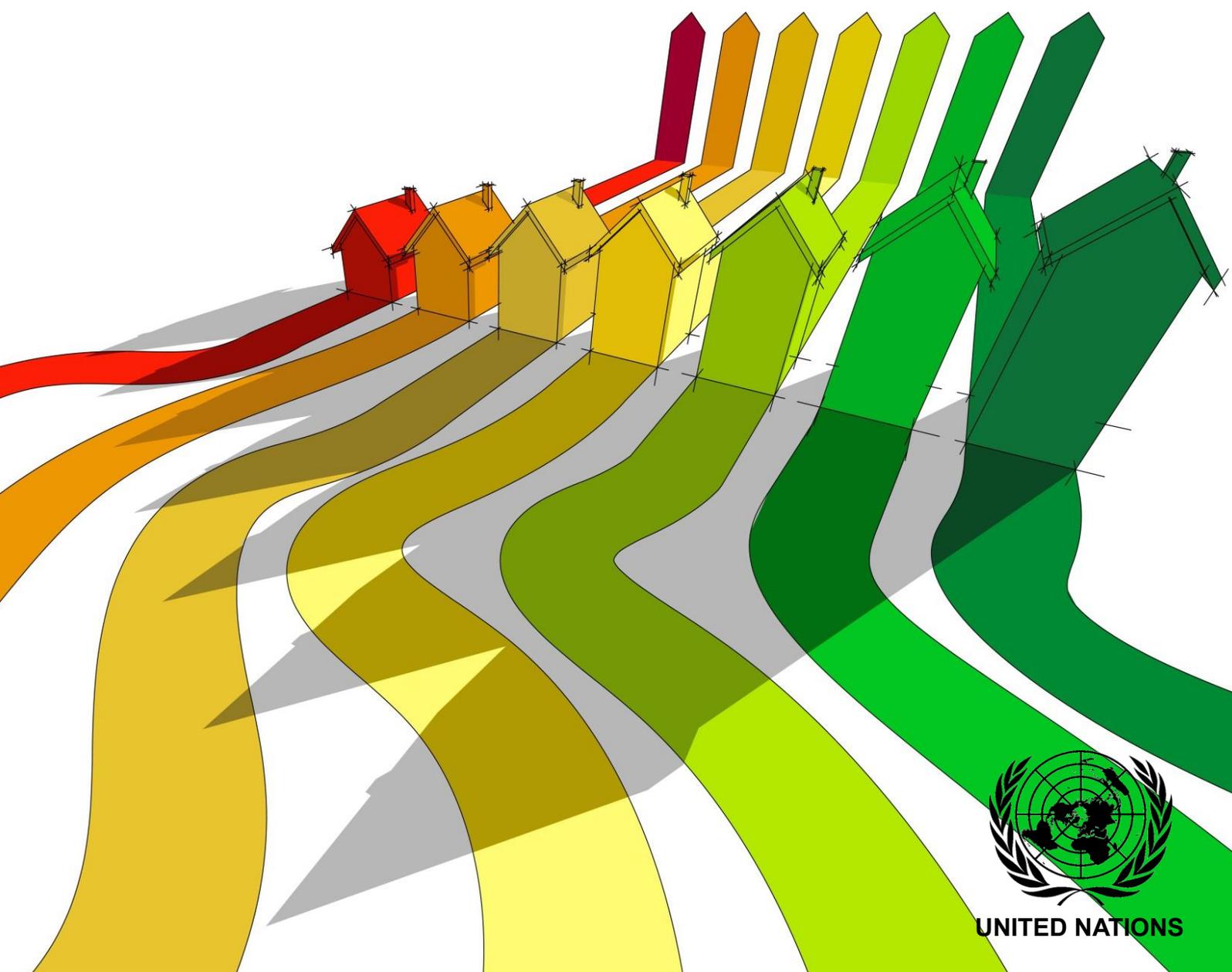


# GOOD PRACTICES

## FOR ENERGY-EFFICIENT HOUSING IN THE UNECE REGION



United Nations Economic Commission for Europe

United Nations Human Settlements Programme

# **Good Practices**

for energy-efficient housing  
in the UNECE region



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## FOREWORD

Houses define our living environment, and much of our leisure time is spent at home. Thus, our standard of living and our quality of life depend to a large extent on the quality of our houses.

We can improve our levels of comfort by renovating apartments and houses and, when doing so, we should always keep an eye on our energy consumption. Every maintenance and renovation activity is an opportunity to enhance a building's energy performance, helping residents save money by cutting their energy bills. Keeping energy bills down is important to overcome energy poverty, which is an important issue across Europe.

Energy efficiency also reduces greenhouse-gas emissions. A recent report by the International Energy Agency (IEA) confirms that energy efficiency remains the largest contributor to climate change mitigation. IEA suggests that energy efficiency, particularly in residential and commercial buildings, can dramatically reduce emissions, since the building sector accounts for almost 40 per cent of carbon-dioxide emissions from combustion.

The technology exists to do this, and has been adopted and tested in several countries. Yet achieving energy efficiency in residential buildings remains a major challenge for countries in the UNECE region. A UNECE survey on housing and land management revealed that housing energy efficiency is a priority challenge in member states. National and local governments have a key role in addressing this challenge by creating the conditions that enable home owners, residents, banks or the private sector to take action toward energy-efficient housing.

The present report provides practical recommendations to help overcome barriers to energy efficiency in housing. It illustrates them with some successful examples that can inspire action, in particular in transition countries. The report builds on the *Action Plan for Energy-Efficient Housing in the UNECE Region* – a concrete and comprehensive list of actions to support housing energy efficiency.

I trust that this report will provide Governments and stakeholders with hands-on ideas and guide them in creating a practical framework for housing residents. It should enable them to take action to make their homes more energy efficient and thus increase their living comfort and quality of life.

Sven Alkalaj  
Executive Secretary  
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# CONTENTS

ABBREVIATIONS.....	IX
EXECUTIVE SUMMARY AND KEY MESSAGES.....	X
INTRODUCTION .....	1
I. INTERNATIONAL BACKGROUND ON ENERGY EFFICIENCY IN HOUSING .....	6
A. Western Europe (EU 15, Norway and Switzerland), Canada and the United States .....	6
B. Central Europe and Baltic states (EU 12) .....	8
C. Eastern Europe, Caucasus and Central Asia .....	9
II. LEGISLATIVE AND REGULATORY FRAMEWORK.....	13
A. Background.....	13
B. Energy related legislation and regulation .....	14
C. Housing-related legislation .....	27
D. Key messages for transition countries.....	31
III. MANAGEMENT OF MULTI-FAMILY HOUSING STOCK .....	33
A. Background.....	33
B. Homeowners' associations .....	33
C. Professional managers.....	48
D. Key messages for transition countries.....	53
IV. AWARENESS RAISING AND BEHAVIOUR CHANGE .....	55
A. Background.....	55
B. Public information campaigns .....	56
C. Energy efficiency advice and information centres.....	59
D. Pilot projects .....	61
E. Key messages for transition countries.....	64
V. TECHNICAL MEASURES .....	65
A. Background.....	65
B. Demolish or renovate?.....	66
C. Systematic approach to building renovation.....	70
D. Energy measures implemented during renovation.....	73
E. New construction.....	91
F. Key messages for transition countries.....	99
VI. FINANCIAL MECHANISMS .....	102
A. Background.....	102
B. Energy tariffs and the motivation for energy-efficiency investments .....	104
C. Public financial support to homeowners' associations and individuals .....	105
D. State support to special-purpose financial institutions.....	108
E. Market based financial mechanisms.....	127
F. Key messages for transition countries.....	133
CONCLUSIONS.....	135
REFERENCES.....	137

## LIST OF TABLES

TABLE 1 – OVERVIEW OF ENERGY DIRECTIVES OF THE EUROPEAN UNION .....	15
TABLE 2 – ISO STANDARDS ON ENERGY PERFORMANCE OF BUILDINGS .....	17
TABLE 3 – MAXIMUM U-VALUE IN LARGE-SCALE REPAIRS IN SELECTED EU MEMBER STATES .....	20
TABLE 4 – CATALOGUE OF MEASURES TO IMPROVE HEAT INSULATION OF RESIDENTIAL BUILDINGS BASED ON THE ENERGY PYRAMID .....	81
TABLE 5 – OVERVIEW OF WORK ON HEATING, WATER, POWER AND GAS SUPPLY SYSTEMS IN RESIDENTIAL BUILDINGS .....	83

## LIST OF FIGURES

FIGURE 1 – LEGISLATIVE FRAMEWORK SCHEME FOR ENERGY EFFICIENCY IMPROVEMENTS IN EU MEMBER STATES .....	14
FIGURE 2 – ADMINISTRATIVE STRUCTURE OF A HOMEOWNERS’ ASSOCIATION .....	40
FIGURE 3 – THE ENERGY PYRAMID.....	55
FIGURE 4 – REALIZING ENERGY CONSERVATION OPPORTUNITIES (ECOS) .....	70
FIGURE 5 – REALIZING ENERGY CONSERVATION OPPORTUNITIES (ECOS) .....	71
FIGURE 6 – EXAMPLES OF NATIONAL ENERGY PERFORMANCE CERTIFICATES .....	75
FIGURE 7 – ENERGY-SAVING PYRAMID – TECHNICAL MEASURES .....	79
FIGURE 8 – THE C.A.S.E. PROJECT: MULTI-STOREY BUILDINGS IN PRETURO. INSTALLATION OF PHOTOVOLTAIC MODULES IN COMBINATION WITH SOLAR PANELS ON SOUTH FACING ROOFING.....	97
FIGURE 9 – GENERAL SCHEME FOR THE URBAN BLOCK WITH A PRELIMINARY IDEA OF THE PROTOTYPE BUILDING, SHOWING THE SEISMICALLY-ISOLATED PLATE AND INTERNAL PEDESTRIAN STREETS. THE FINAL SOLUTION ADOPTED HAS BEEN THE SINGLE SEISMIC PLATE FOR EACH BUILDING. ....	97
FIGURE 10 – STRUCTURE OF ACTIVITIES OF THE KREDEX GUARANTEE AGENCY (ESTONIA) .	115
FIGURE 11 – SURETIES ISSUED BY THE KREDEX GUARANTEE AGENCY FOR CAPITAL REPAIRS AND ENERGY-EFFICIENT MODERNIZATION OF APARTMENT BUILDINGS .....	116
FIGURE 12 – LOANS ORIGINATED BY COMMERCIAL BANKS FOR CAPITAL REPAIRS AND ENERGY-EFFICIENT MODERNIZATION OF APARTMENT BUILDINGS BACKED BY THE SURETY ISSUED BY KREDEX .....	116
FIGURE 13 – STRUCTURE OF ACTIVITIES OF THE STATE HOUSING DEVELOPMENT FUND (SLOVAKIA) .....	118
FIGURE 14 – SUBSIDY FACILITIES FOR THERMAL UPGRADING UPON AN ENERGY AUDIT. ....	119
FIGURE 15 – TOTAL NUMBER OF APPLICATIONS RECEIVED BY TYPE OF SUBSIDIES .....	120

## LIST OF BOXES

BOX 1 – TOWARDS AN INTEGRATED FRAMEWORK FOR ACHIEVING ENERGY-EFFICIENT HOUSING .....	4
BOX 2 – COMPONENTS FOR ENERGY-EFFICIENT HOUSING .....	6
BOX 3 – WHY MAKE YOUR HOME MORE ENERGY EFFICIENT? .....	9
BOX 4 – BARRIERS AND CHALLENGES TO ENERGY EFFICIENCY INVESTMENTS.....	11
BOX 5 – RECOMMENDED READING I .....	12
BOX 6 – RECOMMENDED READING II .....	15
BOX 7 – RECOMMENDED READING III.....	21
BOX 8 – THE IMPACT OF INDIVIDUAL METERING IN KAZAKHSTAN.....	22

BOX 9 – LEGISLATION FRAMEWORK FOR ENERGY SAVING AND ENERGY EFFICIENCY ENHANCEMENT IN OTHER COUNTRIES OF EASTERN EUROPE .....	25
BOX 10 – LEGISLATION FRAMEWORK FOR ENERGY SAVING AND ENERGY EFFICIENCY ENHANCEMENT IN CENTRAL ASIA AND THE CAUCASUS .....	26
BOX 11 – THE APARTMENT AS A PLEDGE IN HUNGARY .....	30
BOX 12 – SUPPORT FOR LOW-INCOME HOUSEHOLDS .....	39
BOX 13 – EXAMPLE OF CONDOMINIUM MANAGEMENT BY RESIDENTS THEMSELVES .....	41
BOX 14 – RECOMMENDED READING IV .....	42
BOX 15 – PROFESSIONAL EDUCATION OF HOUSING MANAGERS IN HUNGARY .....	50
BOX 16 – LATVIAN ASSOCIATION OF PROPERTY MANAGEMENT AND MAINTENANCE ENTERPRISES (LAPMME) .....	51
BOX 17 – ENERGY NEIGHBOURHOODS: COULD YOURS BE THE BEST ENERGY SAVING COMMUNITY? .....	56
BOX 18 – AN ENERGY PARTNER NEXT DOOR – TRAINING NEIGHBOURS IN ENERGY COUNSELLING .....	57
BOX 19 – WANT TO CHANGE BEHAVIOUR? START WITH KIDS .....	58
BOX 20 – VIDEO TRAINING BY THE RUSSIAN ENERGY AGENCY .....	58
BOX 21 – ENERGY COUNSELLING IN OULU, FINLAND .....	61
BOX 22 – QUICK FIXES FOR RENOVATION .....	73
BOX 23 – RECOMMENDED READING V .....	78
BOX 24 – RECOMMENDED READING VI .....	93
BOX 25 – LEED BUILDINGS .....	94
BOX 26 – SUBSIDIES FOR APARTMENT BUILDING RENOVATION DEPENDING ON LEVEL OF ENERGY SAVINGS .....	105
BOX 27 – SUBSIDIES FOR TECHNICAL EXPERT EXAMINATION AND ENERGY AUDIT OF RESIDENTIAL BUILDINGS .....	106
BOX 28 – ALLOWANCES TO LOW-INCOME PEOPLE TO COMPENSATE RENOVATION COSTS ....	107
BOX 29 – THE STATE HOUSING DEVELOPMENT FUND, SLOVAKIA .....	108
BOX 30 – THE FUND FOR FACILITATION OF THERMAL UPGRADING AND RECONSTRUCTION, POLAND .....	109
BOX 31 – THE PUBLIC HOUSING FUND OF THE MUNICIPALITY OF LJUBLJANA, SLOVENIA .....	109
BOX 32 – LOANS ORIGINATED BY STATE FINANCIAL INSTITUTIONS .....	110
BOX 33 – MEASURES TO REDUCE THE RISKS FACED BY COMMERCIAL BANKS WHEN GIVING LOANS TO HOMEOWNERS’ ASSOCIATIONS .....	111
BOX 34 – SUBSIDIZING INTEREST RATES ON THE LOANS MADE BY COMMERCIAL BANKS FOR THE PURPOSES OF CAPITAL REPAIRS AND UPGRADING OF HOUSING .....	112
BOX 35 – AVAILABILITY OF BANK LOANS FOR APARTMENT BUILDING RENOVATION AND ENERGY-EFFICIENCY ENHANCEMENT .....	127
BOX 36 – COLLATERAL-FREE LOANS FOR APARTMENT BUILDING RENOVATION IN BALTIC STATES .....	130
BOX 37 – CONSTRUCTION SAVINGS (BAUSPAR SYSTEM) IN SLOVAKIA .....	131

## LIST OF CASE STUDIES

CASE STUDY 1 – NATIONAL PLAN FOR ENERGY TRANSFORMATION IN GERMANY .....	19
CASE STUDY 2 – ENERGY SAVING AND ENERGY EFFICIENCY LAWS OF THE RUSSIAN FEDERATION .....	23
CASE STUDY 3 – CHANGES IN THE MAINTENANCE AND REPAIRS OF THE SLOVAK HOUSING STOCK .....	42
CASE STUDY 4 – DEVELOPING ENERGY EFFICIENCY TRADITIONS IN THE ESTONIAN HOUSING SECTOR .....	44
CASE STUDY 5 – ENERGY-EFFICIENT HOUSING PILOT PROJECT IN LITHUANIA.....	45
CASE STUDY 6 – ENERGY-EFFICIENCY ENHANCEMENT AS A RESULT OF PROFESSIONAL RESIDENTIAL PROPERTY MANAGEMENT IN LATVIA.....	52
CASE STUDY 7 – THE ‘WIEN ENERGIE HAUS’ CUSTOMER CARE CENTRE IN AUSTRIA .....	59
CASE STUDY 8 – THE BALTIC ENERGY EFFICIENCY NETWORK FOR THE BUILDING STOCK (BEEN) IN ESTONIA .....	62
CASE STUDY 9 – THE URBAN RENEWAL OF LEINEFELDE-WORBIS IN GERMANY.....	67
CASE STUDY 10 – ENERGY CERTIFICATES IN ESTONIA.....	76
CASE STUDY 11 – PAYBACK PERIOD OF ENERGY-EFFICIENCY INVESTMENTS IN URAL REGION, RUSSIAN FEDERATION .....	87
CASE STUDY 12 – RENOVATION OF APARTMENT BUILDINGS IN ESTONIA.....	89
CASE STUDY 13 – WOODEN MULTI-STORY HOUSING IN L’AQUILA IN ITALY .....	94
CASE STUDY 14 – THE FIRST NORDIC MERA PASSIVE HOUSE (BLOCK OF FLATS).....	98
CASE STUDY 15 – THE KREDEX AGENCY AS AN IMPLEMENTER OF THE MEASURES OF STATE SUPPORT FOR ENERGY-EFFICIENCY ENHANCEMENT IN ESTONIA .....	113
CASE STUDY 16 – THE ACTIVITY OF THE STATE HOUSING DEVELOPMENT FUND, SLOVAKIA	117
CASE STUDY 17 – THE ACTIVITY OF THE FUND FOR FACILITATION OF THERMAL UPGRADING AND RECONSTRUCTION, POLAND.....	119
CASE STUDY 18 – THEWOSAN-THERMAL REHABILITATION IN AUSTRIA .....	121
CASE STUDY 19 – RENOVATION PILOT PROJECT FOR MULTI-FAMILY BUILDINGS IN BULGARIA .....	122
CASE STUDY 20 – AMERICAN RECOVERY AND REINVESTMENT TAX ACT AS A CATALYST TO RETROFIT HOMES IN THE UNITED STATES .....	124

## ABBREVIATIONS

ARRA	American Recovery and Reinvestment Tax Act
AFD	Agence Française de Développement
BEEN	Baltic Energy Efficiency Network
BGK	Bank of the State Economy of Poland
BPIE	Building Performance Institute Europe
EBRD	European Bank for Reconstruction and Development
EERSF	Energy Efficiency and Renewable Sources Fund in Bulgaria
EPBD	Energy Performance of Buildings Directive
ESD	Energy Services Directive
ESCO	Energy Service Company
ESIB	Energy Saving Initiative in the Building Sector
EU	European Union
GBPN	Global Building Performance Network
GEF	Global Environment Facility
GWh	Gigawatt-hours
HVAC	Heating, ventilation and air conditioning
IEA	International Energy Agency
IFC	International Finance Corporation
INOATE	International Energy Co-operation Programme
ISO	International Organization for Standardization
ITACA	Institute for Innovation and Transparency in Procurement and Environmental Compatibility
IUE	Institute for Urban Economics
KfW	German national development bank
KliP	Climate Protection Programme of the City of Vienna
KredEx	Estonian Credit and Export Guarantee Fund
KWh/m <sup>2</sup>	Kilowatt-hours per square meter
KWh/m <sup>2</sup> year	Kilowatt-hours per square meter per year
LED	Light-emitting diode
LEED	Leadership in Energy and Environment Design
LAPMME	Latvian Association of Property Management and Maintenance Enterprises
MERA	Matala Energia Rakentaminen (Low-energy construction)
MoREEFF	Moldovan Residential Energy Efficiency Financing Facility
MWh	Megawatt-hours
NHF	National Housing Fund of Slovenia
OCEAN	Online Code Environment and Advocacy Network
OECD	Organisation for Economic Co-operation and Development
REA	Russian Energy Agency
SBC	Sustainable Buildings Centre
SEMISE	Support to Energy Market Integration and Sustainable Energy in the New Independent States
SLOVSEFF	Slovak Energy Efficiency and Renewable Energy Finance Facility
SMEs	Small and medium-sized enterprises
UNDP	United Nations Development Programme
UNECE	United Nations Economic Commission for Europe
UN-Habitat	United Nations Human Settlements Programme
USAID	United States Agency for International Development
WWFSG	Vienna Housing Promotion Act

## EXECUTIVE SUMMARY AND KEY MESSAGES

Realizing energy efficiency remains a challenge for countries in the East and West alike. However, solutions exist: using technology that is already available can reduce a building's energy consumption by 30 to 50 per cent without greatly increasing investment costs. Moreover, improving the energy performance of a residential building goes hand-in-hand with enhancing living conditions and reducing energy bills for residents. It also contributes to reducing fuel poverty and mitigating greenhouse-gas emissions while creating employment.

Retrofitting existing housing stock and, in particular, multi-family housing, was identified as a priority challenge across the UNECE region in a UNECE survey of member States. Because of the acute need in most transition economies to address problems in multi-family housing, the practices and initiatives described in this report predominantly target existing multi-family housing blocks. The discussions on legislation, housing stock management, financial mechanisms and technical solutions are focus on the residential building sector. Single-family housing is not the emphasis of this report, although some of the examples and solutions could also be extended to this sector.

A joint effort of UNECE, UN-Habitat and the City of Vienna, this report builds on existing work in the area, such as the *Action Plan for Energy-Efficient Housing in the UNECE Region* issued by UNECE in 2011. The objective of this follow-up report is to provide practical examples on how to implement proposed actions. Examples include case studies from the UN-Habitat Best Practices Centre for Central and Eastern Europe in Vienna and case studies specifically prepared for this publication. These case studies are practical, short and illustrative, with innovative ideas presented to facilitate the exchange of good practice.

As a result of a review of energy-efficiency improvement practices for the housing sector in the UNECE region, several success factors and important lessons have been identified in this report. They can provide food for thought for practitioners and decision-makers in transition countries, and encourage them to transfer lessons learned to their national and local contexts.

Key messages and lessons for transition countries are:

### **Political will and commitment are key driving forces to advance housing energy efficiency**

- Political will is needed in order to create the regulations, tax reductions and incentives needed to support renewable energy and energy efficiency policies and actions in housing.
- The price of energy in a country can be politically regulated. Energy prices which are too low can result in high levels of use.
- Building codes, technical norms and standards for residential buildings need to be set by governments in collaboration with technical experts and regularly revisited to take into consideration technological advancement. These should be binding for apartment owners, in particular. Building energy codes should set parameters for energy consumption.

- Lack of owner empowerment and motivation coupled with a lack of private initiatives are still among the major obstacles to improve energy efficiency in the housing sector. To overcome these, governments need to clearly define property rights and set legal obligations, which should include:
  - Compliance with building codes and technical norms and standards
  - Maintenance of common building areas and structures
  - Establishment of a building management structure
  - Regular contributions to a maintenance fund for the building

### **Public awareness about energy consumption is a first step to energy conservation**

- Evidence from European Union (EU) member states suggests that adding a competitive element to energy efficiency awareness campaigns encourages residents to reduce their energy bills. For instance, residents who know their neighbours are saving money may follow their example.
- Public authorities, as well as homeowner associations, have an important role in raising awareness and reaching out to the public on the need and means to reduce individual energy consumption. This includes technical measures to improve energy efficiency. Information should be targeted to particular groups, including schoolchildren, pensioners and low-income groups.
- It is effective to inform apartment owners or residents about different energy-efficiency options and their short-term and long-term costs and savings when they take important decisions, such as applying for a building permit before major renovations or new construction.

### **Residents should know their energy consumption and have control over their energy bills**

- Energy consumption is behaviour-related. Individuals have a range of options to reduce electricity consumption and heating bills and should be more aware of their consumption patterns. This requires that residents and homeowners' associations have free access to reliable information in order to make optimal decisions. This information can be provided by public authorities, research institutions, non-governmental organizations and, to a certain extent, the private sector. The role of energy providers is especially crucial in this regard.
- Energy consumption meters need to be installed in all apartment units so that households have control over their energy consumption and thus over their energy bills. Examples from Central European and Central Asian countries show that individual meters bring down energy consumption considerably and are often the first step when developing the legal framework for energy efficiency in housing. The data collected by meters also provides relevant information when issuing energy performance certificates for buildings and apartments.
- Resident participation increases their acceptance of a project. This involves consulting residents and inviting them to share their needs, concerns and ideas. Public authorities, developers and other stakeholders can then make informed decisions. Additionally, participation can build trust between residents and decision-makers and contribute to a positive attitude.
- Energy performance certificates for buildings are means for consumer protection, as they provide information on the quality of the apartment or the building, the long-term savings in energy bills and the healthiness of the living environment. Issuing these certificates requires

appropriate technical research programmes, trained auditors and the metering of energy consumption.

### **The whole building should be targeted for one-time renovation**

- Retrofitting an entire housing block is preferable to improving the energy performance of individual apartments. It is more energy and cost effective to first make repairs to a whole-building's common parts, including the outer walls, windows, roof and heating system before renovating individual apartments.
- Deep, or one-time, renovation of a building is recommended. However, due to financial constraints and lack of capital, residents in transition countries might not be able to afford one-time renovation. If this is the case, a step-by-step or gradual renovation should be pursued. This includes replacing building parts according to their lifecycle. However, if this approach is used, a comprehensive plan is necessary in order to guarantee that the different stages together will lead to an appropriate end result.

### **Demolition can be an alternative to building renovation**

- Under certain circumstances, demolition of existing housing stock can be an alternative to renovation. The decision to demolish should be taken after a careful assessment of the quality of the building stock. The assessment should include an analysis of the parts of the building and their energy efficiency, and a comparison of the cost of renovation with that of demolition and reconstruction.
- When constructing a new building, energy performance should be considered at a very early stage. It is cheaper to plan and design a low-energy building than to improve the energy performance of a building after it has been erected.
- A building audit should be conducted before renovation of a building starts. This audit, by a trained expert, should assess the building's energy performance and provide the basis for the development of a renovation plan.

### **Energy efficiency does not have to be expensive**

- There are several low- or no-cost options for residents to reduce their energy expenditures both before, during and after construction. These should be exploited before making any large investment. For example:
  - Reducing the cost during construction, for example, by installing sufficient insulation and tight connections between building parts. Rooms should not be too large, and passive heating can be used, for instance, by placing windows on the southern facade.
  - Reducing energy costs after construction by, for example, regulating the temperature and sealing windows.
  - Promoting inexpensive but highly effective measures such as sealing air leaks or replacing light bulbs. It is worth testing a variety of technological solutions in pilot projects which can then be used in large-scale retrofitting programmes.

### **Retrofitting existing buildings has long payback periods and requires additional incentives from governments**

- Retrofitting existing housing blocks to meet energy-efficient building standards will generally not be possible without additional costs. Therefore, aim for high building performance but keep in mind that it is more important to focus on achieving the greatest possible energy savings while keeping investment costs at a reasonable level.
- Energy efficiency investments can be repaid through reduced energy bills. However, retrofitting existing buildings has long payback periods, especially if energy tariffs are low. Therefore, financial support from local or national governments is needed to reduce the payback period in order to make investments more attractive to residents.
- In many countries, high interest rates also extend payback periods of retrofitting projects. Additionally, the low income level of many residents increases the need for public subsidies.

### **Energy efficiency investments should be bankable**

- Instead of paying rent, property owners invest in their property. Therefore, they should be highly motivated to invest in energy efficiency measures to improve the comfort and value of the property, including investing in the common parts of the building. Local and national governments should provide a set of incentives to encourage homeowners' associations to upgrade their property by improving its energy performance.
- Affordable credits and loans for apartment owners and homeowners' associations should be offered by commercial banks in order to improve the energy performance of apartments and multi-family housing blocks. Savings from reduced energy bills can be used to pay back the loan. In transition countries, governments need to facilitate the creation of a market for energy efficiency loans.
- Experience shows that homeowners' associations take debt seriously and often repay loans faster than required, making them reliable clients for commercial banks.
- Government financial support can be provided on the conditions that a certain portion of the costs is financed by residential property owners themselves (out of their savings or borrowings), and that it is confirmed that investments in energy efficiency really took place. This has proven to be effective when the level of state support depends on the percentage of energy savings achieved by the renovation.

### **Every building needs a manager**

- In multi-family housing blocks, common parts such as roof, staircases, technical and service systems and plot of land are under the joint responsibility of all apartment owners. They should be jointly managed and maintained through a homeowners' association. For multi-family housing blocks, membership in homeowners' associations should be compulsory. Such associations safeguard the interests of individual owners.

- A maintenance fund should be established for each multi-family housing block and administered by the board of the homeowners' association. This fund can be used to cover expenditures from maintenance, repairs and renovations to improve the building's condition and energy performance. Regular contributions to the fund should be compulsory for all owners and weighted on the basis of ownership fraction - freeriding should not be possible. If an owner gets into arrears to the fund, his/her property should be ultimately be used as collateral.
- Managing apartment buildings requires certain competences and skills. This requires governments to set standards for apartment-building maintenance. Certified vocational training in building management and maintenance should also be available for private management companies and individuals. Moreover, it should be the role of the government to create a market for professional managers and firms. Relevant good-quality training for professionals such as architects, engineers and energy-efficiency evaluators can be ensured by allowing only accredited professionals to work in financially-supported renovation projects.

#### **State support measures are important at the transition period**

- When implementing projects for energy-efficiency upgrades of apartment buildings, government support to homeowners should include co-financing, other grants and special measures to support low-income households to cover renovation costs.
- Governments should support the establishment of special financial institutions to facilitate the implementation of projects for energy-efficiency upgrades of apartment buildings. This will promote lending for the energy-efficiency renovation of residential buildings in transition economies. Financial institutions should aim to reduce, with the help of guarantees, the risks of loans.
- High energy prices are an important driving force for investing in energy efficiency. Fair tariff regulation and staged increases of tariffs for utility services provided to residents in housing stock are important for developing countries.

## INTRODUCTION

*“Energy efficiency is not just low-hanging fruit; it is fruit that is lying on the ground”*

Steven Chu, former United States Secretary of Energy  
on the easiest way to reduce the world's carbon footprint  
*The Times*, London, 26 May 2012

The need for an energy-efficient housing sector is stronger than ever. In the UNECE region, buildings are responsible for approximately one third of total final energy consumption.<sup>1</sup> Three quarters of this energy consumption is by the residential sector.

Achieving energy efficiency remains a challenge for countries in the UNECE region. At the same time, there are solutions: existing technology can reduce a building's energy consumption by 30 to 50 per cent without greatly increasing investment costs.<sup>2</sup> Moreover, improving the energy performance of a residential building goes hand-in-hand with an increase in living comfort and a reduction of energy bills. It also contributes to reducing fuel poverty and mitigating greenhouse-gas emissions, while also creating employment.

Investments in energy efficiency are cheaper than investing in new energy production capacity. The World Bank estimates that enhancing energy efficiency in Russia would cost only about one third of increasing the energy supply.<sup>3</sup> In 2006, member states of the International Energy Agency (IEA) with no energy savings from reduced energy intensity consumed, on average, close to 17 per cent more energy. In the United States, energy efficiency is considered the largest domestic energy resource, as today's energy consumption would be 55 per cent higher if there had been no efficiency improvements since 1973.<sup>4</sup>

This report has been prepared to stress the viability of an energy-efficient housing sector, raise awareness of options and suggest ways to remove barriers to investments in energy efficiency. Using practical examples from countries across the UNECE region,<sup>5</sup> the focus is on illustrating what has worked, where and why.

What functions well in one country may not work in another. Thus, the cases should be considered information for practitioners and decision makers in transition countries to encourage them to reflect on the examples and eventually transfer lessons learned to their national and local contexts.

Hands-on, short and illustrative case studies with innovative ideas are presented to facilitate the exchange of good practice. Cases describe experiences from Western Europe and North America as well as from Eastern European, Caucasus and Central Asian countries. Key messages and learning elements for transition countries are summarized after each section. Interesting facts and short examples from different UNECE member states are featured in boxes.

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<sup>1</sup> UNECE 2012a

<sup>2</sup> Metz et al 2007

<sup>3</sup> IFC 2008

<sup>4</sup> Alliance to Save Energy 2012

<sup>5</sup> The UNECE has 56 member states reaching from North America to Western Europe, Eastern and Central Europe to Caucasus and Central Asia.

This publication does not claim to be exhaustive; much information on energy efficiency, housing, and related themes is already available. Other recommended publications and studies are referenced for readers interested in taking a closer look at certain aspects of energy efficiency.

The target audiences for this report are policy makers and practitioners involved in developing, managing and promoting energy-efficient housing at the national and subnational level in the UNECE region. It may also be of interest to the private sector, homeowners, homeowners' associations in multi-family housing blocks and technical experts. While the report is designed mainly for Eastern Europe, the Caucasus and Central Asia, the examples presented may also be of interest to policy makers and practitioners in other countries in and beyond the UNECE region.

This report is a joint effort of the UNECE, the United Nations Human Settlements Programme (UN-Habitat) and the City of Vienna under the Global Network for Sustainable Housing. It builds on existing work in this area: the report structure is based on the *Action Plan for Energy-Efficient Housing in the UNECE Region*<sup>6</sup> issued by UNECE in 2011. The objective of this follow-up report is to give practical examples on how to realize proposed actions. Examples include case studies from the UN-Habitat Best Practices Centre for Central and Eastern Europe in Vienna<sup>7</sup> and case studies prepared for the report by international experts who participated in an expert group meeting on good practices for energy efficiency in the housing sector, which was organized in Vienna on 26 and 27 February 2013 and supported by Wien Energy and Tina Vienna.<sup>8</sup>

## Report focus

“Improved energy efficiency in housing is defined as achieving reduced energy intensities in residential services without compromising the well-being of the residents or the environment.”<sup>9</sup> The primary intention of this report is not to recommend the highest building performance standards but to achieve the greatest energy saving possible while keeping investment costs at a reasonable level.

With a life span of 150 years and more, buildings are among the longest-lasting manmade physical structures. This means that in the UNECE region, the majority of buildings that will exist in 2050 have already been built. The annual rate of construction of new residential buildings is less than one per cent of the existing building stock.<sup>10</sup> It is, therefore, crucial to optimize the energy performance of existing residential buildings in order to reduce emissions and energy consumption. Therefore, retrofitting existing housing stock, in particular multi-family housing, has been identified as a priority challenge across the UNECE region, according to a survey of UNECE member States.<sup>11</sup>

Practices and initiatives described in this report target existing multi-family housing blocks, not single-family housing. The discussions of legislation, housing stock management, financial mechanisms and technical solutions relate to the residential building sector.

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<sup>6</sup> UNECE 2010

<sup>7</sup> <http://www.bestpractices.at/database/>

<sup>8</sup> Workshop materials are at <http://www.unece.org/index.php?id=31990>

<sup>9</sup> UNECE 2010

<sup>10</sup> BPIE 2011

<sup>11</sup> UNECE 2013

Retrofitting an entire housing block is preferable to improving the energy performance of individual apartment units. Higher levels of efficiency can be achieved when retrofitting activities are coordinated among all owners of the housing block. A whole-building-based approach makes repairs of common parts, including the roof and the heating system, more effective. Furthermore, it avoids negative effects on the thermal performance of the building envelope caused by different levels of facade insulation. Therefore, this report promotes the creation of decision-making and management structures in multi-family housing blocks and financial mechanisms to target the whole building instead of only individual apartments.

It should also be noted that the report considers energy consumption of buildings in a traditional sense, focusing on technological improvements to reduce operational energy needs for heating, ventilation, and air conditioning (HVAC). The report does not take into account the energy consumed by raw materials, transportation, building construction, installation and demolition as part of the overall life-cycle of a building.

The energy performance of housing is also influenced by the design of the surrounding built environment. Therefore, energy efficiency considerations need to take into account spatial planning and the broader urban context. More information on the nexus of spatial planning and energy consumption can be found in the publications recommended in Box 5.

### **Promoting an integrated framework for energy-efficient housing**

As pointed out in the UNECE study *Green Homes*,<sup>12</sup> to improve the energy efficiency and living comfort of their housing stock, transition countries need information, motivation, experience, capacity, technology and funds.

This report suggests an integrated framework of action to address key regional challenges in the sustainable and energy-efficient management of housing stock. To ensure a comprehensive improvement of energy efficiency, it promotes:

- The creation of an institutional, legal and financial framework
- Financial mechanisms to encourage energy savings in the residential sector
- Management of the housing stock in an energy-efficient manner, in particular for condominiums
- Refurbishment of existing housing stock in an optimal energy-efficient manner
- Affordable and energy-efficient housing

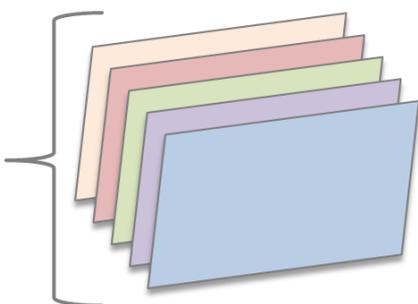
An integrated framework for energy-efficient housing consists of different areas of action or “layers”. The interconnected layers aim to ensure an effective framework for energy efficiency in housing (see Box 1).

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<sup>12</sup> UNECE 2012a

## Box 1 – Towards an integrated framework for achieving energy-efficient housing

Integrated framework  
for energy efficient housing



**Legislative framework**  
**Management of multi-family housing block**  
**Awareness raising and behaviour change**  
**Technical measures, including building assessment**  
**Financial mechanisms**

- **Design a legislative framework** composed of energy and housing legislation, civil code, property rights and technical norms
- **Create management structures** in multi-family housing blocks that have the necessary technical information on the building, the mandate to take investment decisions and knowledge of funding possibilities
- **Raise awareness** on energy efficiency benefits and prospects, and make information available to the public and building managers in order to change behaviour
- **Conduct building assessments** that provide reliable information on the entire building as the basis for maintenance and renovation decisions and **use appropriate technical measures**
- **Develop and provide access to financial instruments** that support investment in housing stock beyond the financial capacity of homeowners' associations

Source: Based on UNECE 2011

### Structure of the report

The chapters of this report are structured according to the integrated framework for energy-efficient housing presented in Box 1. Each chapter represents one component or layer of this framework. Concrete actions to implement this framework can be found in UNECE 2011.

Creating a comprehensive framework for energy efficiency cannot be achieved overnight. One answer to the question “where do we start with creating such a framework?” is suggested by the sequence of the chapters. However, it is important to keep the entire framework and its interconnected layers in mind while starting with one level and then gradually moving to the next.

**Chapter I** gives an overview of the status of energy efficiency in housing in UNECE member States by briefly outlining the situation in different subregions. It also summarizes the key arguments for and barriers against investment in improving energy performance in residential buildings.

**Chapter II** looks at legislation related to energy and housing. Both types of legislation need to be in place to ensure that energy efficiency legislation can be applied successfully to residential buildings.

