (WEG): Right of the “by-passed” minority prevents qualitative retrofitting measures (AT).</p>	<p>3. There should be exception-regulations within the right of the by-passed minority: for a few defined actions like comprehensive thermal retrofit of the building every owner has to share the costs if there is a majority for these measures.</p>

Legislative barriers:	Summary strategies for overcoming national specific legislative barriers:
4. The actual Spanish building rules are not much exigent in terms of thermal conditions (ES).	4. The building rules should be more flexible with the details or solutions and more exigent with de results.
5. Lack of definition for social housing in national laws (BG).	5. Formulate the conception of social housing in national laws.
6. Generally owners have rights only to construction of the dwelling but have no rights to the land, where the multifamily blocks are built The land under multifamily blocks is the ownership of the state or municipalities (BG).	6. It is necessary to cession the state/municipality territories, which satiated under multifamily blocks and between then, with the regulation of the territory to owners or investors.
7. Properties in multifamily buildings in 1968-1989 have been gained without clear definition of maintenance and managements for the owners. Lack of clear definition for building management (BG).	7. Formulate clear definition of building management in separate regulation to New Property Law.

Annex B. Subsidies for retrofit measures in Styria, Austria

(www.rosh-project.eu)

Retrofit measures – for example energy saving measures (thermal insulation, window replacement, modernisation of the heating system) – can be subsidized as part of the housing improvement act of the Federal State of Styria.

The actual amount of the subsidy depends on the amount of eco-points. The maximum amount per flat is:

Table 10 The actual amount of the subsidy

30.000 Euros	Basic subsidy, no eco-point
35.000 Euros	For one eco-point
40.000 Euros	For two eco-points
45.000 Euros	For three eco-points
50.000 Euros	For four eco-points

One eco-point is for example given for the connection to the district heating, for installation of a biomass boiler, a solar system, a heat pump, a ventilation system with heat recovery, or for thermal insulation measures (for the last, all U-values of outer structural elements have to meet the requirements of the thermal insulation directive).

Two eco-points are given for the installation of a biomass boiler or connection to district heating and an installation of a solar system, for installation of a biomass boiler and the installation of a ventilation system with heat recovery, or for thermal insulation measures if all U-values are at least 20 % below the requirements of the thermal insulation directive.

The subsidy consists of the granting of non refundable annuity subventions for eco-logical measures, energy saving measures and retrofit measures, for which at least one eco-point is given. For other improvement and maintenance measures, refundable annuity subventions are granted.

1. Solar subsidy in Styria

The installation of a solar heating system is subsidized by the province of Styria with a direct subvention. One condition among others is that the regional municipality also grants a subsidy for solar heating systems. Solar systems for domestic hot water, integration in the heating system and power production can be subsidized up to the following amounts, if certain requirements are fulfilled:

Table 11

Requirements:	For domestic hot water:	For integration in the heating system:	For photovoltaic installations:
Minimum aperture area	5 m ²	15 m ²	2 m ²
Subsidy amount	300 Euros basic allowance and 50 Euros per m ² installed collector area	500 Euros basic allowance and 50 Euros per m ² installed collector area	500 Euros basic allowance and 50 Euros per m ² installed solar module area.

The maximum amount lies at around 500 Euros per apartment for multifamily houses. The application is carried out after the installation of the system at one of the information centres or the respective municipality.

2. Biomass subsidy in Styria

The installation of a biomass boiler is subsidized by the province of Styria with a direct subvention.

An additional subsidy from municipalities is possible (but no requirement). Requirement (only a selection):

- The combustion plant complies with the regulations of the combustion plant directive;
- The power output of the combustion plant matches the heating energy demand of the building;
- No (economical reasonable) connection to district heating possible;
- The heating system must count as an overall heating system;
- The old plant has to be disposed.

The maximum amount of the subsidy is 25 % of the net investment costs, with the following boundaries:

Table 12

Pellet stove	800 Euros
Firewood stove	1.100 Euros
Tiled stove	1.100 Euros
Pellet-central heating systems	1.100 Euros
Wood chip central heating systems	1.800 Euros

The application is carried out after the installation at one of the information centres.

Annex C. Spanish important changes on building rules

Building rules prevalent in each period determine, under the energy point of view, the new buildings quality.

1. The most important changes on building rules have been the following:

Before 1977 no thermal and energetic rule for new buildings were applied. That means that around 40% of the existing buildings were built before any thermal rule and without no insulation at all.

- 1977: first building rule, Normas Básicas de la Edificación (NBE) including thermal performances (RD 1650/1977);
- 2000: municipal solar ordinances;
- 2006-2007: Implementation of building and energy efficiency EU directives:
 - Código Técnico de la Edificación (CTE) (Building Technical Code) (RD 314/2006);
 - Reglamento de Instalaciones Térmicas (RITE) (Thermal Installations Regulations) (RD 1027/2007);
 - New buildings energy efficiency certification (RD 47/2007);

Between 1979 and 2007 the usual typology of collective residential building had the following parameters: concrete structure; ceramic or concrete block envelope walls; envelope insulation (internal side or in air cavity); cement or ceramic finished façades; single pane glazing; wood window frames (most recently also plastic and aluminium frames are installed); individual heating systems, with gas boiler and radiators; centralized ventilation installations are only common in service and administrative buildings; renovation air heat exchangers are unusual; building air tightness usually is low; renovation air is procured by opening windows; heating and space refrigeration in most homes operate only during some hours per day; energy metering integrate many different consumptions (gas: kitchen, hot water, heating), so it's impossible to know separate heating or refrigeration expenditure; centralized heating or space refrigeration (and paying for the consumed energy using energy meters) are not usual.

