

Current Situation on Energy Efficiency in the Target Countries

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INTRODUCTION

The warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level. The Earth's average surface temperature has risen by 0.76° C since 1850. Most of the warming that has occurred over the last 50 years is very likely to have been caused by human activities.

Climate change is already happening and represents one of the greatest environmental, social and economic threats facing the planet. The European Union is committed to working constructively for a global agreement to control climate change, and is leading the way by taking ambitious action of its own.

Human activities that contribute to climate change include in particular the burning of fossil fuels, agriculture and land-use changes like deforestation. These cause emissions of carbon dioxide (CO₂), the main gas responsible for climate change, as well as of other 'greenhouse' gases. To bring climate change to a halt, global greenhouse gas emissions must be reduced significantly.

The European Union has long been at the forefront of international efforts to combat climate change and has played a key role in the development of the two major treaties addressing the issue, the **1992 United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol, agreed in 1997.**

The EU has been taking serious steps to address its own greenhouse gas emissions since the early 1990s. In 2000 the Commission launched the European Climate Change Programme (ECCP). The ECCP has led to the adoption of a wide range of new policies and measures. These include the pioneering EU Emissions Trading System, which has become the cornerstone of EU efforts to reduce emissions cost-effectively, and legislation to tackle emissions of fluorinated greenhouse gases.

On 23th January 2008 the European Commission launched a very ambitious package of proposals with a main aim: to reduce the level of CO₂ emissions a 20% by the year 2020 compared with the levels in 2005 below 1990 levels. This plan will help transform Europe into a low-carbon economy and increase its energy security.

The 20-20-20 plan foresees the following results:

- ❖ Reduction of CO₂ emissions in a 20% by 2020
- ❖ Increase of the share of renewables in energy use to 20% by 2020.
- ❖ Improvement of the energy efficiency in a 20% by 2020

The national renewable energy targets proposed for each Member State will contribute to achieving emissions reductions and will also decrease the European Union's dependence on foreign sources of energy. These include a minimum 10% share for biofuels in petrol and diesel by 2020. The package also sets out sustainability criteria that biofuels will have to meet to ensure they deliver real environmental benefits.

Therefore, it is clearly stated that energy efficiency is a main target for the European Environmental Policies. The project **Euroeneff "Development of a**

Guide for Energy efficiency renovation of buildings” aims at developing a guide on Energy efficiency renovation of buildings techniques in line with up-to-date technology and methodology, e-learning methods applied, referred to EQF. This guide is intended to be a solution for the lack of training and expertise within the energy efficiency at the renovation of residential buildings.

All members of the project, who are mainly training providers, are committed to adopt the guide and provide relevant training to further trainees.

It is possible for each vocational school, training centre or companies – wherever they are located – to easily contact any of the project’s partners:

Bulgarian Construction Chamber is an Employer’s association of SMEs of Construction industry of Bulgaria, joining over 2100 companies. Established by special Law on 09.06.2007, legal successor of Bulgarian Building and Construction Chamber, established 1999. Keeping of the Central Professional Register of Builders, operating on the territory of Bulgaria. Involvement in Social dialogue, collective agreement, priority VET activities, with a special attention to H&S issues, project management, further training of construction professionals. Initiator of two Mobility Leonardo da Vinci projects, Alternative energy sources, specialised software in construction and architectural design, partner on Leonardo da Vinci pilot project Build Up, developed Orientation & Training tester Module for technicians, in particular Quantity Surveyor, managing the Local partnership network of 5 VET institutions.

Contact person: Nina Georgieva: ngeorgieva@ksb.bg

“GLAVBOLGARSTROY” AD Center for professional staff selection and vocational training is a Vocational training centre with valuable experience in providing of training services for initial and further training in Construction sector and IT sector, licensed by national certification body – NAVET, with key experience on PHARE, Leonardo da Vinci A and B type projects, UNDP, national funds etc., related to the development of the methodology and curricula for training of Construction workers, people temporary excluded from the labour market, training on Geodesy, Architecture and Construction, further training for construction professionals, site managers and technicians. Involvement in development of Taster Orientation & Training module for Quantity Surveyor on LDV project, aimed at attracting young people to Construction sector and carrier opportunity. Commitment to pilot training of the Module and feedback from trainers and trainees, aimed at development of tailored training tools to the trainees needs, and e-learning approach application.

Contact person: Pavel Kalistratov: ckopk@gbs-bg.com

Bulgarian German Vocational Training Centre Pleven: For more than 11 years the DBBZ Pleven has been working in the field of adult vocational training and active employment measures. The Centre have rich experience in international and national projects commissioned by various donor organisations – experience in adapting products and results of Leonardo da Vinci projects to Bulgarian conditions, norms and standards, in pilot testing of training materials, in elaboration of an adult training strategy and training of the staff to apply the methodology for vocational training of adults, in development of vocational education standards in construction and building taking into account the EU developments and proposal for assessment and mutual recognition. The team (permanent staff 33) is open to new challenges in the area of vocational training and develop relevant basic and advanced training

courses that reflect the demand in the Bulgarian economy. The DBBZ works in close co-operation with local, regional and national institutions and companies.