**Chapter III** presents the important role of homeowners' associations in managing multi-family housing blocks. It describes the role of different actors, including private management companies, in the decision-making processes.

**Chapter IV** describes different options for raising awareness and providing information on energy-efficiency benefits to promote behaviour changes in residents.

**Chapter V** outlines a systematic approach for building maintenance and renovation to improve energy performance.

**Chapter VI** looks at different financial mechanisms to finance investment in residential energy efficiency and describes how governments can make the transition from state-funded to market-based instruments.

**Chapter VII** concludes the report with key lessons for transition countries.

## I. INTERNATIONAL BACKGROUND ON ENERGY EFFICIENCY IN HOUSING

Countries in the UNECE region have very different starting points and experiences in enhancing the energy performance of the residential building stock. Due to the location of many UNECE member states in cold and temperate climates, on average over 80 per cent of household energy consumption is spent on heating and hot water supply.<sup>13</sup> Some countries spend up to 40 per cent of their energy resources on heating residential buildings. Research suggests that a minimum of 75 per cent of buildings in Europe need to be modernized to reduce energy consumption.<sup>14</sup> Box 2 summarizes the necessary components for energy-efficient housing.

The following section provides a snapshot of the housing stock and describes experience in residential energy efficiency in the various UNECE subregions. In addition, benefits, opportunities, challenges and risks for energy efficiency investments are summarized in Box 3 and Box 4.

### Box 2 – Components for energy-efficient housing

**Improving housing energy efficiency may include the following aspects:**

- Awareness of energy consumption and behaviour change in residents
- Retrofitting existing housing to achieve high energy efficiency standards
- High energy standards for newly built homes
- Energy-efficient utility systems providing services to housing
- Low-energy housing management systems
- Replacement of inefficient equipment, appliances and lighting systems
- Good environmental quality in spatial planning
- Environmentally friendly building practices
- A minimized carbon footprint for the housing sector
- Housing energy affordability

Source: UNECE 2011

### A. Western Europe (EU 15, Norway and Switzerland), Canada and the United States

In the EU, three quarters of the building stock is residential; of this, apartment blocks account for 36 per cent and single-family houses for 64 per cent.<sup>15</sup> The annual growth rate in residential buildings is

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<sup>13</sup> UNECE 2012a

<sup>14</sup> Gentsler et al 2009

<sup>15</sup> BPIE 2011

around one per cent. This low rate in recent years can be explained by the impact of the financial crisis on the construction sector.

More than 40 per cent of residential buildings in this region were constructed before the 1960s, before major energy efficiency regulations for buildings were put in place. According to the Building Performance Institute Europe (BPIE), the largest energy saving potential lies in these buildings as “some buildings from 1960 are worse than buildings from earlier decades”.<sup>16</sup>

The experience of Western countries with energy building regulations dates back to the fuel and energy crisis in the early 1970s. At that time, skyrocketing prices for fossil fuels particularly affected the economies of energy-importing countries, which in response had to reduce their energy consumption to increase energy security. National programmes on energy saving were therefore adopted. In the United States, the first energy-efficient building was designed in 1972. Measures introduced included speed limits and restricted the sale of petrol to individuals. In the building sector, energy consumption standards and requirements to improve building insulation were introduced. Such standards and requirements are today part of government regulations.

At the same time, governments in Western Europe started to develop administrative and legislative measures to increase the efficient use of fuel and energy in many economic sectors in order to reduce dependence on energy imports and increase energy security. In 1976, Germany became the first country in Europe to adopt a law on energy saving, recognizing that the level of energy consumption for heating and hot water in buildings was too high. The law regulated the heat insulation of buildings, energy efficiency in heating devices and the distribution of payment for heating.

In the 1980s, state measures on energy efficiency were adopted in France, Belgium and Denmark. These countries made a breakthrough in managing energy demand through tariff differentiation to reduce energy consumption during peak hours and seasonal peaks by offering preferential tariffs during other times.

Eventually Western countries developed comprehensive regulations for energy efficiency. At the national level, this includes:

- Legislative frameworks and norms promoting energy savings and the supporting the implementation of energy-saving technologies and research and development in energy saving
- National standards for new construction and the modernization of existing housing stock
- Comprehensive energy efficiency national plans and programmes, including financial incentives and public outreach to encourage energy efficiency and savings.

While energy is considered a national competence of EU member states, directives at the EU level influence national legislation on this matter in the following ways:

- Legislative frameworks in the form of EU directives, which are an important factor for enhancing energy efficiency and developing energy-servicing activities. They also help the convergence of national legislative norms and practices (see Chapter II: Legislative and Regulatory Framework)
- Supporting and conducting energy surveys for implementing and tightening periodic energy efficiency standards and systems for labelling energy-consuming equipment and devices

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<sup>16</sup> BPIE 2011

- Requiring new building construction to follow nearly zero-energy standards from 2020

## **B. Central Europe and Baltic states (EU 12)<sup>17</sup>**

This subregion comprises the 12 EU member states that joined the EU in 2004 and 2007. Nearly half of the existing housing stock in these countries was constructed between 1960 and 1990.<sup>18</sup> During this time, new housing construction was primarily pre-fabricated large-scale multi-family housing blocks built with little or no consideration of energy efficiency. For example, this type of housing is 70 per cent of the housing stock in Bucharest and 45 per cent in Sofia.<sup>19</sup> A key characteristic of housing stock in this subregion is the predominance of private homeownership. Mass privatization in the 1990s resulted in owner-occupation rates from 80 to over 90 per cent, which is well above the 65 per cent average in Western Europe. In most cases, the transfer from public to private ownership took place within two to three years by transferring the right of ownership to sitting tenants.

Mass privatization may have been the best solution to a difficult situation, but the speed with which it needed to be done left many Central European and Baltic countries without an adequate regulatory framework for managing and maintaining of these buildings. New homeowners had few resources to manage and maintain their own apartment, let alone common building facilities in multi-family housing units.

The housing stock in many countries with economies in transition is ageing prematurely and deteriorating as a result of limited funds, a change of management, a lack of maintenance and low quality construction and materials. Residential buildings are often very energy inefficient.

Although most countries have begun introducing laws to regulate the operation of homeowners' associations, this needs to be done faster and on a broader scale. Today, the management and rehabilitation of high-rise multi-family housing is one of the largest problems facing municipalities in Eastern European countries in transition.<sup>20</sup> This was confirmed by a 2013 survey of UNECE member States.<sup>21</sup>

Housing renovation in Central European and Baltic states started in the mid-1990s with small, self-made repairs initiated by owners of detached houses and apartments in multi-family housing blocks. Major obstacles to coordinated investments in the whole building include a lack of decision-making and management structures among owners, leading to a lack of owner empowerment. To compound the situation, there is a general lack of private initiatives, and even government support can vary from country to country. Usually, government support includes two components: direct financial support for the modernization of apartment buildings and incentives for bank loans for housing renovation.

All Central European and Baltic countries have implemented pilot projects to improve the energy performance of apartment buildings. International organizations have often played an important role in funding and realising these projects. In recent years, building-refurbishment projects have increased in scale.

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<sup>17</sup> The challenges in Southeastern Europe are also similar to those in Central Europe and the Baltics.

<sup>18</sup> BPIE 2011

<sup>19</sup> UN-Habitat 2011

<sup>20</sup> UN-Habitat 2011

<sup>21</sup> UNECE 2013

The creation of a legal, financial and organizational framework to improve the energy performance of housing stock in these countries is closely linked to EU legislation. All countries in this subregion adopted EU directives on energy efficiency in their national legislation. The sharp increase in prices of imported fossil fuels, primarily from the Russian Federation, is another incentive for national governments to invest in energy efficiency. However, some countries have improved residential energy efficiency more than others.

### Box 3 – Why make your home more energy efficient?

**Improved energy efficiency in housing can create the following benefits and opportunities:**

- **Environmental benefits.** As most anthropogenic emissions of greenhouse gases are caused by energy generation from fossil fuels, energy efficiency and the use of renewable energy in housing help mitigate global climate change. Energy-efficient housing is also a local climate change measure that reduces the exposure of households to adverse weather conditions.
- **Energy availability and energy security.** Improved energy efficiency in housing opens up more energy for alternative uses and for growing energy demands in the housing sector itself. Energy importing countries are less dependent on external energy resources, while energy exporting countries can increase their exports or meet growing domestic demand. For example, the EU imports about half of the natural gas it consumes. According to estimates, natural gas imports will account for 84 per cent of consumption 2030. Energy security also reduces the risk of a country being destabilized by energy shortages or price inflation.
- **Financial benefits.** Better efficiency offers savings on running costs for tenants, while service providers suffer less loss in energy-service delivery. Investing in energy-efficient homes provides greater and quicker savings than increasing energy production. The development of this sector also has positive impacts on research and innovation, employment, investment, the development of small and medium-sized enterprises (SMEs) and the competitiveness of national economies.
- **Regeneration of the built environment.** Retrofitting homes and using proper technologies for homebuilding can significantly improve indoor comfort and give longer cycles of property repair. Comprehensive programmes also enhance the aesthetics of domestic buildings and surrounding public areas, making the urban environment more attractive.
- **Social effects.** Energy-efficiency improvements in housing improve public health and comfort and address the issues of energy affordability. As a result, they mitigate social exclusion and inequality, fostering social cohesion. Moreover, they lower energy costs for residents and therefore contribute to reducing energy or fuel poverty.

Source: Adapted from UNECE 2012a

## C. Eastern Europe, Caucasus and Central Asia

The housing stock in this subregion has similar characteristics to that in Central Europe. There are many multi-family panel-built housing blocks that have deteriorated over time and have low levels

of energy efficiency. Mass privatization after the collapse of the Soviet Union led to very high rates of private homeownership.

As countries in this region are mainly located in cold climate zones, energy and heating efficiency should be a major concern for governments and residents. However, the awareness of potential energy savings is lower than in Central Europe, and, probably, fewer than 30 per cent of homes have meters for electricity or heat. In addition, subsidized energy prices in some countries do not create sufficient financial incentives for energy conservation.

Despite this, energy efficiency was identified as priority challenge in the housing sector.<sup>22</sup> For the time being, activities are limited to the implementation of pilot projects in selected multi-family buildings in order to develop experience with different technologies and materials. These activities are usually supported by international organizations (such as the UNDP or Global Environment Facility [GEF] in Kyrgyzstan, Kazakhstan or Armenia) and include advice on developing legislative and technical standards. Some small-scale projects by individuals also exist in the absence of government regulation and organizational and financial support. As in Central European and Baltic countries, renovation practices are usually concentrated on individual apartment units only.

Finance mechanisms are usually introduced by international development banks. For instance, in Ukraine, a technical assistance programme for housing stock was implemented in 2010, financed by the Special Fund of the European Bank for Reconstruction and Development (EBRD). In Moldova, the EBRD designed a programme to finance energy efficiency enhancement in the Moldovan housing sector called MoREEFF (Moldovan Residential Energy Efficiency Financing Facility). The programme provides credit lines to selected Moldovan banks which can then offer loans to homeowners, homeowners' associations and housing management companies for energy efficiency improvement in residential buildings.

In the Russian Federation, two distinct approaches address the issue of energy-inefficient apartment buildings. In one programme, new energy-efficient houses are constructed using state funds to resettle the residents of unsafe buildings. At the end of 2012, 22 energy-efficient buildings in six federal districts of the Russian Federation were erected. An additional 21 buildings are under construction.<sup>23</sup> The application of technologies, use of materials and equipment depend on the climate and the capacities of service providers.

In another programme, initiatives focus on the renovation of existing housing stock. Renovation to increase energy efficiency is not given high priority, though Russian public authorities continue to work for capital repairs in apartment buildings, in particular on specific elements such as elevators and roofs.

For some countries in the subregion, such as Azerbaijan, Tajikistan, Turkmenistan and Uzbekistan, there is very little information available on existing energy efficiency initiatives.

The experience gained by economies in this subregion is still extremely limited. Energy-efficient housing stock has not become a top state priority in any of these countries. Energy-efficiency policies are not pursued systematically. They are implemented within the framework of international cooperation programmes with international organizations or (rarely) are based on the

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<sup>22</sup> UNECE 2013

<sup>23</sup> Russian Federation Assistance Fund for Housing and Communal Services 2013

private initiatives of apartment residents. As a next step, existing initiatives need to be scaled up from the pilot level to large-scale programmes.

#### Box 4 – Barriers and challenges to energy efficiency investments

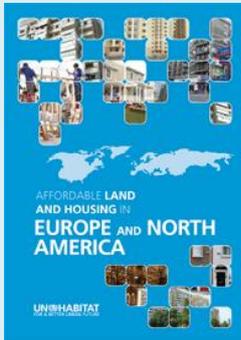
**Energy efficiency investments can be controversial. Several barriers and challenges to such interventions exist:**

- **Environmental challenges.** To ensure the maximum reduction of emissions and energy, the best technology should be applied when retrofitting existing housing or constructing new buildings. Often, such technologies are not yet available in countries with economies in transition, and the diffusion of new materials and technical solutions is still low.
- **Energy availability and cost.** For political and social reasons energy prices are kept artificially low in some countries in the region. Low energy prices and subsidized energy tariffs distort the actual cost of fuel and energy supply and production. Such low energy prices do not encourage the efficient use of energy and do not adequately take into account the capital, infrastructure and environmental costs of fossil fuel-based energy production and consumption.
- **Economic barriers.** Not every energy efficiency investment is actually cost-effective and some measures come with very long payback periods. Also, due to the lack of finances, not every investment to renovate a building is affordable for the owner or tenant. Furthermore, commercial banks may not be aware of the business potential of energy efficiency investments, so loans and other financial instruments are not available to individuals or associations. Where such instruments do exist, owners might be hesitant to use their apartment as collateral. Moreover, energy efficiency can create employment in certain sectors and destroy jobs in another.
- **Regeneration of the built environment.** Failing to use or correctly apply proper technology for retrofitting homes can cause moisture problems and promote the formation of mold, with a negative impact on the health of residents. Furthermore, an increase in property value after retrofitting of a building might lead to increased rent and the exclusion of low-income groups.
- **Social challenges.** As energy efficiency interventions are, to a large extent, behavior-related, the lack of awareness of energy consumption and possibilities to reduce it is a major barrier. Not having individual electricity and heat meters installed can contribute to this. In addition, concerns about covering investment costs and lack of support mechanisms also reduce or hinder investments in energy efficiency.

Source: Adapted from UNECE 2012a

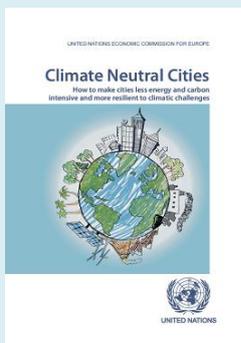
## Box 5 – Recommended reading I

### ***Affordable Land and Housing in Europe and North America (UN-Habitat 2011)***



This investigates the state of affordable land and housing in Europe and North America. It explores major trends in housing provision, conditions, availability, and quality and analyses housing policy responses and practices. It provides key recommendations for local, national and international policy initiatives to increase affordable housing supply.

### ***Climate Neutral Cities (UNECE 2012b)***



This provides an overview of the importance of cities for energy reduction, climate protection and climate adaptation. It discusses actions that cities in the UNECE region need to take in order to reduce their energy intensity, carbon footprint and vulnerability to climate change. The report presents information targeted to relevant urban sectors, such as energy, buildings and green space, with the overall aim of advancing sustainable development and ensuring green growth. It concludes by introducing a City Roadmap for Climate Neutrality, including milestones for actions in priority sectors.

This brief overview of status and experience in housing energy efficiency illustrates the great differences across the UNECE region. While many Western European countries have implemented energy efficiency measures since the 1970s and today have legal, financial and institutional frameworks in place, countries in Central Europe and the Baltic region started energy efficiency programmes more recently. The latter have, however, already shown improvements in housing-sector energy performance.

In Eastern Europe, Caucasus and Central Asia, some countries are making their first steps in the form of pilot projects, while others do not yet have any relevant experience. In this subregion, pilot projects are usually initiated by international organizations rather than local communities or public authorities. Some countries are now using what they learned from these projects to implement large-scale programmes to retrofit housing stock. This includes: establishing a regulatory and legislative framework and the necessary organizational and financial institutions; raising public awareness of the benefits of energy efficiency; and involving commercial banks and businesses in energy efficiency activities.

## II. LEGISLATIVE AND REGULATORY FRAMEWORK

### A. Background

The development of the legal framework for energy efficiency in the residential sector in Europe and North America differs considerably from that in countries in transition. As major users of energy, these areas were hit hard by the energy crisis in the early 1970s, forcing them to recognize the importance of energy saving and form a legal framework for it. Energy-performance standards are being made more stringent in response to climate change and the need to encourage the efficient use of resources. Meanwhile, energy-efficiency improvements in Eastern Europe, Caucasus and Central Asian countries have acquired national relevance only in the last decade.

Legal systems and legislation differ from country to country, as they are deeply connected with each country's historical development. Regulations are built into the legislative system and linked with each country's laws and have to be analysed in the national and political context of that country. Therefore, no one piece of legislation is recommended as best or good practice in this report.

"Improving energy efficiency is a long-term policy commitment. In the building sector, policies are effective not over two or three years, but two or three decades".<sup>24</sup> Both the legal framework and national programmes are of interest. The legal framework creates benchmarks based on target indicators for energy consumption in the housing sector. National programmes frequently offer organizational and financial mechanisms for attaining such target indicators, including financial support.

Transition countries have often had to focus on challenges other than energy inefficiency. Energy-efficiency legislation in these countries often faces the following challenges:

- Non-existent, non-binding or unambitious legislation
- Lack of integration between energy- and housing-related legislation
- Unclear property rights
- Complex housing ownership structures
- Politicized regulation of energy prices and hidden subsidies
- Lack of a legal framework for establishing homeowners' associations
- Unfavourable legal conditions for the free-market financing of energy-efficient repairs
- Lack of promotion of energy-efficient measures to the public
- Lack of enforcement of legislation and regulation
- Lack of institutional structures for inter-sectorial coordination of energy efficiency legislation and regulation

This remainder of this chapter is divided in two parts. The first looks at the legislation and regulations adopted in different countries concerning building codes and standards, metering, and energy performance certificates. Such laws and codes are usually prepared under the auspices of energy ministries and related departments. The second part of this chapter outlines relevant laws and regulations on housing that do not focus specifically on the energy performance of residential

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<sup>24</sup> BPIE 2011

buildings. These are framework laws which need to be in place in order to ensure that energy laws can be successfully applied to these buildings.

## B. Energy related legislation and regulation

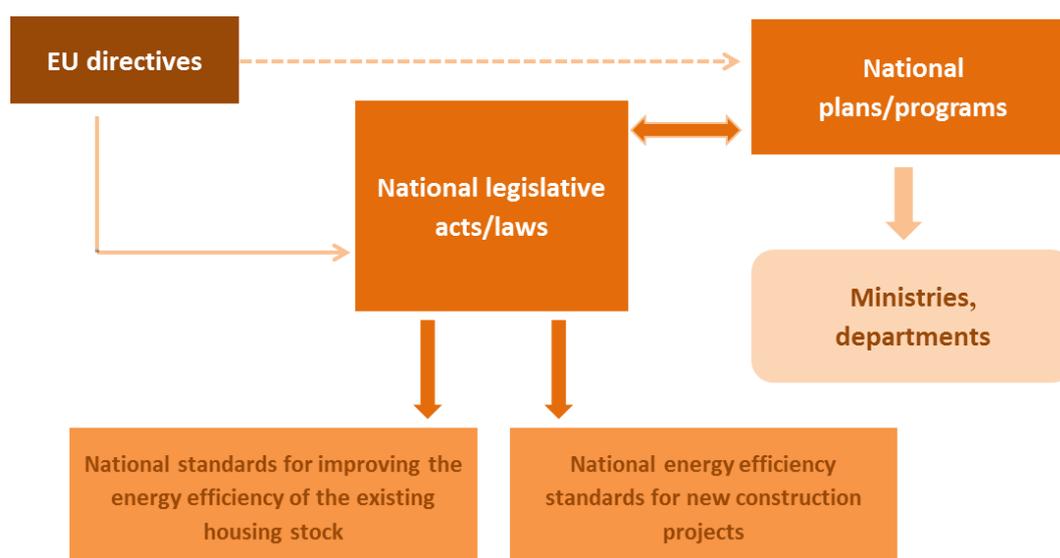
### 1 European Union directives related to energy

In EU member states, energy is considered a topic of national concern. As the EU imports more than half of its gross inland energy consumption, energy security is an important issue as well.<sup>25</sup> The EU has passed several directives that aim to reduce the energy consumption of EU member states.

EU directives outline the objectives and results to be achieved by member States without directing how to achieve them. After ratification, national laws are amended or corrected to meet the objectives of the EU directive. In this way, the EU respects that each country creates its own regulatory legal framework and needs to overcome individual country-specific challenges. As a result, the legal regulation of activities and standards to improve energy efficiency and develop energy services varies substantially across EU countries.

This is important for transition countries to note when analysing EU directives. The content, objectives and targets of the directives may be of interest to transition countries, but these countries should not transfer EU directives directly into national legislation. Instead, it is recommended that they focus on creating related legislation which preserves the spirit of these directives.

The long-term plans of European states shape their general policies to enhance energy efficiency and reduce carbon-dioxide emissions. To meet energy-savings objectives in the housing sector, for example, ad hoc measures and actions are often required, which depend on the availability of a set of legislative frameworks (see Figure 1).



**Figure 1** – Legislative framework scheme for energy efficiency improvements in EU member states<sup>26</sup>

<sup>25</sup> Eurostat 2012

In the 1990s and the first decade of the 2000s, the EU developed several directives to enhance energy efficiency in the EU. The most important for increasing residential energy efficiency are:

- The Energy Services Directive (ESD) 2006/32/EC<sup>27</sup>
- Energy Performance of Buildings (EPBD) 2002/91/EC and its 2010 recast 2010/31/EU<sup>28</sup>
- Directive on the Eco-design of Energy-using Products 2005/32/EC<sup>29</sup>

These Directives are briefly summarized in Table 1.

So far, EU legislation only partly covers building renovation. Through the EPBD, the EU promotes deep renovation rather than gradual building renovation (more details on this distinction can be found in Chapter V: Technical Measures). Also, it has been recognized that there is a need for more targeted measures to foster deep renovation.<sup>30</sup>

## Box 6 – Recommended reading II

### ***EU Regulatory Frameworks in a Nutshell (World Green Building Council 2011)***



This report, published by the World Green Building Council in 2011, includes an inventory of the main regulatory frameworks of the EU on green buildings. It includes a review of the directives and policy packages related to energy efficiency in buildings, labelling, construction products and many other topics.

## Table 1 – Overview of energy directives of the European Union

### **Energy End-Use Efficiency and Energy Services Directive (2006/32/EC)**

This Directive requires state subsidization of energy-saving measures, including: appropriate heat insulation in newly constructed buildings; regular inspections and monitoring of heat generating devices; introduction of a building energy certificate; energy auditing of facilities with high energy consumption; and calculation of actual expenditures for heating, ventilation, air-conditioning and the hot water supply.

<sup>26</sup> Compiled by the authors based on European Commission No date

<sup>27</sup> European Parliament and Council 2006

<sup>28</sup> European Parliament and Council Directive 2002 and European Parliament and Council Directive 2010

<sup>29</sup> European Parliament and Council Directive 2005

<sup>30</sup> BPIE 2011

### **Energy Performance of Buildings (2002/91/EC)**

The Energy Performance of Buildings Directive (EPBD) was adopted in 2002 to ensure the fulfilment of the Kyoto Protocol on climate change.

According to this Directive, by 2006 all EU member-states should have adopted national laws on mandatory minimum energy standards for newly constructed buildings on the basis of the following requirements:

- Construction projects for new buildings should ensure a minimal annual consumption of 7 litres of fuel oil (or 7 m<sup>3</sup> of gas) per 1 m<sup>2</sup> for heating
- Mandatory minimal energy standards are regularly revised to match evolving design and construction technologies for buildings and increasing energy efficiency levels for infrastructure equipment and household appliances

The continued tightening of requirements for heat insulation and reducing heating-energy consumption is an incentive to design new technologies to reduce energy consumption in newly built or renovated buildings and buildings subject to capital repairs. For example, the Danish construction norms of 2006 set the maximum energy consumption for heating purposes at 50 per cent of the level of the 1982 norms (from four to two litres of oil per m<sup>2</sup>) and aimed to halve this again by 2015.<sup>31</sup>

### **Energy Performance of Buildings (2010/31/EU)**

In 2010, the European Commission made the following considerable amendments to the EPBD:

- By January 1, 2021, all new buildings and existing buildings subjected to comprehensive capital repairs should meet the “highest energy efficiency standards”. The public and municipal sectors are key players in this process and all buildings owned or occupied by them should have energy consumption close to zero by January 1, 2019.
- The list of buildings covered by the EPBD was increased with the threshold building floor space lowered to 1000 m<sup>2</sup>.
- Certification based on energy efficiency indicators is now mandatory for any newly constructed, sold or rented buildings, or premises within them. Similar certification is also mandatory for all premises occupied by public or municipal structures if the floor space of such premises exceeds 500 m<sup>2</sup>. By 2015, this threshold will be decreased to 250 m<sup>2</sup>.
- The EPBD ties the effectiveness of energy service providers’ and energy suppliers’ activity to the performance of financial institutions (Article 19).
- Major attention is focused on the need to conduct a public awareness campaign in EU member-states to inspire real estate owners and landlords to improve the energy performance of their buildings.

### **Eco-design Requirements for Energy-using Products (2005/32/EC)**

Eco-design means integrating life-cycle environmental impact considerations into the production design phase. It includes accounting for energy efficiency.<sup>32</sup>

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<sup>31</sup> Back 2008

<sup>32</sup> OECD/IEA and Agence Française de Développement (AFD) 2008

This Directive includes measures for heating and water heating equipment, lighting in the residential and tertiary sectors and HVAC systems. The 2005 Directive on Eco-design of Energy-using Products (Directive 2005/32/EC) provides coherent EU-wide rules on ecological design of products such as electrical devices and heating equipment.

The Directive covers all energy-using products, excluding vehicles and transportation.

## 2 Building norms and standards

Energy norms and standards for buildings are a key driver for energy efficiency investment. If energy efficiency requirements are incorporated into national or local building standards, they ensure that technical requirements for the building's energy performance are incorporated during its design or retrofitting phase. If energy efficiency is considered at the design phase, much larger efficiency potentials can be realized. It is always more difficult to reduce the energy consumption in an existing building than to make sure that it performs well from the beginning.

Building codes have existed in many countries for a relatively long time addressing aspects of new construction such as construction safety, fire safety, and occupants' health in new buildings. Compared to such building codes, energy efficiency regulation for new buildings is relatively new in most countries.

The first regulations covering energy-efficiency requirements for buildings, including thermal insulation, were adopted in the late 1950s and 1960s in Scandinavia, where cold winters and severe weather can strongly influence public health.<sup>33</sup> Increasing standards of living motivated governments to raise requirements for improving indoor comfort in buildings. During the past decade, international collaboration to create international energy efficiency requirements or standards has developed. Examples are the energy efficiency standards (IECC 200415 and ASHRAE 200416) which are used in the United States, Canada, EU Directives and ISO (International Organization for Standardization) standards.

### Table 2 – ISO Standards on energy performance of buildings

Two technical committees developing standards for making buildings more energy efficient:

#### **ISO/TC 163 Thermal performance and energy use in the built environment**

- Standardization in building and civil engineering, including the thermal and hydrothermal performance of materials, products, components, elements and systems in new and existing buildings, and their interaction with technical building systems
- Thermal insulation materials, products and systems for building and industrial application, including insulation of installed equipment in buildings

The standard covers test and calculation methods for:

- Quality indicators of utility services and energy performance inside buildings

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<sup>33</sup> OECD/IEA 2008

- Specifications for thermal insulation materials, products and systems
- General review and coordination of work on thermal and hydrothermal performance within ISO

### **ISO/TC 205 Building environment design**

Standardization in the design of new buildings and retrofitting of existing buildings for an acceptable indoor environment (air quality and thermal, acoustic and visual factors) and practicable energy conservation and efficiency. Building environment design addresses technical building systems and related architectural aspects, and includes design processes, design methods, design outcomes, and design-phase building commissioning.

The standard covers: the sustainability of indoor environmental quality; general principles of building environment design and the design of energy-efficient buildings; building automation and control systems; indicators of indoor environment quality; the design of heating and cooling systems (including radiant); and the application of methods for testing and rating the performance of building environmental equipment in the design and retrofitting of buildings.

Source: ISO No date

#### **Standards:**

ISO 16813:2006 Building environment design – Indoor Environment – General principles

ISO/TR 16344:2012 Energy performance of buildings – common terms, definitions and symbols for the overall energy performance rating and certification.

#### **Under preparation:**

ISO 16346 Energy performance of buildings – Assessment of overall energy performance

Source: ISO 2013

Buildings are subject to both European and national regulation on energy efficiency, but the requirements of national laws include measures which make economic sense and are of great public importance. Germany has been cited<sup>34</sup> as a good example of a country which has established legislative requirements for energy saving in the housing sector, including the heat insulation of pipelines and upper storeys and the installation of heat meters and thermostatic valves in the heating system. These requirements facilitate the implementation of energy-saving measures in the housing sector, since they do not need the agreement of the majority of owners, which is needed in the case of other large-scale repairs.

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<sup>34</sup> Ibid.

## Case Study 1 – National plan for energy transformation in Germany

**Situation before the initiative began:** The energy sector in Germany before the initiative was vulnerable and highly dependent on imports: 70 per cent of the total energy used in Germany was imported.

**Formulation of objectives and strategies:** Primary energy demand of buildings is to be reduced by 80 per cent by 2050, making major thermal retrofitting programmes necessary, as 80 per cent of the building stock was below standard.

**Process:** A strong legal framework, incentives, subsidies and regulation have been introduced in Germany to guide the activities of both the energy production sector and the housing sector:

- the Renewable Energy Sources Act adopted by the government in 2000 stipulates that individuals and companies meeting the renewable energy requirements are guaranteed a long-term stable rate per kilowatt-hour (the feed-in tariff) for selling their energy, and receive help in feeding their energy into an overall grid.
- the Heating Costs Act (HeizkostenV), strengthened in 2009, stipulates that renters have to pay a much higher portion for high energy use, making energy-saving attractive.
- the Renewable Energy and Heat Act of 2009 (EEWärmeG) states that 15 per cent of new constructions should be heated with renewable energy.

**Results achieved:** Nearly half a million renewable-energy-related new jobs were created; carbon dioxide decreased by more than 100 million tons by 2006.

**Sustainability:** The governmental incentives have resulted in a booming renewable-energy market, providing much new employment. Energy bills will be lower in the long term due to increased housing energy efficiency and a wider use of renewable energy. The better thermal comfort of new and old retrofitted energy-efficient housing has and will have positive health impacts on residents.

**Lessons learned:** The country responded to international resolutions on common global issues in an efficient and consistent way, and showed that determined governmental policies can make significant changes in a country's energy sector in a very short time. Germany achieved good results in decreasing greenhouse-gas emissions and energy bills by using energy-efficient housing stock and renewable energy.

**Key messages for transition countries:** The German model cannot be transferred to other countries directly. However, Germany has provided an important example for other countries to study and be influenced by when they draft their respective national strategies for energy efficiency and the use of renewable energy.

Sources: Clean Technica 2012; The Energy Collective 2012; German Missions in the US 2012; Maracci 2011; Neuhoff et al. 2011; Power and Zulauf 2011; UN-Habitat and the City of Vienna 2012; UN-Habitat 2012; Wind Works.org 2011

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EPBD was the first attempt by the EU to require all member states to introduce a general framework to set building energy code requirements based on a whole-building approach. Beginning in 2020, all new construction in the EU needs to follow nearly-zero energy standards.

At present, countries in Central Europe do not have any mandatory legal requirements to implement energy saving measures in buildings, and modernization is conducted on a voluntary basis. However, repair and construction must comply with current standards. To this end, EU member states have adopted, in line with EU directives, national requirements for the execution of large-scale repairs. Table 3 gives an overview on the maximum heat output ratio in selected member states.

**Table 3 – Maximum U-value in large-scale repairs in selected EU member states**

Type of building structure	Latvia	Poland	Lithuania	Germany
Outside walls	0.30	0.30-0.40	0.30	0.45/0.35
Windows	1.80	1.70-1.90	1.90	-
Roof	0.20	0.25	0.25	0.30/0.25
Overlap of the basement)	0.25	-	0.35	0.40/0.50

U-value = rate of transfer of heat in Watt/m<sup>2</sup>K

Source: BEEN 2007

## Box 7 – Recommended reading III

### Online databases on national energy efficiency policies

Access existing building policies and regulations of other countries.

#### **Sustainable Buildings Centre (SBC),**

<http://www.sustainablebuildingscentre.org/pages/home>

The Centre, created by the International Energy Agency, makes available building energy efficiency policies which target reduced building energy demand from countries around the world. The database differentiates between three main policies:

- **Building energy codes** as the main regulatory instrument used by policy-makers to reduce the energy demand of the building sector. These set minimum energy performance requirements regulating energy use in buildings.
- **Labelling schemes** as information instruments used by policy-makers to raise awareness. They provide information on a building's energy performance for end-users.
- **Incentive schemes** are financial instruments used by policy-makers as part of their market transformation programmes. Incentives drive improvements in the energy performance of new or existing buildings.

#### **BPIE Data Hub,** <http://www.buildingsdata.eu/>

The Building Performance Institute Europe (BPIE) set up an online data centre for statistical data and policy information related to energy performance of buildings in Europe. It provides data on building stock performance, including energy consumption, envelope performance, district heating and cogeneration as well as policy information on building codes, labels, certificates, inspections and economic and market instruments for all 27 EU member states.

#### **OCEAN – Online Code Environment and Advocacy Network,**

<http://energycodesocean.org/research-topics>

This United States portal by the Building Code Assistance Project is an online library with resources on building code development, adoption, implementation and enforcement and on building design and energy savings through building codes. The information targets the United States federal system and market but could be interesting for transition countries developing or updating building legislation and regulations.

Legislation must include measures for energy savings, including the metering of electricity and heat consumption in buildings. Metering should be considered an information instrument that makes consumption visible and therefore encourages a more responsible use of heating and electricity and, through reduced consumption, leverages savings.

Although installation of meters in Eastern Europe, Caucasus and Central Asian countries started only recently, most of these countries adopted regulations on mandatory metering following the model

of Western European countries. For example, the legislation of the Russian Federation on energy efficiency enhancement defines concrete measures to ensure the accounting of the energy resources consumed (see Case Study 2 for more details). All generated, transmitted and consumed energy is subject to mandatory accounting through meters. The “Law on Energy Saving and Energy Efficiency Enhancement” stipulates that installation of meters in residential buildings should have been completed by 2012. Heating and hot water meters are installed in about 34 per cent of the housing stock.<sup>35</sup>

### **Box 8 – The impact of individual metering in Kazakhstan**

In Kazakhstan, heat and electricity are paid based on meter readings. Electricity is metered individually while heating is metered at for the whole building. If meters are not installed, the amount of energy consumed is calculated based on average consumption levels.

Electric meters are installed in almost all dwellings, because without them consumption levels are assumed to be the maximum energy consumption by an apartment unit (based on the number of plug sockets), which is costly for the user. This also leads to residents having a better understanding of their electricity consumption. Energy-efficient light bulbs are more likely to be installed in apartments when users are aware that they are more economical.

The installation of heat meters is still very complicated and costly. For instance, the installation of a heat metering system in a 50-apartment building in Astana, the capital of Kazakhstan, costs nearly EUR 270,000. Therefore, collective (building-level) heat meters are installed in only 40 per cent of buildings in Kazakhstan today. Poor meter equipment results in paying for heat based on standards which are often set far too low. Thus, if a collective heat meter is missing, residents pay less than they consume. Pilot projects supported by the UNDP and the Global Environment Facility (GEF) in the city of Karaganda confirmed this. In such conditions, heat providers incur losses, while users are not motivated to reduce heating.

The creation of incentives for energy saving in heating started from the recommendations of the UNDP/GEF project. After adoption of the Kazakh “Law on Energy Saving and Energy-Efficiency Enhancement”, residents are obliged to repay costs for heating based on differentiated tariffs derived from the availability of heat meters. This means that residents who do not have a common heat meter in their buildings will have to pay 20 per cent more than the average city tariff, which creates an economic incentive for the installation of meters.

Differentiated tariffs are now approved in three cities: Astana, Almaty and Aktobe. In these cities, heat meters are being installed in apartment buildings. The projects supported by UNDP and GEF in Astana have shown that the payback period of a common heat meter is two to three months under current conditions. Furthermore, after the installation of a heat meter, residents start thinking of energy saving in their apartment building.

Source: GEF and UNDP 2013

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<sup>35</sup> All-Russia Information and Statistics Collection 2012

Some Western European countries are considering a legal framework for the installation of so-called smart meters. These meters record electricity consumption in intervals of an hour or less and communicate this information back to the utility company for monitoring and billing. Smart meters allow two-way communication between the meter and the utility company. They therefore help prepare more accurate electricity bills and allow the residents to closely monitor their electricity consumption and costs.

Due to the regulatory push and the efforts of market players, the development of legislation and regulation for smart metering in Europe is very dynamic. The Austrian Energy Agency (2012) reports that in some EU member states such as Estonia, Finland, France and the Netherlands either a mandatory rollout is already decided or major pilot projects are paving the way for the subsequent decision. Other countries such as the Czech Republic, Denmark or Germany do not have legal requirements in place yet, but install electronic meters because of internal synergetic effects or customer demands. More information on meters can be found in Chapter V: Technical Measures.

## Case Study 2 – Energy saving and energy efficiency laws of the Russian Federation

**Situation before the initiative began:** The energy efficiency of the Russian Federation’s housing stock was generally low: in 2009, energy consumption of buildings was, on average, 382.2 KWh/m<sup>2</sup>year compared to 178 KWh/m<sup>2</sup>year in Norway, 289 KWh/m<sup>2</sup>year in Sweden and 298 KWh/m<sup>2</sup>year in Finland. Energy meter penetration was also low. The lack of energy meters meant that it was difficult to stimulate consumers to undertake energy efficiency measures.

**Formulation of objectives and strategies:** Installation of meters as first step for implementing the energy saving framework.

**Process:** The basic legal act on enhancement of energy efficiency was adopted in 2009. This is “Federal Law #261-FZ on Energy Saving and Energy Efficiency Enhancement”. Regarding energy efficiency in housing sector, the law

- establishes the use of energy consumption based meters
- defines deadlines for the installation of meters
- provides a framework for energy performance contracting
- stipulates procedures for energy audits and issuing of energy certificates

Aside from the federal law on energy saving, some housing-related laws include provisions on energy saving, energy-efficiency enhancement and the disposal of domestic appliances. Along with federal laws, the issues of energy saving and energy efficiency enhancement are regulated by bylaws, endorsed at various levels including Russian Federation Government Decrees:

- On Rules for Establishing Energy Efficiency Requirements for Buildings, and Regulations on How to Determine the Grade of Energy Efficiency in Apartment Buildings
- On Requirements to Regional and Municipal Programs on Energy Saving and Energy Efficiency Enhancement

- On Changes to Provision on Composition of Development Documentation and Requirements to its Contents.