2. New energy rules according to CTE (2006) and RITE (2007) - all the aspects of building design have changed. The most important improvements on the energy aspects are:

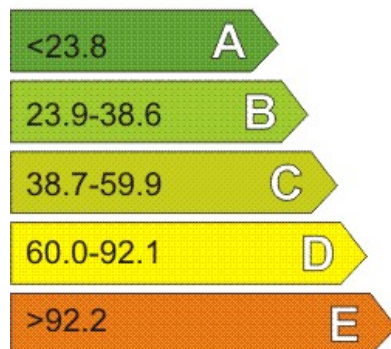
- Hot water - Solar equipments are compulsory in all buildings with HW demand.
- Heating and cooling: higher reduction of thermal transmissivity of building envelope (walls, roof and windows) than before; solar protection on windows;
- Ventilation:
 - Mandatory mechanical ventilation in new and multifamily buildings for improving the indoor air quality;
 - Mandatory maintenance programme

- Permanent forced ventilation without energy recovery from exhausted air will increase the energy losses during the space heating or refrigeration seasons
- Mandatory heat recovery from extracted air when air renovation is $> 0,5 \text{ m}^3/\text{s}$
- Mandatory free cooling when refrigeration unit power is $> 70 \text{ kW}$
- Individual energy consumption metering (hot water, heating and cooling) in centralize installation
- No reference to energy efficiency or heat recovery from extracted air.

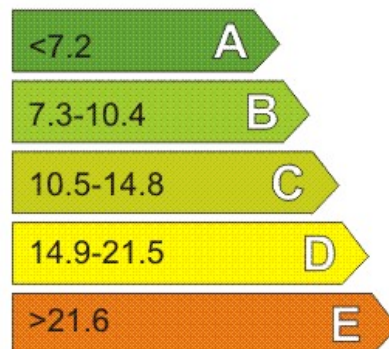
3. *New buildings energy efficiency certification* improved the energy information available to the final user of dwellings and other buildings types. The owner of all residential buildings to be sold or rented must to provide an energy efficiency certification (in terms of kg of CO₂ emissions and energy demand, kWh/m²). The energy consumption rates and CO₂ emissions rates (heating and cooling) for each certification level in Spain are showed in the following table:

Table 13

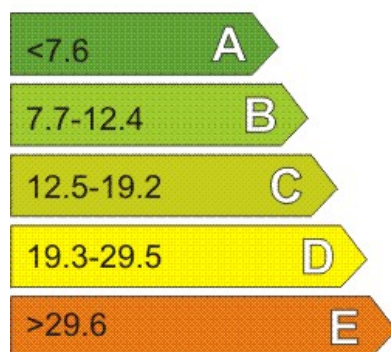
heating demand
kWh/m² year



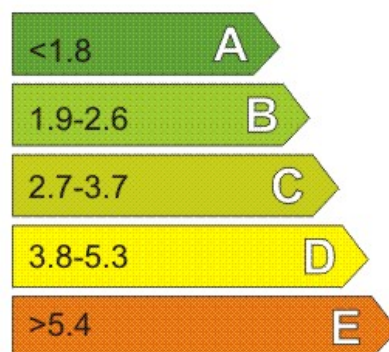
cooling demand
kWh/m² year



heating emissions
kgCO₂/m² year



cooling emissions
kgCO₂/m² year



The decision about major investments in the buildings depends of its ownership. The most usual situation is that the owners of the apartments are also the users, and the investments must be approved by the owner's community (all the owners of an apartment building). The decisions are regulated by the Horizontal property law. Owner's Community is also the responsible to contract the maintenance service for the common systems and building structure. Usually the maintenance is managed by the property administrator. The operation management of the buildings is also done by the property administrator.

Annex D. Finland organising of Building Management and Maintenance

Management - All the most important decisions in housing companies are made at the shareholders' meeting, at which an administrative board is also elected. The board usually consists of owners of apartments, that is, private individuals living in the building. The board appoints a property manager and auditors, either professionals or residents. The housing company is therefore a good example of resident democracy, where residents decide on housing matters themselves and bear the financial consequences of their decisions. Housing companies tend to be rather small, often comprising only one building.

Maintenance - Building maintenance includes the maintenance of technical systems, cleaning and the maintenance of out-door areas. The latter consists of snow clearing, waste collection and maintenance of out-door plants.

The janitor system has been popular in condo's. The janitor gets his payments directly from the housing company. Traditionally the janitor has made more housing services to the residents than the maintenance companies.

The sizes of the maintenance companies differ from the small regional companies to the big international companies. The buying of the services from these companies base on the contract in which the services are explained in detail.

When the residents are doing all the work themselves they are getting any fees from it. This way is very common in small housing companies. Participating to this work is voluntary.

The big building owners can have their own organisation which produces all the maintenance and management services. This way is used for example in social housing. Usually the big building owners use the mixture of all kinds of ways to maintain the buildings.



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