Contact person: Nikolay Kanchev: info@pl.bgcpo.bg

MGM Ltd. Established in February 2006, MGM company has rapidly developed and positioned between the leading providers of services, complex solutions for SMEs, as well as for large companies in the area of advertising, and publishing activities – development and support of LAN networks, supplying of office equipment, support and service activities

Contact person: Yulian Uzunski: office@mgm-bg.com

Vocational Training Institute of the Construction Industry in Northrhine-Westphalia is a training centre – inter-company training centre in the dual system (VET school – company) of the construction industry, with a broad palette of training courses – initial vocational education, further education and advanced education for occupations in the construction industry, covering the most important occupations in the field of civil engineering. Our training offer is flexible and orientated toward the needs of the companies in the construction industry Germany-wide. We train apprentices, adults both employed and unemployed, other trainers. We have a competent team of 35 employees and a team of experts who cooperate with us on demand, especially project-oriented. skills, knowledge, expertise and experience of the organisation in relation to its role in the project: The AZE, Germany has experience in the areas of : - training: initial vocational education, further education and advanced education, TOT (train the trainer), occupational retraining - mobility of trainers, instructors and apprentices in the building industry

- curriculum development in the field of construction industry - promoting the usage of e-learning tools among companies (SME´s) in the construction industry
- conceiving and testing programmes for employees in the construction industry.
- conceiving and testing additional skills of the EU-skilled worker in the building industry

Contact person: Berndt Garstka garstka@bauindustrie-nrw.de

VOCATIONAL HOUSE OF BUILDERS: CMC Foundation is created as a non profit organization with permanent activity. The CMC Foundation advisory department is the sectoral committee, where the employers and unions representatives have par representation and where they debate and adopt the human resources development policies at the sector level. CMC has a multi - annual plan for financial assurance of it's own actions and of those regarding the sectoral committee activity from own incomes, as well as from social partners contributions. As technical secretariat of the Sectoral committee, CMC performs part of its activity as for VET in construction industry, and is involved in the implementation of the qualification policies of the social partners in construction industry. In the same time, CMC organises and implements training for sector specialists in order to improve their capacity to develop occupational standards, assess training programs and training institutions, etc.

Contact person: Maria Luiza Enaru: luiza.enaru@cmc.org.ro

GOA-INFRA is a training centre of vocational education in the Netherlands that functions in the Infra sector. GOA Infra has been involved in the delivery of vocational skills since 1985. GOA Infra delivers both initial vocational educational courses and labour market training courses. There are ca 250 students per year, ca 200 adult learners per year taking various courses, ca 20 teachers, trainers and

employees. GOA Infra has different curricula; GOA Infra is a pilot VET centre for the Infra sector in the Netherlands.

Contact Person: Harm Korporaal: info@goa-infra.nl

TECHNOLOGICAL INSTITUTE OF CONSTRUCTION-AIDICO is the private and non-profit Construction Technology Institute, which was promoted and created in 1990 by the regional government (IMPIVA – Institute for the Valencian SMEs) as the Research Association of Construction Companies. AIDICO aims to increase business capacity for innovation and quality to foster competitiveness on national and international markets.

AIDICO works in the field of certification for guaranteeing quality control of building products/companies, and has an infrastructure based on specialised laboratories with accreditation and recognition on the highest levels. It carries out research and development projects intended to improve building materials, building systems and production processes, as well as the design of procedures capable of simulating and evaluating the characteristics of all these.

The Institute is constituted by 430 associated companies involved in the construction process: construction companies, materials providers, quality control laboratories, engineers and architects. A member of our board of directors is the technical co-ordinator of the Quality National Plan of Edification. The technical staff represents more than 100 people with specific formation in diverse areas related with the competence of the Centre: architecture, organic and inorganic chemistry, industrial engineering, geology and physics.

AIDICO is developing training activities for the Construction sector since 1991. The training is carried out by the company's staff as by specialised professors from the University, Sectoral Associations or companies.

Contact Person: Lucía Ordaz: lucia.ordaz@aidico.es

The project, whose aims are completely in line with the EU's environmental goals and legislation, is addressed to teachers, trainers, tutors, and site managers in long-term prospective. The main beneficiaries and potential users of the project will be trainees participating in the training activities using this tool. These trainees will have the profile of construction street workers. Indirect beneficiaries will be project managers and clients of construction services.

DOCUMENT PURPOSE

This document has been elaborated with the data compiled through a questionnaire that the project partner's themselves, as well as other VET providers and companies performing renovation in buildings have provided. A total of 26 companies and VET centres have participated in the same. This document centres in the countries participating in the Euroeneff project.

The text describes the overall situation of the residential buildings and the use of energy in the same. It also compares the transpositions that countries have made to adapt the Energy Performance of Buildings Directive approved by the European Commission in January 2003 and analyse further legislation regarding energy efficiency in buildings.

The results of this analysis will help the partners to define the training materials to be developed in our Guide on energy efficiency renovation in buildings.

INTENDED AUDIENCE

The document should be useful for anyone willing to contribute or get involved in the training process on energy efficiency in buildings. This means that it can be useful for trainers, trainees, vocational training centres, policy-makers, etc. Globalization introduces essential changes in education modules. Therefore education providers are no longer geographically limited, which enables to establish mutually beneficial relationship and to consider the best practices and success stories.