To implement federal regulations on enhancement of energy efficiency of residential housing, the Russian Ministry for Economic Development issued several decrees, including:

- On Approval of a Model List of Energy-Efficient Measures for an Apartment Building (a group of apartment buildings)
- On Regulations for Determining the Grades of Energy Efficiency in Apartment Buildings and Requirements to Index of Energy Efficiency Grades Placed on Apartment Buildings' Faces
- On Requirements to Energy Efficiency Passport

**Results achieved:** The setup of legal, economic, and organizational frameworks to encourage energy saving and enhance energy efficiency. The process of rollout metering and equipping of residential housing stock with heat and water meters has started. The legal framework for energy-performance contracting has been formed.

**Sustainability:** The “Law on Energy Saving and Energy-Efficiency Enhancement” provides for revision every five years of energy efficiency standards. Furthermore, the law stipulates that energy certificates are mandatory for all buildings newly constructed and renovated in future.

**Lessons learned:** The framework law on energy saving, sectorial, and special federal laws and bylaws created wide-scale changes after protracted inaction. However, the application of the “Law on Energy Saving and Energy-Efficiency Enhancement” was impeded by legal gaps and conflicts of law.

**Key messages for transition countries:** Setting up a regulatory framework on energy saving and energy efficiency enhancement in the housing sector of the Russian Federation was the starting point for wide-scale shifts after period of little change.

Source: IUE 2011

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Countries in Eastern Europe, Caucasus, and Central Asia fall into two main categories regarding their legal frameworks for energy-efficiency:

- Countries with a developed legal framework for enhancement of energy efficiency in the housing sector. Primarily, these are where laws on improving the energy efficiency of the national economy and similar laws have been adopted. Among these countries are Belarus, Kazakhstan, the Russian Federation and Ukraine.
- Countries which have just begun to develop a legal framework for energy efficiency improvements.

### **Box 9 – Legislation framework for energy saving and energy efficiency enhancement in other countries of Eastern Europe**

In Ukraine, the law "On Energy Saving" has been in place since 1994. This law does not establish any specific mandatory requirements for energy efficiency in housing stock or apartment buildings. At the same time, Ukraine has adopted some regulations to encourage energy saving in the housing sector. In particular, in 2012 the Cabinet of Ministers of Ukraine approved the State Target Programme for Energy Efficiency and Development of Energy Resources Production with the Use of Renewable Energy Sources and Alternative Fuels in 2010 - 2015. This programme makes provisions for energy efficiency measures only in residential buildings, the maintenance of which is fully financed from the budget.

In 2012, the Cabinet of Ministers of Ukraine also approved a plan for measures to provide regulatory support to implement energy-efficient heat consumption policies and modernize the heat-supply sector. At present, a draft law, "On Energy Efficiency of Residential and Public Buildings" has been drafted. Its purpose is to define the legal, economic and organizational basis that will secure the energy efficiency of living areas and public spaces, as well as create conditions to reduce the consumption of energy resources in them. This draft law establishes the obligatory minimum requirements for energy efficiency of buildings at the design and construction stages, as well as during reconstruction. It also regulates the capital repairs of existing buildings, imposes the commitment to have an Energy Efficiency Credit for the and defines methods of financial support for better energy efficiency in buildings. This law is now under consideration by the Verkhovna Rada (Parliament) of Ukraine. Improving energy efficiency in the housing sector in Ukraine will require considerable time and costs.

In Belarus, the adoption of the Presidential Directive "Economy and Thrift: Main Factors of the State Economic Security" in 2007 encouraged the strengthening of energy efficiency activities. It set out a commitment to reduce gross domestic product energy intensity from 2006 to 2010 and from 2010 to 2015 by, respectively, 31 per cent and 28 per cent. This would be the equivalent of 0.27 tons and 0.20 tons of oil.

Ambitious plans for large-scale construction of energy-efficient housing and the renovation of existing housing stock are set out in the Comprehensive Programme for Design, Construction and Reconstruction of Energy-Efficient Buildings in the Republic of Belarus for 2009-2010 and until 2020. This programme was approved by Decree No. 706 of the Council of Ministers.<sup>36</sup>

Energy efficiency problems in the Belarusian housing sector are being addressed primarily through the energy-efficiency requirements in new residential construction. There are currently very few

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<sup>36</sup> InfoBank.by 2009

measures to upgrade apartment buildings to increase their energy efficiency.

Source: IUE No date

### **Box 10 – Legislation framework for energy saving and energy efficiency enhancement in Central Asia and the Caucasus**

Generally, countries with energy-saving plans introduce new technologies to reduce carbon-dioxide emissions and energy consumption. The countries of Central Asia and the Caucasus are, however, still implementing pilot projects for the construction or renovation of apartment buildings. International and EU organizations are actively contributing to implementing plans to reduce energy consumption in these countries.

In some countries in Central Asia and the Caucasus, energy consumption standards for new construction have been adopted. In addition, laws and regulations have been implemented that will subsequently serve as a basis for the efficient implementation of energy-saving measures.

In Kyrgyzstan, the UNDP/GEF project spearheaded the development of a new national mandatory building code, which was adopted by the State Agency for Architecture and Construction in October 2009 and entered into force on 1 January 2010. The required energy performance levels are complex, and vary by factors such as building category and number of storeys. However, for most standard buildings, thermal energy savings of 30 to 40 per cent will be achieved.<sup>37</sup>

In Uzbekistan, a UNDP/GEF project developed energy-related revisions to nine national building codes.<sup>38</sup> These revisions (including the complete rewriting of one code) were adopted by the State Committee for Architecture and Construction and immediately made mandatory. The codes include three levels of energy-performance requirements, and even the least stringent, applicable to residential and privately-funded commercial buildings, requires an average reduction of energy use of about 25 per cent. A second level, which applies to all publicly-funded schools and health-care facilities, requires thermal energy consumption reductions of about 50 per cent. The project also includes extensive compliance-support activities, including:

- Training for code-enforcement officials
- The development of streamlined work plans
- The development of national procedural standards for energy audit and documentation
- The delivery of training and curriculum development for aspiring and practicing architects and engineers
- Public outreach

In Uzbekistan, no real mechanisms have yet been established to improve energy efficiency, including

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<sup>37</sup> Information on the project is available at <http://www.undp.kg/en/component/resource/article/1-projects/895-energy-efficiency-in-buildings>

<sup>38</sup> Information on the project is available at <http://www.undp.uz/en/projects/project.php?id=155>

in the housing sector. The 1997 “Law No. 412-I: Concerning energy efficiency” provides a framework but needs to be revised.

As part of the Reform Programme in the Energy Sector of Azerbaijan (supported by the EU within the framework of the Energy Saving Initiative in the Building Sector (ESIB)), laws and regulations were drafted governing the development of unconventional renewable energy sources and energy efficiency.<sup>39</sup> Among these are:

- draft law "Concerning Energy Saving and Energy Efficiency"
- draft regulations "Concerning State Energy Expert Review"
- draft methodology "Calculating Energy Requirements in Buildings"
- more than 20 other laws and regulations

In recent years, some positive changes have taken place in Georgia with regard to energy efficiency in the building sector, including the development of policy documents, awareness campaigns and enhancement of private sector capabilities. According to an INOGATE-SEMISE<sup>40</sup> project in Georgia, the greatest energy-saving potential can be found in the building and transport sectors.<sup>41</sup>

In recent years, Georgia has pursued a consistent policy of deregulation and market liberalization, and achieved strong economic growth, including in the construction sector. In the first quarter of 2012, total turnover achieved by the construction sector was GEL 546.7 million, which exceeded that in the previous year by 201.2 per cent. Unfortunately, Georgia has not yet adopted a construction code affecting energy efficiency. Existing municipal level policy documents and strategies can be used as a soft tool, but are limited by the lack of an information and awareness campaign. However, the Ministry of Economy and Sustainable Development is developing codes for the structural design of buildings. These codes are being designed to be consistent with EU codes. The recently adopted Spatial Planning and Construction Code also affects construction.<sup>42</sup>

## C. Housing-related legislation

The implementation of energy efficiency measures largely depends on decisions taken by the home or apartment owner. A legislative framework is needed that defines the rights and obligations of apartment owners in multi-family housing blocks. This section, therefore, refers to laws and regulations that are related to energy laws but do not focus specifically on the energy performance of residential buildings. These are framework laws which need to be in place in order to ensure that energy laws can be successfully applied to residential buildings. Such housing-related legislation needs to address both new and existing residential buildings.

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<sup>39</sup> Information on the project is available at [http://ec.europa.eu/europeaid/where/neighbourhood/country-cooperation/azerbaijan/azerbaijan\\_en.htm](http://ec.europa.eu/europeaid/where/neighbourhood/country-cooperation/azerbaijan/azerbaijan_en.htm)

<sup>40</sup> International Energy Co-operation Programme (INOGATE) – Support to Energy Market Integration and Sustainable Energy in the New Independent States (SEMISE)

<sup>41</sup> INOGATE 2013

<sup>42</sup> Rukhadze 2012

This section outlines legislation such as civil codes and housing-related legislation. Civil codes regulate ownership rights for apartments, as well as common spaces in multi-apartment buildings. Housing-related legislation regulates the management and maintenance of multi-family housing blocks, the responsibilities of apartment owners and the fundamentals for decision making in multi-family buildings. The laws on financial mechanisms for energy-efficient upgrading are described in Chapter VI. Political commitment is crucial for the development, implementation and, in particular, the enforcement of legal acts and regulations.

There are several different mechanisms of ownership and management of multi-family apartment buildings in Western Europe. In most Western European countries, the majority of apartment buildings are owned by legal entities which provide dwellings for rent: not-for-profit companies (Germany), associations of cooperative housing (Denmark), cooperative associations (Norway and Sweden), and housing associations (the Netherlands and the United Kingdom). Many of these legal entities are fairly big and can own thousands of buildings. Additionally, in many Western European countries, significant numbers of residential buildings are owned by municipalities (as in Austria) or insurance companies (as in Switzerland).

Condominium ownership systems also vary between countries. In this model, the dwellings are owned by individuals, but the common parts and plot of land are jointly owned. A homeowners' association exists for managing these common properties. This form is common in France, Germany, Greece, Italy and Spain and exists less commonly in England and Wales (United Kingdom) and Sweden.<sup>43</sup>

Two other forms of owner-occupation are found in Western Europe. In Austria, the Netherlands, Norway and Switzerland, each co-owner owns a certain share of the property and connected to that share is an exclusive right to use a particular apartment in the building. The management of these buildings is executed by homeowners' associations.<sup>44</sup>

In Finland, the owner of the property (the building and the plot of land) is a housing company which is a special type of a limited-liability company. Each co-owner owns a certain share of this company and that share provides an exclusive right to use a particular apartment in the building, as in the previous model. The decision-making pattern of the housing company is close to the pattern used in conventional limited-liability companies (with shareholders' meetings, an executive board, a manager and auditors).<sup>45</sup>

In summary, in Western Europe either the apartment buildings are owned by one single owner, usually a municipality or another type of legal entity, or, if the complex has many owners, as is the case for the two main models for owner-occupied dwellings, homeowners' associations are used for the decision-making and the management of the parts of the building that are outside the inner parts of the walls surrounding the dwellings.<sup>46</sup>

In Central European and the Baltic countries, private homeownership of individual apartments is predominant (although the ownership rate is lower in the Czech Republic and in Poland). The situation is very similar in countries of Eastern Europe, Caucasus and Central Asia. Rental markets

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<sup>43</sup> Lujanen 2010

<sup>44</sup> Ibid

<sup>45</sup> Ibid

<sup>46</sup> Ibid

are nearly non-existent. Having a high number of private owners strongly affects decisions on common property in multi-family apartment buildings.

## 1 Apartment ownership and common parts in multi-family housing blocks

In Central Europe and the Baltic states in the late 1980s and early 1990s, public housing stock was generally privatized by municipalities based on the depreciated value of the apartment according to the data provided by technical inventory agencies. In many cases, vouchers received by individuals for their service record were used to pay for the transfer of apartment ownership. Through this system, most of the sitting tenants of municipal apartments could now afford to become apartment owners, while in Western European countries they would not have sufficient financial means for homeownership (the “poor owner” phenomenon). The privatization rate in Central European countries, as in most of the former Soviet Union (except for the Russian Federation), is very high (95 to 98 per cent).

The laws of some of these countries state that the title to the apartment is accompanied by the right to equity ownership of common property in apartment buildings, including surrounding land plots. For instance, in Estonia, Hungary, Latvia and Slovakia, the land plots of apartment buildings are registered with the land or real estate cadastre and are part of the common property of the homeowners in apartment buildings. This meant that municipalities subdivided housing areas and land plots for apartment buildings in a consistent manner. In other countries, the common property continues to belong to the municipality.

## 2 Maintenance of multi-family housing blocks and responsibilities of owners

According to the laws on housing stock privatization in Central Europe and the Baltic countries, the title to an apartment is transferred to a new owner (a former tenant) from a former owner (municipality or state), along with responsibility for the condition of the common property in the building, including its maintenance and rehabilitation.

The state, while transferring the responsibility for the condition of residential buildings to new owners, cannot completely withdraw because its constitutional duty is to assure safe conditions for its citizens. Therefore, the state sets mandatory requirements for the condition of apartment buildings, assuring the safety of its residents. It also recommends possible administrative sanctions to be applied in the event of non-compliance with mandatory requirements.

In all countries in the UNECE region, the owner of real estate must maintain it at his/her own expense. Consequently, owners of premises in an apartment building are obliged to share general expenses on the maintenance and repair of common property and pay utility services.

The owners of premises in apartment buildings are therefore obliged to ensure the safety, and pay for the renovation of, common property in apartment buildings. However, in no country are compulsory renovation fees or the means of financing renovation stated by law. These issues are generally decided by homeowners.

Some countries (Estonia, Hungary and Slovakia) have laws which include an important provision stating that the homeowner’s failure to fulfil his/her obligation to share general expenditures (including utility payments) will be deemed a violation of the legal rights of other owners in an

apartment building. In order to protect the interests of homeowners and persons responsible for the management and maintenance of apartment buildings, they are given the right to require non-paying owners to fulfil their obligations and pay damages incurred by homeowners' associations due to the non-payment or late payment of compulsory charges or fees.

In many countries, a common law-making approach assumes that an owner of premises who refuses to share general expenditure for maintenance of building and payment of utility services is liable for his/her obligations with money raised from the sale of his/her premises. Usually, however, this is a last resort, applied after all other coercive measures had no effect.

In Hungary, the forced sale of an apartment follows the registration of the pledge of the apartment. This is a law-based pledge, distinct from the voluntary pledge of the apartment by an owner with mortgage loan, for instance. According to a law-based pledge, a partnership of owners, whose interests were violated by the non-paying owner, should register a pledge of premises owned by the debtor with public authorities responsible for registering real estate. Registration of the pledge involves first banning the debtor from selling the apartment before all of his/her debts are paid, and then selling the apartment at a public auction. After this, the association of owners will reimburse the creditor for the debt from the funds received after the sale.

### **Box 11 – The apartment as a pledge in Hungary**

#### **Commentary to the Hungarian Law on Homeowner Partnerships 2004**

Homeowner partnerships are entitled to register a pledge of an apartment whose owner is in arrears for the payment of general expenses on maintenance, repairs and utilities for a period exceeding six months. To register a pledge of apartment, a written decision of the general meeting of owners is required.

Based on this decision, an application is filed to the national land cadastre, which issues a resolution on the registration of the pledge. It then makes appropriate notes in the margins of the technical and utility passport of the building and surrounding territory.

At the general meeting where a decision on pledge of property is made, the owner-debtor has no right to vote. The general meeting takes the decision, and its representative may dispose of the property. If the owner disagrees with the decision, they may file a statement of claim to the court within sixty days of the decision.

The document that serves as a basis for registration of pledge should include:

- Accurate data about the partnership and pledgee
- The last name and address of partnership's representative
- The inventory number of the apartment being put in pledge
- The personal data of the building owner or the official data (such as office address and registration number) of the building owner if it is a legal entity
- The monetary value of obligations secured by the pledge

If the debt is paid, a member of the partnership's administrative committee should, within eight

days, issue a certificate to withdraw this pledge from the national land cadastre. The certificate is made up as an official document and should be certified by a notary. If another six-month debt is accumulated, a decision to put in a pledge may again be taken.

The national land cadastre registers applications such that if a pledge is registered on a single real estate unit several times, registration shall be carried out in the order they are received.

Source: Gabor 2005

In many Western European countries (Austria, France, Germany, the Netherlands, Norway, Spain, Sweden and Switzerland), Canada and the United States, a statutory lien or privileged lien is introduced. By law, this provides collateral for the loans which are taken by the homeowners' association without requiring the consent of individual owners.<sup>47</sup>

In the countries of Eastern Europe, Caucasus and Central Asia, this collateral, by law, is not a widely-used measure. For example, according to the laws of the Russian Federation, no penalty can be imposed on the sole residential premises of the owner. This legal provision does not always, therefore, allow the full debt to be collected from owners. The right of ownership takes precedence over the repayment of debts for mandatory fees and utility charges. This causes a conflict in which the right one owner is protected but at the same time the rights of other owners are violated.

Legally giving an apartment owners' community in a residential building the right to impose a penalty on the apartment of an owner who is in arrears with payments for mandatory fees or utility payments aids the protection of the owners' interests and ensures the stable financial standing of the partnership. Banks, for example, require assurance that the partnership is capable of repaying a loan because it is allowed to collect debts for mandatory payments from apartment owners.

## **D. Key messages for transition countries**

A legal framework creates benchmarks based on target indicators for energy consumption in the housing sector, whereas national programmes frequently offer organizational and financial mechanisms for achieving such targets, including financial support.

Many transition economies have just begun creating legal frameworks for energy saving. These frameworks are of a purely declarative nature, and do not offer any tools to attain their goals.

The following key messages and lessons can be drawn from this chapter and are of particular interest for transition countries:

### **Political will and commitment are key driving forces to advance housing energy efficiency**

- National and local governments have to create the legislative conditions for improving residential energy efficiency. Political will and commitment are prerequisites and key drivers for creating these framework conditions, so improving energy efficiency in housing and living standards have to become policy goals and political priorities.

### **Property ownership comes with rights and obligations**

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<sup>47</sup> An analysis of this approach is presented in Lujanen 2010.

- Lack of decision-making by the owners both at the level of individual apartments and for the building in general, coupled with lack of private initiatives, are still among the major obstacles to improve housing sector energy efficiency. To overcome this, governments need to clearly define property rights and obligations in the legislative framework. Obligations should include:
  - Compliance with building codes and technical norms and standards
  - Maintenance of common parts
  - Set-up of a building management structure
  - Regular contributions to a maintenance fund for the building
- Building codes and technical norms and standards for residential buildings need to be set by governments in collaboration with technical experts and regularly revisited to reflect technological progress. They should be binding for apartment owners. Building codes should set parameters for energy consumption as well as technical, sanitary and environmental standards. Compliance with building codes and technical standards needs to be monitored.
- Legislation should differentiate between:
  - Standards for new construction, which should consider existing international practices and ambitious energy-performance standards for buildings, such as the passive-house standard
  - Standards for existing buildings, the setting of which is a more complex task. However, given the comparably low variety of building types in many transition countries, renovation concepts and requirements can be replicated in housing blocks of the same type
- The participation of residents increases their acceptance of a project. Residents should be consulted and invited to share their needs, concerns and ideas. The public authority, developer and other stakeholders are then able to make informed decisions. Additionally, participation can build trust between residents and decision-makers and contribute to a positive attitude.
- In multi-family housing blocks, common parts (such as the roof, staircases, technical and service systems and the plot of land) should be under joint ownership, the responsibility of all apartment owners and jointly managed and maintained through a homeowners' association. A private management company could be hired by the association to execute these maintenance tasks; this has proven to work very successfully. There are also examples of homeowners' associations successfully managing the buildings themselves, because owners took initiative and decided to work together in the interest of the building. Management through the homeowners' association is usually practiced only in buildings with a small number of apartment owners.

### **III. MANAGEMENT OF MULTI-FAMILY HOUSING STOCK**

#### **A. Background**

As stated in the previous chapter, buildings in Western Europe, Canada and the United States usually have one owner, which is an individual or a juridical person. If the building complex does not have a single owner, as is the case in condominiums, a homeowners' association exist to manage the common parts of the building and the plot of land. This means that every building has either one owner or a capable body who is responsible for the management.

Ideologists of housing privatization in former socialist countries expected, among other things, that privatization would promote a rapid shift from the careless municipal ownership of housing stock to responsible private ownership of individual apartments. However, achieving the expected result remains a problem, in particular regarding building management, whether the buildings are newly constructed or needing retrofitting.

Unlike in the United States and Western Europe, various methods of multi-apartment housing management are used in Central and Eastern European, Baltic, Caucasus and Central Asian countries. This is a result of the privatization process. National legislation in these countries suggests solutions to this issue through general meetings of apartment owners and the creation of homeowners' associations or partnerships as umbrella tools to manage and improve common parts.

Registration of homeowners' associations as a legal entity in every apartment building owned by different apartment owners is not mandatory in most of these countries. However, collective decision-making by apartment owners is always compulsory, so there is at least an informal partnership in every building.

Therefore, in most of the countries of Eastern Europe, Caucasus and Central Asia, multi-apartment buildings are usually managed either by various types of associations of housing owners or by private or municipal management organizations. These self-governing and professional management institutions play an important role in the energy-efficient upgrading of apartment buildings.

In Western Europe, Canada and the United, homeowners' associations and professional hired management are not considered to be mutually exclusive and sometimes function in parallel. This approach has become more and more popular in Central European and the Baltic countries.

#### **B. Homeowners' associations**

The privatization of public housing stock sometimes led to problems with the management of apartment buildings. Some countries launched new mechanisms of management simultaneously with housing privatization, while others deliberately retained a centralized control system.

According the laws of some Central European countries, such as the Czech Republic and Hungary, the establishment of homeowners' associations became a mandatory condition for privatization. In Hungary, owners of premises in every apartment building where apartments are partially or fully privatized need to legally incorporate a homeowners' association. The association selects the form

of building management – a homeowners’ representative, the board, an individual manager or a management organization.

Under Slovak law, during the privatization of the first apartment in a building, representatives of the former owner and future owner have to select a type of common property management in the building. They establish an association of owners of apartments and non-residential premises, or make an agreement for management services with a manager or a management organization. In 2003, there were 5,600 apartment owners’ associations in Bratislava. In recent years, the number of associations has continually grown and the contracting of management services to a specialized management organization become more widely spread.

In Estonia, apartment privatization led to formation of homeowners’ associations that can gain legal status but are entitled to act without doing so, in which case they should make an agreement with a manager or a management organization. Apartment owners’ associations have now been established in more than 60 per cent of apartment buildings.

Contrary to this approach, many of republics of the former Soviet Union (Armenia, Azerbaijan, Belarus, Moldova, the Russian Federation, Tajikistan, Ukraine and Uzbekistan), when beginning privatization, failed to legally settle issues concerning common property in apartment buildings and change the system of apartment-building management. Legal norms on selecting the form of management of a building with privately-owned apartments and special laws on apartment owners’ associations, appeared later than the laws on privatization. The retention of centralized management and maintenance of apartment buildings greatly slowed down the formation of apartment owners’ associations. In the Russian Federation, for example, apartment owners’ associations have been established in only 10 per cent of apartment buildings.

Moreover, Russian legislation does not require mandatory membership of apartment owners in the association registered for the apartment building, as, for historical reasons, the constitution of the Russian Federation prevents coercive membership in any association. This often causes problems between members and non-members of an association, particularly regarding decision-making, payments and the fulfilment of homeowners’ responsibilities. Furthermore, these problems impede the development of bank lending for the renovation of buildings.

In contrast, Central European and Baltic states do not view associations of owners as an alternative to municipal or public housing organizations, although homeowners’ associations are entitled to independently manage and maintain their buildings. Instead they are described in laws as a mechanism for the owners to make decisions about apartment-building management, the collection of funds for maintenance and methods for routine maintenance and service.

Only apartment owners’ associations, where all association members are concerned with the preservation and improvement of their building, and which have principles of democratic self-governance can manage a building effectively. This means that key decisions are made at general meetings, a management board is elected and monitored and the use of funds is controlled.

In most Eastern European, Caucasus and Central Asian countries, although legislators tried to apply the best international examples of condominium laws, homeowners’ associations become either competitors to housing management organizations (as in Moldova, the Russian Federation and Ukraine) or replacements for municipal housing organizations (as in Kazakhstan and Uzbekistan).

Positive examples combining self-governance in homeowners' associations with professional management by a hired specialized company are still not common.

Until now, homeowners' associations in most Eastern European, Caucasus and Central Asian countries (Belarus, Moldova, the Russian Federation, Ukraine and others) have been inhibited by numerous operational difficulties, such as:

- A low level of activity by owners due to their individualism, disbelief in the positive effect of joint activities and mistrust of the state and its housing policies, as well as a lack of leaders
- Legislative and administrative barriers, including unreasonably complicated procedures and high expenditures for the registration of non-profit organizations
- An unfriendly local environment for a homeowners' association, a limited supply of managing organizations and service providers, a lack of competition between these organizations and problems with utility providers in concluding contracts on the supply of resources
- The poor condition of buildings, which are often deteriorated and have poor energy performance, coupled with owners' and municipalities' limited financial resources for renovations

## 1 Mandatory or voluntary homeowners' association

### 1.1 Creation and registration of homeowners' associations

One of the most disputed issues in housing is whether the creation of homeowners' associations should be mandatory or voluntary. There are four major trends concerning this topic in the countries of Central Europe, the Baltic, Eastern Europe, Caucasus and Central Asia:

1. *Homeowners' associations were established prior to housing privatization.* In these countries the privatization of apartments was legally permitted only if a homeowners' association was established in the building have evolved professional housing management services implemented by municipal or private companies. The Czech Republic, Hungary and Poland are good examples of this.
2. *Homeowners' associations were not established prior to housing privatization, but rapid progress has occurred in the area as a whole.* These are countries where the proportion of homeowners' associations has increased rapidly, training programmes for their staff and board members have been organized, private banks have been willing to provide loans to homeowners' associations and the regular maintenance of the privatized apartment housing stock has constantly improved. Estonia and Slovakia are good examples in this regard.
3. *Establishment of homeowners' associations is of secondary importance to privatization and municipal management is eliminated.* In countries such as Armenia, Bulgaria and Kazakhstan, a multi-year collapse of housing services in the 1990s and the first decade of the 2000s was caused by a population unready to pay in full for housing services and governments eager to get rid of responsibility for the housing sector. As a result, the existing system of municipal management was virtually destroyed, often along with newly organized systems of self-management. This negatively affected the housing stock. The establishment of homeowners'

associations was sometimes mandatory and sometimes voluntary. Condominium associations failed when owners were unwilling to participate in them.

4. *Establishment of homeowners' associations is of secondary importance to privatization and municipal management is preserved or only gradually transformed or eliminated.* In these countries, the owners of an apartment building are entitled to either self-manage or engage professional managers. Currently, private management companies are not well-developed and homeowners' associations continue to resort to municipal or former municipal enterprises (recreated as joint stock companies). The Russian Federation followed this model.

It can be seen that the mandatory establishment of a homeowners' association contributes to continuity of housing sector management on properties with more than one owner. Furthermore, by allowing customers to pool their resources, this facilitates the development of private businesses who maintain and manage apartments. Homeowners' associations which are registered as legal entities can open bank accounts and thus accumulate funds for renovation and raise loans on their accounts.

On the other hand, good decision-making and the assumption of responsibility by owners is more important than the simple registration of a homeowners' association in legal company registers.

In Hungary, apartment owners in every apartment building are obliged to incorporate a homeowners' partnership, but such partnerships are never registered. The informal partnership selects the form of building management: a homeowners' representative, a board, an individual manager or a management organization.

Russian legislation suggests a very similar system of compulsory decision-making by apartment owners in each building. Apartment owners are obliged to select a method of building management: by the residents themselves, by contracting a management organization, or by registering the homeowners' association leading to management by the association's board. Moreover, recent Russian legislation obliges apartment owners in every building where a homeowners' association is *not* registered to select a council from the building residents. This council is authorized to oversee management or maintenance organizations' compliance with contracts. A problem with the fulfilment of these legislative requirements in Russian cities is that the residents are often indifferent and public bodies often take advantage of this passivity to keep the housing-management sector under municipal control.

## 1.2 Membership in homeowners' associations

In all the analysed countries, except Lithuania the Russian Federation, membership in a homeowners' association is compulsory for every apartment owner. In practice, resolutions passed by owners' at general meetings or by homeowners' associations have similar power.

Under Russian law, the owners of premises in an apartment building have to join a homeowners' association on a voluntary basis, as the Constitutional Court decreed in 1998 that membership of citizens in public organizations must be voluntary. Lithuania adopted a similar decision for similar reasons.

Consequently, the property owners in the same building may have different legal statuses as members or non-members of homeowners' associations. If the homeowners' association represents less than 50 per cent of common property in their apartment building, however, it must be dissolved, according to the Russian Housing Code. This provision adds to the instability of homeowners' associations and increases the risks of lending to them.

It has frequently been pointed out that this provision runs contrary to legal practice in the overwhelming majority of countries. Fortunately, a legal solution is available. The terminology relating to membership should be replaced by a provision under which the owner of a newly purchased housing unit in an apartment building at once becomes a participant in the homeowners' association. There is still freedom of choice in this, as everyone makes his/her decision whether or not to purchase a housing unit in an apartment building (even under free-of-charge privatization).

In this way, the situation can be rectified by political action. In fact, some time will be needed in order to fully understand the need for such decisions. This is expected to take place as soon as practical programmes for capital repairs of apartment buildings begin to become widespread.

## 2 Decision-making structures in homeowners' association

It is important to guarantee to all owners the opportunity to participate in decision-making provide owners opportunities to take legitimate decisions that are legally binding for everybody. The laws of various countries treat these decision-making requirements differently. Options for the requirement to pass a measure include:

- Simple majority (50 per cent of all premises owners' votes, plus 1 vote)
- Simple majority of votes of premises owners who attended a quorate meeting (50 per cent of votes of owner-attendees, plus 1 vote)
- Qualified majority (such as two thirds of votes)
- Complete consent (100 per cent of votes)

There are many differences in the application of these different options.<sup>48</sup> Sometimes, the law states different requirements depending on the decision to be taken. For example, in France, a majority is needed to take decisions on implementing energy-saving actions in an apartment building. In Spain, to decide to install a renewable energy source such as a solar energy system, only one third of the votes of apartment building owners are required.<sup>49</sup> In the Russian Federation, for most decisions, a simple majority of votes of premises owners who attend a quorate general meeting (about 26 per cent of all votes of building owners) is needed, but for decisions on building renovation or applying for a bank loan, at least two-thirds of the votes of all premises owners in the apartment building are required.

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<sup>48</sup> Urban Institute 2005

<sup>49</sup> Lujanen 2010

## 2.1 Quorum

A quorum is frequently set high in order to ensure that small numbers of residents cannot force a decision. However, the greater the quorum required at a general meeting or the number of owners' votes required for a decision, the more difficult it is to meet these thresholds.

When a country's laws mandate a quorum, the size of the quorum is usually specified. When it is not feasible to achieve this quorum, the law usually provides additional options for taking decisions. For example, the law in many countries allows owners to take decisions by absentee letter ballot (as in Hungary, the Russian Federation and Uzbekistan). For a general meeting that repeatedly fails to be quorate, the law usually allows a smaller quorum for future meetings. In Estonia, for example, a repeatedly convened meeting is legally authorized to make decisions with any number of attendees.

## 2.2 Obligation of decisions made and measures of enforcement

If a general meeting of owners is legally convened and quorate, decisions taken become binding for all owners. Decisions establishing fees to raise funds for building repairs or mobilize loans for building renovation are also binding for all owners. If the association can show the regular payment of fees it proves itself a reliable client for professional management and maintenance contractors and energy efficiency investors. If any owner fails to make a compulsory payment, there will not be sufficient funds to carry out all scheduled work.

To reduce the risk that homeowners' associations will not be able to pay for utility services, contract work or make loan payments, most countries require monthly advance payments by homeowners and the creation of a reserve fund. These measures do not directly improve the payment discipline of homeowners, but diminish risks when making settlements with utility companies or banks.

Nearly all countries use similar pre-trial settlement procedures, and apply similar out-of-court sanctions, to owners in apartment buildings who fail to pay on time and in full. These sanctions include:

- Regular written contact with a debtor requiring him/her to pay. This includes a reminder that payment should be made by a due date, a notice of arrears and notification that legal proceedings have been instigated
- Charging an interest penalty on arrears (Estonia, Latvia, the Russian Federation and Slovakia)
- Termination or limitation of utility services delivery

Usually, the registration of collateral and the forced sale of the debtor's apartment is applied only as a last resort.<sup>50</sup>

## 2.3 Support for low-income households

Many countries have housing allowance programmes for low-income households. Housing allowances are financial support for low-income households to cover some housing costs.

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<sup>50</sup> Collateral by law is described in detail in the Chapter II.

Housing allowance programmes were first established in France (1948), Germany (1965), the United Kingdom (1972) and the Scandinavian countries. By the 1970s, most Western European countries had adopted housing allowance programmes.

Most European countries give housing allowances to both tenants and apartment owners, though housing allowances are less commonly given to owners than to tenants. In Denmark, Germany, Italy, the Netherlands, Portugal and Spain, housing allowances are given to tenants only, but apartment owners can get allowances for maintenance. Ireland, Spain, Sweden, and the United Kingdom also give allowances for the repayment of mortgage loans. Although these allowances are mainly paid to low-income households, in some countries up to nearly half of the tenants receive housing allowances.

A renovation allowance for capital repairs or renovations is given to owners of both individual houses and condominium apartments in several Canadian provinces. Furthermore, in some Central European countries housing allowances partially cover renovation costs.

## Box 12 – Support for low-income households

**Hungary** According to the amended law on social assistance, subsidies are provided to pay for housing maintenance and utility services. Also, from 1 June 2004, some households may receive an allowance to pay arrears on their payments.

**Lithuania** Special favourable conditions for credit are available for low-income households; the state subsidizes annual interest rates up to six per cent during half the loan payback period, up to 10 years.

**Slovakia** Since 2000, low-income households are legally entitled to housing allowances as state social benefits to pay expenses such as rent and utilities related to the use of an apartment or a single residential house. The main eligibility criterion is that the household has previously paid rent and utility services in full. Whenever a household's rent and utility expenses is at least 30 per cent of the household's income, they become eligible for housing allowance. The allowance is paid to an individual at the end of each month, after confirmation of rent payment for the preceding month.<sup>51</sup> There are also special non-repayable subsidies for the purchase or reconstruction of an apartment or house which are allocated depending on the household's income.

Source: UN-Habitat and City of Vienna 2013

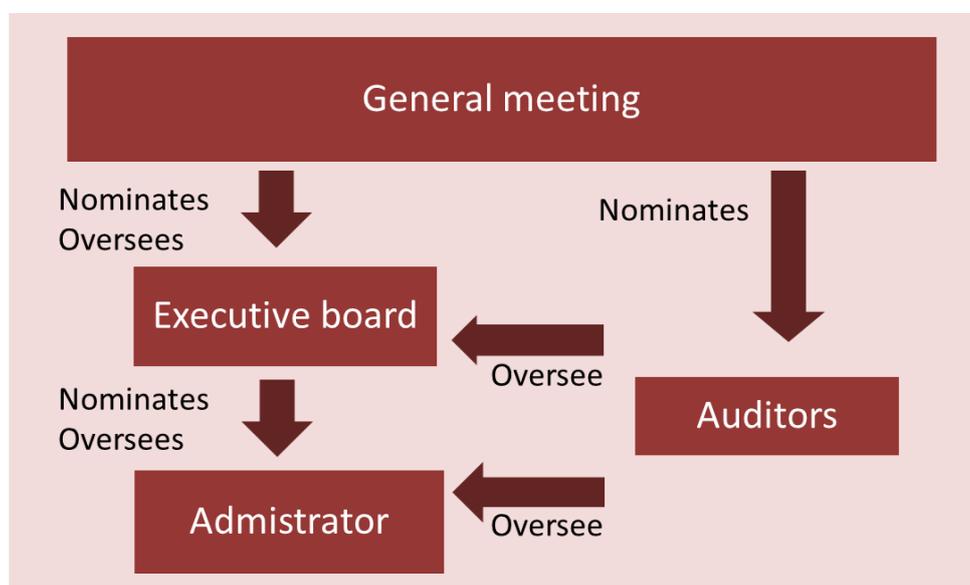
## 3 Role of different actors

### 3.1 Administrative structure of homeowners' association

In most countries studied, the administrative structure of homeowners' associations is hierarchical, clearly described in legislation and strictly regulated.

<sup>51</sup> Zapletalová 2003

This hierarchy consists of several levels<sup>52</sup> (Figure 2). The top level is a general meeting of apartment owners, the supreme decision-making body. The lower levels are the executive board authorised to secure execute decisions made by the general meeting and to lead the management of the common parts of the building and the plot of land. The administrator or manager manages the day-to-day affairs of the complex. He/she is responsible for bookkeeping, the collection of monthly payments and the preparation of documentation for the general and board meetings. He/she is authorised (often together with a board member) to sign contracts, invoices and payoff orders and other financial documents. The executive board is entitled to contract other actors for professional services (such as property management, cleaning service, plumbing or electricity services and repairs). The bookkeeping functions of the executive board and the administrator are usually subject to an internal audit by selected association members, or in many countries, by professional auditors.



**Figure 2** – Administrative structure of a homeowners’ association

Source: Lujanen 2013

### 3.2 Functions of the homeowners’ association

The functions of the homeowners’ association concerning common property management in apartment buildings can be seen as a two-level system.

*The first level of management* involves joint decisions by owners of premises on the common property in the apartment building and goals for apartment-building management. These include identifying the technical, safety, and comfort level desired by the owners, deciding the method of management and establishing the payment system for the maintenance of common property. Management at this level is the right and obligation of the owners of the premises.

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<sup>52</sup> Lujanen 2013

*The second level of management* is the implementation of decisions.<sup>53</sup> This includes: developing work plans with estimates of expenditures and revenue; selecting contractors, signing contracts and monitoring their performance; arranging for payment collection; and working with debtors.

Management requires knowledge, skills and experience. Such routine day-to-day management can be entrusted to the executive board of the association, administrator, hired manager or a management company. It also requires some managerial decisions to be made by a designated person and entity within the framework of the mandate.

### **Box 13 – Example of condominium management by residents themselves**

Activity of the homeowners' association located at the following address: 197 Feheivari street, Budapest, Hungary

The building was constructed in 1976. It has 200 apartments, four entrances and four elevators (two cargo and two passenger). Most of the residents are pensioners and 40 families get municipal subsidies for utility fees. The building apartments were privatized in 1991; only six apartments are still municipally owned.

A homeowners' association was created in 1991. The building is managed by an administrative commission chaired by Ms. Emilne Chizmadia, who is a pensioner with a law diploma and extensive experience in management. However, as none of the board members are professional property managers, they all needed training and experience. The association has full-time staff: a plumber, a heat engineer, two janitors, one yard keeper and an accountant. The elevators are maintained and serviced by a contracted, self-employed technical engineer.

At the start, the association faced a lot of problems: the infrastructure of the building was worn-out, the roof leaked, the doors could not be closed and there were no heat, water, or gas meters. Since the association members are not rich, they were unable to finance the necessary work in the short-term. Therefore, after a technical inspection of the building, a plan with both urgent and long-term tasks was drafted.

Over a period of 14 years, the association renovated elevators, repaired the roofing, upgraded the heating system, and repaired entrances. They also installed entrance intercoms, hot- and cold water systems and water, heat and gas meters.

Source: Urban Institute 2005

The executive board of a homeowners' association consists of the group of apartment owners who other owners think are the most reliable and knowledgeable. The board members represent the top of the second level of building management. If they are not housing-management professionals, they need to either hire a manager or contract a management company.

The board president or elected administrator is usually responsible for leading executive board meetings, signing contracts and, sometimes, bookkeeping.

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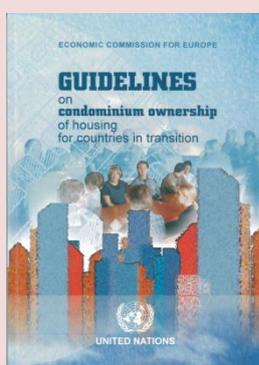
<sup>53</sup> Gentsler and Lykova 2008

In European and American countries, homeowners' associations often hire management personnel. The elected or hired manager is not a master but a servant of the building. The association always has the right to dismiss a manager.

In many countries, the law requires the homeowners' general meeting to elect internal auditors (the audit committee) who are responsible for monitoring the financial activities of the executive board and the board president or administrator. In addition, the homeowners' association, like any other legal entity, has the right to contract independent financial or technical auditors to evaluate the results of the Executive Board and management company's activities.

## Box 14 – Recommended reading IV

### ***Guidelines on Condominium Ownership of Housing for Countries in Transition (UNECE 2003)***



The UNECE developed and published *Guidelines on Condominium Ownership of Housing for Countries in Transition*. This aims to provide practical advice and guidance to the many homeowners and professional administrators of housing condominiums in Central and Eastern Europe. It is hoped that the Guidelines will provide a solutions to some of the major problems related to condominium ownership in Central and Eastern Europe. As they cover a broad region, these guidelines must necessarily present a general approach. Specific solutions based on them must be adapted to national conditions.

## Case Study 3 – Changes in the maintenance and repairs of the Slovak housing stock

**Situation before the initiative began:** A major part of the Slovak housing stock was built between 1955 and 1989 using concrete panels. The project and technical standards of housing construction were appropriate for that time, with no set energy consumption limit or norm set between 1960 and 1980. 46 per cent of Slovak housing stock was built during that period.

**Formulation of objectives and strategies:** The objectives were first formulated in Czechoslovak National Standard in 1984 and then updated in two acts on energy efficiency issued in 2005 and 2009. The desired savings amount to 40 to 45 per cent of original consumption.

**Process:** The main actors are homeowners' associations which are non-profit legal entities (as civic associations) that have to be registered, have an identification number and can open a bank account. The owners pay monthly fees to collect a repair and maintenance fund. The bank sector can offer homeowners' associations and management companies the opportunity to get a loan using the repairs and maintenance fund as a guarantee, as it is secured by the registered collateral of all the apartments in the building. If the technical renovation of a building is carried out and the renovation includes energy savings, a certificate on energy efficiency is issued.

This renovation process has been going on since approximately 1996, starting with small, self-made repairs carried out on individual houses. The owners, facing the challenge to understand the type of

repairs needed, learned to use expert assessments of building conditions and cost estimates. It was then possible to carry out financial analyses and secure funding. The establishment of the Association of Homeowners' Associations in 1996 has played a crucial role in this process. It consisted of six homeowners' associations in 1996, but grew to over 1,300 members by 2013. It distributes educational materials, disseminates best practices among its members, and organizes training sessions and seminars for individual homeowners' associations.

When translated into numbers and expert estimates in 1994, the repairs that had to be performed on the common parts of apartment houses averaged EUR 6,600 (about SKK 200,000) per unit in 1994 prices.

**Results achieved:** The example demonstrates that the repair and maintenance fund can suffice for complex or gradual reconstruction. The state price policy plays a crucial role here, as the owners actually pay the same amount for heat despite the fact that the prices for heating more than doubled over several years. The difference is covered by saved energy consumption for head and hot and cold water.

**Sustainability:** The consistency of the Slovak state policy on energy saving (Czechoslovak National Standard, acts on energy efficiency of 2005 and 2009) creates incentives for stakeholders. Furthermore, the legislative framework has created prerequisites for a complex system of housing management by owners and allowed contractual relations with suppliers of goods, services and employment. Currently, the bank sector offers homeowners' associations and maintenance companies loan opportunities when the repairs and maintenance fund is used as a guarantee, since it is secured by a registered lien for all the flats in house.

#### **Lessons learned:**

- Well-organized decision-making systems are needed.
- The owners can benefit from expert assessments of building conditions and cost estimates. This allows financial analysis and secure funding.
- The establishment of the Association of Homeowner's Associations in 1996 has played a crucial role in this process. This Association distributes educational materials, disseminates best practices among its members and organizes training and seminars for individual homeowners' associations.

**Transfers:** The model of interaction between legally constituted homeowners' associations or management companies and banks together with simple and well-targeted measures of state support is transferrable to the economies of Eastern Europe, Caucasus and Central Asian countries.

#### **Related policy:**

- Czechoslovak National Standard
- Act no. 555/2005 on energy efficiency of the buildings
- Act no. 311/2009 on energy efficiency

**Key messages for transition countries:** Homeowners' associations as legal entities have easier access to loans and are reliable partners for banks and energy efficiency investors.

Source: Zapletalová 2013

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## Case Study 4 – Developing energy efficiency traditions in the Estonian housing sector

**Situation before the initiative began:** As a result of housing privatization after 1995, apartment owners who owned their units began massive improvements by improving finishings and changing windows. As ordinary people who had no access to advice on energy-saving measures or systems from consulting companies, this was done somewhat chaotically. As a result, some buildings developed huge moisture problems. What was considered to be a simple technical replacement of windows was revealed to be a complicated socio-technical process that involved the habits and attitudes of residents and the design process of window manufacturers. It became clear nationally that it was time for apartment owners to learn to act jointly and to carry out renovations in apartment buildings.

**Formulation of objectives and strategies:** The most important issues highlighted in the Estonian housing development plan are:

- Most of the housing stock requires extensive renovation
- There is lack of regular information about the technical condition of housing stock
- The sector requires funding not only for renovation but also for supporting activities such as quality designing, technical inspection, and energy audits

**Process:** The renovation of apartment buildings started in the middle of the 1990s but really progressed between 2004 and 2010. Homeowners' associations have showed remarkable results when renovating their block of apartments. From 2005 to 2007, a 1972-built nine-storey apartment block was renovated with the help of a commercial loan. Extensive work has been carried out, including: insulation of the whole envelope structure of the building, including windows and balconies; total reconstruction of the heating system with the installation of thermostats and individual measuring devices in apartments; roof insulation; the replacement of water pipes and electricity installations; the installation of timers to allow the maximum use of day-lighting; and the renovation of elevators and corridors.

**Results achieved:** The energy consumption of this building was cut in half after refurbishment and annual heat energy consumption was reduced to 93.8 kWh/m<sup>2</sup>year. As the price of district heating energy had tripled during this period, the savings in absolute terms was significant and payback times for loans have shortened considerably.

**Sustainability:** The homeowners' association plans introduce additional measures to reduce energy

consumption. The publicly-funded energy-efficiency consulting centre promotes smart energy saving measures in apartment buildings and helps find common ground between different parties related to energy reduction in buildings.

**Lessons learned:**

- Homeowners' associations are the most active players in energy efficiency enhancement in apartment buildings, as their members appreciate indoor comfort and like to reduce their heating fees.
- Homeowners' associations who plan to start refurbishment should make a proper, comprehensive and holistic plan and technical design.
- The best way to get renovation decisions passed by the homeowners' association and other decision-making bodies is to include all parties from an early stage and allow them to influence the process.

**Transfers:** The fact that homeowners' associations can obtain loans for renovation and energy savings led to the creation of homeowners' associations for more than 60 per cent of housing in Estonia. In addition, it showed the energy efficiency measures which seemed to be most popular and effective in residential buildings. These are transferable to residential housing stock in most Eastern Europe, Caucasus and Central Asian countries.

**Related policy:** Estonian housing development plan.

**Key messages for transition countries:** Homeowners' associations are representatives of apartment owners for whom improvement of their own comfort is paramount. Investing in energy efficiency by homeowners' associations reduces energy consumption and improves the indoor environment, assuring comfort for residents.

Source: Liias 2013

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## Case Study 5 – Energy-efficient housing pilot project in Lithuania

**Situation before the initiative began:** After the break-up of the Soviet Union, Lithuania inherited housing with very low energy efficiency compared to Western Europe. In the early 1990s, a mass

privatization programme meant that 90 per cent of former tenants acquired titles for their apartments at practically no cost.

**Formulation of objectives and strategies:** The goal of the programme is to improve this formerly state-provided housing. The programme operates through 1,100 individual homeowners' associations via long-term affordable financing schemes. On average, energy consumption has been reduced by 25 per cent per apartment. Residents of multi-family housing blocks have recognized that working together in a homeowners' association leads to greater social cooperation and inclusion.

**Process:** A multi-sourced funding and technical support package has established an energy-efficient housing pilot project and enabled households to improve energy efficiency and renovate their crumbling apartment blocks. A USD 10 million loan agreement was signed between the World Bank and the Lithuanian government in August 1996 for a five-year pilot project. Of this loan, 53 per cent was dedicated to housing and 47 per cent to schools. The Lithuanian government contributed 30 per cent matching funds, and homeowners' associations contributed 10 per cent of retrofitting costs to be eligible for a loan.

#### **Results:**

- The main beneficiaries of the project are Lithuanians who became apartment owners after privatization. Local municipalities have also benefited from the programme as energy subsidy payments for low-income households have been reduced.
- This is a genuinely demand-driven undertaking which started a shift in thinking in Lithuania from centralized housing maintenance and renovation towards a market-based system that requires active involvement of residents in decision making, while providing support for low-income families and fostering social cohesion.
- Legal and institutional innovation allows commercial banks to be involved in financing the renovation of apartment blocks.
- Synergy of all stakeholders removed bottlenecks and ensured the overall success of the project.

#### **Sustainability:**

**Environmental:** Energy-efficient building improvements have led to a reduction of greenhouse-gas emissions. Annual carbon dioxide saving is estimated to reach 12,000 to 22,000 tons. Technical monitoring has shown that there is, on average, 20 to 30 per cent savings on heating. To raise awareness of housing energy efficiency, radio and TV programmes report on energy saving possibilities, and a regular newsletter is distributed to all homeowners' associations.

**Financial:** In 2001, the World Bank permitted the Lithuanian government to use the repaid loans to establish a revolving fund and good repayment rates will ensure the fund's continuity. A survey showed that 60 per cent of participating households found that the loan burden was insignificant or negligible and only 35 per cent found that it was a significant burden. Further, 56 per cent of households have reduced heating bills, on average, by 25 per cent, after adjusting for an increased comfort factor. Carrying out energy improvements usually increases the market price of an apartment, thereby increasing the value of the owner's assets.

**Social:** The need for homeowners to work together has helped improve social integration and the quality of the blocks, meaning that different income groups have continued to live together. The creation of ghetto, or sink, blocks has been avoided by encouraging wealthier families to stay in the block, thus ensuring a broader range of income and social groups. Training sessions and seminars have been provided for all members of homeowners' associations, who are encouraged to get more involved in decision-making about the common parts of apartment blocks. This is done by voting in a community meeting, and clear guidance is provided on voting procedures and rules so it is a transparent process with no misunderstandings.

#### **Lessons learned:**

- The main motivations for homeowners when they decide to take a loan are to improve their own apartment, to carry out urgent repairs on the building and to obtain energy savings.
- After project implementation, homeowners become more interested in energy savings and some start planning new projects.
- Metering in individual apartments, and thermostatic valves and heat cost allocators on radiators, have led to high levels of energy saving and resident satisfaction. On average, having adjusted for increased comfort levels, 25 per cent energy cost savings are achieved per household.
- The lack of a proper legal and regulatory framework to facilitate the formation of homeowners' associations and energy-efficiency investments was addressed with public information campaigns and by increasing the financial accountability of borrowers.
- Lack of collateral is an obstacle to private sector lending, and is addressed by the government acting as guarantor of last resort.
- The privatization of municipal maintenance companies would encourage the formation of homeowners' associations by giving choices, and lower costs for maintenance services.

#### **Transfers:**

- The project has received considerable attention from Lithuanian and foreign housing and energy policy makers, researchers and mass media.
- The project started in the largest cities of Lithuania but it is now being extended to more than 20 cities and towns all across the country.
- 558 homeowners' associations have joined the project to date, with a further 160 new projects starting in 2005.

#### **Key messages for transition countries:**

- Prior to project commencement, legal and financial systems need to be amended to support the operation of the loan programme by allowing homeowners' associations to obtain bank loans without mortgaging individual apartments.<sup>54</sup>
- Homeowners are able and willing to renovate common property if provided with institutional

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<sup>54</sup> World Habitat Awards 2005

and technical support and financial incentives.

- Homeowners' associations will take debt seriously and are repaying loans, often faster than needed.
- Case studies and examples have an important demonstration effect when communicating to homeowners.
- Lack of collateral is an obstacle to private sector lending and is addressed by the government acting as guarantor of last resort.

Source: Central Project Management Agency 2013

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## **C. Professional managers**

### **1 Development of a housing management market**

A market of services and goods can only emerge if there are many potential clients, that is, if there is no monopsony buyer of services. The conditions for a market in services for apartment-building management, maintenance, and repairs were created only when the privatization of multi-apartment housing stock commenced. One centralized customer, the city administration, was replaced by a plethora of potential customers, owners of premises in every single apartment building.

In some blocks, privatization evolved alongside the need for the apartment owners to make independent decisions about the method of apartment-building management. In these cases, municipal housing organizations were deprived of the pool of apartment buildings in a certain territory assigned by the local administration to a particular municipal organization. The new homeowners, dissatisfied with the performance of the municipal organization, started to decline the latter's services and look for better options. The fact that the assured order was no longer guaranteed forced many housing specialists to set up privately owned organizations or become self-employed businessmen in order to attract clients.

No Central European or Baltic state had a national policy ready for the elimination of municipal-housing enterprises and the country-wide creation of apartment owners' associations able to work as small-scale housing and maintenance organizations. Even in Hungary, where the law requires that each apartment building has an association of owners, the owners were given a choice: their apartment building could be managed by one of the owners, the management board, by an outsourced entrepreneur-manager or a management company. It was believed that not a single apartment building should be left without routine management, and, if the owners did not create their own legal entity, they were obliged to select a manager. This was also the case in Estonia and Slovakia.

Since the national government assisted professionals to establish privately-owned businesses and did not interfere with the owners' selection of their apartment-building manager, those who needed services and those who could offer these services could find each other and reach an agreement on the terms and conditions of the contract. In Estonia, Hungary and Latvia there are various types of apartment managers, including small, medium and large companies and self-employed entrepreneurs.

Large management companies usually operate, not only in different city districts, but also in various cities nationwide, and in some cases, even in neighbouring countries. Small and medium usually manage buildings located in one city and the immediate suburbs.

Naturally, the highest competition is in large cities; small cities usually have only two to five management companies. However, even if a residential settlement has only one management company, it still has all the necessary incentives to operate in the interests of the owners of every building. If the owners are dissatisfied with its performance, they can easily dismiss the company and establish an owner's association to manage and maintain the apartment building themselves.

In Poland, the law allows homeowners' associations with no more than seven apartment owners to be managed either by the owners themselves or by a professional manager. All other homeowners' associations are obliged to hire a professional manager. As of 2010, there were more than 18,000 licensed managers across the country that could operate either independently or in the employ of legal entities engaged in real estate management.<sup>55</sup> On average, each licensed manager provides services to 10 to 20 apartment buildings.

In Slovakia, the most popular form of apartment-building management is the hire of managers by homeowners' associations. It is noteworthy that, in Slovakia, it is not obligatory to employ a professional, certified manager. According to the law on ownership, the owners of apartments in each building should establish a fund for building operation and repairs, which is used to cover payments for utility services and capital repairs of the common property in the building.

Apartment-building management in Hungary can also be performed by professional managers, who can be private entrepreneurs or companies. A management company can be more competitive if it has certificates confirming its professional competence, experience, financial sustainability and conformity with professional standards.

The experience of countries in Eastern Europe, the Caucasus and Central Asian shows that management companies tend to keep their close association with municipalities. In Russian cities,

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<sup>55</sup> IFC and EBRD 2012

many municipal housing management organizations were transformed to joint-stock companies, but these new corporations retained management of municipally owned buildings. Very often, the transition of housing management took place without the awareness of apartment owners who, according to the law, have to be customers of property management services. Competition in the service market is just taking its first steps.

In Kazakhstan and Uzbekistan, where the privatization rate is higher than in other countries in Eastern Europe, the Caucasus and Central Asia, municipal housing management organizations were replaced by multi-building homeowners' associations. These associations were created, not by the initiative of owners themselves, but administratively, with employees from municipal housing management organizations who sought new jobs in associations. As a result, these new associations reflect the structure of former municipal management and maintenance organizations as, they have similar administrative and production staff. Multi-building associations usually work based on principles of subsistence economy; they perform all work and services themselves and enter the market only to procure large-scale repair services. Thus, such associations discourage the development of a market for management and maintenance services.

Therefore, in Eastern Europe, the Caucasus and Central Asia, housing management organizations still have a greater role than homeowners' associations.

## 2 Training of all actors

To further develop the market of housing management services, well-educated housing owners organized in informal or legally constituted associations are needed. It is very important, therefore, to facilitate the development of a system for educating local communities on issues relating to their rights and responsibilities as apartment owners and on opportunities for selecting efficient apartment-building management.

It is similarly important to ensure the professional competence of real-estate experts and people engaged in the maintenance of in-building infrastructure networks and equipment. Professional training should be an integral part of both higher and vocational education, and should also be provided through training and skills-improvement centres, which can be created, with government assistance, under business associations of management and maintenance companies.

### **Box 15 – Professional education of housing managers in Hungary**

In Hungary, the law "On Homeowners' Associations" states that condominiums can be managed only by those who have completed a relevant professional training programme. Since 1999, there have been special courses for training condominium managers and real-estate managers accredited by the Hungarian government. Both courses meet the criteria of professional training and examination established by a resolution issued by the Ministry of the Interior of Hungary. They are diploma courses, comprising: lectures, consultations and workshops aimed at finding concrete solutions; course papers; and oral and written graduation exams.

For example, the course for training condominium managers consists of 200 academic hours (including 8 days of lectures), and the course for training real-estate managers consists of 500 academic hours (including 20 days of lectures), including all the training materials for condominium managers. The course for training condominium managers focuses on homeowners' associations in

condominiums with residential and non-residential premises and the range of tasks facing a representative of the association. The course for training real-estate managers also covers other properties, regardless of their designation and ownership type. The training process focuses on managing investment projects, assessing activities, the computation of profitability of real estate and development of a comprehensive real-estate management plan. These training courses operate in 22 educational centres nationwide on the basis of training guidelines designed the FUTI OMEGA real estate school exam centre. The cost of the courses is virtually same across Hungary.

Source: UN-Habitat and the City of Vienna 2013

It is noteworthy that, usually, it is necessary to obtain a vocational education to become a professional manager, not due to legislative requirements, but because owners do not like their property managed by incompetent people. Similarly, nationally and internationally recognized certificates confirming vocational training increases the chances of managers to be engaged by owners and well-remunerated for their work.

The Association of Real Estate Companies of Estonia implemented an apartment-building maintenance standard which came into force in 2001. Application of this standard demonstrated that it helps to inform apartment owners about the scale and scope of measures that ensure the proper condition of buildings. Moreover, the list of services and prices offered by a management organization, set in accordance with this standard, enables the owners to select the services they deem necessary for their apartment building, and so to define the cost of the management contract.

The standard describes the content of each service and the standards required from management organizations. It is thus unnecessary to give a detailed list of services in a management contract, and owners can efficiently monitor contract implementation. Management contracts and cost estimates are easily replicated, and the process of preparing a contract takes very little time. Therefore, the standard became a common, comprehensible means of communication between management companies and owners.

### **Box 16 – Latvian Association of Property Management and Maintenance Enterprises (LAPMME)**

LAPMME was created in 1989 and immediately started activities to improve the performance of housing sector enterprises, so as to meet the interests of its clientele: owners and tenants of apartments. Today, LAPMME is comprised of almost thirty real estate management companies who manage apartment buildings populated by about 400,000 people.

To facilitate harmonious development of the industry, LAPMME takes an active part in designing housing development policy. It also makes proposals about the improvement of effective legislation, and facilitates the professional training of real-estate maintenance experts. The importance of informal meetings of experts is not neglected; LAPMME's annual sports games are now a tradition.

In 2002, LAPMME began to issue a Certificate of Conformance to assist its clients to make a well-informed choice. The same year, LAPMME became a member of the Council of the Society of Associations of Baltic states and joined the project "Development of professionalism in the area of

real-estate maintenance in the Baltic states”.

In 2003, LAPMME became a member of the Consultative Council for the development of the Latvian housing sector. Such membership provides an opportunity to participate in regular meetings of representatives of various organizations to discuss crucial housing industry issues.

Source: CDzP management and maintenance company No date

## Case study 6 – Energy-efficiency enhancement as a result of professional residential property management in Latvia

**Situation before the initiative began:** The CDzP management and maintenance company is a member of LAPMME. The company carries out its activities in small cities across Latvia, managing 192 apartment buildings in Cesis (3,900 apartments with the total floor space of 168,582 m<sup>2</sup>), and 23 apartment buildings in Sigulda (370 apartments with the total floor space of 21,115 m<sup>2</sup>). By 2003, most of the buildings constructed in between 1970 and 1980 had an unattractive appearance and were in average to poor physical condition.

**Formulation of objectives and strategies:** To improve the appearance of the buildings and make repairs, the CDzP offered projects assuring better building appearance and indoor comfort through envelope renovation and insulation.

**Process:** From 2003 to 2006, the CDzP implemented more than 70 projects upgrading apartment buildings of varying ages in Cesis and Sigulda. Credit funds from commercial banks were mobilized for this work. The average loan term was 12 years.

Using these funds, the CDzP installed heat insulation in facades, replaced windows and doors in staircases, replaced roofing and made cosmetic repairs of staircases in most of the buildings serviced by the company, all of which helped achieve the owners’ targets. In addition, the CDzP used the same credit to upgrade heating units in all the buildings, saving energy.

**Results achieved:** The buildings now look more attractive, leading to a higher demand for their apartments. The level of the buildings’ comfort improved, heating became better balanced, heat losses were reduced, and average expenditure for heating per 1 m<sup>2</sup> declined by 18 to 23 per cent.

**Sustainability:** The availability of bank loans together with reserves in building repairs funds has helped homeowners to pay for major repairs and modernization of their building when needed. The fact that homeowners choose professional management of their buildings makes further renovation of multi-apartment housing stock practicable. The buildings’ comfort increases after renovation and, accordingly, the demand for apartments in them became higher, which improves their marketability.

**Lessons learned:** Apartment owners can see their investments are being recovered, so their attitude to the maintenance of the common property and further improvements of their building has considerably changed.

**Key messages for transition countries:** Energy efficiency enhancement can be the part of a management company’s services.

Source: CDzP management and maintenance company No date

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## **D. Key messages for transition countries**

The following key messages and learning for transition countries can be drawn from this chapter:

### **Every building needs a manager**

- Every building needs a manager. The board of homeowners' association should select a private management company through a tendering process, which requires a competitive market. The owners of the building should always have the right to dismiss the manager; the company is not permanently hired. The manager of the building is actually the servant for the house, ensuring that common parts are well maintained.
- For multi-family housing blocks, the creation of and membership in homeowners' associations to manage the building should be compulsory. Such associations safeguard the interests of individual owners and common ownership. As legal bodies established with the legal authority to act on behalf of all the owners in a multi-family housing block, homeowners' associations should to be able to enter contractual commitments (such as hiring a private management company and accessing a loan from a local bank).
- A well-balanced system arranged for making and implementing decisions guarantees to all apartment owners the opportunity to participate in decision-making and provides an opportunity to take legitimate decisions legally binding to everyone. The larger the quorum required for decision-making, the more difficulties arise.
- In multi-family housing blocks, common parts (such as roof, staircases, technical and service systems and plot of land) are the joint responsibility of all apartment owners. All decisions regarding building management and maintenance should be made jointly by homeowners. A private management company can be hired by homeowners to execute these maintenance tasks, and this has been proven to work very successfully. There are also successful homeowners' associations executing management functions without engaging professional managers. This is possible when owners took the initiative and expressed their intention to work together in the interests of the building. Management through the homeowners' association is usually practiced in buildings with only a small number of apartment owners.

### **Avoid free riders by using property as collateral**

- A maintenance fund should be established for each multi-family housing block and administered by the board of the homeowners' association. This fund may be used to cover all expenditures relating to maintenance and repairs and other measures to improve the apartment building condition and enhance its energy performance. Regular contributions should be compulsory for all owners and weighted on the basis of ownership fraction. Free riding should not be possible, and when an owner defaults on payments over a certain period of time, his/her property should be used as collateral.
- Experience shows that homeowners' associations take debt seriously and often repay loans more quickly than required. This makes them reliable clients for commercial banks.

### **Standards and certified training for building management and maintenance**

- Managing apartment buildings is a special type of activity, which implies certain competences and skills. These require governments to set standards for apartment-building maintenance. Certified vocational training on building management and maintenance needs to be available for private management companies and individuals. Moreover, it should be the role of the government to create a market of professional managers and firms.

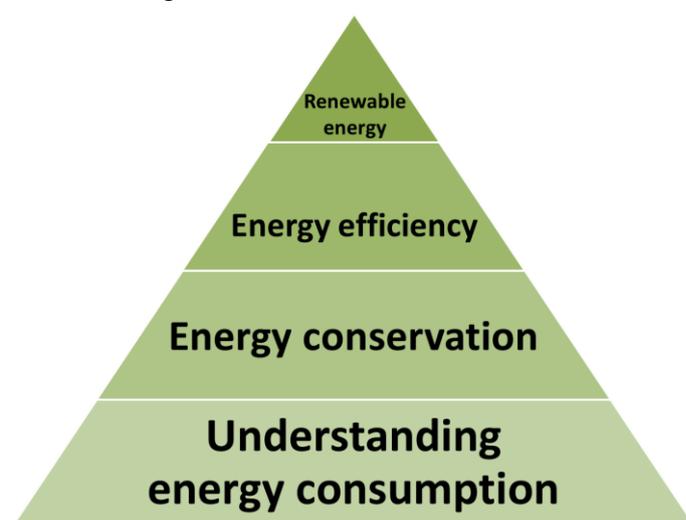
## IV. AWARENESS RAISING AND BEHAVIOUR CHANGE

### A. Background

Energy consumption in housing depends greatly on the behaviour of residents and their consumption patterns. To achieve energy efficiency in the residential sector it is essential that apartment owners, tenants, the executive boards of homeowners' association, professional managers of buildings, local utility companies and other stakeholders understand how energy is consumed. They also need to be aware of the benefits and methods of energy conservation and the influence they can have on energy efficiency.

The energy pyramid (see Figure 3) is a helpful illustration. **Understanding energy consumption**, or awareness-raising and behaviour change, lay at the base of the. This builds the foundation for any measure to save energy or any investment to improve the energy performance of a building. Understanding energy consumption also requires that apartment owners and managers of multi-family buildings have regular and up-to-date information on the technical condition of their housing stock. Building assessments or energy audits are often an important first step for this. Also, metering heating and electricity at the individual (i.e., apartment) instead of communal (i.e., building) level helps residents better understand their energy consumption pattern (see Chapter II: Legislative and Regulatory Framework and Chapter V: Technical Measures).

**Figure 3** – The Energy Pyramid  
Source: Buffington 2010



The most important message of any awareness-raising activity should be that energy-efficiency measures do not have to be expensive. There are simple, cheap, or even free solutions to save energy.

**Energy conservation** depends on consumer behaviour. To save energy and use it in a more efficient manner, residents need to change their practices. These include turning off lights when they are not needed, setting thermostats to lower settings in the winter and higher settings in the summer, cleaning the

blades of ventilation fans frequently to remove dust, and replacing air filters on HVAC systems on a monthly or bimonthly basis. Energy-conservation behavioural changes can often be made at little or no cost, but it is essential to have the cooperation of all people involved for them to be successful.<sup>56</sup>

**Energy efficiency** involves purchasing and installing energy-efficient equipment and systems. This includes using compact fluorescent lamps or light-emitting diodes rather than incandescent lamps,

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<sup>56</sup> Buffington 2010

or double-pane insulated windows rather than single-pane windows. More technical solutions for higher energy efficiency in housing are further discussed in Chapter V: Technical Measures.

**Renewable energy** is the peak of the pyramid, meaning that renewable energy technologies should be installed only after measures for understanding energy consumption, energy conservation and energy efficiency have been implemented. It is economically ineffective to install renewable energy sources, such as solar panels, when energy is not yet used in an efficient manner. Fewer solar panels will be needed if the system is first modified to use energy as efficiently as possible.

## B. Public information campaigns

Energy consumption is invisible to the user. Most people have only a vague idea of how much energy they are using for different purposes and what difference they can make by changing day-to-day behaviour or investing in efficiency measures.<sup>57</sup> Consumption in identical homes, even those designed to be low-energy dwellings, can easily differ by a factor of two or more depending on the behaviour of residents.<sup>58</sup> Any attempt to change the patterns of supply and consumption, therefore, has to take into account the interfaces between supplier, technology and consumer, and the ways in which these can be improved.<sup>59</sup>

A household's energy consumption pattern can be strongly influenced by the behaviour of its neighbours. Those with neighbours who spend less on his energy bills, also want to reduce energy costs. Public awareness campaigns, such as "energy hunts" to identify "energy guzzlers" in homes or neighbourhoods, build on this idea. They show that competition is a good incentive for residents to critically assess their energy consumption and identify methods for energy conservation (see Box 18). Of course, a prerequisite for such initiatives, as for all energy-saving and energy-efficiency measures, is non-subsidized energy tariffs; otherwise, financial benefits are not clear to households. Furthermore, electric and heat meters need to be installed monitor energy consumption.

### Box 17 – Energy neighbourhoods: Could yours be the best energy saving community?



This energy competition at neighbourhood-level was organized in 16 European countries. The aim was to save at least nine per cent of electricity and heat energy per household for four months. The neighbourhood team with the greatest savings won. A team could consist of actual neighbours but also could be work colleagues, members of an association, or a group of friends. The idea was to help people make the connection between their energy use and its cost to their wallet and the environment.

The competitions took place in 2011 and 2012. In 2011, more than 7,000 households from all over Europe joined the challenge. The winners exceeded the original objective by achieving energy savings of 37 per cent during the four months of the competition.

Each neighbourhood needed to have between five and 12 participating households. Experience

<sup>57</sup> Ibid.

<sup>58</sup> Sonderegger 1978

<sup>59</sup> Darby2006

suggested that the more households involved, the better the results. The key element for the neighbourhood to work well was that the individuals involved met on a regular basis. Each neighbourhood team was led by its own “Energy Master”, someone from within the group who helped the team achieve its energy-saving goals. No previous experience was needed for this role; training was provided and support was available from energy experts throughout the project.

On 1 December the competition began and the teams took their first meter readings. This was followed by a do-it-yourself home energy check to see where savings could be made. The energy neighbourhood website provided additional ideas for energy conservation. The teams entered their weekly meter readings on a website to monitor progress and compare it with that of other teams. Four months later, on 31 March, the competition ended and the teams submitted their final meter readings.

More information at [www.EnergyNeighbourhoods.eu](http://www.EnergyNeighbourhoods.eu)

### **Box 18 – An energy partner next door – training neighbours in energy counselling**

Wohnpartner and the Eco-social Forum Vienna offer free training for tenants of public or communal housing to become energy partners. As energy partners, they advise their neighbours on how to reduce energy consumption in their everyday life. Experts and energy consultants in Vienna provide a seven-day training course on different topics related to energy-efficient housing. These include cutting electricity costs, avoiding mould, installing correct airing and heating systems and reading an energy bill.

Energy partners are then given an ammeter, a thermal hygrometer and a survey form to undertake energy consultations in their neighbourhood. Three practice consultations are carried out jointly with an energy consultant. After these consultations, the energy partners carry out their own consultations, then visit the households again six months later to update their information and record changes in energy consumption.

The exercise contributes to the three pillars of sustainable development. Economically, it saves energy costs; socially, it creates new neighbourhood networks and relationships; and environmentally, the programme saves energy and creates a more conscious and efficient use of resources.

Sources: Wohnpartner No date, Ecosocial Forum No date

Information campaigns can be an effective way to reach out to the public on the benefits of energy-saving measures and activities. Such campaigns may, for example, disseminate information on why energy losses should be reduced and how this can be done effectively in apartment buildings. This can include: information on technical repairs and financial programmes to support them; public energy-efficiency programmes and initiatives; and benefits from using meters and more efficient light fixtures and household appliances (such cost-effective measures are discussed in more detail in Chapter V: Technical Measures).

Information campaigns and outreach can only be supportive measures; legislation and regulations have to support them. National and local authorities have a responsibility for information outreach and can use leaflets, brochures, videos, quizzes, billboards, radio or television spots for this. Information on energy-saving technologies and services should be easily accessible and quick to understand. Material can be displayed on the internet and in public spaces, including public administration offices. Print media is another important vehicle and can promote and include good examples to facilitate the implementation of energy efficiency activities and make them common practice. In Western Europe, energy providers and utility companies have also proven to be important promoters of energy efficiency and conservation. They are encouraging their costumers to reduce their energy consumption because they have realized that it is cheaper for them to invest in energy efficiency than in to invest in alternative sources of energy supply (see Case Study 8).

### **Box 19 – Want to change behaviour? Start with kids**

Since August 2011, the Russian Energy Agency (REA) organizes energy-saving courses in kindergartens in the town of Kemerovo. This awareness campaign for children is an example of an educational project implemented by the agency in cooperation with local administration.

Children learn why and how to save electricity, water and heating through lectures with customized training materials, including brochures, presentations, brain games and animated cartoons. They also encourage the children to come up with their own ideas and suggestions for energy saving.

In 2011-2012, more than 120 training courses were conducted in over 30 kindergartens. The Kemerovo Branch of REA and the city administration plan to continue awareness-raising training among preschool children. Children have shown to be both change agents and multipliers, as they apply what they have learned during the training and, by doing so, pass it on to their parents.

Source: REA 2011

Homeowners' associations and building management organizations can also directly participate in information campaigns, for example, by distributing material on energy conservation in their periodical publications and member newsletters. For instance, in Slovakia, homeowners' associations inform their members about energy efficiency through their regular newspaper. In Eastern Europe, commercial banks providing loans for capital repairs and the reconstruction of apartment buildings disseminate information on energy conservation to potential customers, such as apartment owners and homeowners' associations. Another effective method for information outreach is public information or counselling centres, as presented in the next section.

### **Box 20 – Video training by the Russian Energy Agency**

REA supports public policies to improve energy efficiency in the Russian Federation. REA is developing and implementing information and education programmes and establishing centres to promote energy savings in households. It prepares information materials such as advertising, presentations, video and training courses. The materials are available to the public in all 72 REA branches and in the online information portal "State Information System on Energy Saving and

Energy Efficiency Improvement” (<http://gisee.ru/>). Other REA activities include the collection and analysis of information from territories and expert evaluation and support for projects for energy-efficiency improvement and the use of renewable energy.

A video training course called “School of Energy Conservation” is one example of the training materials developed by REA. This seven-lesson course describes how individuals can improve energy efficiency with information on topics such as domestic and office appliances, lighting and heating.

Source: State Information System on Energy Saving and Energy Efficiency Improvement No date

### C. Energy efficiency advice and information centres

In several European countries, such as Austria and Finland, it has been effective to disseminate information on energy efficiency investment at important moments for property owners or developers, such as when applying for a building or renovation permit before undertaking major investments in an apartment or housing block. “Ambitious renovations comprise a major decision and can only work if the right advice is available for the consumer.”<sup>60</sup> Correct and appropriate information on energy savings and technical options is therefore essential. In this case, the active involvement of the relevant authorities is required (see Case Study 8 for more details). Information is made available to the public in energy centres or information centres by national or local governments, non-governmental organizations, or semi-public institutions such as utility companies.

Information services may include consultations on energy saving for apartment owners, options for technical equipment and state and municipal programmes to support energy saving measures. This is supported by information on preferential lending schemes and the financial institutions that finance energy efficiency projects.

Information centres can also create databases on organizations in the region that specialize in surveys or energy audits of buildings and make recommendations on optimum energy-saving measures. They can also give information on engineering and energy service organizations and completed energy efficiency projects. This information can be useful to residential property owners, homeowners' associations and private management companies.

### Case Study 7 – The ‘Wien Energie Haus’ customer care centre in Austria

Picture: © Wien Energie Haus



The Wien Energie Haus is a joint initiative launched by the three utility companies owned by the city of Vienna, Wienstrom, Wiengas and Fernwärme Wien. The programme provides assistance in energy matters adapted to customer needs and the services required, for example hot water, light or heat. Energy counselling is free of charge and constitutes an essential element in the push to a resource-minded, cost-efficient and

<sup>60</sup> BPIE 2011

environmentally-friendly energy supply.

Assistance is youth-oriented and aims to make young people aware of how to use valuable energy sensibly. The exhibition includes real-life situations where people can actually feel how simulated winter conditions affect different types of windows. Customers are made aware of differences in quality and technical problems such as condensation; they can measure for themselves the different inside surface temperatures. One exhibit is a set of different wall constructions and insulation materials, which visitors can assemble individually to calculate energy consumption and the effect different combinations have on the environment.

What makes this concept so successful is that customers receive competent, independent and comprehensive counselling on all sources of energy and are not pressured into buying appliances or tools. Regular training is offered to increase the circle of customers.

**Situation before the initiative began:** Before the Wien Energie Haus was opened, customers had to call their local energy (gas, electricity or heat) suppliers for advice in energy matters, which was not optimal. This also meant that only customers who contacted the energy supplier (for example, to apply for connection to the main system or to enquire about billing) received information.