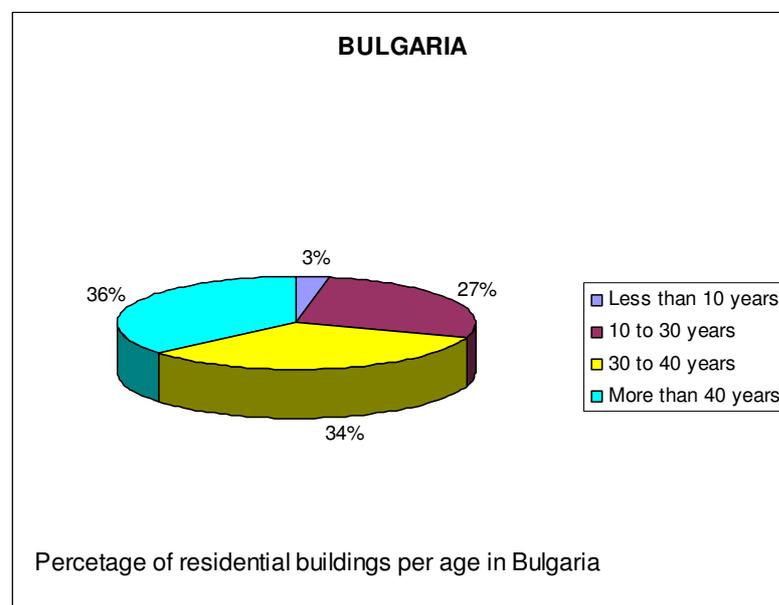
GENERAL OVERVIEW

This first part of the study intends to compare the general state of the residential buildings amongst every participating country, as well as the national legislations trying to implement the European Directives concerning Energy Efficiency in residential buildings. This will prove the impact of the project's results.

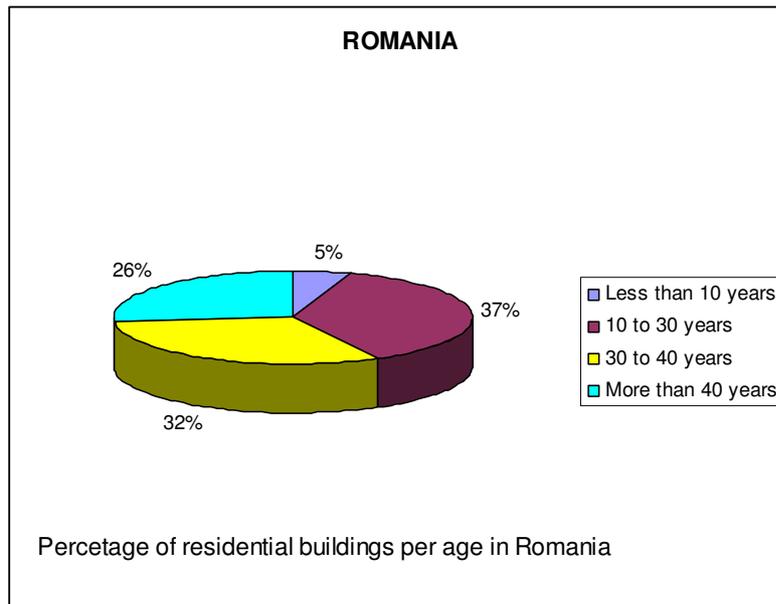
Total number of residential buildings in participating countries: percentage corresponding to blocks of flats

SPAIN		
Total residential buildings	With 1 or 2	With 3 or more (blocks of flats)
8.625.595	7.509.351	1.116.244
	87,05 %	12,94 %

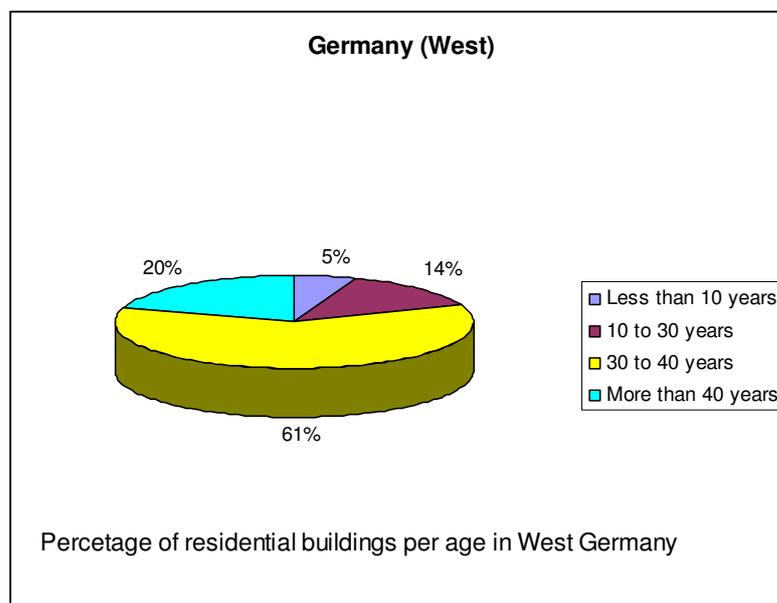
Percentage of residential buildings per age:



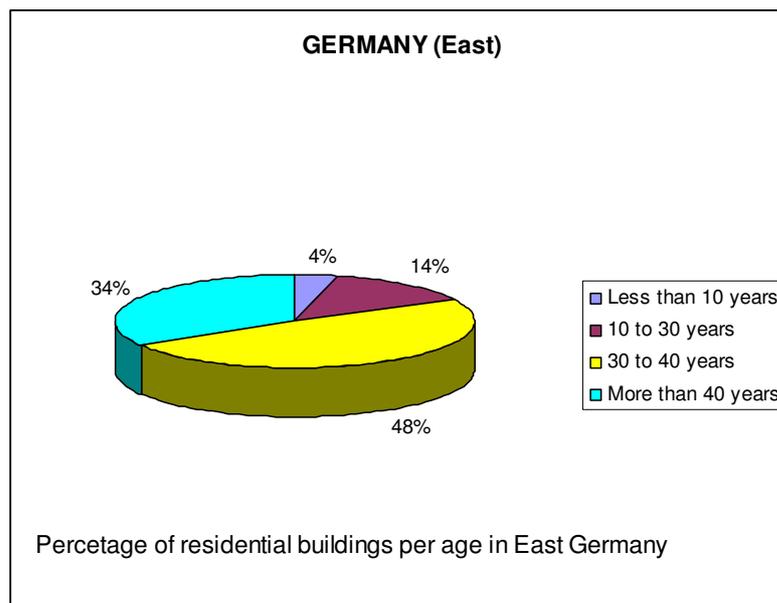
According to the data provided by the Bulgarian Construction Chamber, the majority of residential buildings in this country were built until 1969. Also a high percentage of buildings were built between 1969 and 1979. These data show that a 70% of the residential buildings in Bulgaria are at least 30 years old, which shows a large necessity of renovation in residential buildings of this country. On the other hand, the 30% of Bulgarian residential buildings are 0 to 30 years old.