**Process:** The Wien Energie Haus was opened in September 1997 as a single, comprehensive consulting location which covers all sources of energy, provides information on assistance on everyday energy matters, and provides individual advice free of charge to over 900,000 households.

Most of the advisory sessions concern refurbishment, but customers are also very interested in building insulation, energy efficiency in housing, heating and hot water systems, household appliances and different sources of energy. Many people come to the Centre because they question their energy behaviour and want to do something about it. In these cases, advisors try to outline individual options for action. The free energy-savings check, which is also available to customers on the Internet, forms the basis of this.

The Centre functions as:

- An energy advice centre for private households and small enterprises, with ten experts providing daily individual advisory services, including over the phone
- An information centre, providing answers to different questions on energy issues and illustrating energy-consumption and saving options, using hands-on objects, interactive models and experiments
- A venue for guided tours, lectures, seminars, games, competitions and discussions on the issue of energy, which are organized for different population groups, focusing on the needs of children and young people as well as pensioners and the elderly
- A training place for energy advisors; the semi-public meeting place is on one of Vienna's busiest shopping streets, which is open to everyone
- A place to rental measurement equipment for energy consumption free of charge

**Results achieved:** Approximately 7,000 customers visited the old consulting centres in 1997; 42,000 people came to the new centre after it was opened in 1998. In July 2011, the millionth visitor was welcomed in the centre.

**Sustainability:** The centre costs EUR 1.9 million per year to maintain, and is funded by the energy provider Wien Energie and hence by the city of Vienna itself. The basis for the centre is the city of Vienna's active commitment in the field of energy policy. The provision of energy advice is only one pillar of the city's energy concept. As the energy provider is municipally owned, the energy company implements not only economic objectives but also the city's energy policy objectives.

**Lessons learned:**

- The location of the centre is crucial to attract visitors
- Opening hours should be set according to customers' needs
- Advice should be authentic, transparent and credible, without sales pressure
- Staff have developed their own training programme; in Austria, energy consulting is now considered a profession in its own right
- Energy suppliers no longer consider consulting on sensible utilization a threat, but instead see it as an opportunity.

Source: Wien Energie 2011

## Box 21 – Energy counselling in Oulu, Finland

In Finland, existing building regulations aim to meet the minimum level of energy efficiency in buildings. Optimal energy efficiency, however, has not been achieved, because of lack of comprehensive information and fragmented energy counselling, which is difficult for customers to access. Therefore, the city of Oulu decided to offer guidance and supervision to residential owners during their planning and building stages. The city realized that “it is 50 to 100 times more energy efficient to invest in energy counselling in the building phase than in the new energy production required by energy-consuming buildings”. The successful experience of the city will now be up-scaled and energy counselling be offered at the national level in Finland.

Source: Sitra 2009

### D. Pilot projects

Pilot projects in the housing sector are carried out to demonstrate technical, organizational and financial opportunities and the viability of retrofitting multi-family buildings to improve energy efficiency and living comfort. They can be an efficient way to introduce and present technologies, technical measures and solutions to realize energy savings. They can also be a good platform to promote technologies related to renewable energy, such as photovoltaic systems or solar water heating. Being able to see, test and touch these technical solutions and explore their function in practice is important for decision-makers and the general public to understand the feasibility of improving housing energy efficiency. Moreover, pilot projects help disseminate technological solutions and support the argument for energy efficiency investment. They can also be used to test

and compare different technologies and to support research on the optimal materials and technologies for a country's climate.

It is important to give detailed background information and technical specifications on the pilot project and the technical equipment and processes applied. This includes information on project costs and financing and demonstrated or estimated energy savings. When developing a pilot project it is also necessary to carefully select the location and demonstration method.

Pilot projects illustrate an important role of national governments in promoting new technologies and supporting research and development. Alternatively, governments can invest in research and innovation through the creation of public research institutes that follow international developments in building energy efficiency and that test technology in real environments through pilot projects. In many transition countries, pilot projects are carried out with the support of international organizations (see Case Study 9).

### Case Study 8 – The Baltic Energy Efficiency Network for the Building Stock (BEEN) in Estonia

**Situation before the initiative began:** Between 1950 and 1990, built in standardized panel construction with exterior walls of single-layer or three-layer concrete slabs by a construction company that was selected through tendering. Due to lack of maintenance and under-investment, these houses are now in need of capital repairs and are characterized by very low energy efficiency; heating consumption is from 170 to 330 KWh/m<sup>2</sup>/year. The selected building was constructed in 1977, has four entrances and 60 apartments and is managed by a housing cooperative. Prior to the implementation of the pilot project, an energy audit of this building had been already carried out and block walls had been insulated.<sup>61</sup>

**Formulation of objectives and strategies:** The project was started in 2005 to develop technical, legal, institutional and financial strategies and instruments needed for the energy-efficient rehabilitation of apartment buildings in the Baltic Sea region.<sup>62</sup> Belarus, Estonia, Germany, Latvia, Lithuania, Poland and the Russian Federation participated in this project, which was partly funded by the European Regional Development Fund and the Technical Aid to the Commonwealth of Independent States (TACIS) programme through the EU. The purpose of the project was to demonstrate that an optimum comprehensive package of measures is more cost-effective and energy-efficient than a step-by-step solution. Also, through pilot projects in different countries, there was an attempt to develop a finance scheme for apartment owners consisting of several financial sources, mainly loans.

Interventions for energy-efficient rehabilitation include:

- Measures to reduce heat loss through the insulation of walls, roofs, basements, heating pipes and other sources of heat loss.
- Measures to reduce heat consumption through, for example, the replacement of heating systems, pipes, and radiators and the installation of energy consumption meters on radiators.

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<sup>61</sup> Gentsler, Petrova, Sivaev and Lykova 2009

<sup>62</sup> BEEN 2008

**Results achieved:** In the course of the project:

- The heating system of the building was completely overhauled and the pipes and heating radiators replaced
- A bulk (single-building) heat energy consumption meter and individual (apartment) heat meters were installed
- The roof and facades were repaired and had heat insulation installed
- Loggias and balconies were glazed

Tenants can now individually control the temperature in their apartments and pay for actual heat consumption. Upon the completion of the work the apartment building was extensively publicized as an example of energy-saving renovation.

A survey conducted by the Tallinn University of Technology among 80 per cent of the owners revealed that they highly appreciated the changes in the appearance of the building and the substantially improved heating system.

Comparison of data in 2005 and 2008 revealed that the consumption of energy for heating was reduced by 30 per cent. During the same period, the price for thermal energy increased by almost 80 per cent; however, tenants' heating costs in this refurbished building increased by only 24 per cent thanks to improved energy performance.

**Lessons learned:**

- Energy-efficient modernization is a relatively expensive investment project. Given the short duration of loans and high interest rates, coupled with still relatively low energy prices, loan repayment can turn into a heavy financial burden, despite a significant part of the loan being paid off through energy savings and these savings continuing after repayment of the loan. With loan durations of eight to 12 years, owners are reluctant to assume such financial obligations.
- When carrying out such comprehensive modernization, a budgetary allowance is necessary to reduce the burden on owners and to make modernization affordable for average-income owners. Moreover, additional financial support measures are needed for low-income families.
- It is very important to inform apartment owners and tenants in a building from the very beginning about the modernization project, and get them involved in the discussion and decision making.

Source: BEEN No date

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## **E. Key messages for transition countries**

Public authorities and homeowners' associations have a crucial role in raising awareness, informing residents about why and how to reduce energy consumption, and explaining including technical measures for improved energy efficiency. Information should be targeted to particular groups, including school children, pensioners and low-income groups.

One key message for residents is that energy efficiency not only reduces energy bills but also improves the comfort of living and the value of housing. This message should always be communicated clearly as energy-efficiency improvements leading to a better quality of life, which is a good incentive for residents to take action. It should also be made clear that energy-conservation behavioural changes can be made at little or no cost.

In order for residents to make the right decisions to achieve optimal energy efficiency, reliable and easily-accessible information is crucial. As this chapter has illustrated, there are several ways to raise awareness and provide information: provide energy efficiency counselling, open customer information centres and educate voluntary energy experts that pass their knowledge on to neighbours. Evidence from EU member states suggests that adding a competitive element to energy-efficiency awareness campaigns encourages residents to reduce their energy bills. Apartment owners or residents should be informed about different energy-efficiency options when taking important decisions. Finally, there is often a need for pilot projects where decision-makers and individuals can see, touch and learn about technical measures and solutions to improve the energy performance of a building.

## V. TECHNICAL MEASURES

### A. Background

Investing in technical measures to save energy in residential buildings is motivated by reduced expenditure on heating, hot water and electricity and improved comfort of living and health of housing. Moreover, investments in an apartment or common parts in a building increase its value. Despite these benefits, it is important to consider the economic viability of technical interventions and the amortization rate of planned investment. This includes considering the quality of the building; if a building is dilapidated, so that its renovation is not economically viable or structurally possible, demolition and replacement with a new energy-efficient construction may be an alternative.

Depending on priorities and desired efficiency levels, there are three types of building renovation:<sup>63</sup>

- **Type A** – Renovation to ensure safety and health standards, when safety and security are the first priority. Measures should account for building load capacity, fire safety, safe use and environmental safety.
- **Type B** – Renovation to enhance energy performance and prolong building life span.
- **Type C** – Renovation to improve building quality and living comfort of residents. Energy-efficiency improvements lead to reduced energy consumption, but current energy prices in the region often make type C renovations less profitable than Type B renovations. Damaged constructions may be replaced with new ones as, to some extent, Type C renovated buildings may compete with brand-new buildings.

In general, greater energy savings are attained as a result of coordinated activities implemented in the entire building rather than only in individual apartments. There are several low-cost measures which yield benefit quickly which apartment owners can use as a first step to ensure more efficient energy use.

Energy performance standards in different countries help determine the desired energy-efficiency to be achieved after renovation or construction of a building. Implementing of a variety of energy saving measures in apartment buildings can lead to reduction of energy consumption by about one third. For example, if the initial primary energy consumption is 230 KWh/m<sup>2</sup>year<sup>64</sup> (the average energy consumption of a house in Russia) this could be reduced to about 150 KWh/m<sup>2</sup>year. This is still far from the passive house standard, which is less than 15 KWh/m<sup>2</sup>year of energy consumed for heating and 120 KWh/m<sup>2</sup>year of energy consumed for all domestic needs (heating, hot water and electric power). While standards for new construction are based on how much energy the building consumes when it is completed, in existing buildings, it is important to consider how much energy consumption is reduced.

Energy saving measures may be applied to:

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<sup>63</sup> Tallinn University of Technology 2009

<sup>64</sup> Gentsler et al 2009

- The building envelope (including exterior wall surfaces, windows, balconies, doors, and the roof) which is not usually insulated in post-war housing stock. Measures such as thermal insulation, the removal of “cold bridges” and the replacement of windows and doors can reduce heat loss.
- The interior structures where heat losses occur (such as lobbies, attics and basements), as thermal insulation of inner common premises also reduces heat loss.
- The interior engineering systems (heating and hot water pipes and equipment, ventilation systems, cold water supply and sewage systems), because measures to reduce heat loss and consumption regulation are important.

Construction laws in many European countries require renovation projects to be developed and approved before they are implemented; permission for construction must be issued by authorized bodies. Furthermore, the design and implementation of construction needs to be subject to the permanent supervision of a competent representative of the customer. If the renovation project is based on recommendations received after an energy audit of the building, then energy-saving measures are included in the project. The metering of individual energy consumption gives a strong basis for designing energy-saving measures.

The design and implementation of renovation measures, energy audits and pre-project work should be performed by competent professionals. All this adds to the project costs, which have to be recouped quickly for the project to be economically viable.<sup>65</sup>

This chapter summarizes practices and research from different countries and assessing the economic justification for measures to improve the energy performance of standard panel and brick multi-family apartment buildings of the type constructed during the Soviet period in almost all countries in Eastern Europe, the Caucasus and Central Asia.

## **B. Demolish or renovate?**

There are four main strategies for dealing with energy-inefficient residential buildings: demolition, renovation, maintenance, and inaction.<sup>66</sup> This section focuses on renovation; however, it is important to also explore the possibility of demolishing a building if its renovation is not economically viable.

In several Western European countries, municipalities and housing associations own much of the housing stock and are leading players in housing renewal. They are primarily responsible for building and developing designated areas and upgrading post-war neighbourhoods.

To address rising demand for housing and simultaneously cut energy costs, in some countries such as Germany and the Netherlands, renewal projects have involved demolition and reconstruction.<sup>67</sup> In EU member states, however, only approximately 0.2 per cent annually of the housing stock is demolished annually.<sup>68</sup> Every building should be evaluated for renovation or demolition, and the possible long-term benefits of demolition versus renovation should be analysed in depth. Buildings

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<sup>65</sup> Tallinn Institute for Economics and Management 2007

<sup>66</sup> Boon and Sunikka 2004

<sup>67</sup> Ibid.

<sup>68</sup> Ibid.

may also have architectural or historical value, which should also be considered when choosing between demolition and reconstruction.

At the same time, research on sustainable urban renewal suggests that decisions between demolition and new construction are not based on environmental considerations, but on economic forecasts of the housing market. Very little attention is paid to waste prevention, energy saving or the use of new materials. The type, size, location and market position of a dwelling are given more importance and financial considerations take precedence.<sup>69</sup>

In transition countries the very high level of individual homeownership impedes the decision to demolish apartment buildings for environmental or market reasons. In the Russian Federation, for instance, apartment owners are obliged by law to demolish dilapidated and accident-prone apartment buildings, and may do this by selling the building to developers. This almost never happens in practice, however, even if homeowners can get a good price for the land under their building. Instead, municipalities have to purchase apartments from homeowners (mostly by allocating premises in other newly-constructed buildings) in order to secure residents' safety and replace old buildings.

Therefore, as long as the safety of residents can be ensured, and investment is economically viable, the renovation of energy inefficient residential buildings should be prioritized in transition countries. Renovating for energy efficiency may be the best alternative to demolition and new construction in housing renewal. However, a lack of maintenance and investment in this region has already led to degradation and deterioration of housing stock. Without prompt action, the number of buildings that need to be demolished will increase.

In any case, the decision to demolish or repair a building should only be taken after a systematic analysis and evaluation of the building's condition by a professional and certified auditor.

## Case Study 9 – The urban renewal of Leinefelde-Worbis in Germany

**Situation before the initiative began:** Leinefelde-Worbis is a city of approximately 20,000 inhabitants located in Eastern Germany. The reunification of East and West Germany in 1990 led to a collapse of the textile industry in Leinefelde-Worbis, forcing people to move away as unemployment rose. As a result, more and more apartments became vacant due to the low quality of housing stock and declining population. To ameliorate this, the Mayor of Leinefelde initiated a modernization process to address environmental, social, financial and economic issues by creating more sustainable and attractive housing.

**Formulation of objectives and strategies:** The project aimed to create and realize a long term strategy for housing stock that would meet the needs of inhabitants and adapt to the housing market. An innovative strategy was needed for both refurbishing and demolishing parts of the building stock in order to make it financially viable without sacrificing affordability or suitability for different social groups. The goals and strategies were established and implemented by the municipality in close coordination with housing societies, the private sector, residents, and the

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<sup>69</sup> Bus 2001

national government.

**Process:** The project started in 1993, and the overall plan for urban renewal was agreed in 1995 after comprehensive discussions between stakeholders. A participatory process started with pilot projects and ended with the redevelopment of the whole area. The planning, design, and implementation of the programme was a joint effort of the municipality, housing societies, private sector and residents. Housing societies were involved from the beginning and their contribution was crucial to identify housing needs and indicate which apartments to demolish and which to refurbish. During the process, 50 per cent of the housing stock was demolished and the other half refurbished to a high quality to meet a variety of housing needs. Houses were made available in different types and sizes for different income groups and household sizes.

The project has been regularly monitored and evaluated since its completion. Lessons learned have been transferred to other projects in Eastern Germany and to regional, national and international programmes, strategies and regulations. New challenges lay in unifying the newly refurbished areas and the older city structures.

**Results achieved:** A double strategy of demolishing and refurbishing apartments has been used. 1,700 apartments have been demolished and over 2,500 apartments have been refurbished. These were newly insulated with polystyrene and equipped with modern heating and cooling systems. These innovations improved living conditions for residents, resulting in major reductions in energy consumption, household expenditures and greenhouse-gas emissions.

#### **Sustainability:**

**Environmental:** Over 2,500 apartments have been refurbished and equipped with new insulation and modern heating, cooling and renewable energy systems, such as solar panels, which have led to decreases in energy consumption, greenhouse-gas emissions and pollution. Rubble created from demolishing some of the houses was reused as building material for housing and landscaping. The abundant use of recycled materials has decreased the embodied energy of the buildings and the amount of new construction materials used. This also reduced the need for raw materials and the energy used to produce them and transport them to the site.

**Financial:** In total, USD 177 million was invested in the project. Throughout the programme, the municipality worked closely with the private sector, generating much-needed private investment in form of capital and private bank credit. Other financing sources included local housing societies, the municipal government, and subsidies from the national government. Continuous maintenance of the housing stock has been paid for by rents. Maintenance of public areas has been paid for by taxes and subsidies.

**Social and Economic:** The initiative supported new enterprises and created much-needed employment in the area. Today there are over 1,200 businesses; unemployment and public debt are significantly lower than regional averages. Over 1,300 people commute to the town for work and six per cent more people live in Leinefelde than at the beginning of the project. Residents participated in decision-making, planning and design through transparent interaction with housing societies. Satisfaction and living standards increased through improvements in the built environment. Migration from the area declined significantly. Before, the most common reasons for moving away were dislike of the social environment and housing; now, they are family- and work-related reasons or to buy a house elsewhere.

**Institutional:** The municipality demonstrated responsible and transparent communication, a willingness to channel demographic change and a commitment to address challenges in a holistic, long-term and sustainable way; this is proof of institutional stability and innovation. The way the municipality innovatively identified opportunities and minimized losses by engaging housing societies and their residents, who are the most familiar with the problems and opportunities of their living environment, was a sign of good governance.

**Lessons learned:**

- The decision to selectively demolish some parts and renovate others increased the overall sustainability and acceptability of the project.
- Close cooperation between housing societies and their residents allowed the development of acceptable and suitable solutions to maintain the housing stock. It also encouraged residents to stay in the area.
- It is possible to reverse declining population trends by improving quality of life.
- Pilot projects are not enough. There is a need for comprehensive urban development projects that take into account different areas of sustainability and create a holistic overall development strategy for an area.
- Transparent, open and active local governments are crucial for successful urban renewal projects. They are needed to realize problems in time and bring together different stakeholders to find long-term comprehensive future strategies for their areas.

**Transfers:** The project directly influenced the launch of Urban Reconstruction East 2002-2009, a federal programme in Eastern Germany, and a similar programme in Western Germany in 2006. Bauhaus University near Weimar offers a programme on the lessons learned from the Leinefelde-Worbis transformation. There is an international study visit organized for the project area every year, bringing together people from different countries to learn lessons from the project and carry the knowledge to their respective countries.

**Key message for transition countries:**

- Do not avoid considering demolishing existing housing stock as an alternative to renovation. The decision to demolish should be taken only after a careful assessment of the quality of the building stock. This analysis should include an assessment of potential energy-efficiency improvements in all parts of the building and a comparison of the costs of renovation and demolition and reconstruction.
- Residents accept a project more when they participate in it. Residents were consulted and invited by housing societies to share their needs, concerns and ideas. Additionally, this relationship has helped to maintain the housing stock after the renovations have been completed, and encouraged residents to stay in the area.

Sources: World Habitat Awards 2007, Building and Social Housing Foundation No date

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### C. Systematic approach to building renovation

Before starting energy-efficiency renovation projects, a systematic audit is needed to understand and analyse the different options. The decision whether to demolish or renovate a building should be taken according to the approach shown in Figures 4 and 5.

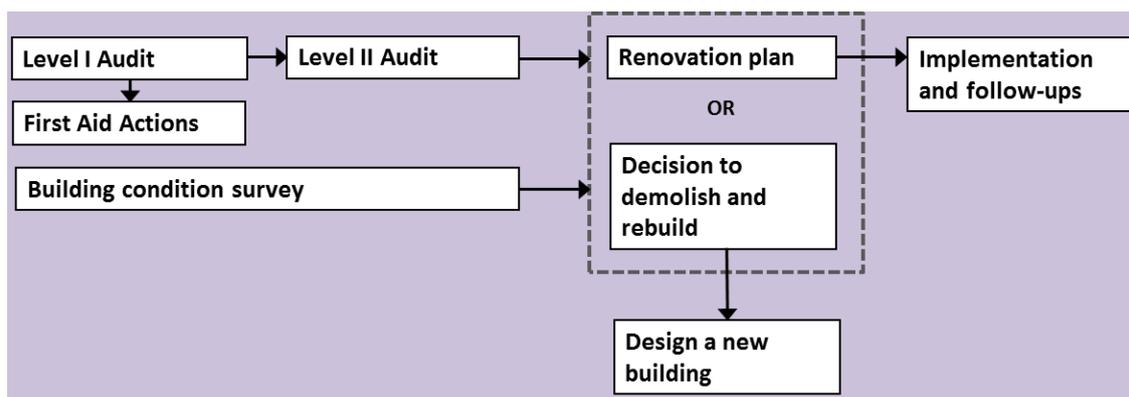


Figure 4 – Realizing energy conservation opportunities

Source: Drawn by Pekka Tuominen in part based on practices used at the VTT Technical Research Centre of Finland and IEA Source Book for Energy Auditors (Lyberg 1987) and Guide to Energy Management (Capehart et al. 2008).

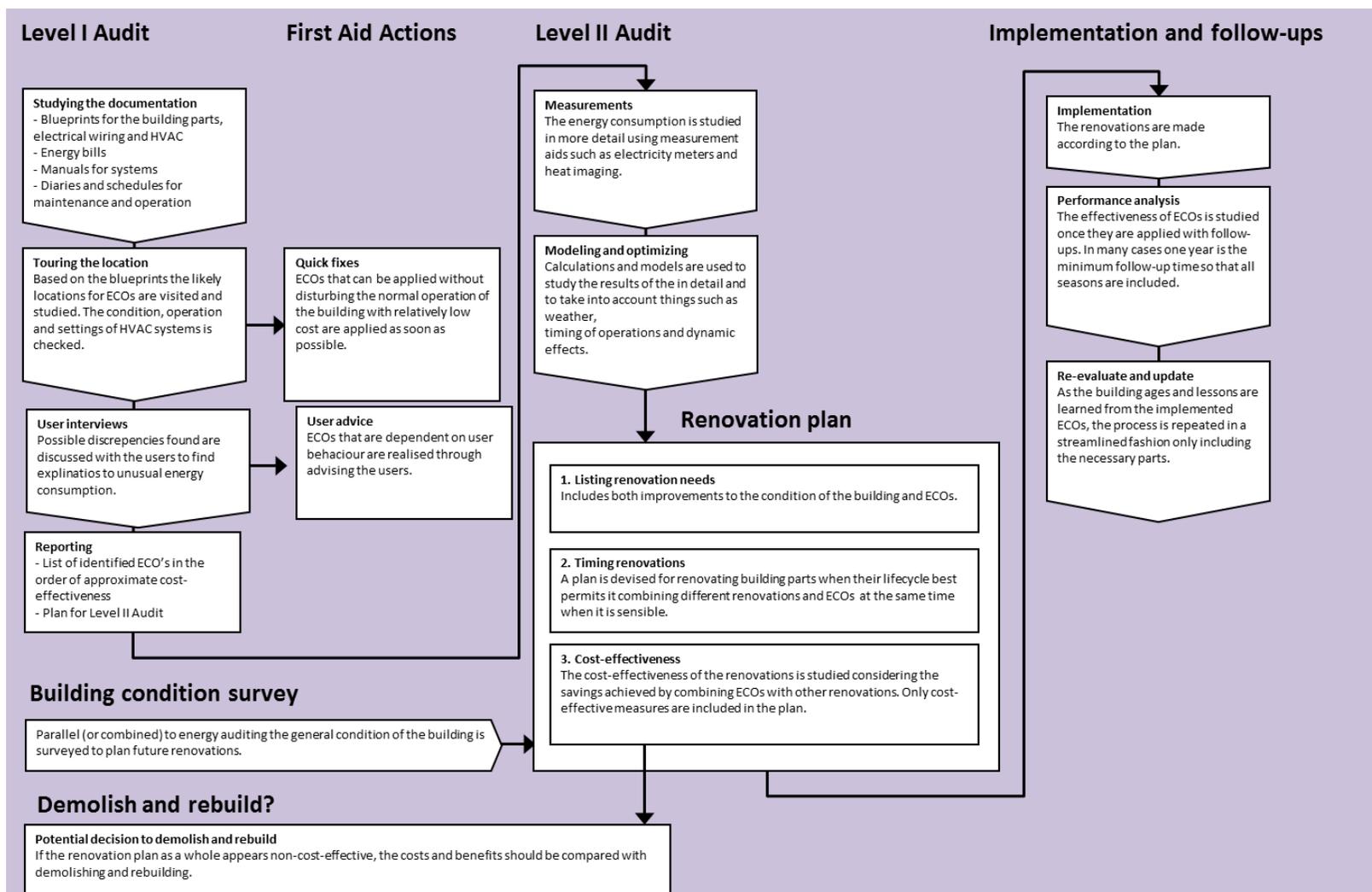


Figure 5 – Realizing energy conservation opportunities

Source: Drawn by Pekka Tuominen in part based on practices used at the VTT Technical Research Centre of Finland and IEA Source Book for Energy Auditors (Lyberg 1987) and Guide to Energy Management (Capehart et al. 2008).

If a building is to be renovated, a comprehensive renovation plan should be made. There are two options for renovation: deep (one-time) renovation and gradual (multistage) renovation.

According to the Global Building Performance Network (GBPN), deep renovation is a building renovation that captures the full economic energy-efficiency potential of improvements by using state-of-the-art technologies. This renovation typically includes a focus on the building shell to achieve very high-energy performance (often less than 60 kWh/m<sup>2</sup>year). The renovated building consumes 75 per cent less primary energy due to improvements in heating, cooling, ventilation, hot water and lighting.<sup>70</sup> In comparison, a standard renovation or refurbishment will often yield minimum energy savings of 20 to 30 per cent or less.

In a gradual renovation, the measures are implemented in different stages. At each stage high energy savings are achieved, as long as individual stages are completed in a high quality manner. The final costs of energy and construction are relatively low.

The deep renovation of buildings is generally recommended; however, due to financial constraints and lack of capital, residents in transition countries might not be able to afford it. In this case, a gradual renovation should be undertaken. To ensure a systematic approach in gradual renovation, the following steps are suggested:

- First, the physical condition of the building should be systematically evaluated.
- Second, immediate needs should be identified and fixed, such as a leaking roof.
- Third, quick fixes (or first aid actions) should be recognized and implemented (see Box 24 and Figure 7 for more information). These measures should be effective and low-cost.
- Fourth, a plan for implementing more intensive renovations should be timed so that each building part is fixed or replaced when it reaches the end of its technical and economic lifespan. This means coupling energy-efficiency improvements with the lifecycles of building components such as the roof or windows. At the end of their lifecycle, these building parts are replaced with more energy-efficient alternatives. In this way, the cost increase due to energy-efficiency renovations can be very modest.

Cost-saving measures during construction or renovation can increase costs in the long run. For instance, the installation of a ventilation system with low heat-recuperation characteristics will result in more complex and costly ventilation improvements later. If outer walls are insulated with thin coats of heatproofing material, then further additional insulation will be required, needing further work and new expense. The building envelope may be kept without additional insulation at the interim stage only if it does not cause microclimate problems like cold bridges and steam condensation.<sup>71</sup>

Finally, it is important that building systems such as heating, hot water supply and ventilation be properly operated and maintained. Proper building maintenance may prolong the building's lifespan and improve its energy efficiency in the most cheap and effective way.

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<sup>70</sup> GBPN 2013

<sup>71</sup> KredEX 2012

## Box 22 – Quick fixes for renovation

To achieve energy savings in housing stock as fast as possible, effective measures which can be implemented quickly and on a large scale are needed. Cost-effective measures that give the shortest payback periods should be prioritized. In most cases, these criteria are complementary, not conflicting.

There are many simple measures of this kind. For instance, residents can seal leaks around windows by using glued paper or other similar materials. In addition, air leaks around the main doors to staircases can be sealed or a mechanism installed which would shut the door. Relatively low-cost information campaigns can promote these measures.

Relatively inexpensive measures implemented on large scale often have a greater impact than a few expensive projects, though this does not mean relatively expensive retrofit projects should not be carried out at all. There is also a need for well-planned and monitored renovation projects in which a variety of different technologies are tested. These technologies can then be introduced into large-scale operations supported by developments in the building materials industry.

Source: Lujanen 2013

## D. Energy measures implemented during renovation

### 1 Metering energy and water consumption

Any major implementation of energy-efficient activities should be preceded by the installation of devices metering the consumption of utility resources such as electricity or hot water. In multi-family apartments, electricity and hot water can be metered in individual apartments, or for the entire housing block when a master meter is in place. Bulk meters are necessary for the settlement of accounts with suppliers of utility resources, and encourage the implementation of resource-saving activities in the whole building.

Individual metering of electricity and hot water consumption allows a fair division of payment between individual consumers and affects their behaviour. In addition, it can provide a great incentive for residents to save energy and use utilities more efficiently, as they have direct control over their levels of consumption. Individual meters are therefore the basis for behaviour change and an important reference point. Having meters installed is also a prerequisite for measuring the actual energy performance of a building or unit in the building.

In most Western European countries, metering of heat, water, electricity and gas has been standard for decades, in contrast to many Eastern European, Caucasian and Central Asian countries where unmetered electricity consumption in apartments has been accepted since Soviet times. Metering of hot water or gas is only just being implemented in some countries in this area.

## 2 Energy auditing and energy certification<sup>72</sup>

As soon as individual meters have been installed, the information they collect can be used for energy performance certificates. Such certificates rate and certify the energy performance of new and existing buildings. Due to the EBPD, in the EU, energy performance certificates are required for every house or apartment for sale or rent, and must be less than ten years old.

The objective of the certificates is to provide information. Performance certificates and labels are also a measure to protect consumers by informing them about the quality of the building.

Energy performance certificates are a tool that helps energy consumers in a building to understand if their building consumes more or less energy than other buildings and if it complies with legal standards and benchmarks. In practice, energy performance certificates are generally accompanied by recommendations on what energy-saving measures to implement in order to improve the energy efficiency of the building. The certificates are usually based on either calculated or measured energy consumption or both.

Although different certificates exist across EU member states, all energy performance certificates contain the same information and are designed to be understood easily by everybody (see national examples of energy certificates in Figure 6). The certificate shows energy efficiency on a scale from A, which is the most energy efficient (less than 100 kWh/m<sup>2</sup>year), to G, which is the least efficient. Energy consumption exceeding 301 kWh/m<sup>2</sup>year is considered energy inefficient. The energy class of a building is shown to the right of its energy consumption of the building is shown. For example, in the Russian Federation, the vast majority of buildings constructed before 1995 would be marked E to F energy class, as annual energy consumption of such buildings is about 235 to 295 kWh/m<sup>2</sup>a.<sup>73</sup>

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<sup>72</sup> OECD/IEA and AFD 2008

<sup>73</sup> EBRD 2012

Energy certificate	Building Energy Performance	As built		
	Space to make reference to the energy certification procedure used	Calculated		
	Very energy efficient			
	Not energy efficient			
	Space to include additional information on the indicator and building energy use	130 kWh/m <sup>2</sup>		

Energy certificate	Building Energy Performance	As built	In use
	Space to make reference to the energy certification procedure used	Calculated	Measured
	Very energy efficient		
	Not energy efficient		
	Units used kWh/m <sup>2</sup>	130	170
Space to include additional information on the indicator and building energy use			

Energy certificate	Building Energy Performance	As built
	Space to make reference to the energy certification procedure used	Calculated
	Very energy efficient	
	Regulations for new buildings	
	Typical existing building	
Not energy efficient		
Space to include additional information on the indicator and building energy use		130 kWh/m <sup>2</sup>

**Figure 6** – Examples of national energy performance certificates

Source: OECD/IEA and AFD 2008

Energy performance certificates for household appliances have already had a substantial impact on consumer choices. They could have a similar impact on rental choices, but this measure has only recently been put in place. Establishing energy performance certificates for buildings is relatively complex, and requires substantial skills from the organizations which award the certificates.

## Case Study 10 – Energy certificates in Estonia

**Formulation of objectives and strategies:** Implementation of the European Directive to provide owners of apartments with a user-friendly tool to assess building quality, in order to positively impact consumer choices.

**Process:** The Estonian Law on Construction regulates the preparation and issue of energy certificates. An energy certificate is based on calculations of energy consumption for new buildings and measured or estimated energy consumption for existing buildings. Energy certificates for existing buildings are issued by an enterprise entitled to conduct energy auditing and issue 10-year energy certificates. Energy certificates for buildings which are being designed are issued by the designer and are valid for two years from the end date of the guarantee for construction.

Since 1 January 2009, a Resolution by the Government of Estonia established a list of buildings for which an energy certificate has been mandatory. It includes buildings under construction, public buildings with a useful floor space exceeding 1,000 m<sup>2</sup>, and existing buildings or parts of buildings which are being sold or rented, if so required by the buyer or tenant.

An energy certificate may be ordered by the owner of a building, the management board of a homeowners' association or a management company, which, in their turn, is obliged to submit a copy of the energy certificate to all residents. The energy certificate needs to be renewed after each substantial renovation.

The Estonian implementation of the EU Directive proved that a real estate owner or a potential buyer can easily find out the energy class of the apartment building or an individual apartment with the help of the energy certificate.

As energy audits and energy certificates are not mandatory for individuals, the state established a special-purpose allowance to promote this measure. The state-funded Estonian Credit and Export Guarantee Fund (KredEx agency) allocates allowances to homeowners' associations to conduct energy audits or expert evaluation of the apartment building. Allowances account for 50 per cent of the cost and should not exceed EUR 700 per year.

There is a single format for an energy certificate (see example below). The cost of the certificate for a single residential apartment building varies from EUR 60 to EUR 130 and is valid for ten years. The energy auditing of a residential building will cost between EUR 630 and EUR 1000. The energy certificate data are recorded in the construction register.<sup>74</sup>

**Sustainability:** The allowances allocated by the KredEx agency to apartment owners' associations for energy auditing or expert evaluation of the apartment building have helped an increasing number of residential buildings. Furthermore, if a subsidy is allocated to modernize an apartment building,

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<sup>74</sup> 2010

upon the project's completion, the building should meet mandatory energy-efficiency requirements.

**Related policy:**

- The Estonian Law on Construction
- Resolution by the Government of Estonia, 2009
- The Programme on Housing Sector Development of the state-funded agency

**Key messages for transition countries:** Building certificates and energy consumption labels support consumer protection as they give consumers information about the quality of the building. So, an energy consumption label is more than an energy-efficiency indicator, as it assesses more than just the energy performance of a building.

Source: Liias 2013

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An energy audit is an assessment of a building's energy efficiency by a competent assessor using a recognized method.<sup>75</sup> Energy efficiency depends on different factors like climate, building design, construction materials, the types of heating and utility systems installed in the building and supportive appliances and equipment. Energy audits precede energy certification and assess the building's energy performance as a whole. Energy audits generally analyse: the building shape; the thermal and solar properties of the building envelope and its air permeability; the efficiency of heating, hot water, ventilation and air-conditioning systems; and what fuel and energy sources the building uses. Other elements, such as lighting systems and installed equipment and appliances, may also be analyzed.<sup>76</sup>

Energy certification (and hence energy auditing) may be voluntary or mandatory in different European countries. Voluntary certification serves as a marketing tool for constructors, but tends to identify only the most efficient buildings. Mandatory schemes, on the other hand, help to identify the most inefficient buildings and include advice on how to improve energy ratings. Therefore,

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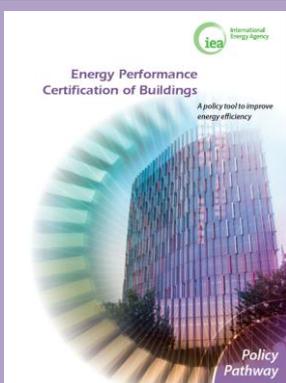
<sup>75</sup> OECD/IEA 2010

<sup>76</sup> Arkesteijn and van Dijk 2010

mandatory energy auditing may significantly influence energy efficiency in the building sector, but such auditing is somewhat complex and costly to implement.

Energy auditing is an important tool for improving the energy efficiency of buildings. Energy audits and their recommendations should be taken in account when making the decision to renovate or refurbish a building. In multi-apartment buildings, energy consumption and energy costs should be assessed at the building and individual level. In many countries, energy improvements are subject to joint approval by apartment owners, so the results of building-wide energy audits are important for such decisions. Energy audits for individual apartments are of interest to individual unit owners.

### Box 23 – Recommended reading V

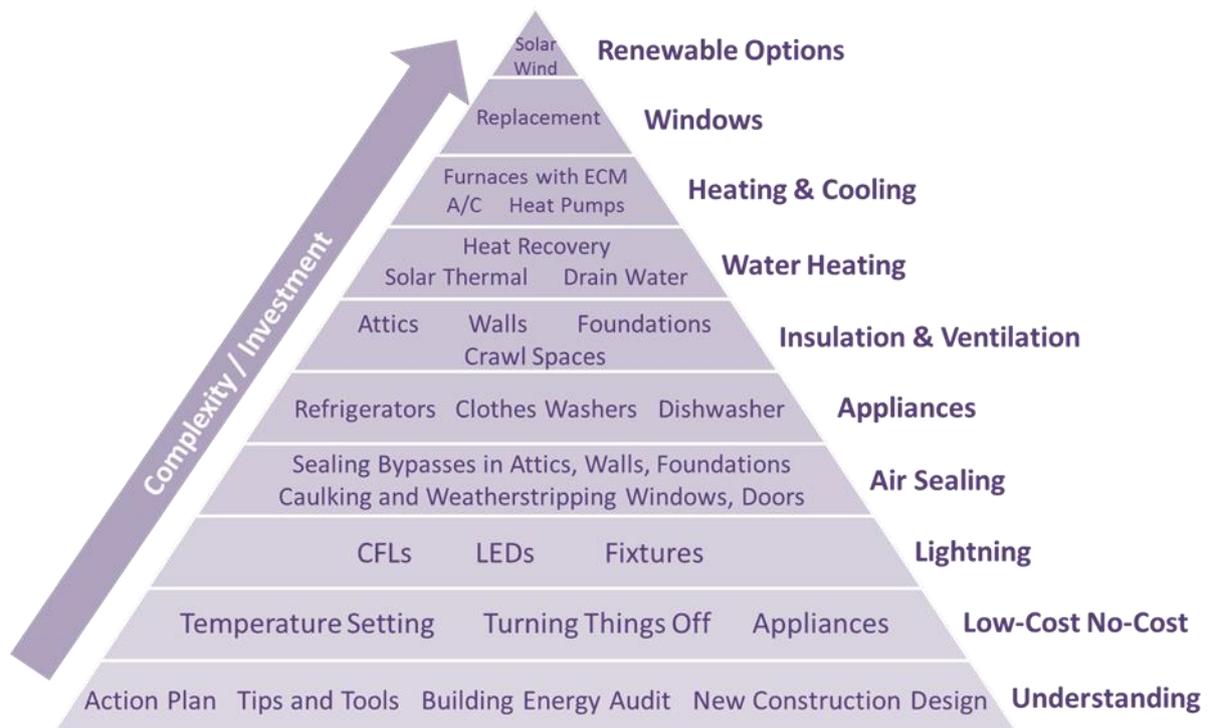


#### ***Energy Performance Certification of Buildings (OECD/IEA 2010)***

Policy Pathway publications provide details on how to implement specific recommendations drawn from the IEA's 25 Energy Efficiency Policy Recommendations. Based on direct experience, published research, expert workshops and best-practice country case studies, the series aims to provide guidance to all countries on the essential steps and milestones in implementing specific energy-efficiency policies.

### 3 Impact and cost effectiveness of renovation measures

An energy-saving pyramid illustrates the systematic approach to apartment building renovation in order to reduce its energy consumption. It is a ten-level pyramid which should be read from the bottom up. The bottom levels show the easiest and least expensive energy saving measures, and as one goes up the pyramid's levels, the steps become more complex and expensive.



**Figure 7** – Energy-Saving Pyramid – Technical measures

Source: Based on Meehan 2010

Ten steps have been suggested to achieve energy efficiency:<sup>77</sup>

1. Conduct a building energy audit to understand the problem
2. Implement low- or no-cost measures
3. Replace inefficient lighting
4. Tighten the building's envelope by air-sealing
5. Replace inefficient appliances
6. Fix and improve insulation and ventilation
7. Arrange for a drain water heat-recovery system
8. Replace old furnaces and boilers with energy-efficient ones
9. Replace windows with energy-efficient ones
10. Go renewable by installing a solar power system, micro-hydro or small wind turbine

<sup>77</sup> Meehan 2010

## 4 Energy-saving measures at the building level

The main measures to reduce energy consumption for heating living spaces in residential buildings are thermal insulation, passive solar design, air-tightness and ventilation control, and heating system efficiency and control.

Practice shows that the most significant thermal losses result from an uninsulated building envelope. The simplest way to reduce losses is to install extra insulation in the outside walls, roof and floor.<sup>78</sup> In addition to extra insulation, the next important step is to replace inefficient single- or double-glazing installed in post-war housing stock with new, energy-efficient HY++ windows (U-value 1.6).

Other energy-efficient measures may include the installing a high-yield boiler for space heating, installing a boiler with water-saving regulators for heating tap water, adjusting ventilation systems, sealing the joints in the construction and eliminating thermal bridges. Finally, solar boilers for hot water can be installed on the roof;<sup>79</sup> this is less attractive for most territories of Belarus and the Russian Federation, but is a good solution for the countries in Central Asia and the Caucasus.

Table 4 presents a catalogue of suggested energy saving measures to reduce transmission losses of heat through residential buildings' envelope.

Measures to improve the heat insulation of building envelopes should be implemented alongside activities to reduce losses through the heat, water, electric, and gas supply. A list of measures to reduce losses through these systems, which can be implemented during the capital repairs of residential buildings, is specified in Table 5.

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<sup>78</sup> Boon and Sunikka 2004

<sup>79</sup> Ibid.

**Table 4 – Catalogue of measures to improve heat insulation of residential buildings based on the Energy Pyramid**

Pyramid step	Part of building	Measure description	Effect of implementation, energy savings	Applied technology, equipment & materials
<b>Step 4</b>	<b>External door apertures</b>	Sealing (insulation) of external door apertures with the installation of door closers (providing automatic door closing)	Reduction of heat consumption needed to warm up cold outdoor air infiltrating into a building through leakages in door apertures or through open doors <b>Savings 4 per cent</b>	Seal gaskets of polyurethane foam; automatic door closers
<b>Step 4</b>	<b>Heating radiators in premises</b>	Installation of heat-reflecting screens behind heating radiators	Reduction of transmission heat loss through external walls (reduction of heat energy wasted to warm walls behind heating radiators) <b>Savings 0.5 per cent</b>	
<b>Step 4</b>	<b>Windows (repairs)</b>	Air sealing through the repair of existing windows, single and/or double glazing in wooden window casements	1) Reduction of heat consumption to warm up cold outdoor air infiltrating into a building through leakages in window apertures 2) Reduction of transmission heat loss through windows <b>Savings about 10 per cent</b>	
<b>Step 6</b>	<b>Foundation</b>	Thermal insulation of floors and basement walls contacting soil	1) Reduction of transmission heat loss through floors and basement walls 2) Reduction of frost penetration into floors and basement walls (increase of operating life) <b>Savings 8.5 per cent</b>	Energy-efficient insulation materials (polyurethane, foam boards, polystyrene boards, mineral wool slabs)
<b>Step 6</b>	<b>Attic</b>	Thermal insulation and waterproofing of attic floors	1) Reduction of transmission heat loss through attic floors 2) Reduction of frost penetration into attic floors (increase of operating life) 3) Reduction of moisture penetration (water leaks) into residential and non-residential rooms of a building <b>Savings 4 per cent</b>	Energy-efficient insulation and waterproofing materials

<b>Step 6</b>	<b>External walls</b>	Heat insulation of external walls including: <ul style="list-style-type: none"> <li>- Thermal insulation of external walls by insulation plates with subsequent plastering</li> <li>- Thermal insulation of external walls using suspended ventilated facades</li> <li>- Thermal insulation of external walls by spraying polyurethane foam or an asbestos-perlite mixture</li> <li>- Repair and sealing of external wall joints</li> </ul>	<ol style="list-style-type: none"> <li>1) Reduction of transmission heat loss through external walls</li> <li>2) Reduction of heat consumption to warm up cold outdoor air infiltrating into a building through external walls</li> <li>3) Reduction of frost penetration into external walls (increase of operating life)</li> <li>4) Reduction of heat consumption to warm up cold outdoor air infiltrating into a building through external wall joints</li> <li>5) Reduction of frost penetration into external walls</li> </ol> <p><b>Savings &gt; 25 per cent</b></p>	<p>Suspended ventilated facade techniques: slabs of mineral wool or polystyrene foam</p> <p>Insulated joint techniques: heat-insulation gasket seals, joint fillers, mastic compounds</p>
<b>Step 9</b>	<b>Windows (replacement)</b>	Installation of state-of-the-art energy-efficient triple glazed windows in plastic window frames	<ol style="list-style-type: none"> <li>1) Reduction of transmission heat loss through windows</li> <li>2) Reduction of heat consumption to warm up cold outdoor air infiltrating into a building through leakages in window apertures</li> </ol> <p><b>Savings &gt; 15 per cent</b></p>	State-of-the-art energy-efficient triple-pane windows in polymerized vinyl chloride frames

Source: IUE 2011

**Table 5 – Overview of work on heating, water, power and gas supply systems in residential buildings**

Pyramid Step	Part of building	Measure description	Effect of implementation	Applied technologies, equipment & materials
<b>Repairs and modernizing electricity supply system and lighting:</b>				
<i>Total electric power savings up to 70 per cent</i>				
<b>Step 4</b>	<b>Lighting</b>	Replacement of light bulbs in public spaces (staircases, stair flights, external lighting of entrances) with energy saving lighting fixtures	Reduction of electricity consumption for public space lighting	Compact fluorescent lamps; LED lighting fixtures
		Installation of occupancy sensors in public spaces	Automatic public spaces illumination control	State-of-the-art efficient control gears; occupancy sensors
<b>Step 4</b>	<b>Electricity supply systems</b>	Replacement of physically worn out in-building electric power supply systems (electrical wiring) and input distribution devices	Reduction of physical wear and extension of operating life of power supply systems	
<b>Repairs or replacement of parts of existing in-building utility systems:</b>				
<i>Total energy savings up to 10 per cent</i>				

<b>Step 7</b>	<b>In-building utility systems (repairs)</b>	<p>Repair of heating pipes in a building with thermal insulation</p> <p>Repair of pipes of the hot water supply system in a building with the installation of a water pressure regulator at the inlet</p> <p>Repair of pipes of the cold water supply system in a building with the installation of a water pressure regulator at the inlet</p> <p>Repair of pipes of the sanitation (sewage) system inside a building</p> <p>Repair of pipes of the gas-supply system inside a building</p>	<p>Reduction of heat loss in heating pipes</p> <p>Reduction of heat loss in pipes of the hot water supply system</p> <p>Reduction of hot water discharge due to system cool down (in case of no hot water draw-off at night time or daytime)</p> <p>Reduction of physical depreciation and extension of operating life of heating systems, hot and cold water supply systems, sanitation systems and gas-supply systems</p> <p><b>Savings 5 per cent</b></p>	<p>Steel pipes for heating systems. Pipe-lines made of cross-linked polyethylene, polybutene, polypropylene for cold and hot water supply systems, sanitation systems and gas-supply systems.</p> <p>Shutoff and control valves (valves, gate valves, cold and hot water pressure regulators).</p> <p>State-of-the-art energy-efficient insulation materials.</p>
<b>Step 7</b>	<b>In-building utility systems (replacement)</b>	<p>Complete makeover (total replacement) including:</p> <p>Refurbishment of pipes of in-building heating systems (pipes in the basement and/or in the attic, riser pipes, heating radiators)</p> <p>Refurbishment of pipes of in-building hot water supply systems (pipes in the basement and/or in the attic, standpipes)</p> <p>Refurbishment of pipes of in-building cold water supply systems (pipes in the basement and/or in the attic, standpipes)</p> <p>Refurbishment of pipes of in-building sanitation systems (pipes in the basement and/or in the attic, standpipes)</p> <p>Refurbishment of pipes of in-building gas-supply systems (pipes in the basement and/or in the attic, riser pipes)</p>	<p>Reduction of heat loss in heating pipes</p> <p>Reduction of heat loss in pipes of the hot water supply system</p> <p>Reduction of hot water discharge due to system cool down (in case of no hot water draw-off at night time or daytime)</p> <p>Reduction of physical depreciation and extension of operating life of heating systems, hot and cold water supply systems, sanitation systems and gas-supply systems</p> <p><b>Savings 5 per cent</b></p>	<p>Steel pipes for heating systems.</p> <p>Pipe-lines made of cross-linked polyethylene, polybutene, polypropylene for cold and hot water supply systems, sanitation systems and gas-supply systems.</p> <p>Shutoff and control valves (valves, gate valves).</p> <p>State-of-the-art energy-efficient insulation materials.</p>

**Modernizing and installation of regulating equipment on in-building utility systems**  
*total energy savings up to 20 per cent*

<b>Step 8</b>	<b>Hot water supply systems</b>	Installation of hot water return lines	Reduction of hot water discharge due to system cool down (in case of no hot water draw-off at night time or daytime)	Plastic pipelines; circulating pump; water meter for return hot water metering
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<b>Step 8</b>	<b>Heating system</b>	Installation of an automated heating system control unit (replacement of mixing valves in a building)	Automatic heat medium parameters control in the heating system (keeping the temperature curve of the heating system at a pre-set level)	Pump unit for delivery water mixing with automatic equipment (controller, temperature sensors, flow controller, differential pressure controller)
			Reduction of firing rate in the heating system (eliminating excessive building heating in the transitional season)	
		Installation of an automated single-building heat distribution and metering station (replacement of mixing valves in a building)	Automatic heat medium parameters control in the heating systems and hot water supply systems (keeping the temperature curve of the heating system and hot water temperature at a pre-set level)	Modular automated ready-to-operate heat distribution and metering stations
			Reduction of firing rate in the heating system (eliminating excessive building heating in the transitional season)	
			Reduction of firing rate in the hot water supply system	
			Elimination of risers maladjustment in building heating systems	
			Reduction of heat energy consumption in a building	
	Installation of balancing valves in riser pipes of the heating system	Improvement of comfort conditions in rooms	Manual or automatic balancing valves	
	Installation of thermostatic control valves (temperature regulators) on heating radiators	Reduction of heat energy consumption for heating purposes	Control valves and thermostatic heads (thermostatic regulators)	

Source: IUE 2011

## 5 Cost effectiveness of energy saving measures

For the environment, energy savings are the most important indicator of whether renovation was efficient. Households focus on economic savings due to reduced energy bills. At the same time, professional investment advisors often see investment costs as more important than estimated revenue savings unless the payback time is very short, that is, less than five years.<sup>80</sup> Payback period is an indicator important to households and professional investors.

The payback period for an energy-saving measure depends on a broad range of factors, including, first, the tariffs on energy, and second, the amount of energy saved. Additionally, since all buildings feature different performance specifications, the payback period for energy saving activity in different apartment buildings should always be calculated separately.

### Case Study 11 – Payback period of energy-efficiency investments in Ural region, Russian Federation

Approximate duration of payback periods for energy saving activities and improvement of energy performance in apartment buildings in the Ural region of Russian Federation, in 2012 values.

Energy-saving measure	Objective of the measure implementation	Payback period (years)
<b>System for heating and hot water supply</b>		
Flushing pipes and risers of the heating system.	Efficient use of thermal power; Thermal power savings in the heating system	0.5
Repair and restoration of insulating material of pipes in basements		1.5
Installation of linear balancing valves and balancing of the heating system		2.5
Installation of thermostatic valves on radiators	Improving the level of temperature comfort in premises; Maintaining the required temperature in premises (elimination of overheating); Thermal power savings in the heating system	3
Modernization of individual heating unit through installation and adjustment of the system capable to automatically control water conditions in the heating system depending on the outdoor temperature	Automated regulation of parameters in the heating system; Efficient use of thermal power; Thermal power savings in the heating system	4
Replacement of pipes and fixtures in the heating system	Extension of operating life of pipelines; Reduction of water leaks; Reduction of breakdowns;	7
Replacement of insulating material of pipes in the heating system in the basement by energy-efficient one.	Thrifty consumption of thermal power and water. Efficient use of thermal power.	3

<sup>80</sup> Bell, Lowe and Roberts 1996

Refurbishment of individual heating unit – replacement of a heating subsystem by a new one capable to automatically regulate heat carrier supply at the individual heating unit.	Optimum consumption of thermal power in different time of day and seasons	2-5
Balancing of riser pipes in the heating system, installation of thermostatic valves (replacement of connectors in the heaters by regulating ones) on ascending and descending distribution pipes of the heating systems (risers)	Equalization of heat carrier parameters between the ascending and descending pipes of the heating system on storeys and in building premises.	9
<b>Electricity supply system</b>		
Replacement of electric bulbs in public spaces by energy-saving lighting fixtures with presence sensors	Electric power saving; Enhancement of the lighting intensity	1
Installation of LED lamps in public spaces	LED lamps are switched on only at dusk, which reduces electric power consumption	0.3
Replacement of electric motors in elevators by energy-efficient ones	Electric power consumption	5
<b>System for cold water supply</b>		
Replacement of cold water supply pipe and fixtures in the basement and risers.	Reduction of water leaks. Reduction of breakdowns. Extension of operating life. thrifty consumption of cold water	3
<b>Door and window frames</b>		
Sealing and draught-proofing of windows in entrances	Reduction of heat leaks through entrance doors; Efficient use of thermal power; Enhancement of residents safety; Extension of operating life.	1
Installation of doors and shutters in apertures of basement and attic premises		5
Sealing, draught-proofing and winterization of door frames at the entrances and equipping them with door closing devices		6
Replacement of window frames		6
<b>Walls</b>		
Sealing of intersection and control joints	Reduction of draughts, leaks, freezing, fungoid growth; Efficient use of thermal power; Extension of service life of walls	7
Winterization of basement ceiling, attic floor, roof and outside walls.	Reduction of cooling or freezing of the ceiling in mechanical basement room; Reduction of leaks, cooling or freezing of the floor in mechanical attic room; Reduction of wall freezing; Efficient use of thermal power; Extension of operating life of building structures	12
Hydrofobization of walls	Resistance to wetting and freezing of walls; Efficient use of thermal power; Extension of service life of walls	15

The cost of thermal power in most of countries in Eastern Europe, the Caucasus and Central Asia is higher than in the Russian Federation. However, the climate in these countries is milder and less heating is needed. The above-mentioned payback terms can thus be used, as a first approximation, for assessments in other Eastern European, Caucasus and Central Asian countries as well.

**Lessons learned:** Retrofitting an existing building has long payback periods, and is effective if organized at the whole building scale.

**Key messages for transition countries:** Financial support from local or national governments is needed to reduce the payback period in order to make investments more attractive for residents. Renovation methods used by owners can be controlled by supporting more certain approaches such as retrofitting the whole apartment block at once.

Source: IUE No date

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## Case Study 12 – Renovation of apartment buildings in Estonia

**Situation before the initiative began:** In the 1990s, in Estonia, apartment owners started to attempt to improve apartment windows without access to professional advice. This led to a worsening of the indoor climate of the apartments: most buildings then had no fresh-air intakes and, without such intakes, moisture builds up, potentially causing dry rot. As a result, huge moisture problems appeared in some buildings. Measurements show that ventilation has worsened dramatically after the replacement of old windows.

**Formulation of objectives and strategies:** The goal of a nationwide information campaign for residents was to teach the owners of the apartments how to act jointly and carry out renovations in apartment buildings in order to make them both safe and energy efficient. The major targets of the energy centre which organized the information campaign were:

- Promotion of smart energy-saving measures in apartment buildings
- Administering information concerning energy-saving topics for all apartment buildings
- Finding common grounds between different parties relating to the further use of energy-efficiency measures in buildings

**Process:** The Tallinn administration started with the renovation of several municipal apartment buildings in the Mustamäe district to convert these buildings into demonstration houses. Renovation began with apartment buildings with an average annual energy consumption of 380 kWh/m<sup>2</sup>. After renovation, this dropped to about 300 kWh/m<sup>2</sup>, a 21 per cent reduction. The activities used can be

characterized as low technology transfer with modest investments compared to current solutions.

In 2006, a pilot project to renovate 1977-built apartment house was carried out as part of a Baltic Energy Efficiency Network (BEEN) project. Here, full renovation of the house was carried out to achieve energy savings of up to 50 per cent. The goal of this pilot renovation was to create a working example of good practice showing how to renovate an apartment block, including developing technical and design solutions, procurement and construction supervision. The building has been monitored over a five year period; total heating energy consumption fell from 392 MWh in 2005 to 165 MWh in 2010. Monitoring has been expanded to obtain data on energy consumption and document best practices in property management and maintenance for at least ten years.

After this, homeowners' associations showed a remarkable improvement when renovating their apartment buildings. The most popular and effective measures for improving the energy efficiency of a residential building: are adding insulation to the exterior of the ceiling and outer walls and making them more airtight; replacing the windows, balcony doors and exterior doors; installing exchange heat production systems; and constructing an intake and exhaust air ventilation system with heat recovery units in each apartment. These measures are supported by financial support schemes.

The main barrier to having one complex and well-ordered refurbishment plan has been the scepticism of some of the building's inhabitants, which hindered the decision-making process in homeowners' associations. Old habits have been stronger than the motivation to change behaviours; for example, traditionally, the most popular measure to ventilate rooms in the winter is to open the windows. Sceptical attitudes regarding new and innovative technologies and solutions are still found.

When the price of heating energy remains low compared to the price required for improvements, there is almost no incentive to make large-scale investments to save energy. Long-term feasibility studies are not trusted and it is consequently very difficult to make long-term financial decisions and obtain joint commitments from all the owners in an apartment building. Furthermore, the payback time for investments is not always attractive to financial institutions or for the households. For deep renovations, the payback time may exceed 20 years.

#### **Lessons learned:**

- Most importantly, not having holistic and complex, well-ordered renovation plans from the very beginning meant that not all steps in the renovation were undertaken the right order and financial costs were considerably higher.
- Most of the public still do not believe that energy-saving measures are economically feasible for households and experts have often given contradictory data and opinions. Now, when the data from a variety of buildings prove that implemented measures have been profitable, public opinion is starting to shift.
- Builders and construction companies need more training on renovation and energy-efficient building technologies. Industrialized methods are still not greatly used and the quality of work depends on the quality of individual workers; for example, the airtightness of structures in the building seems to be difficult to assure.
- The primary criterion for making a decision is comfort, even with energy-efficiency renovations. This requires various all-inclusive solutions that take into account the end-user, the resident. Residents should be offered significantly more comfortable and pleasant

apartments, instead of focussing on the need for technical repairs and technology updates.

**Key messages for transition countries:** Before beginning renovations of apartment buildings in transition countries, a proper, comprehensive, holistic plan and a sustainable technical design are needed.

Source: Liias 2013

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## E. New construction

The energy efficiency of new buildings may influence energy consumption in the residential sector for many years, as the lifespan of most buildings is relatively long.<sup>81</sup> New housing usually has better insulation and more efficient heating installations. As a result, energy consumption in new buildings, constructed in accordance with present-day regulations, is, on average, 50 per cent lower than that in older buildings. Energy-efficient decisions made during a building's design phase helps lower costs and increase the energy-saving potential of buildings. Such decisions usually relate to the shape of the building, its orientation, the orientation of its windows, building materials and building technologies. In addition, decisions may be influenced by the need for reduction of the demand for, and costs of, cooling and heating systems.

However, these, like decisions made after construction, can appear to be too costly to enact or can sometimes involve irreparable damage to the structure.

### 1 Building codes and standards of energy efficiency for new construction

Modern European legislation establishes requirements for the energy efficiency of new construction. Although most energy-efficiency requirements in building codes have followed local, state or national traditions, the past decade has shown a trend towards international collaboration to develop international energy-efficiency requirements or standards. Examples include the United-States based energy-efficiency standards which are used in Canada and the United States and the European Energy Performance in Buildings Directive (EPBD) that required member states of the

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<sup>81</sup> OECD/IEA 2008

European Union to establish requirements for energy efficiency in new buildings beginning in January 2006.

Still, energy efficiency in new buildings faces some obstacles, as development mostly focuses on construction costs rather than future building operation costs. Furthermore, incentives for energy saving are often split between different people operating the building; consumers tend not to be involved. Therefore it is crucially important to increase stakeholders' awareness of energy efficiency and the possibilities for further improvements in new buildings. Comprehensive policies which address energy efficiency in new buildings are required. Building codes or standards are part of such policies, regulating the efficiency of the building envelope and, quite often, the efficiency of parts of the lighting, heating, cooling and ventilation systems.

## 2 Higher energy-efficiency standards – beyond the building codes

Building codes and standards can set minimum requirements for energy efficiency for all new buildings, but do not limit constructors or future owners from aiming for still higher energy efficiency. Moreover, present-day technologies allow building with a much higher efficiency than the standard. Therefore, buildings with much higher efficiency standards are already built in Europe, including low-energy buildings, passive houses, and zero-energy buildings.

Low-energy buildings have a better energy performance than typical new buildings or than that required by building regulations.

Passive houses have a comfortable indoor climate obtained without a traditional heating or cooling system. For example, in Germany, the current standard of energy heat consumption for heating is three times lower than it was before 1984. Since the late 1980s, Germany has developed the concept of a building that would not need an individual heating system, the passive house. In 1991, the first experimental building of this kind was constructed in the city of Darmstadt. Today, Germany has 12,000 passive houses; most of them are privately owned detached houses. Passive buildings are no longer experimental projects, and they have become widely disseminated both in Germany and in other European states, in particular, Austria.

Today passive houses have become a construction standard. They have a level of energy consumption so low that they are virtually independent of energy supplies.<sup>82</sup> At the same time, such a building has a very comfortable micro-climate.

A passive house is defined as using:

- No more than 15 kWh/m<sup>2</sup>year for heating<sup>83</sup>
- No more than 120 kWh/m<sup>2</sup>year for all domestic needs (including heating, hot water and electric power)

Passive houses are popular in Europe because they are the most advanced buildings from the point of view of their design, level of comfort and energy consumption. Due to large-scale construction and the improvement of construction technologies and engineering equipment, the construction costs for passive houses have dropped almost to the level of that for traditional buildings.

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<sup>82</sup> ESCO 2008

<sup>83</sup> This level refers to climatic conditions in Germany. For colder climates the respective figures are higher.

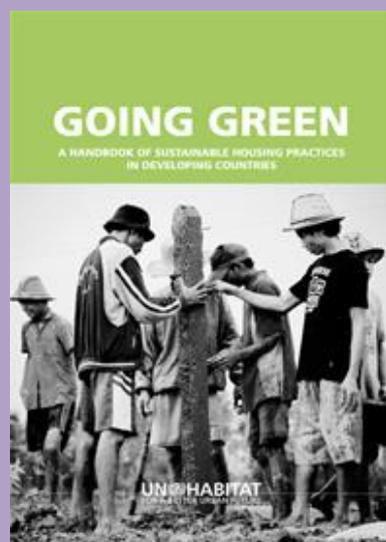
According to data provided by designers, this cost is just 10 to 12 per cent more than for ordinary buildings. Operation costs are much lower because of reduced energy consumption.

The popularity of passive house construction practices, as well as widely adopted energy-saving technologies applied in building renovations, has led to the development of programmes for the renovation of existing housing in several European countries. Such programmes were targeted to achieve passive-house standards by 2025.

Also, zero-energy buildings have been erected in many countries. This is a building for which “as a result of very high level of energy efficiency of the building, the overall primary energy consumption is equal or less than the energy production sources on site.”<sup>84</sup>

This means that in normal cases a zero-energy building produces more energy than it consumes during the summer and thus is able to sell the surplus energy, for instance, to the electric grid. The building often buys electrical energy during the winter.

## Box 24 – Recommended reading VI

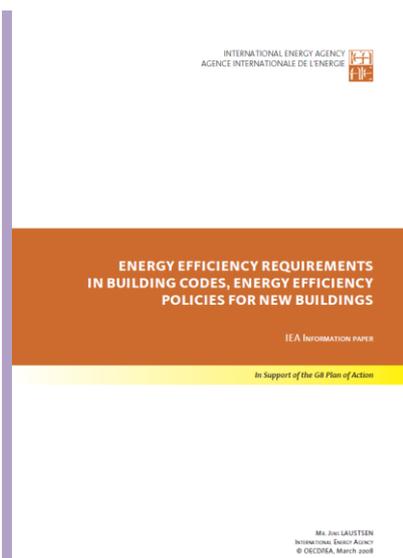


### **Going Green (UN-Habitat 2012)**

The housing sector is in a prime position to mitigate climate change in cities. *Going Green: A Handbook of Sustainable Housing Practices in Developing Countries*, published by UN-Habitat, provides an overview of sustainable housing practices with a focus on green building materials, construction technologies for affordable housing and climate-responsive housing and settlement design. However, improving the sustainability of housing is not only a technical challenge, and this book shows how environmental-conservation measures can be successfully interwoven with the social, cultural and economic milieu in which they are proposed, adopted and, ideally, scaled-up to meet the massive housing demand in developing countries.

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<sup>84</sup> European Council for an Energy Efficient Economy 2011, Appendix 1



### ***Energy-Efficiency Requirements in Building Codes, Energy-Efficiency Policies for New Buildings (OECD/IEA 2008)***

This paper describes and analyses current approaches to encourage energy efficiency in building codes for new buildings. Based on this analysis, it gives policy recommendations for enhancing how energy efficiency is addressed in building codes and other policies for new buildings.

These recommendations reflect the study of different policy options for increasing energy efficiency in new buildings and the examination of other energy efficiency-requirements in standards or building codes, such as energy-efficiency requirements for major renovation or refurbishment.

The paper describes different standards covering different regions or climatic conditions and different types of buildings. To complement the discussion of efficiency standards, this study describes best-practice buildings with extremely low or no energy consumption and other policies to raise buildings' energy efficiency beyond minimum requirements.

### **Box 25 – LEED Buildings**

Leadership in Energy and Environmental Design (LEED) is an initiative of the United States Green Building Council, based on a consensus to rate the environmental friendliness of buildings using a points system (from 40 to 110 for commercial buildings and from 45 to 136 for homes). A project earns points according to its effects on energy efficiency and carbon-dioxide reduction.

LEED certifies different types and sizes of new and renovated buildings, and even neighbourhoods that are designed, constructed and operated according to a defined set of environmentally-friendly criteria.

The use and promotion of LEED certificates is voluntary, but is a good way to market housing, making it attractive for the private sector. It is a well-established indicator of a building's effective and cheap performance and maintenance. It measures the healthiness, safety, energy- and water-saving capacity and environmental quality of building.

The LEED initiative was created in 2000 and has since been recognized internationally as a reliable rating tool for sustainable, environmentally-friendly housing practices. The LEED certification tool has already spread from the United States to 134 countries.

Sources: US Green Building Council No date (a), US Green Building Council No date (b)

### **Case Study 13 – Wooden multi-story housing in L'Aquila in Italy**

**Situation before the initiative began:** The C.A.S.E. project was developed after the 6 April 2009 earthquake in the L'Aquila region in Italy, where thousands of people were left homeless. The average level of building energy efficiency in Italy, including the L'Aquila region, is low. There is, however, a

strong commitment to improve performance through the implementation of a new regulatory framework, responding to the urgent need to improve the energy efficiency of the housing stock.

Prior to the earthquake, the area was struggling economically; the earthquake made this worse. Before to the earthquake, housing stock in the area was of poor condition and had major structural problems.

**Formulation of objectives and strategies:** C.A.S.E. covers 19 areas and includes 185 buildings (approximately 4,500 apartments) designed with different technologies to withstand earthquakes and to meet sustainability criteria. A specific wood technology was used in five areas surrounding the city of Aquila, for a total of 12 buildings with 24 apartments in each, on seismically isolated concrete platforms. Each building was delivered 78 days from the start of production at the factory. The buildings were completed on 19 February 2010.

The main objectives of the project were to deliver homes for people who lost everything in the earthquake and to build houses better and more disaster- and earthquake-resistant than those destroyed. This raised the level of safety, energy efficiency and sustainability of the housing stock and provided a better standard of living for the people of the area. The strategy was to avoid building temporary shelters and to proceed to permanent reconstruction at once, while housing people in high-standard emergency shelters during construction.

**Process:** The project was designed with high energy-efficiency standards. Sufficient wall insulation for the prevailing climate was used, and balconies and shutters designed to enable temperature control during hot summers. The U-value of the exterior walls is less than 0.2 W/m<sup>2</sup>K, of the window frames approximately 1.5 W/m<sup>2</sup>K and of the glass approximately 1.0 W/m<sup>2</sup>K. The overall energy performance of the building is less than 25 kWh/m<sup>2</sup>year.

An innovative wood-technology was used. A platform-frame-like system with spruce laminated wood beams (*lamellare sdraiato*) for the floor slabs was constructed. The facades were constructed with a prefabricated spruce wood frame, insulated with wood fibre, sandwiched between Oriented Strand Board panels and finished outside with expanded polystyrene, and inside with gypsum boards. Using this technology, together with modular prefabricated elements for balconies, lifts and stairs, the construction time was minimized. Wood as a building material ensured the construction process was fast and affordable, and that the requirements for energy efficiency and disaster resistance were met.

Concrete seismic isolation platforms were used to build earthquake resistance. They were supported by columns that were isolated from the ground and separated from the platform by sliding isolation pendulums that can separate the movement of the earth from the movement of the building.

**Results achieved:** The project increased the safety and well-being of people in the area significantly. The housing stock was modernized to meet disaster-resistance and energy-efficiency requirements.

#### **Sustainability:**

**Environmental:** The environmentally-friendly design led to improved air quality, which had a positive health impact. The buildings were constructed using modularity, reuse, and disassembly of components in a way that minimized resource consumption and environmental burden. Efficient insulation and good thermal transmittance values enhanced energy efficiency and thus decreased greenhouse-gas emissions. Building materials with low embodied energy and low carbon-dioxide emission values were used. The ITACA protocol, an Italian energy and environmental building

certification tool, was used to assess the environmental sustainability of the buildings and construction process.

**Financial:** The project was financed by public and private funds in a way that was still affordable for the inhabitants. The overall cost of the 12 buildings that used the wooden technology was EUR 25,600,000 and the cost per square meter was EUR 1,166. Due to the urgent need for homes, cost reduction was not the first priority of the project, but was still a consideration; costs were reduced as much as possible without sacrificing the goals of delivering disaster-resistant, energy-efficient, high-standard housing stock.

**Social and Economic:** The project had a positive impact on the local economy, as over 500 companies were involved in the building process. Homes for people affected by the earthquake were built to settle them as close as possible to their old homes. Efforts were made to create communities with a sense of belonging, instead of just delivering buildings. Settlement patterns were designed using common areas similar to traditional piazzas (squares) and cortiles (courtyards) where people could socialize.

**Cultural:** The project took into consideration the cultural patterns of the area in settlement and building design. Careful thought was put to the use of colours and culturally suitable outdoor areas.

**Institutional:** New partnerships between the private and public sectors and between different local private sector actors were built. The building process was fully transparent and monitored and the database of the project was made accessible to any institution for review. There was good cooperation among the Civil Protection Department, the scientific community, research institutes and universities that led to important partnerships and an efficient operational model.

#### **Lessons learned:**

- The project shows that even where policies and strict building codes could have prohibited the direct move from emergency shelters to permanent housing due to a long construction time; it is possible, with the transparent and effective cooperation of different authorities, institutions and the private sector, to make the construction process so fast that temporary shelters are not needed.
- Effective coordination and cooperation of the different stakeholders, the Civil Protection Department, the scientific community, research institutes, universities and the private sector were able to cooperate in a fast and efficient way to provide sustainable and highly efficient solutions.

**Transfers:** The project sets a wide selection of best practice principles for meeting goals of high energy efficiency and disaster resistance. The construction methods and principles are relevant both for reconstruction and for a normal building process.

The project demonstrated how wood can be used sustainably for building high-standard multi-storey building stock. The construction process and building design are highly replicable and their wider use should be encouraged in similar areas.

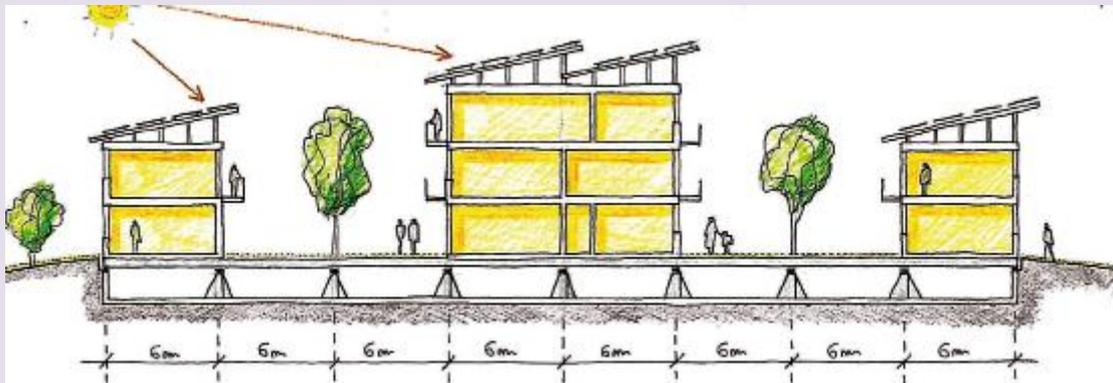
The project marked the first time that disaster-resistant housing stock was delivered in Italy on such a large scale. Together with high standards of energy-efficiency and holistic sustainability, the project is a best practice example which, it is hoped, will affect the building tradition and policies in the region.

### Key messages for transition countries:

- The example demonstrates how, in emergency situations, energy-efficient solutions for reconstruction are available. Moreover, it shows that quick reconstruction after a disaster with energy-efficient housing is possible, using local resources and sustainable construction material.
- It also illustrates that in new and energy-efficient construction, wood can be an important construction material, not only for single-family houses but also for multi-family housing blocks.



**Figure 8** – The C.A.S.E. project: Multi-storey buildings in Preturo. Installation of photovoltaic modules in combination with solar panels on south facing roofing.<sup>85</sup>



**Figure 9** – General scheme for the urban block with a preliminary idea of the prototype building, showing the seismically-isolated plate and internal pedestrian streets. The final solution adopted has been the single seismic plate for each building.<sup>86</sup>

Source: UN-Habitat 2012

<sup>85</sup> By permission of Enerpoint S.P.A; [www.enerpoint.it](http://www.enerpoint.it)

<sup>86</sup> Copyright: Fondazione Eucentre.

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## Case Study 14 – The first Nordic MERA passive house (block of flats)

**Situation before the initiative began:** Päijät-Häme is a Finnish region with wide temperature variations. While numerous innovations deal with energy efficiency in single-family detached houses, energy-efficiency solutions in multi-story buildings have been somewhat rare.

**Formulation of objectives and strategies:** MERA (Matala Energia Rakentaminen [low-energy construction]) was designed to reduce housing costs by reducing the energy consumption by 50 per cent.

**Process:** Construction of the first pilot building in Heinola started in 2008 and was finished in mid-2009. Construction-regulating bodies, companies operating in the construction industry and research organizations all participated. After implementing the first MERA block of flats in the rural town of Heinola RKL, the construction company Reponen Oy has built more MERA block of flats in Helsinki, the capital of Finland.

The walls, roof, floor, windows and doors of the building are built to a high standard with new sustainable building techniques; the waste of heat is therefore minimized and the airtightness of structures is assured. Heat waste is reduced by half or more of initial consumption. A proper ventilation system, which collects and reuses the heat energy of exhaust air, is the most important component in MERA flats. Electric appliances are chosen to use less electricity.

**Results achieved:** MERA cut the energy consumption of blocks of flats by 70 per cent compared to the conventional reference building, with construction costs only 1.7 per cent more than that of conventional house built according to building regulations. MERA provided:

- The first low-energy apartment in northern countries in 2005
- The first over-four-storey wooden apartment house in Finland. (Other high wooden buildings, such as churches, have traditionally been built in Finland.)

**Sustainability:** The MERA block of flats is optimized to save energy. It uses solar energy (through its windows) and the heat from household appliances. Reponen is now a pioneer in low energy block buildings in Finland. The development of the MERA concept started in 2000 in cooperation with the Technical Research Centre of Finland; cooperation with Lahti Science and Business Park, Centre of Expertise began in 2007. Foundation for this partnership was established in the 1990s with the Regional Council of the Päijät-Häme region. After implementing the first MERA block of flats, Reponen

has built more MERA flats in Helsinki, the capital of Finland. The Päijät-Häme region, with other regions, is developing more applications that can be utilized in MERA flats or elsewhere

**Transfers:** The possibility to transfer good practice seems to be promising. The Päijät-Häme region and five other regions are developing further applications of the MERA block of flats in the Southwood project, partly financed by the European Regional Development Fund.

The MERA concept includes:

- Construction
- Planning and design
- Building
- Energy-efficiency and carbon-footprint calculation
- Measuring and monitoring
- Materials and product systems
- Real estate- and lifecycle management
- User feedback orientation

The MERA concept is applicable to fit the requirements of different countries.

**Key messages for transition countries:** Cold climate is not an obstacle to energy efficiency. MERA is an example of a technical solution which includes very good insulation and controlled ventilation with heat-recovery. This leads to reduced need for heating, implying no need for radiators, with their water circulation and heat-exchanger system in the basement, or connection to a district heating network. The cost of insulation can be covered by energy savings.