This information provided by the Vocational House of Builders in Romania shows that the majority of residential buildings in this country have been built between 1979 and 1999 (a 37% of the total residential buildings). On the other hand, there is a total of a 58% of the residential buildings in this country which are more than 30 years and therefore are subject to possible renovation works.



The details provided by ABZ-Kerpen have been provided according to two different areas in Germany: West and East Germany. This is due to the differences that both areas have experienced in their economical and industrial growth, which leads us to slight differences in the demographic growth and therefore in the development of the residential buildings. Therefore we can see that Germany's old states experienced a remarkable growth in their residential buildings until 1969, since the 61% of them were built until that date.



The development of the residential buildings in the new states from Germany has been more homogeneous, because the half of the residential buildings were built until 1969, and the other half from that day until current.

Percentage of final energy consume in the domestic sector per item:

Country	Bulgaria	Romania	Germany	Holland	Spain	Average
Air Conditioning	1%	25%	2%	17%	0,4%	9,08%
Lighting	10%	30%	8%	16%	9%	14,6%
Kitchen	12%	5%	33%	3,5%	10,8%	12,86%
Hot water	20%	20%	25%	14,7%	26,2%	21,18%
Domestic electrical devices	12%	10%	7%	14,6%	12%	11,12%
Heating	45%	10%	25%	14,7%	41,7%	27,28%

The average percentages of final energy consume in the residential buildings in each country gives us an overall idea of the activities that need a greater use of energy. These are mainly heating and hot water. In most of the countries the less electricity spending activity is the air conditioning, with the exception of Romania, that spends a 25% and Holland that spends a 17% of their total energy consumption in residences in this item.

LEGAL FRAMEWORK

Transpositions of the Energy Performance Directive in each participating countries' legal system and dates in which these transpositions entered into force

Bulgaria

- ❖ **Energy Efficiency Act (EEA):** enforced in March 2004. Last amendments have been published in SG. No 6/23.01.2009 effective 1.05.2009 and SG. No. 19/13.03.2009, effective 10.04.2009.

The EEA has been developed in line with the requirements of EPBD and the Directive on the promotion of Energy End-use Efficiency and Energy Services COM 2006/32/EC. In the Bulgarian legislation provisions on indicative prices for energy savings have been implemented, and an Action Plan in the Energy Efficiency field has been developed including concrete measures for achieving the goals and the development of the energy efficiency development market.

- ❖ **Regulation Nr RD-16-296/11.04.2008** for Energy characteristics of sites
- ❖ **Regulation Nr RD-16-294/11.04.2008** for Energy efficiency audit
- ❖ **Regulation Nr RD-16-295/11.04.2008** for certification of Buildings for Energy efficiency
- ❖ **Regulation Nr RD-16-1238/28.12.2007** on circumstances, subject of entry into the register of persons, performing certification of buildings and audit for Energy efficiency, for order for receiving an information from the Register and conditions and order for an competences obtaining and recognition, entered into force on 22nd of January 2008.

Romania

- ❖ **GO 174/2002** for setting up special measures for thermal rehabilitation of residential buildings approved by the Law 211/2003 (came into force in 2003)
- ❖ **GO 1070/2003** to approve the special methodological norms for application of GO 174/2002 regarding to the growth of residential buildings energy efficiency (came into force in 2003)
- ❖ **Law 372/2005** for regulating the building energy efficiency

Germany

Energy Passport: Entered into force in July 2008

Holland

- ❖ **Qualification method** available January 1st 2007

During 2007, 800 extra inspectors to be expected, makes total of 1000 (200-300 companies). After reaching 1000 qualified inspectors, certificate will become mandatory, January 1st 2008.

The Netherlands has qualified for some time a significant part of the directive. The remaining parts of the Directive into national legislation will be realized by the adoption and publication of the Decree on energy buildings (Decision of November 24, 2006 to implement the Directive on energy performance of buildings, Staatsblad 2006, 608)

Spain

- ❖ The **Building Technical Code: Basic Document - HE**, which is a partial transposition of the EPBD: approved by Royal Decree 314/2006 on 17 March 2006 and came into effect on 29 September 2006.
- ❖ The **Basic Procedure for Energy Efficiency Certification of New Buildings**: approved by Royal Decree 47/2007 on 19 January 2007 and came into effect on 1 November 2007
- ❖ The **Regulation on Indoor Heating/Air-conditioning Systems (RITE)**: approved by Royal Decree 1027/2007 on 20 July 2007 and came into effect on 29 February 2008.

Energetic certification in existing buildings is foreseen to be transposed during the year 2009.

Obligatory nature of the transpositions and type of buildings for which these transpositions are obligatory

Bulgaria:

Obligatory certification of buildings for EE (Energy efficiency) is provided for:

- All buildings over 1000 sq. m. built-up area
All buildings which are *in operation* and whose *gross floor area exceeds 1,000 square metres* shall be subject to mandatory certification according to the procedure established by Energy Efficiency Act (Art. 19, 1)
- state-owned and/or municipality-owned buildings, which are in operation and whose gross floor area exceeds 1,000 square metres (EEA, Art. 19,2)

The owners of above mentioned buildings will be obliged to implement the energy efficiency improvement measures prescribed by the energy efficiency audit within three years after the date of acceptance of the results of the audit.

Obligatory updating of the energy performance certificate of the building in case of performance of activities leading to an improvement of the overall energy performance of the building are implemented, such as reconstruction/rehabilitation, major renovation, major/big/general repair or rearrangement/reorganization – change of the function of an existing building.

Certification of the buildings includes audit of buildings.

Energy audit and Certification of Buildings apply to new buildings, putting into operation (new building) not earlier than three and not later than six years after the date of commissioning of the building/putting into operation. Pending the issuing of the certificate the energy performance of the building shall be certified by an energy passport, which shall be part of the technical passport of the building and shall certify compliance with the requirement referred to in Item 6 of Article 169 (1) of the Spatial Development Act.

as well as in case of reconstruction/rehabilitation, major renovation, major/big/general repair or rearrangement/reorganization – change of the function of an existing building.

The energy performance certificate for parts of the building shall be issued on the basis of a common certificate of the whole building in the cases of blocks with a common heating system. The validity of an energy performance certificate of a building shall not exceed ten years.

Romania: thermal rehabilitation of residential buildings is executed according to “Multiannual local program regarding the growth of residential buildings energy efficiency”. The application of the legislation and execution of thermal rehabilitation becomes obligatory after the agreement between owner associations and local

representative is signed. Thermal rehabilitation is applied to the new buildings and also to the existing buildings

Germany: the transpositions are only obligatory if the residence is going to be sold or rent, but not for owns use, and it only applies to those buildings that were built before 1965.

Holland: New and Existing buildings

Spain: the transpositions are fully obligatory for new and refurbished buildings, except the **Basic Procedure for Energy Efficiency Certification of New Buildings** which has been brought into force for new buildings.

Additional legislation transposing the European Directive on existing buildings energy saving or existing building refurbishment

Bulgaria: there is currently one law and a draft:

- ❖ Regulation No 2 for Design, implementation, control and commissioning of waterproofing and waterproofing systems of buildings and facilities;
- ❖ Draft of Regulation: Technical rules and norms for control concerning the insulation works in construction;

Romania: there are legislation instruments and specific standards for expertise, designing and execution (implementation).

Germany: Yes

Holland: Yes

Spain: at a national level there is no more legislation on this respect. However, there are some Royal Decrees approved at a Regional level:

In the Catalonia Region, the RD 21/2006 was approved on the 14th February. It regulates the adoption of environmental and eco-efficient criteria in buildings, being one of the parameters of eco-efficiency, the part concerning the energetic saving. This Royal Decree is not compulsory

As a complement for the Royal Decree 47/2007, *Basic Procedure for Energy Efficiency Certification of New Buildings*, each autonomous region must regulate the register and external control to verify the fulfilment of this norm. Therefore, every Autonomous Region has to approve Royal Decree that will be compulsory

Existing legislation in the following areas

OUTER WALLS: all the countries analyzed count on regulation about outer walls based on the legislation instruments transposing the European Directive and also on the specific standards for expertise, designing and execution. In the case of Bulgaria, there is a draft regulation for heating insulations, provisions regarding pouter heating insulation systems and in Germany the laws stand for better and more effective and healthy sealing material: asbestos is strictly forbidden. The Spanish legislation transposing the European Directive that deals with outer walls is the Building Technical Code – Basic Exigency HE1. Limitation of Energetic Demand.

WINDOWS AND ROOFS: Like in the previous case, all countries refer to windows and roofs in the legislations transposing the European Directive. In Bulgaria, this legislation is included in the N2-hydro insulations – of roofs, incl. of general renovation works and repair. In Germany the legislation binds to have double glazed windows in every building.

Lastly, in Spain the exigencies about windows and roofs are included in the Building Technical Code – Basic Exigency HE1. Limitation of Energetic Demand.

SOLAR PANELS: There is no legislation about solar panels in Germany and Bulgaria. However, in the case of Spain the regulations about solar panels are included in the following documents of the Technical Building Code:

- Basic Document on Energy Saving (BDES)
- Basic Exigency HE5. Minimal photovoltaic contribution to electric power.

THERMAL ALTERNATIVE ENERGY INSTALLATIONS: There is no specific legislation for thermal alternative energy installations in Bulgaria and Germany, but in the last one the costs for those technical installations are partly reimbursed by the state. Spain, Holland and Romania count on legislation about thermal alternative energy installations included in the transpositions of the European Directive. In the case of Spain, we can find it in the Building Technical Code– Basic Exigency HE4. Minimal solar contribution for sanitary hot water

HEATING AND COOLING: every country analysed in this report has a regulation on heating and cooling. Here we can see the regulations running in some of the countries analysed:

Bulgaria: Heating installations draft regulation for heating insulations, provisions regarding

Germany: Heating Systems: boiler started up from 01.10.1978 and modernised after 01. November 1996 have to change until 31.12.2008. New systems have to be built in. The legislation is only valid for building which is going to be sold.