Source: Regional Council of Päijät Häme, Finland 2012

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## F. Key messages for transition countries

The new construction of low-energy buildings and the renovation of existing housing stock to meet higher levels of energy performance require consideration of a wide range of technical, economical, architectural and behavioural factors. Therefore, investing in energy-efficiency measures alone is not

always cost-effective. Retrofitting existing housing blocks to meet passive-house or zero-energy building standards will usually not be possible without high additional costs. Therefore, energy-efficiency measures should not always try to meet the highest building performance standard. It is more important to focus on achieving the greatest energy savings while keeping investment costs at a reasonable level.

Energy efficiency does not have to be expensive, however, and several low- or no-cost options exist for residents to reduce their energy expenditures. The implementation of many of these measures is advisable even given low energy prices. Governments should promote inexpensive, effective measures, such as sealing air leaks or replacing light bulbs, before making a large investment. Governments should also test a variety of technological solutions in pilot projects which can then be used in large-scale retrofitting programmes.

Furthermore, governments and home owners alike should consider demolishing existing housing stock. Under certain circumstances, demolition can be an alternative to renovation. The decision to demolish should be taken after a careful assessment of the quality of the building stock. This analysis should include an assessment of the different parts of a building and a comparison of the costs of renovation with that of demolition and reconstruction. This analysis should be conducted by a trained expert and form the basis for development of a renovation plan.

Retrofitting an entire housing block should be favoured over improving the energy performance of individual apartment. Higher levels of efficiency can be achieved when renovation activities are coordinated among all owners of a multi-family housing block. A whole-building approach makes repairs of common parts, including the roof and the heating system, more energy and cost effective. This implies coordination and agreement between apartment owners, which may be difficult to achieve.

Deep or one-time renovations are recommended; however, due to financial constraints, residents in transition countries may not be able to afford this. In this case, a step-by-step or gradual renovation should be undertaken. This includes replacing building parts according to their lifecycle. However, if this approach is used, a comprehensive plan is necessary in order to guarantee that the different stages will lead to an appropriate end result.

Meters need to be installed in all apartment units to measure individual energy consumption so that households have control over their own energy consumption and energy bills. Examples from Central European and Central Asian countries show that individual meters bring down energy consumption and are often the first step when developing the legal framework for energy efficiency in housing. The data collected by meters also provides relevant information for energy-performance certificates for buildings and apartments.

Energy-performance certificates for buildings protect consumers, as they provide information on the quality of the apartment or building. Issuing these certificates requires technical research programmes, trained auditors and the metering of energy consumption.

The energy performance of the building should be considered at a very early stage of its construction. It is cheaper to plan and design a low-energy building than to improve the energy performance of a building after it has been built. In transition countries, energy-related legislation and standards can be used as reference points for the construction and renovation of apartment

buildings. The construction of buildings such as zero-energy buildings, passive house and LEED-certified buildings, are driving forces to move the market towards energy-efficient buildings.

Standards for new construction are based on how much energy the building consumes when it is completed. They indicate what is technically feasible, while strict building energy codes help improve the least efficient units of building stock from the market by requiring them to retrofit. In transition countries, the highest energy efficiency standards of housing in Western Europe can be a long-term goal, but the short-term focus should be on achievable improvements.

## **VI. FINANCIAL MECHANISMS**

### **A. Background**

Countries in Eastern Europe, the Caucasus and Central Asia struggle with energy inefficiency. The biggest barrier to improvements is the relatively low energy tariffs, which do not motivate owners to improve the energy efficiency of their buildings. Tariffs in these countries are lower than in Western European countries, as tariff regulation is distinctly politicized.

Utility tariffs do not reflect the actual needs of the utility sector, and this often results in poor quality public utilities. To develop a working, sustainable utility sector, tariffs for heating and other utilities must rise; this will also incentivize energy-efficiency.

Another problem in this region is the poor condition of housing stock due to long-term lack of renovation. During the socialist period, all the major repairs and renovations of residential buildings were financed by the state. Today, most countries in this region lack financing for this purpose. Homeowners contribute little, if any, to the renovation of their buildings. There is a lack of opportunities for credit or for third-party service-provider investments to fund resource-saving measures or energy service contracts.

In order to improve living conditions and increase energy efficiency in these countries, it is crucial that finance mechanisms be developed that will encourage the renovation and modernization of apartment buildings. Most costs should be borne by homeowners and financed through commercial markets.

Experience in the EU shows that commercial bank loans are the principal instrument used by homeowners to finance building renovation and implement energy-saving measures. Residents also use their own funds to pay into the reserve funds of homeowners' associations and as a pledge for bank loans. Many Eastern European countries have demonstrated that it is possible to move from state- to market-based financial mechanisms and overcome the reluctance of commercial banks to enter the energy-efficiency loans market.

There are target programmes for housing stock rehabilitation and modernization in all Central and Eastern European countries which are members of the EU. State or municipal support encourages homeowners to act and leverages market financing to relieve the financial burden of improving their homes. This support is provided in the form of grants or preferential interest rates.

To develop programmes for bank lending for apartment-building renovation and modernization, special-purpose guarantee agencies were established with state support in many countries in Eastern Europe and the Baltic. These agencies provide homeowners with guarantees to reduce risks to the bank.

The following challenges in Eastern Europe, Caucasus and Central Asian countries have to be taken into account:

- Utility tariffs are subject to government regulation in these countries; this regulation often results in slow tariff growth, although energy production and fuel are relatively expensive.
- For political reasons, tariffs are kept low in many countries in order to compensate for the lack

of other government support such as unemployment benefits, adequate salaries for public sector employees and adequate pensions.

- People do not consider utility tariffs to be low. Therefore, raising tariffs causes social resentment against utility providers and local governments.
- Increasing utility tariffs necessitates subsidizing low-income households and, therefore, increasing the burden on the state budget.
- Cross-subsidies are present in several countries to compensate for differences between tariffs and the cost of energy production.
- Energy prices do not reflect environmental issues and the use of fossil fuel resources.

There are three main types of regulation for financing the renovation and energy-efficient modernization of multi-apartment housing stock:<sup>87</sup>

1. Mandatory requirements for the creation and use of a reserve fund for building repairs and renovation by associations, partnerships or cooperatives of apartment owners
2. Allocation of grants or subsidies provided by the state or municipalities
3. Facilitation of borrowing funds in the financial market or from public authorities

The use of the reserve renovation fund of a legally constituted association of apartment owners, in combination with borrowing, is the most important mechanism for financing the rehabilitation and modernization of apartment buildings.

Unlike in Central European countries, the legislation of the Russian Federation stipulates that money paid by apartment owners should be the main source for financing renovation. The federal law “On Making Amendments to the Housing Code”, adopted in late 2012, supplements the Housing Code with a section devoted to organizing the renovation of common property in apartment buildings based on owners’ contributions. These contributions may be paid either to a special-purpose separate bank account of the apartment building, or to a regional non-profit operator of multi-apartment housing renovation established by the regional government.

Although other financial sources, like funds from the government, are not legally restricted from use for financing renovation, it does not provide any specific regulations for financial support and bank lending. As a result, the adopted law:

- Does not create legal possibilities to carry out the energy-efficient modernization of apartment buildings
- Does not create legal conditions to attract financial market resources to the housing sphere

The law lacks several essential points, which leads to a lack of methods for financing apartment building capital repairs. It leaves no realistic alternative to administratively-focused non-market models of accumulation and redistribution of obligatory payments by regional operators.

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<sup>87</sup> Lujanen 2010

## **B. Energy tariffs and the motivation for energy-efficiency investments**

Cost savings are the key incentive for the public to increase energy efficiency. High tariffs decrease the payback period for energy-efficiency improvements and create public interest in energy-efficiency measures; this results in more energy saving by consumers and businesses working in real-estate management and energy service. Living comfort is also an incentive: energy-efficient housing is much more comfortable to live in.

In transition economies, most energy and utility services are provided to the housing sector by national or local monopolies. There are exceptions, such as the electric power sector in the Russian Federation. Low tariffs in Eastern European, Caucasus and Central Asian countries are not always justified, because they leads to reduced quality of services and frequently result in cross-financing when the government or private sector have to pay more for household consumption. State authorities and local governments should act as protectors of low-income households rather than as energy suppliers. Transition countries should increase tariffs for public utility services to reasonable values and develop support measures for low-income households. The Russian Federation sets a good example in this respect.

The mechanisms of government support can be divided into the following groups:

- Government support for homeowners who are implementing energy-efficiency upgrades to apartment buildings, including co-financing, other grants, and programmes to support low-income families.
- Government support to establish special financial institutions to facilitate the energy-efficiency upgrading of apartment buildings. For this purpose, government support is usually provided on the following conditions:
  - The decision to carry out capital repairs of the given building must be initiated by residential property owners in the building and made at the general meeting
  - The allocation of funds is implemented on the basis of an application by the owners, or organizations authorized by the owners, and is usually competitive
  - A certain portion of the cost is financed by the residential property owners themselves out of their savings or borrowings; such financing must be confirmed

International practice provides numerous examples of how public policy can stimulate the inflow of financial resources to the housing sector to implement energy-efficiency measures. In this chapter, various mechanisms of government support for measures to improve the energy efficiency of apartment buildings are reviewed.

Measures of governmental support can be divided into two groups:

- Public financial support to homeowners and homeowners' associations implementing energy-efficient modernization of their apartments and apartment buildings (including budget subsidies, other grants and allowances to low-income families; see part C, below).
- State support to special-purpose financial institutions, encouraging the implementation of energy-saving projects in apartment buildings; see part D, below.

## C. Public financial support to homeowners' associations and individuals

In several countries in Central Europe and the Baltic states, funds are made available from the state budget, municipal budget or both to homeowners to partially finance capital repairs in apartment buildings. Budget subsidies to homeowners' associations for capital upgrading repairs contribute to the renovation initiatives of residential property owners. These subsidies are in the form of non-repayable grants to co-finance the costs of capital repair upgrades, or as partial compensation for the costs incurred by the owners. Additionally, other types of subsidies, for instance, interest subsidies or preferential interest rates, can be used.

### 1 Grants for building renovation

In Estonia, Lithuania and Poland, subsidies are provided equal to: 10 per cent of the cost in Estonia; 18 to 20 per cent of the cost in Poland; and 15 to 30 per cent of the cost in Lithuania. In Estonia, there is no set level of energy efficiency improvement required for the subsidy; in Poland and Lithuania, the size of subsidy depends on the level of heat energy saving.

#### Box 26 – Subsidies for apartment building renovation depending on level of energy savings

##### Estonia

Apartment owners' associations (an analogue of Russian homeowners' associations) submit applications, on the basis of which they receive partial compensation of capital repairs or renovation expenses that have already been paid. A similar benefit for repairs is intended to compensate owners for part of the repair of key structures, such as supports and walls, and pays for 10 per cent of the costs. This is, however, limited by a maximum amount per square meter of the total floor space of apartments. Funds are limited and are distributed in accordance with rules requiring apartment owners' associations to apply on time and meet the stated conditions well in advance.

##### Hungary

Financial assistance is provided to homeowners' associations and housing cooperatives from municipal budgets via annual competitions for grants awards. When a competition is announced, a municipality defines priority fields of activity to be covered by grants (for example, renovations of the heating system, repairs to the roof, replacement of elevators and heat insulation of facades). A homeowners' association can take part in the competition and receive funds at several times during stage-by-stage repair of the building. The annual programme of competitions for grant awards in the city of Budapest states that homeowners' associations should contribute at least 60 per cent of their own funds for the repairs. Also, a minimum of three bidders should be considered in contract selection. Funds are spent to pay off the very last invoice issued by the contractor upon the completion of his work.

## Lithuania

A homeowners' association can get a state grant of up to 30 per cent of the cost of housing upgrades through a government programme approved in 2004. This is intended to encourage homeowners to establish associations, renovate their houses and implement energy-saving technologies. Furthermore, the programme "From a renovated house – to the renovated city" approved by the Vilnius City Council makes it possible to supplement the state grant with a city grant of 15 per cent of the project cost. In this case, the association's should pay for at least 10 per cent of the project cost from its own funds, and the rest of the money can be borrowed from a bank and guaranteed by a special purpose agency. It is planned that, by 2020, 70 per cent of old houses in Lithuania will be renovated due to the availability of various sources of financing.

## Slovakia

Subsidies are allocated from the state budget to rectify defects in prefabricated panel apartment buildings due to faulty design and violations of construction standards if such defects appear in at least 20 per cent of that type of building. The maximum subsidy (depending on the defect) is up to 50 per cent of the cost of defect correction or repair, but is limited by a maximum per apartment. A municipality, a housing construction cooperative, a homeowners' association or the building manager can apply for a subsidy. Subsidies are granted only if a competent expert provides an opinion that repairs are needed and that repairs will be conducted in a manner that will rectify the defect.

Slovakia adopted norms on building energy-efficiency and made energy-efficiency certificates mandatory. If the technical renovation of a building is carried out, this renovation must result in energy savings. If a budget subsidy is allocated for the modernization of an apartment building, then upon project completion, the building must meet mandatory energy efficiency requirements.

Source: EBRD and International Financial Corporation (IFC) 2011

## 2 Grants for energy auditing

There are also programmes for grants to finance the expert examination and energy audit of residential buildings.

### Box 27 – Subsidies for technical expert examination and energy audit of residential buildings

#### Estonia

Apartment owners' associations can apply for special allowances. These are compensation for owners' expenditures on technical expertise and the energy auditing of a building, and pay for 50 per cent of the cost (although the maximum amount per building is limited).

**Latvia**

The state Agency of Housing has a programme to support housing owners in the energy auditing of apartment buildings. After an energy audit conducted in an approved manner, owners receive an energy certificate, which is a standard document that contains information about energy consumption in that particular apartment building compared to consumption in other residential buildings (with relevant energy efficiency grades assigned). It also contains information on key factors that influence energy consumption. Apartment owners' associations in buildings constructed before 1992 can get assistance for with energy auditing if 75 per cent of the owners approve of the decision to conduct an energy audit. In 2004 and 2005, energy auditing was conducted in 208 buildings in 18 cities in Latvia.

Source: EBRD and IFC 2011

### 3 Allowances to low-income households to compensate renovation costs

Assistance to low-income households to pay for capital repairs and upgrades is important to attract funds from private owners to improve the energy efficiency of apartment buildings. This support makes loans from commercial banks more affordable.

#### Box 28 – Allowances to low-income people to compensate renovation costs

**Hungary**

After the law on social assistance was amended, there are now subsidies to pay for housing maintenance and utility services. Additionally, some households may receive an allowance to pay arrears on these payments after 1 June 20014.

**Lithuania**

There are special favourable credit options for low-income households; the state subsidizes annual interest rates up to 6 per cent during half of the loan payback period (up to 10 years).

**Slovakia**

Since 2000, low-income households are legally entitled to state social benefits covering part of the cost of rent and utility services for their apartment or single-family house. The main eligibility criterion for the allowance is whether a citizen has previously paid rent and utility services in full. If the share of the household's rent and utility payments reaches 30 per cent of the household's income, households are eligible for this allowance. It is provided to citizens at the end of each month after confirmation of rent payment from the previous payment.<sup>88</sup> There are also special non-repayable subsidies for the purchase or reconstruction of an apartment or house, which are allocated based on the household's income.

Source: EBRD and IFC 2011

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<sup>88</sup> Zapletalová 2003

## D. State support to special-purpose financial institutions

Countries in Central Europe and the Baltic are putting more emphasis on establishing specialized institutions to facilitate debt financing for energy-efficiency improvements in the housing sector. In some countries there are financial institutions that provide loans for energy-efficient upgrades to apartment buildings in combination with guarantees and sureties. Some of them have been implemented with the support of state-owned banks, including development banks and guarantee banks, such as KfW, the German national development bank).

Beside these national-scale financial institutions, there are also city-scale agencies performing similar functions, supported by both local government and national financial structures.

### Box 29 – The State Housing Development Fund, Slovakia

The State Housing Development Fund was established in 1996 to provide state support to purchase, upgrade and construct new apartments. Initially, parts of the State Housing Development Fund were allocated for the construction of social housing and provided to municipalities only. Since 2003, the activities of the Fund have been significantly extended; today it also provides low-interest loans for the modernization, construction or purchase of housing by individuals and legal entities such as homeowner's partnerships.

The Fund gives financial support for the following purposes:

- Construction of an apartment in an apartment building
- Construction of an apartment in an individual residential house
- Construction or extension of a social institution or conversion of non-residential premises into a social institution designated for citizens in need for assistance, in compliance with a special order
- Purchase of an apartment
- Refurbishment of an apartment building
- Construction of a municipal rental apartment in an apartment building, including an apartment that is acquired by building a superstructure over, building into, making a structural addition to or rebuilding existing non-residential property

Annually, part of the budget for housing stock development is from the state budget, which is controlled by the Ministry of Construction and Regional Development; the amount from the state budget depends on the political situation. In this way, the state, represented by the Ministry of Construction and Regional Development, acts as a donor and controls the activities of the State Housing Development Fund.

Source: Zapletalová 2013

### **Box 30 – The Fund for Facilitation of Thermal Upgrading and Reconstruction, Poland**

On December 18, 1998 the Polish Parliament adopted the Deed "On Support of thermal upgrading" in which key activities were defined for the Fund for the Facilitation of Thermal Upgrading and Reconstruction. This fund manages state budget resources for implementing thermal upgrading and carries out its financial activities via the Bank Gospodarstwa Krajowego (Bank of the State Economy, BGK).

The goals of fund are:

- To reduce energy consumption in a residential building; for the heating and hot water supply, this will be done by modernizing the heating system, improving heat insulation, replacing windows and making other building improvements
- To reduce energy losses in local heat distribution networks and local heat sources
- To partially or completely replace traditional heat sources with non-traditional ones including renewable sources

The fund provides financial support from the state budget in form of subsidies which include:

- subsidies for thermal upgrading
- subsidies for reconstruction

Source: The Fund for Facilitation of Thermal Upgrading and Reconstruction, <http://www.bgk.com.pl/fundusz-termomodernizacji-i-remontow/dane-liczbowe>

### **Box 31 – The Public Housing Fund of the Municipality of Ljubljana, Slovenia**

The Public Housing Fund of the Municipality of Ljubljana is in charge of implementing the national housing programme in Ljubljana, the capital of Slovenia. The fund was set up to manage all aspects of the municipality's housing programme, such as developing and implementing policy, organising lines of credit from financial institutions, allocating funds and managing properties. It also carries out landlord responsibilities, including the energy-efficient refurbishments of properties and the construction of low-energy and passive housing.

Resources used by the municipality to carry out the refurbishment managed by the fund, include the municipalities' own budget resources (20 per cent) and loans from the Slovenian Environmental Public Fund (80 per cent). For new construction projects, the costs were met entirely from the fund's own resources, except for one project which was half funded by the National Housing Fund (NHF).

Results achieved:

- Highlighting the need to address the poor energy performance of Slovenian rental housing stock, since this had never been a concern in the country or the former Eastern Bloc.
- Utilizing the highest possible refurbishment and development standards for social rented housing.
- Using innovative technical solutions, including renewable energy systems in development of the new stock and in the refurbishment of existing stock.

Source: UN-Habitat Best Practices Centre for Central and Eastern Europe in Vienna

## 1 Facilitation of bank lending for building renovation and energy saving (transition towards market financing)

Some countries in Central Europe countries and the Baltic (for example, Estonia, Germany, Hungary, Latvia, Lithuania and Slovakia), which in the recent past had a system of housing stock management similar to that in the Russian Federation, with similar problems related to the unsatisfactory condition of housing, today are succeeding in tackling these problems. Over the past 15 to 20 years, the thinking of most apartment owners changed and there have been remarkable achievements in the upgrading and renovation of apartment buildings.

The availability of loans from local or international banks to residential property owners for repairs and upgrades and the consistent legislative regulation of housing were two important preconditions for this change. The state plays an important role in facilitating loans to homeowners and their associations.

## 2 Loans of state financial institutions

One option to raise loans for upgrading old housing stock is to use the funds of state financial institutions. Such financial institutions receive state support, which enables them to originate loans on soft, non-market terms. They may establish special requirements to a borrower, such as energy-efficiency achievements.

### Box 32 – Loans originated by state financial institutions

**Germany** In East Germany, most activities related to the rehabilitation of prefabricated panel housing were financed with loans from the German national development bank (KfW). The bank provided loans on preferential terms that covered the full cost of a package of activities to rehabilitate buildings. The loans were for up to 25 years, with an interest rate 7.5 per cent (to be subsequently reduced) and an annuity of 9.3 per cent (in the 1990s), and then 6.23 per cent (with the easing of the loan). In case of a large-scale rehabilitation, the interest rate was additionally subsidized.

**Slovakia** Since 2003, the State Fund for Housing Development has provided loans with low interest rates to homeowners' associations. The purpose of the loans was to rectify structural defects, improve the building's facade and improve quality of heat insulation in apartment buildings and detached houses. The loan accounts for up to 80 per cent of the total project cost (the maximum sum per one apartment is limited), has a life of up to 20 years, and is issued at an annual interest rate of 3.3 per cent if this particular project is an integral part of the State Programme for Housing Stock Renovations. Otherwise, it is extended for a term of 10-20 years at an annual interest rate of 4.9 to 6.5 per cent. A soft loan may be provided to a project for building repairs or upgrades that result in at least 20 per cent energy saving compared to estimated energy consumption prior to project implementation. This is on the condition that, after the completion of the project, the energy spent on heating the building does not exceed the norms set in a special regulation.

Source: EBRD and IFC 2011

### 3 Measures to reduce the risks faced by commercial banks when giving loans to homeowners' associations

In international practice, state financial institutions frequently attract private financial resources to a publicly relevant area through actions to reduce risks associated with financing a selected group of projects. These actions can include the extension of guarantees and a repurchase of securities. As a result, projects that are important for the state become more acceptable to private financial institutions because of a better ratio of risk to return.

#### **Box 33 – Measures to reduce the risks faced by commercial banks when giving loans to homeowners' associations**

##### **Lithuania, Estonia**

Special-purpose guarantee agencies have been established in these countries with the active participation of the state. These provide guarantees to apartment owners' associations and managing companies when they get loans for capital repairs or upgrades of apartment buildings. Such guarantees can amount to 75 per cent of the total loan value. An apartment owners association has to pay the agency 1.1 to 1.2 per cent per year of the amount covered by the guarantee.

The main goal of guarantee agencies is to enable banks to work with associations and convince them that the risks of such lending are relatively low. Furthermore, the risks can easily be assessed because they are covered by mandatory monthly payments by the owners. Owners will only make the decision to take a loan if they can afford the monthly payments. If owners pay on time, the risks faced by banks are minimal.

Experience suggests that the role of guarantee agencies in developing the lending system is gradually diminishing: banks demand fewer and fewer such guarantees from associations. For example, in Estonia, in the first years its operation, the guarantee agency guaranteed almost 30 per cent of loans, compared to 3 per cent today. Today, banks insist on a guarantee only if the owners of premises in the building have failed to establish an association, in which case a managing organization takes on the bank loan.

##### **Slovakia**

Guarantees backing the loans provided to associations, cooperatives and managing organizations are provide by the State Slovak Bank of Guarantees and Development. This is the only non-private bank with authorized capital formed by state assets.

Source: EBRD and IFC 2011

### 4 Subsidizing interest rates on loans made by commercial banks for the purposes of capital repairs and upgrading housing

Subsidized interest rates reduce the cost of loans provided by commercial banks to upgrade and repair residential buildings.

### Box 34 – Subsidizing interest rates on the loans made by commercial banks for the purposes of capital repairs and upgrading of housing

<b>Estonia</b>	Every year, the municipality of the city of Tallinn subsidizes interest rates on loans made by the bank that win a special open competition.
<b>Germany</b>	The German national development bank (KfW) receives targeted subsidies from the state budget to reduce the interest rate on loans for particular packages of energy saving measures, such as the refurbishment of houses with walls built in the 1990s.
<b>Slovakia</b>	In late 1990s and early 2000s state and individual municipalities (including Bratislava Koshitse) provided subsidies to reduce the interest rate on loans provided for capital repairs and upgrades of buildings in historic neighbourhoods that are a national asset.

Source: EBRD and IFC 2011

## 5 Implementation of energy-efficiency measures through tax deductions

The instruments of fiscal policy when implementing energy-efficiency projects are also diverse.

Tax relief is normally used to reduce taxes on particular goods or to correct market failures. Therefore, tax relief can help overcome barriers to energy-efficiency investment. According to OECD tax relief is “provisions of tax law, regulation or practices that reduce or postpone revenue for a comparatively narrow population of taxpayers relative to a benchmark tax”.<sup>89</sup>

Several types of tax relief are used in energy-efficiency policy when investing in energy-efficient renovations. These tax relief measures include:<sup>90</sup>

- Tax deduction, when investment costs can be deducted from income or revenues liable to taxation
- Tax credits, when investment costs are deducted from taxes due to be paid
- Tax reductions (at the moment of sale) and rebates (after the sale), when purchase taxes or sales taxes are reduced for qualifying equipment or services
- Accelerated depreciation allowances, which allow purchasers to write-off the cost of depreciation of qualifying equipment more rapidly than standard equipment
- Tax or customs duty exemptions which relieve purchasers from paying customs duties or import taxes on qualifying imported equipment

Mechanisms of tax credits and benefits are traditionally prevalent in France, Italy, the Netherlands, the United Kingdom and the United States. Recently, such mechanisms have also been implemented to a lesser extent in Belgium and Sweden. The use of fiscal instruments for energy efficiency is

<sup>89</sup> OECD 2010a

<sup>90</sup> Hilke and Ryan 2012

gaining popularity in the new EU member states. In some EU countries the provision of tax credits and benefits depends on the characteristics of residential buildings. This is the case with real estate taxes and state duties in France, Portugal and the United Kingdom.<sup>91</sup> In the United States, an ambitious recovery plan called the American Recovery and Reinvestment Tax Act (ARRA) was initiated to help the country recover from the 2009 economic crisis. (See details in the Case Studies below.)

### Case Study 15 – The KredEx agency as an implementer of the measures of state support for energy-efficiency enhancement in Estonia

**Situation before the initiative began:** Since 1996, national legislation has allowed apartment owners to mobilize borrowed funds to finance rehabilitation work. However, homeowners' partnerships could not actually exercise this right until 2001, as the law required a compulsory pledge of apartments by all owners in a building to secure a loan. In 2000, this compulsory pledge of real estate was cancelled, and in 2001 and 2002 banks granted loans to partnerships against apartment owners' surety. Unfortunately, this also proved difficult, as to collect surety from every owner requires only a little less effort than to ensure a pledge of apartments by each owner.

**Formulation of objectives and strategies:** From 2003 to 2008, Estonia followed the Housing Development Plan to improve housing stock and making housing more affordable for young families. To implement this programme, the following actions were taken to provide:

- Subsidies for the overhaul and upgrade of apartment buildings and an increase in municipal housing stock for rent
- Guarantees for mortgage loans for young families and credits for apartment partnerships

**Process:** The KredEx agency, established by unification of the housing mortgage fund, the small-business support fund and the export-support fund, combines two functions:

- Commercial activities, such as issuing paid guarantees to upgrade of apartment buildings and guarantees for business credits
- Provision of state support set out in state regulations and financed from the state budget

The structure of KredEx activities are presented in Figure 10.

**Results achieved:** According to KredEx, implemented energy conservation measures under the framework of the 2003-2008 Housing Sector Development Plan helped to reduce energy consumption per apartment building by 26 per cent from 270 KW/m<sup>2</sup> to 200 KW/m<sup>2</sup>. Data on sureties issued by KredEx for the renovation of apartment buildings and the renovation-purpose loans portfolio of commercial banks are presented at Figures 11 and 12.

**Sustainability:** In late 2008, financing proposals dramatically decreased, while inter-bank loans became more expensive and it became more difficult to obtain long-term funds. In order to recover credit activity, in 2009, KredEx started proposing to banks a cheap credit resource to credit enterprises through banks. Thanks to funds received from EU structural banks and the EBRD, KredEx allows its partner banks to give privileged loans for residential houses constructed prior to 1993 with

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<sup>91</sup> Rezessy and Bertoldi

a fixed interest rate of 4.1 to 4.8 per cent. This also allows a longer term of debt repayment (up to 20 years), without refinancing for building refurbishment to improve energy conservation.

As a result, credit activity was improved and commercial banks do not need KredEx guarantees to issue loans for the renovation of apartment buildings.

**Lessons learned:** The combination of a variety of policies for the provision of state support through one agency helps inspire private homeowners' initiatives to renovate apartment buildings and spur the activity of the commercial financial market.

**Related policy:** The Estonian Housing Development Plan

**Key messages for transition countries:** The combination of different types of state support provided through a special-purpose institution is a good tool for energy-efficiency enhancement promotion in the housing sector.

Source: KredEx 2012

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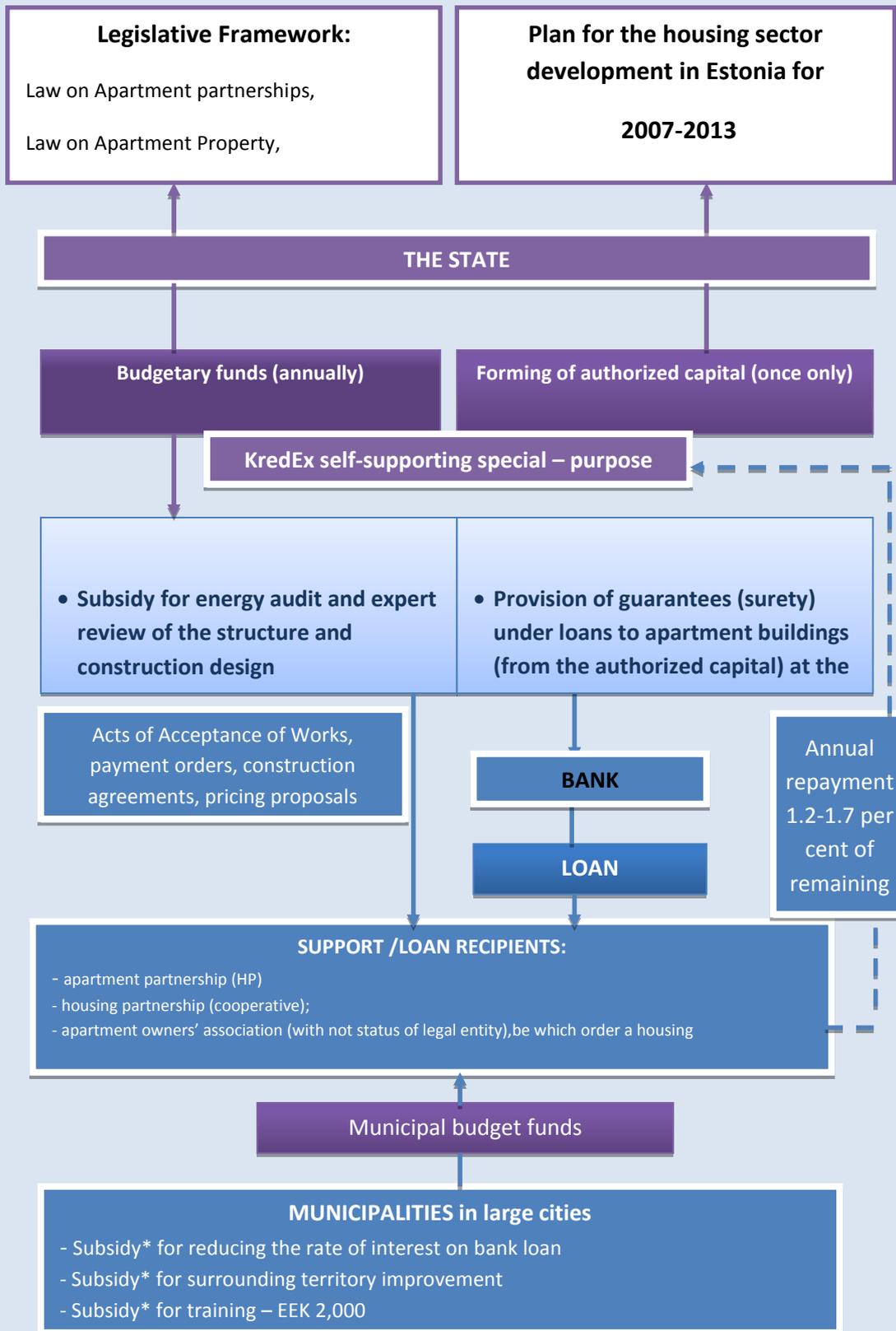
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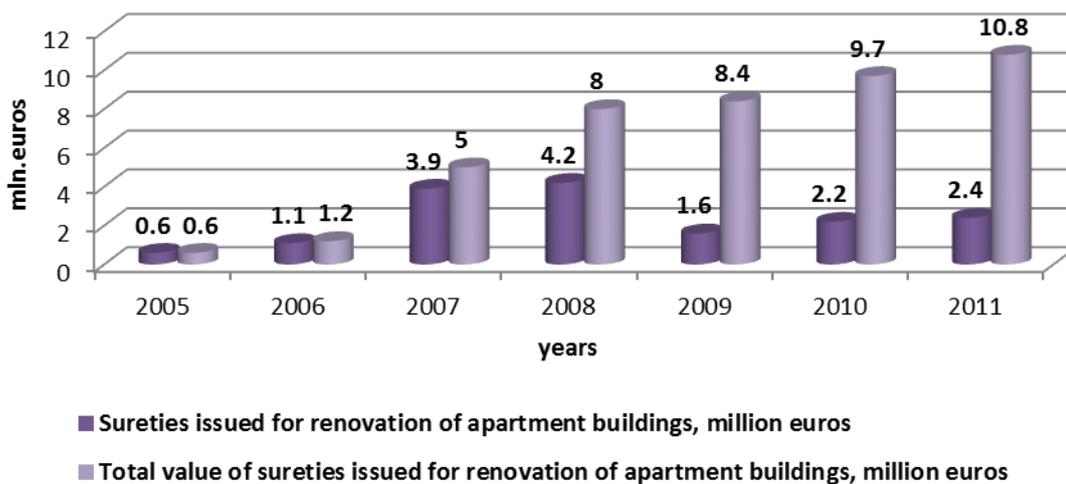
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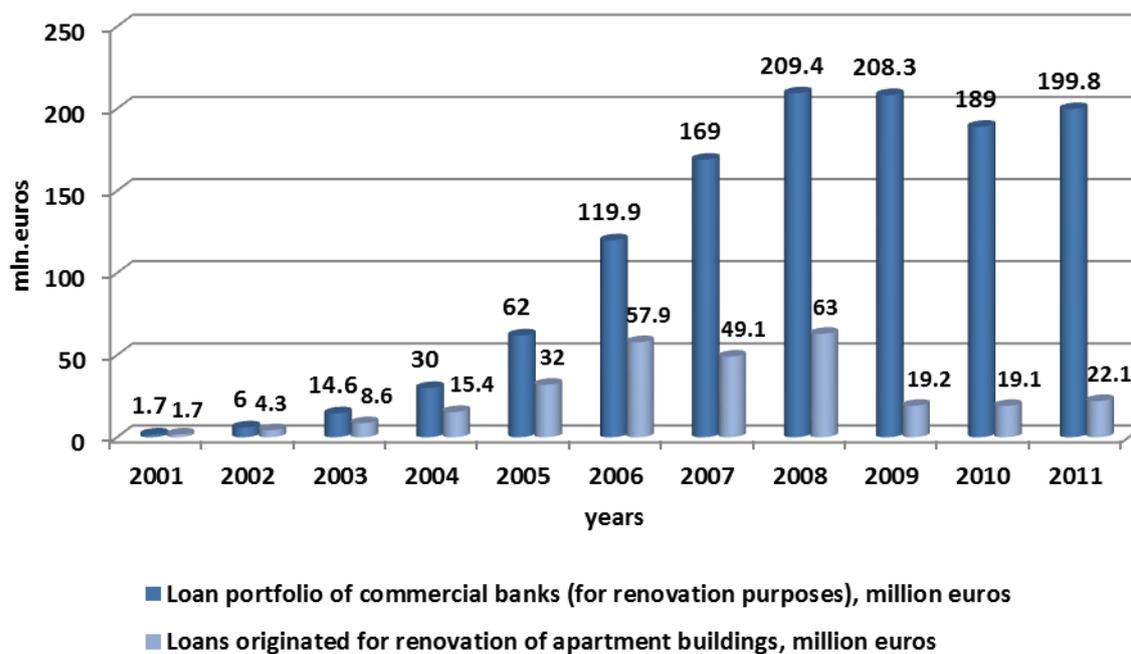
Website: [www.kredex.ee](http://www.kredex.ee)



**Figure 10 – Structure of Activities of the KredEx Guarantee Agency (Estonia)**



**Figure 11** – Sureties issued by the KredEx guarantee agency for capital repairs and energy-efficient modernization of apartment buildings



**Figure 12** – Loans originated by commercial banks for capital repairs and energy-efficient modernization of apartment buildings backed by the surety issued by KredEx

## Case Study 16 – The State Housing Development Fund, Slovakia

**Situation before the initiative began:** State support for housing sector development started with the law on construction savings in 1992. This system became widespread as no alternative existed until 1996 when the law on mortgages (after restoration of the law of pledge) began to have an effect.

**Formulation of objectives and strategies:** The goal of the state was to provide support to purchase, upgrade and construct new apartments.

**Process:** The fund gives financial support in the form of loans and non-repayable subsidies. The structure of the activities of the State Housing Development Fund of Slovakia is presented in Figure 13.

**Lessons learned:** Slovakia's situation is unique because there are several mechanisms of state support for the upgrade of apartment buildings. The system of construction savings and loans of the State Housing Development Fund is based on state budget subsidising, which is not a market financial instrument. It is attractive for potential clients because it is relatively cheap. To attract local commercial banks to finance projects on energy performance improvements in apartment buildings, the Slovak Energy Efficiency and Renewable Energy Finance Facility (SLOVSEFF) was created and operates successfully.

**Related policy:** The Law Number 607 "On State Housing Development Fund", paragraph 8, 6 November 2003.

**Key messages for transition countries:** State-owned banks play an important role in financing and raising funds for the implementation of energy-efficiency projects. These banks are in the position to raise funds on the financial markets and make them available in cooperation with commercial banks.