Spain:

- Regulation On Indoor Heating/Air-Conditioning Systems
- The Building Technical Code – Basic Exigency HE2. Efficiency of thermal installations
- The Regulation on Indoor Heating/Air-conditioning Systems (RITE):

SANITARY:

In Germany, the legislation concerning sanitary only includes requirements about safety, hygiene and innovation. In the case of Bulgaria, there is an ordinance for essential requirements and assessment of construction products conformity, implementing Construction Products Assessment Directive.

Lastly, the Spanish legislation on sanitary is compiled in the following documents:

- The TBC contains a Basic Document on Energy Saving (BDES)
- The Building Technical Code: Basic Document HS. Health Regulations

Each Spanish autonomous Region has specific legislation about the minimum requirements that buildings must fulfil in order to guarantee the minimum health requirements.

Fiscal initiatives or incentives related to energy efficiency in existing buildings refurbishments

All the countries involved in the report count on economic or fiscal incentives in order to raise the level of energy efficiency in residences. This is an indicator the importance that this item has at a regional, national or European level.

Bulgaria:

National Energy Efficiency Fund:

The State reimburses 20% of the overall activities for energy efficiency measures, which is not working well and is not popular.

- Main financial revolving tool: National Energy Efficiency fund (total initial funding of 17 MUS\$) for EE Projects.
- Yearly tax exemptions for entirely insulated buildings for a period of 10 years are foreseen
- Bank loans, subsidies – to 20 % of realised renovation works

Germany:

- Solar panels
- Costs for some heating systems (wooden pellets) are partly reimbursed.
- So called "Passive houses" (building without any heating systems) are fiscally favoured.

Romania:

The local budgets assure the financial resources for: the residential buildings inventories, the expertise and also the projects elaboration.

The execution of thermal rehabilitation of residential buildings is assured different as follow:

- 50% from state budget;
- 30% from local budget;
- 20% from owner association.

The local public administrations take over the 20% of the total amount of expenditures regarding the thermal rehabilitation of residential buildings, payed normally by the owner associations, but only in accordance with the budget (funds) annually approved.

Spain:

The government promotes the energetic saving in existing buildings by means of economic aids through the following actions:

- Renovation of the thermal covering
- Energetic renovation of the thermal installations
- Energetic renovation of the interior lighting installations
- Renovation plan of household appliances

This economic aids are promoted by IDAE (Institute for Diversification and Saving of Energy) and the Action Plan 2008-2012, belonging to the Saving and Energy Efficiency in Spain (E4).

ENERGY EFFICIENT RENOVATION OF RESIDENTIAL BUILDINGS – TRAINING NEEDS IN THE PARTNER COUNTRIES

This second part of the study is aimed to analyse the training needs on energy efficiency construction techniques among training centres and companies in every participant country. In order to do so each partner interviewed several training centres, construction and building companies and associations through a questionnaire. The survey was carried out from February 2009 to May 2009. The following centres took part in the survey:

BULGARIA

Vocational training center 'GeleSoft', City of Gorna Oryahovitsa,
 Adults training, initial and further/continuing vocational training

Vocational training center at Polianitza JSC, City of Targovishte
 Adults training, initial and further/continuing vocational training

Vocational training center at 'Glavbolgarstroy' JSC, City of Sofia
 Adults training, initial and further/continuing vocational training

Vocational training center at Sole Trader 'Pevik Vayan-Viktoriya Georgieva, City of Razgrad
 Adults training, initial and further/continuing vocational training

Vocational secondary school on light industry and Construction – Town of Svishtov
 Specialized professional secondary school

Vocational secondary school on Construction and Architecture – Vratsa
 Specialized vocational secondary school

Vocational secondary school on Construction, Architecture and Geodesy – Town of Veliko Tarnovo
 Specialized vocational secondary school

Vocational secondary school on Construction, Architecture and Geodesy – Town of Shumen
 Specialized professional secondary school, 5-year professional education, graduation in profession "Construction/site technician", "Geodesy"

GERMANY

Berufsförderungswerk der Bauindustrie NRW e.V. Ausbildungszentrum Essen
 Construction Industry

Berufsförderungswerk der Bauindustrie NRW e.V. Ausbildungszentrum der Bauindustrie Hamm
 Construction Industry

ROMANIA

SC "ALEXRAL CONSULT" SRL Bacau
 SRL- Continuing Vocational Training (CVT)

Braila County Agency for Employment - Regional Training Center
 Public Institution, Continuing Vocational Training (CVT)

Regional Training Center, Cluj

Continuing Vocational Training (CVT)

Regional Training Center, Brasov

Continuing Vocational Training (CVT)

S.C. AMICI S.A. BACAU

Private company -main activity – installations in constructions

EDILCONST SA CAMPINA

Private company

COMPANIA DE CONSTRUCTII MOLDCONSTRUCT SA, IASI

Private company

SC CPC ALEX SRL IASI

Private Construction company

SC CIAC SA ORADEA

Private construction company -constructions, installations, fitting out, commercialization

SPAIN

AIDICO-Technological Institute of Construction, Training Department

Specialized vocational training centre

FEVEC- Federación Valenciana de Empresarios de la Construcción

Specialized vocational training centre

IES MIGUEL DE CERVANTES, Murcia

Public Secondary School with Vocational Training

IES Politécnico de Lugo, Lugo

Public Secondary School with Vocational Training

IES Provençana, L'Hospitalet de Llobregat

Public Secondary School with Vocational Training

IES Santa Eugènia, Girona

Public Secondary School with Vocational Training

HOLLAND

GOA INFRA GOREP

Vocational training School

Contents in Curricula and Syllabus on Energy Efficiency Renovation and Rehabilitation of Buildings

The main objective of this first part of the survey was to analyse the presence of energy efficiency renovation and rehabilitation of buildings in the curricula and syllabus of training centres in the different participant countries.

As far as Bulgaria is concerned, five of the Bulgarian centres that answered this questionnaire include in their training offer contents related to this topic. In Bulgaria most of this offer is provided by specialised secondary schools. One of these schools explained that they have 8 hours of Building Renovation in syllabus Technology of Construction, which is an obligatory course, and they also host presentations by firms such as Orgachim, Cerezeit or Baumit.

In other of the Bulgarian schools training on energy efficiency is provided through extracurricular classes, part-time training and free classes, as well as in obligatory elective courses. The contents on this particular topic are covered in obligatory elective classes "Technology of the Construction specialty", "Dry construction", in the part "Thermal-heat insulation systems", type of materials, laying of thermal-/heat insulation facades, heat and hydro insulation in the skirting board, veneer, panelling, flat and skate roofs.

In other schools training on Energy efficiency renovation of buildings is included as part of the subject "Renovation of Buildings and Equipment" from the obligatory professional training. This obligatory subject includes the following units: Introduction, Main point of the renovation, Renovation of buildings, Renovation of equipment/facilities.

There is also a vocational centre in Targovishte that stated to have developed this kind of training on a PHARE Life Long Learning project for short-term adults training courses. In December 2008, when the questionnaire was answered, the centre was drafting the extension of license of their training centre and planned to include renovation as separate specialty; they had been studying including free classes and free elective subjects in all construction specialties.

Finally, the Bulgarian-German Vocational Training Centre in Pleven provides free classes and modular training on this topic and modular training as part of the curriculum for "Energy Saving Advisor", "Building Rehabilitation", "Integrated External Thermal Insulation Composite Systems". Units covered in Energy Saving Advisor and Energy-Efficient Refurbishment of Buildings are the following: Home efficiency survey; Heat insulation of the surrounding constructions and construction parts of buildings; Reconstruction of the heating installation; Financial support of the spot consultation for economical and rational use of energy in residential buildings; Technical solutions and necessary energy-efficient materials for building rehabilitation.

The rest of Bulgarian centres do not have any syllabus or curricula on this area and do not provide any kind of training on Energy Efficiency Renovation and Rehabilitation of Residential Buildings. However some of them pointed out their interest in incorporating such a module in part of the construction vocational training they provide or as separate training.

With reference to Germany, the training centres interviewed do not provide specific training on energy efficiency renovation of buildings. The Berufsförderungswerk der Bauindustrie NRW e.V. Ausbildungszentrum der Bauindustrie in Essen answered that they did not include any curricula or syllabus on Energy efficiency renovation of

buildings, while the equivalent centre in Hamm said that some topics of energy efficiency are integrated in regular training orders.

To analyze the situation in Romania, several Romanian continuing vocational training (CVT) centres were interviewed about their views and needs in energy efficiency renovation of buildings. Most of the centres participating in the study answered that they do not have any training program on this subject, although some of them said they would consider including them in their offer in the future.

Only one of the Romanian centres interviewed offers training related to energy efficiency renovation of residential buildings. They have a program to train in thermal rehabilitation of buildings and to train professionals in building insulating and painting that includes this subject.

To study the training needs in this topic in Spain, several vocational training centres specialized in the construction sector and public secondary schools teaching vocational training were interviewed.

The Spanish secondary schools selected for the survey offer Intermediate Vocational Training Module on Basic Construction Skills. This module has a total duration of 2000 hours and covers the following subjects: Administration, management and marketing in small firms (60 hours); Training in the workplace (400 hours); Training and employment (60 hours); Organization and control of work (100 hours); Prefabricated (145 hours); Paving and tiling (355 hours); Paints and varnishes (165 hours); Projects, assessments and measurements (100 hours); Relations in the team (60 hours); Lining conglomerates (175 hours); Coatings in sheets (100 hours); Construction Safety (60 hours) and Synthesis (60 hours).

Although this topic is partially and indirectly covered in some obligatory subjects, any of the subjects in this module include specific contents on training efficiency renovation of buildings. They pointed out that studies on energy construction techniques corresponded to a higher level, namely, Higher Vocational Training Modules and University degrees. Therefore we can say that these Spanish secondary schools do not offer this specific training at this basic-intermediate level.

On the other hand, the Spanish vocational training centres interviewed offer specialized training for the construction sectors, but when asked about this particular subject they stated that so far no training program aimed at construction workers had been developed to cover the energy-efficiency renovation of residential buildings. However these vocational training centres showed their interest in launching such a specialized training offer in the near future as the new legal and economical situation advises to do it.

Training Materials on Energy Efficiency Renovation and Rehabilitation of Buildings

The objective of this second part of the survey was to learn about the suitability of available materials on energy efficiency renovation of buildings in the target countries.

Most of the Bulgarian centres providing training on this topic use manuals, guides and brochures of companies, manufacturers of heating- and hydro-insulations systems and products such as Knauf, Baumit, Orgachim, Cerezeit –companies that upon invitation carry out presentations in the centers. These centers point out that they also use original materials such as information compiled from different sources, such as Internet and technical literature.

The Vocational Secondary School on light Industry and Construction (Svishtov) said they use materials provided by 'Orgachim' JSC – Rousse, and Cerezit after demonstrations, carried out in our School: Thermoinsulation system. Professional course/training – Module 1 of Orgachim – Rousse; System for heating insulation Ceretherm – of Cerezit.