Source: Zapletalová 2013

Contact:

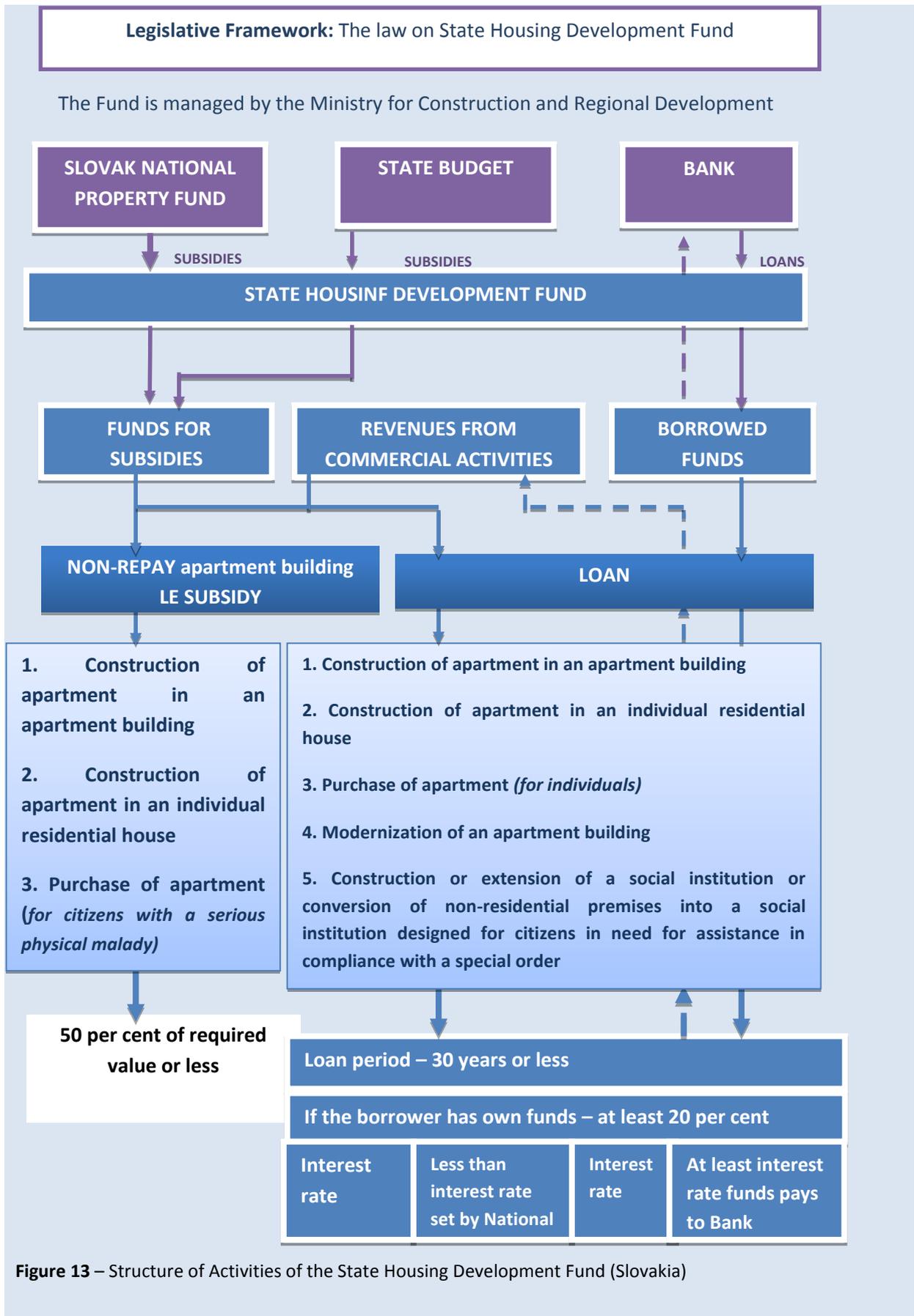
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**Figure 13 – Structure of Activities of the State Housing Development Fund (Slovakia)**

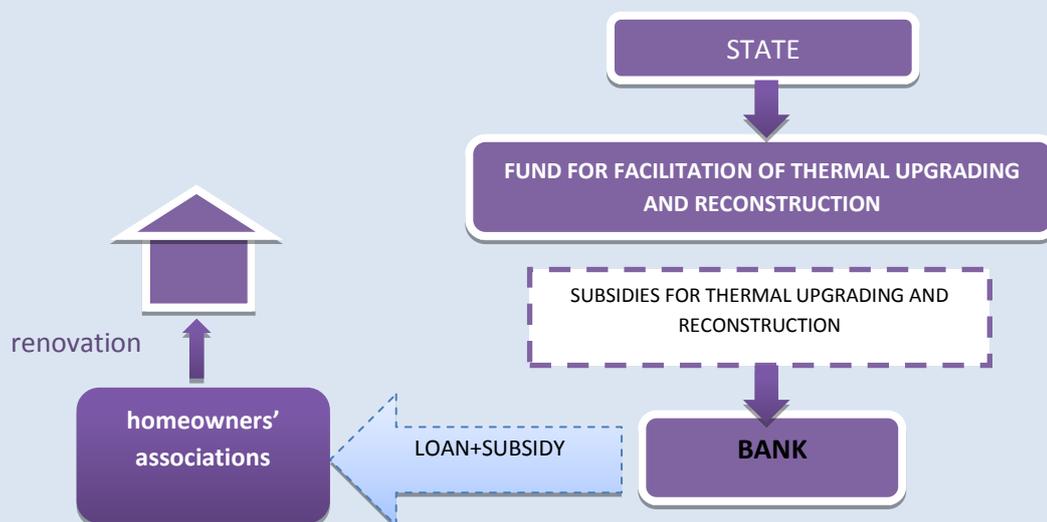
## Case Study 17 – The activity of the Fund for Facilitation of Thermal Upgrading and Reconstruction, Poland

**Situation before the initiative began:** Approximately 1.5 million of 12 million apartments in Poland were built before 1918 and 3.7 million were built before 1939. Old buildings are the biggest source of energy losses, resulting in excessive energy consumption. Systematic increase in prices for heat energy in Poland generated a growing demand for energy-saving measures, not only in the construction of new buildings, but in the maintenance of existing buildings.

In the 1990s, the banking sector, with little or no state participation, began granting loans to homeowners' partnerships and apartment owners' cooperatives in apartment buildings for capital repairs and upgrades. However, without state support, the loans were very insufficient to comprehensively modernize apartment buildings, due to the high cost of repairs.

**Formulation of objectives and strategies:** The goals are to reduce energy consumption in residential buildings, reduce energy losses in local heat distribution networks and partially or completely replace traditional heat sources with non-traditional ones, including renewable sources.

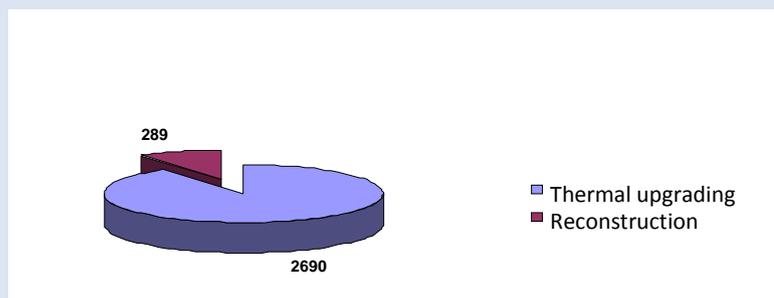
**Process:** The Fund for the Facilitation of Thermal Upgrading and Reconstruction manages state budget resources allocated for thermal upgrading and carries out its financial activities via the Bank of the State Economy. It provides subsidies, including subsidies for thermal upgrading and reconstruction, from the state budget. Subsidy facilities for thermal upgrading are specified in Figure 14.



**Figure 14** – Subsidy facilities for thermal upgrading upon an energy audit.

Source: BGK 2013

**Results achieved:** According to the Housing Stock Department of BGK 2,979 projects were implemented in 2010 with the use of subsidies.



**Figure 15** – Total number of applications received by type of subsidies

**Sustainability:** The state did not create special agencies to promote loan services for thermal upgrading. This was facilitated by legislation and public awareness of owners' responsibility for the condition of their property assets.

**Lessons learned:** The Polish experience of government support to implement the thermal upgrading and reconstruction of apartment buildings is limited to providing budget subsidies to owners of buildings to carry out improvements. The subsidies are granted for older buildings for which significant improvements in energy efficiency can be achieved. The amount of subsidy is limited, and cannot not exceed one-fifth of total costs, the rest of which are usually paid through borrowing.

**Related policy:** The act "On Support of Thermal Upgrading " (1998) in which key activities were defined for the Fund for Facilitation of Thermal Upgrading and Reconstruction.

**Key messages for transition countries:** Combining different types of state support helps energy-efficiency promotion in the housing sector.

Source: BGK 2013

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## Case Study 18 – Thewosan-thermal rehabilitation in Austria

**Situation before the initiative began:** Approximately 25 per cent (more than 200,000) of Viennese apartments were built between 1945 and 1980, at a time where housing affordability was the main concern. Quantity was given priority over quality to meet the strong demand for living space. Funding programmes had already been established by the city government for rehabilitation and improvement of housing built before 1919. More recent calculations found that an additional savings potential of approximately 1,700 GWh could be achieved by rehabilitating exteriors and heating systems in buildings erected between 1945 and 1980.

**Formulation of objectives and strategies:** Along with the principal objective of thermal improvement of building exteriors, the rehabilitation programme also aimed to improve living conditions in general, for example, by installing elevators. Efforts were made to keep procedures as simple as possible and to achieve a building-envelope quality comparable to that in new buildings. Emissions that would adversely affect the climate were to be reduced.

**Process:** An information campaign was launched for the residents of the buildings, who could apply for a one-time non-refundable contribution by the province of Vienna to financially support renovations. The government contribution increased with the energy savings achieved. It was, therefore, highest for buildings which reached the standard of low-energy housing established for new constructions. This was to ensure high quality improvement of the buildings.

The province of Vienna covered up to one third of the estimated costs. The remaining two thirds were covered by owners or tenants of the buildings through reserves, capital resources or loans.

The project encouraged a whole-building approach, as a thermal energy improvement concept had to be filed with all project applications to ensure quality improvement, ensure full insulation of the buildings, and avoid the implementation of only partial measures.

**Results achieved:** By the end of 2007 a total of 66,000 housing units covering a floor space of 4.4 million m<sup>2</sup> have been improved. After the project, living comfort was raised and costs of housing were reduced for 220,000 units and 109,000 tons of carbon dioxide are now saved each year. Heating energy was reduced by approximately 1.000 GWh/year.

The project generated jobs with a total income of more than EUR 2 billion.

**Sustainability:** A high acceptance of the necessary framework conditions and harmonization with the requirements set out by the property management were achieved from the start. This was made possible because experts and builders were part of the development process and all parties concerned were invited to several information events.

The building materials and methods were chosen to ensure sustainable economic improvement, which means that further repairs will not be necessary for at least 20 years. The improvements with regard to climate change mitigation will be effective for the same period of time and will accumulate every year. As the project is financed by non-refundable contributions from the province, the amortization of individual buildings will also be possible.

**Lessons learned:** Although parts of the investment costs are amortized by subsequent savings in energy costs, thermal retrofitting can have long payback periods, especially when retrofitting old housing blocks to meet low-energy building standards.

**Transfers:** Many European cities are coping with an ageing housing stock characterized by large-scale residential buildings with needlessly high energy consumption. The rehabilitation required for these buildings entails financial burdens for communities and residents alike. However, refinancing costs is possible with energy savings achieved through thermal improvement, particularly in the case of intelligent improvement concepts supported by funding models. The funding concepts provide solutions on a partnership basis, with only a minimal burden on communities themselves.

**Related policy:**

- Climate protection programme KliP adopted by the City of Vienna in 1997
- WWFSG (Vienna Housing Promotion Act) of April 5, 2000.

**Key messages for transition countries:**

- Retrofitting is labour intensive and expensive, though paying back energy-efficiency investments is possible through reduced energy bills due to energy savings. Still, retrofitting existing building has long payback periods; therefore, financial support from local or national governments is needed to reduce this period and make investments more attractive to residents.
- Energy-efficiency measures in existing buildings should not necessarily aim to meet the highest building performance standard, but achieve the greatest energy savings while keeping investment costs at a reasonable level.
- Energy-efficiency measures of multi-family housing blocks can be linked with investments in the overall comfort of living, such as through the installation of elevators.

Source: UN-Habitat and the City of Vienna 2013

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## Case Study 19 – Renovation pilot project for multi-family buildings in Bulgaria

**Situation before the initiative began:** The vast majority of Bulgaria's housing stock was industrially built in residential complexes from the 1960s to 1980s. It is not in good shape and constantly degrading, mainly due to insufficient maintenance and inadequate management by owners. The residential sector is characterized by very low thermal efficiencies and wasteful heat distribution

systems; energy performance is about 2.5 times worse than current national technical standards require. The housing sector is a significant contributor to Bulgaria's high energy intensity.

Over 80,000 multifamily buildings with 700,000 residential units, housing more than 2,000,000 people need extensive retrofitting.

**Formulation of objectives and strategies:** The Demonstration Project for the Renovation of Multifamily Buildings started in 2007, developing a replicable scheme for renovation of multifamily buildings. It consisted of 3 major components:

- Conditional subsidies to condominiums for renovation purposes
- Facilitated access to loans for renovation
- Technical assistance to the voluntarily associated homeowners of entire buildings for organization of the renovation process

**Process:** The Bulgarian Energy Efficiency and Renewable Sources Fund (EERSF)<sup>92</sup> has the combined capacity of a lending institution, a credit guarantee facility and a consulting company. It provides technical assistance to Bulgarian enterprises, municipalities and private individuals to develop energy-efficiency investment projects and then assists their financing or co-financing. It can also act as a guarantor for other financing institutions.

EERSF provides financial products, including residential portfolio guarantees.

It helps households in a building to develop a good project. Then, a first-class company is selected to implement the investment. The bank gives the funds to the project developer, but the repayments afterwards come from individual households. Each household pays proportionately to its size. EERSF guarantees that it will cover the first 5 per cent of defaults within this block (or portfolio of blocks). Typically, the default rates in customers' loans range from less than 1 per cent in some banks to about 2.5 to 3 per cent, so a guarantee of 5 per cent will fully cover the risks of the commercial bank.

**Results** (as of December 2008):

Project outputs:

Out of an initial EUR 10.5 million budget, EUR 3.85 million has been spent in order to produce the following outputs:

- 28 voluntary associations of condominium owners established for renovation and maintenance
- Multifamily buildings and their surrounding public areas fully renovated
- 21 buildings undergoing renovation

Direct beneficiaries:

- 485 households have benefited from the project to date

Measurable outputs and outcomes delivered by the project:

- 3,333,521 kWh (60 per cent) planned energy savings due to renovations
- Planned reduction of 2,620 tonnes carbon-dioxide emissions

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<sup>92</sup> <http://www.bgeef.com>

Pre-retrofitting average energy expenditure per household: EUR 1,200 per year

Post-retrofitting energy savings per household: EUR 720 per year

**Sustainability:** This product is being developed as a partnership with commercial banks. The main reason why energy-efficiency investments in the residential sector have not yet materialized is because of a lack of adequate legislation. Moreover, in Bulgaria, there is no tradition of condominium or household associations and there is often a lack of trust between families in one building. The project helped to find a way to overcome all this by acting as a unifying component between commercial banks and energy-efficiency projects in the residential sector.

**Key messages for transition countries:** The Bulgarian Energy Efficiency and Renewable Sources Fund is a good example of a successful approach to financing projects aimed at energy-efficient upgrading of apartment buildings, which provides guaranteed loans to owners to renovate separate apartments or the whole apartment building.

Source: UNDP 2009

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## Case Study 20 – American Recovery and Reinvestment Tax Act as a catalyst to retrofit homes in the United States

**Situation before the initiative began:** The United States in 2009 was in a deep economic crisis. Most of the contemporary houses in Western countries are highly energy inefficient, and due to the large amounts of energy used to heat homes, a considerable amount of energy is wasted. The housing sector accounts for approximately 40 per cent of total energy consumption in the world, making it a major contributor to global warming. In the United States, as in the rest of the Western world, increasing the energy efficiency of new housing is very important, but retrofitting old homes is even more crucial, as the amount of households living in new energy-efficient houses is minimal in comparison to the percentage of the population living in old constructions.

**Formulation of objectives and strategies:** In order to face this challenge, an ambitious recovery plan called the American Recovery and Reinvestment Tax Act (ARRA). ARRA was initiated to help the country to move away from the economic crisis and solve structural, nationwide problems related to economy, education, housing, transportation, infrastructure, homelessness, environment and health care. An innovative, green and sustainable approach was used to act on these problems. One of the main focus areas of ARRA was housing. In order to meet the national and international goals for

energy savings and the energy efficiency of national housing stock, thermal retrofitting was a major component of ARRA.

**Process:** Households in the United States have received federal tax credits (Tax Credits for Energy Efficient Home Improvements) for installing new energy-efficient appliances to their houses, as long as they remain installed for five years. Credits are also available for making home improvements that meet the criteria set for energy-efficiency by the 2000 International Energy Conservation Code. The tax credit is 30 per cent of total product cost (installation not included) and the total maximum amount of credit is USD 1,500 (EUR 1,145) for two years. USD 5,000 (EUR 3,800) needs to be spent in order to get the maximum credit but smaller interventions are also credited. The tax credited improvements need to have taken place in an already self-owned primary home located in the United States. Interventions include installing energy-efficiency improvements such as: windows, doors, and skylights with U-value and solar heat gain coefficient ratings of no more than 0.30; better insulation; more efficient heating and cooling systems; and different renewable energy systems.

Until 2016, the installation of renewable energy appliances including solar panels, solar-powered water heaters, geothermal heat pumps, photovoltaic systems, and small wind energy systems is eligible for a 30 per cent tax credit from the cost, with no maximum amount. In addition to existing primary homes, second homes, vacation homes and new homes are also eligible for this tax credit. Fuel cells for primary homes only are also credited, with a limit of USD 500 (EUR 380) per 5 kW of power capacity.

Energy efficiency is also tax credited: the money saved from energy consumption can be claimed in energy tax credits. The different credits do not restrict each other.

The Residential Energy Property Credit was supposed to end at in December 2010 but was extended to the end of 2011 with new rules and restrictions. According to the 2011 rules, the credit was for 10 per cent, instead of 30 per cent, of the costs of energy-efficiency improvements specified in the programme for the years 2009-2010, with a lifetime limit of USD 500 (EUR 380) (USD 200 [EUR 150] for windows). 30 per cent tax credits could still be gained for renewable energy installations such as solar electric systems, solar hot water heaters, geothermal heat pumps, wind turbines, and fuel cell units.

The total amount of governmental support for the increased energy efficiency of households was USD 4.3 billion (EUR 3.2 billion) and the changes were to be carried out during the years 2009 and 2010. Additionally, a total of USD 13 billion (EUR 9.9 billion) of tax credits were given for renewable energy production.

**Results achieved:** Tax incentives from 2008 to 2011 were widely used by citizens and community organizations, and resulted in a large number of retrofits. ARRA had, in general, major positive effects by providing jobs, creating infrastructure, enabling green economic growth, decreasing homelessness, supporting research and increasing local and private investment in green technologies and investments in renewable energy. The programme increased the energy efficiency and sustainability of American housing stock significantly. Important partnerships between public-private and philanthropic actors were created.

**Sustainability:** More than USD 90 billion (EUR 68.7 billion) was invested in clean energy and a further USD 18 billion (EUR 13.7 billion) in environmental programmes. Together with the construction of over 125,000 new homes, these efforts boosted construction-related employment significantly,

creating or saving between 2.7 to 3.7 million jobs and providing 70,000 more jobs due to public work. As of the third quarter of 2010, more than 15,000 additional jobs were created due to thermal retrofitting in the 4th quarter of 2010.

USD 4 billion was invested in public housing and USD 250 million in private-home retrofitting. Approximately 845,000 homes were energy retrofitted during the programme, all over the United States. This was estimated to have reduced energy consumption by 28 per cent, resulting in annual savings of 41 billion in energy costs, and decreasing 360 million metric tons of carbon dioxide by 2020. Savings in energy bills are especially important for the approximately 600,000 low-income households that benefited from the programme, as they used approximately 17 per cent of their total income for energy. Additionally, the retrofits have had significant positive health impacts.

#### **Lessons learned:**

- Strong governmental commitment to invest in green technologies, green transportation and green homes is possible. The way green agendas were embedded in a national economic recovery programme is a positive pattern of development.
- The significant savings in energy bills due to major energy-efficiency retrofits of housing stock are especially crucial for low-income households, traditionally struggling to pay energy bills that take a significant portion of their total income.
- Major retrofitting programmes generate employment. The retrofits, together with the other green investments made during the programme, have been a major source of employment when it has otherwise been scarce. The private and public works have had a positive impact on the development of the green private sector and led to important public-private partnerships in the field of environmentally friendly products and services.

**Transfers:** The consistent and committed involvement of the government to development of the green private sector and improvement of the sustainability of the housing sector is recommended, and can be transferred to other countries. The fact that the programme was executed in a time of deep financial crisis shows that by directing public funds in a sustainable way, major improvements can be achieved even with tight national budgets.

**Related policy:** American Recovery and Reinvestment Tax Act (ARRA) of 2009

**Key messages for transition countries:** Commitment of government to the green private sector and improving sustainability of the housing sector is recommended. The use of tax credit tools in transition countries may be limited due to laws on property tax.

Sources : Perez No date; Bernard No date; United States Internal Revenue Service 2012a; United States Internal Revenue Service 2012b; Energy Star 2012; United States Department of Housing and Urban Development 2011

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## **E. Market based financial mechanisms**

### **1 Commercial banking sector loans for renovation and energy-efficiency enhancement of apartment buildings**

Experiences in many countries in Western, Central Europe and Eastern Europe, the Caucasus and Central Asia show that apartment owners' savings and budget appropriations are usually not sufficient for large-scale renovations and other improvements to be completed within a short period of time. Therefore, banking products need to be provided to owners, homeowners' associations and managing organizations.

#### **Box 35 – Availability of bank loans for apartment building renovation and energy-efficiency enhancement**

<b>Estonia</b>	Credit products from commercial banks determine housing sector development potential in Estonia. Commercial banks' loans were approximately 50 to 60 per cent of all loans provided in the housing sector in recent years and account for almost 10 to 12 per cent of the total loan portfolio of commercial banks. From 2001 to 2006, Estonian banks provided more than two thousand loans to apartment owners' associations. More than 25 per cent of associations in the country used bank loans to carry out building repairs.
<b>Hungary</b>	Hungary has a lot of banks, some national and some owned by foreigners. Banks provide loans to homeowners' associations on soft terms, with interest rates of six to 10 per cent per year.
<b>Latvia</b>	Latvian banks extend credit for repairs, renovations, restoration and improvement of energy performance of common property in apartment buildings. Candidates for loans include apartment owners' associations, cooperatives, and private or municipal enterprises which perform housing management. These credits are usually used for winterizing buildings, replacing roofs, upgrading heat-supply units, repairing facades and entrances and replacing sanitation systems, electric equipment and wiring. Loans cover up to 100 per cent of the costs and the maximum loan term is 12 years. Owners of apartments use the Fund for Repairs and Technical Maintenance assets to repay the loans.

## Slovakia

In 2007, the Slovak Energy Efficiency and Renewable Energy Finance Facility (SLOVSEFF)<sup>93</sup> was established to encourage local commercial banks to finance projects on energy performance improvement in apartment buildings. SLOVSEFF supported projects to improve energy efficiency in apartment buildings through credit loans from four local commercial banks. As of 2011, loans for housing are offered by 21 bank institutions in Slovakia. The share of loans that represent owners' private resources has multiplied through the years. Most of the banks have their own programmes aimed at renovating of housing stock. Chairpersons of condominiums get overviews of the programmes as a part of the banks' marketing activities.

Source: EBRD and IFC 2011

### 1.1 Risk management and the issue of collateral

In the EU, energy-efficiency investments are considered low-risk markets, so the bank financing of energy-efficient measures in apartment buildings is a normal practice. In Eastern Europe, the Caucasus and Central Asia, banks lack experience lending money and providing low interest rates and affordable loans. These banks have predominantly serviced individuals, providing short-term consumer loans and long-term mortgage loans over several years.

Based on this, a conclusion may be drawn that most Russian banks are experienced in providing long-term loans repaid by individuals. This experience is transferable to loans for energy-efficient renovation upgrades of apartment buildings and establishing enforcement actions against defaulters.

Commercial banks in the Russian Federation and other Eastern Europe, Caucasus and Central Asian countries also focus on granting medium-term (from 1 year to 5 years) loans up to EUR 10 million for the development of medium-sized businesses in trade, energy and mass consumer goods manufacturing. The most important requirements for a borrower are financial stability and the availability of collateral.

Financing of homeowners' associations and housing management companies carrying out management of apartment buildings for energy-efficiency enhancement has not been an area of interest of commercial banks in the Russian Federation up until now. The following are among the reasons for lack of interest by banks in extending loans for capital repairs and energy-efficient upgrading of housing stock:

- Lack (on the part of homeowners' associations) or insufficiency (on the part of management companies) of marketable collateral to secure loans
- Riskiness of loan services for a group of residential property owners due to doubts that all owners will fully repay their portion of the loan
- Lack of credit history for homeowners' partnerships and management companies

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<sup>93</sup> More information is available at [http://www.slovseff.eu/index\\_aj.php?page=o-slovseff](http://www.slovseff.eu/index_aj.php?page=o-slovseff).

- Lack of sustainable demand for loans for capital repairs and upgrading of apartment buildings

At the same time, if the risks of these loans are mitigated, banks show greater interest in extending them. Such measures to mitigate risks, including state-supported guarantees and legal provisions to control homeowners' financial discipline in securing capital collection and loan repayment, were discussed in detail in the previous sections. The issue of securing a loan contract is handled differently in Western and Central European countries.

In Germany, banks provide loans for modernization of multifamily housing stock only against real estate mortgage which makes it possible to recover the remainder of the debt by judicial means, if a borrower is unable to meet his obligations.<sup>94</sup> The main sources in the housing finance are: Banks which rely for funding on deposits and unsecured debt as well as on *Pfandbriefe* (covered bonds) if the bank has a license to issue those.<sup>95</sup> These banks can be separated into three different segments – savings banks, cooperative banks and private banks. *Bausparkassen* (building societies) rely mainly on deposits for funding through their very stable deposits source due to the contractual savings programs.<sup>96</sup>

The German legislation requires the best collateral for Pfandbrief lending. These loans have a first-rank provision of security up to 60 per cent of the lending value of the real property. This lending value, (or *Beleihungswert*) is used by German banks to determine the value of the collateral for the purposes of the bank. This lending value must be conducted by a valuer who has not been involved in the loan decision and who must have the necessary expertise in the assessment of mortgage lending values. In practice, this lending value is often lower than the purchase price of the property. Provided that the borrower has a high degree of creditworthiness, a loan of up to 60 per cent of the lending value is usually granted on good terms.

The specific Bausparkassen Act determines the maximum lending value for the Bausparkassen loans. This is 80 per cent. These loans provide a second-rank provision of security after the Pfandbrief loan. Hence, also in this case the mortgage collateral must be used. Additionally, the customer has been required to fulfil the contractual saving scheme and has thus shown the ability to meet regular savings instalments.

The rest of the required finance often consists of savings the customer has made as a part of a Bausparkassen contract. It can also partly consist of a loan provided by a conventional bank. In this case other guarantees than mortgage collateral are required. At the same time, the loan conditions are not as favourable as in the other options treated above. For instance, the interest level is in most cases clearly higher.

At the federal level, guarantees are not issued for major works to upgrade a building. However, the possibility of a German *Landesbürgschaft* (state guarantee) for, for example the modernisation of apartment buildings, exists in a few states. On the other hand, there are specialised lending institutions (Investment banks) which are owned by the federal government or by individual German

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<sup>94</sup> There are limited exceptions to this general rule.

<sup>95</sup> Housing Finance Network No date

<sup>96</sup> Bausparkassen No date

states. For example, the German national development bank (KfW) can be mentioned targets the energy-efficient refurbishment of rental housing owned by municipalities or private housing entities, as well as apartment owners and homeowners' associations. For these entities, KfW can provide soft loans or grants.

In Germany and elsewhere, the quality of loan guarantees has an effect on the interest level of the loan. Hence, good-quality loan guarantees correspond not only to the interests of a bank which secures repayment of the loan in such a way, but also to the interests of a borrower, since lower interest rates are set on such a loan (a bank minimises its margin for the risk of non-payment). Therefore, real estate mortgage collateral is widely used, for instance, in Western European countries, as well as in the United States and Canada. This approach requires a well-functioning land registration and subsequent legislation.

### Box 36 – Collateral-free loans for apartment building renovation in Baltic states

**Lithuania, Latvia, Estonia**

Loans for capital repairs, upgrading and energy saving are provided by commercial banks without pledging real estate and, in most cases, even without requiring a warranty issue by the owners. (In Latvia, owners' warranties are required if no apartment owners association has been established.) All that is needed to secure the loan repayment is that an owners' association or a managing company opens an account with the creditor bank for the loan term; this account is used for all settlement of payments. In Latvia, a bank that wants an additional guarantee can enter a provision into the loan agreement, allowing them to sell the right to enforce payments to an outside organization if borrowers fail to fulfil their duties under the loan contract.

Source: EBRD and IFC 2011

As the system of lending to homeowners' associations for capital repairs, renovations and upgrades of apartment buildings evolves, the banks themselves create new opportunities for providing such loans. In the Central European and Baltic countries where bank loans became a commonly used financial tool, the issue of securing a loan contract is tackled in different ways.

#### 1.2 Loans of construction savings' banks (Bauspar loans)

Saving with the help of a construction *Bauspar* contract (savings contract) is a well-tried collective self-help system. The professional Bauspar system shows good results in different countries, including Austria, Germany, France, Poland and the United Kingdom. Attempts have also been made in numerous countries to establish such a system in, for example, Central European states like Croatia, the Czech Republic, Hungary and Slovakia.<sup>97</sup>

<sup>97</sup> The Global Heritage Fund 2001

The Bauspar system consists of two strongly connected parts. In the savings phase, the borrower must accumulate capital. Customers accumulate assets in their Bausparkasse and acquire an entitlement, having saved towards a Bauspar fund, to be granted a Bauspar loan at a later time. Having reached the loan phase, they will receive their Bauspar deposits, including interest, together with the Bauspar loan. Then, in the loan phase, the loan has to be repaid in instalments.

The Bauspar system fits into house-building promotion by the state, and thereby complements simple state subsidies very well. This system is also interesting because of its numerous positive effects on the building industry, housing construction, employment, and finance markets. The state and the consumer can profit from such a system.

Two types of Bauspar system, closed and open, are used in different countries. The closed system features savings and finance funds which form a closed circuit that insulates the system from movements in the money market. The closed Bauspar system is used in Germany.<sup>98</sup>

Open systems for purpose-linked savings are characterized by the fact that the lending institutions refinance (at least in part) in the money market or change interest rates according to developments in the money market. Refinancing opportunities are more flexible but exposed to market fluctuations. The interest rates for customer loans are either variable or are set for a fixed term (usually 5 to 15 years). An open system reacts more sensitively to recessions. Open Bauspar systems are used in Austria, France and the United Kingdom.

Several Central and East European countries have also recognized the advantages of the Bauspar system for reaching their housing targets. In the 1990s, when the reforms started, the relevant prerequisites for the creation and the passing of Bausparkassen Acts were put in place. German and Austrian Bausparkassen founded several companies, individually or together with local partners, which now are operating successfully in the Czech Republic, Hungary, Poland and Slovakia.

### **Box 37 – Construction savings (Bauspar system) in Slovakia**

The Slovak government supported large-scale development of a system of construction savings. Initially the system targeted citizens, but, since 1999, it has been applied to legal entities, including homeowners' associations. An association, just like other clients, is entitled to a soft loan from a construction savings bank after the reserved period for savings ends and a fixed sum of money is accumulated. Legally, bank deposits with the association are protected in the same way as citizens' savings.

Source: Zapletalová 2013

## **2 Energy-performance contracting in the housing sector**

Under an energy-performance contract, an energy-service company (ESCO) provides energy-saving services to clients. These services may include project finance, engineering, project management,

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<sup>98</sup> Ibid.

equipment maintenance, monitoring and evaluation. The energy performance contract is a self-reimbursing loan, that is, it is repaid through savings.<sup>99</sup>

An ESCO's activities under energy performance contracts may include energy auditing, developing recommendations on how to improve energy efficiency, arranging finance, installing or overseeing the installation of upgrades, education of personnel or residents, equipment commissioning, maintenance, measuring, verifying and guaranteeing savings.<sup>100</sup>

Unlike ordinary repairs, implementation of energy-saving measures leads to reduction of resource consumption and therefore lowers homeowners' utility bills. Homeowners can spend the money saved to repay costs of energy-saving measures with energy performance contracts.

The key barrier impeding development of energy-performance contracting in the housing sector is the relatively high transaction cost of small projects, because different standardization of projects often makes it impossible to bundle them together. In addition, many institutional obstacles still hinder ESCOs. Elimination of energy price control would be an important first step.

In Central and Eastern Europe, energy service companies have never made proposals for a whole package of energy saving activities to upgrade apartment buildings. This is mainly because of the long payback time for comprehensive upgrading by reduced energy consumption. So far, performance contracts have only been used for residential buildings' individual energy saving activities. For example, German law states that expenditure on heating should be calculated according to apartment-by-apartment consumption, and the equipment required for this (including the acquisition, installation, servicing and taking the readings of metering devices) necessitates additional expenditure of between EUR 30 and 60 per apartment, depending on the supplier and the equipment, and must be added to the cost of heating. Therefore, in residential buildings performance contracts are most widely applied in the form of a leasing model where expenditure on heating is calculated on the basis of actual consumption:

- Energy suppliers are responsible for: the installation, repair, servicing and upgrading of heat-consumption metering devices; reading metering devices; and calculating of expenditures on the basis of actual consumption. This procedure replaces the housing owners' own investment in the devices that meter heat consumption.
- Payments on leasing specified by suppliers of energy in the contract (EUR 30 to 60 per apartment per year) should not exceed the expenditure that would have been incurred by self-financing.
- Performance contracts in this area are attractive to owners because they no longer have to worry about reading meters and calculating energy expenditures.
- Energy suppliers are satisfied with the price, because when they service thousands of apartments their expenditure is much lower than that of single owners who invest exclusively in the devices for their own apartments.<sup>101</sup>

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<sup>99</sup> OECD/IEA 2007

<sup>100</sup> OECD/IEA 2007

<sup>101</sup> BEEN 2007

## **F. Key messages for transition countries**

Most households still do not think that implementing energy-saving measures is economically feasible. The price of heating energy is still too low compared to the price of improvements; in many countries, there are almost no incentives to make large-scale investments for energy saving. The payback period of investments is also not always attractive to financial institutions or households; for comprehensive renovations the payback time may exceed 20 years.

### **Investing in energy-efficiency measures is not always cost-effective**

- Retrofitting is labour-intensive and expensive. Paying back energy-efficiency investments is possible through reduced energy bills due to the energy savings; however, retrofitting existing buildings has long payback periods. Financial support from local or national governments is needed to reduce the payback period to make investments more attractive for residents.

### **Energy-efficiency investments should become bankable**

- Instead of paying rent, property owners invest in their property. Therefore, they should be highly motivated to invest in energy-efficiency measures to improve the living comfort and the value of their property, including the common parts of the building. Nevertheless, local and national governments need to provide a set of measures and incentives to support and encourage home owners to invest their savings and take up loans to upgrade their property by improving its energy performance.
- Collateral and enforcement tools are important as prerequisites for the banks to grant loans. Homeowners' associations should be established as a legal entity, because, usually, loans can then be granted to the homeowners' associations.
- Affordable credits and loans for apartment owners and homeowners' associations should be offered by commercial banks to upgrade apartments and multi-family housing blocks by improving their energy performance. The energy savings can be used to pay back the loan. In transition countries, governments need to facilitate the creation of a market for energy-efficiency loans.
- Funds are provided on the condition that a certain portion of the cost is financed by residential property owners themselves (out of their savings or borrowings), and only if it is confirmed that such financing really took place. It has been proven to be effective if the level of state support depends on the percentage of energy savings achieved by the renovation.

### **Measures of state support are important during the transition period**

- Government support of homeowners when implementing energy-efficiency upgrades to apartment buildings should include co-financing programmes, other grants, and special measures to support low-income households in covering renovation costs.
- Government support to establish special financial institutions to facilitate the implementation of

energy-efficiency upgrades to apartment buildings is crucial to promote lending to residential buildings in transition economies. The institutions' activities should reduce the risks of banks with guarantees, and facilitate the reliability of borrowers.

- High energy prices are an important driving force for investing in energy efficiency. Fair tariff regulation and staged increases in tariffs for utility services for residents are important in developing countries.

## CONCLUSIONS

International experience reveals various examples of decisions related to energy-efficiency improvement in the housing sector. However, in most of the countries in Eastern Europe, the Caucasus and Central Asia participating in UNECE activities, a small number of energy-efficiency projects are currently being implemented. This is due to, inter alia, a lack of focused and consistent government policies, lack of interest on the part of residential property owners in apartment buildings, the technical features of buildings constructed in the 20th century, the political nature of tariff regulation and lack of bank credit products for borrowers.

Without a fundamental change in the management of apartment buildings, metering devices and tariff regulation, and without creating conditions for raising long-term funding, the efficient implementation of energy-efficiency projects is impossible. Nonetheless, there are several institutional problems in Eastern European and Central Asian countries that need to be solved to improve the energy efficiency of the housing sector. First of all, there are problems related to current legislation in the field of energy conservation and ownership relationships in the housing sector. In all these countries, legislation needs to be amended and further developed to create an effective legal framework for energy-efficient housing. Of course, this is a continuous and demanding task. However, it is possible to start changing the situation now through the implementation of pilot projects and dissemination of best practice.

International experience in implementing energy-efficiency projects reveals that it is possible to succeed only by combining the efforts of all parties concerned. The political will to change the situation, the desire of the business community to participate in the process and the pro-active attitude of resource consumers can create the necessary prerequisites for the mass implementation of energy-efficiency projects in the housing sector.

This being the case, it is important to use key guiding principles when making a roadmap for the future:

*Comprehensiveness.* No measure, by itself, can secure energy efficiency in the housing sector. Strategies must be comprehensive and include several instruments. Inter-sectorial simultaneous approaches are needed, as one-dimensional solutions can lead to undesirable and unexpected results. Planning should therefore be considered as an integrated system while all goals and objectives should be reflected in national programmes, even if their practical implementation will depend on local conditions.

*Training and flexibility.* Strategies must both encourage and integrate best practice and innovative approaches as a result of scientific research and development, information exchange and demonstration and pilot projects. Strategies must also be flexible and prevent over-regulation, which can hamper initiatives, lead to the monopolization of relevant industries and can make the relevant actors neglect official requirements if resources are lacking, especially in poor countries.

*People-oriented approach.* It is absolutely necessary to ensure that there is a link between energy efficiency, social programmes, energy affordability, social welfare and reduced social inequality. A purely technocratic approach to energy efficiency in the housing sector is unacceptable both from a social and the political point of view. Furthermore, energy efficiency must be pursued together with

housing affordability.

*Taking into account the geographical context.* The UNECE region varies greatly in terms of levels of economic development, legislative and institutional frameworks, the history and practices of the housing sector and climate. Energy-efficiency plans must be properly integrated into programmes on the national and local level. However, in the course of development and implementation of specific measures, it is necessary to take into account local socio-economic, institutional and geographical conditions.

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