The vocational secondary school on Construction, Architecture and Geodesy (Shumen) uses *Energy efficiency – thermo-insulation systems of building*, issue of Bulgarian association for Construction insulation and waterproofing – Arch. Rosen Savov and Prof. Dr. Eng. Dimitar Nazarski and *Thermo/heating insulation system of outer prevention and plastering* of DEKO Professional – Orgachim JSC.

The materials used by the Vocational Secondary School on Vratsa include detailed description in connection with the proper execution of the heating insulation of the façade walls, technology of this execution, provided by Orgachim company – Ruse. The centre describes them as very well illustrated, visualized, easily understandable and concrete, but they say they also use materials compiled from other sources as concerns the hydro-insulation of foundations and roofs, even the last are not so detailed described.

The Bulgarian-German Vocational Training Centre in Pleven uses the handbook *Energy Saving Advisor* for the modular training on this topic.

Finally, the Vocational Training Centre at Glavbolgarstroy (Sofia) states that they use a handbook for auditing for energy efficiency and certification of buildings of Technical University of Sofia. The handbook includes the following themes: Current situation analyses; Model audit of building; Manual definition of required quantity of heat of the building and Examples.

On the contrary, the German centres participating in the survey do not provide specific training on energy efficiency renovation of buildings. The Berufsförderungswerk der Bauindustrie NRW e.V. Ausbildungszentrum der Bauindustrie in Essen answered that they did not include any curricula or syllabus on Energy efficiency renovation of buildings, while the equivalent centre in Hamm said that some topics of energy efficiency are integrated in regular training orders.

With regard to Romania, of all the continuing vocational training (CVT) centres interviewed only one claimed to have training materials including contents on energy efficiency renovation of residential buildings. These materials do not focus only on this topic but cover general information for the training of future professionals of building insulation and painting.

As for the materials used in Spain, neither the Spanish vocational training centres nor the secondary schools have any specific material to train workers in this subject.

Proposals and References

In order to better understand the training needs in the partner countries the different training centres and companies were also asked about their expectations for this project. We asked them to specify their views about what the guide should be like: format, contents, style, etc.

According to the recommendations made by the centres interviewed the Guide should:

- have reference/information part with links to web sites for the most important legislation/normative acts and characteristics
- be practically oriented
- be easily understandable with respective graphs and illustrations, plainly written in order to be optimal learnable by users
- be interactive
- be visually attractive
- be e-learning based

In addition the centres suggested that the guide should include the following:

- most variety of cases and case studies for solving, to include lots of examples
- different kinds of Renovation, except for the traditional method with expended polystyrene. International expertise on the subject, conducted technological mistakes in the course of the performance and ways of their remedies.
- description and analyses of the buildings considered, energy consumption, development of model house, measures for reduction of energy costs and their definition, respective examples/case studies, and example tests
- contents on Material science, Technology of execution, Quality-measurable indicators for the efficiency of renovation
- contents on 1.General technical terms/concept (quotient of thermal conductivity/diathermancy, heat transfer etc.); 2. Theoretical formulation – calculation of temperature drop/fall, heat transfer etc.; 3. Materials, glue mixtures, and other ones used during the energy efficiency refurbishment of buildings; 4. Technologies of execution EPS, XPS, etc.; 5. Ecological/environmental aspects. Treatment of waste, generated during the renovation; 6. Technique of safety on renovation; 7. Review of energy-efficiency plan' conception.
- sensitization of all persons who are involved in building construction; clarification of energy efficiency and cost minimizing and determination of the biggest energy guzzler on a site.
- information about the new materials used in thermal rehabilitation
- thermal insulation methods for the existing buildings, used materials and equipments in thermal insulation

The organizations that participated in the survey also gave some general recommendations for this project. Some insisted that trainers should take part at a transfer of know how or at a training course in one on the country that has implemented such projects. Also, whereas the thermal rehabilitation of buildings final results is the thermal costs reduction, they said the guide should include an economic study that proves the financial advantages of these procedures.

Finally, other centres suggested that the guide should include a training course for the professional training which has to be elaborated strength on the analyze effectuated on a group of specialized formed of 8-11 persons who has to identify specific objectives, the goals and the steps that a person has to know to be able to

practice a qualification/occupation in the thermal rehabilitation of buildings field related to the energy efficiency.

Companies Survey

To complete this study some construction companies from the target countries were also interviewed. Many of these companies provide services related to carpentry rehabilitation, building thermal insulations and installations with polystyrene, thermal windows and thermal doors. Other companies are interested in providing these services though currently they do not do it.

Most of companies said their employees had received some kind of training in energy efficiency renovations. In some companies employees (foremen or workers) are trained in this subject by their own engineers while in others workers are trained at specialized centres.

Generally companies claim that the training offer available on this topic is not enough to cover their needs and that the methodology could be improved. They also say that this training should be developed through practical methods and even suggest organizing a workshop about building thermal rehabilitation.

Some companies said that the guide should include practical methods and solutions for court/land in accordance with the buildings type, the methods of work, and optimal methods for solutions recommended by energetic audit, the hydrothermal characteristics of used materials. They also recommended to include solutions in accordance to flats structure type and specified consumptions. In addition, some insist that the guide

Finally most companies agree that the training should be provided through a simple

CONCLUSIONS

Based on the analysis of the results of the two parts of the study we are now in a position to draw some conclusions.

The data of the general part of the study indicate that the percentage of residential buildings that were created before 1980 is 70% in Bulgaria, 58% in Romania, 81% in Western Germany and 82% in Eastern Germany. Given this average age of residential buildings in Bulgaria, Romania, Germany and Spain we can conclude that there is an important need for renovation in buildings of the target countries.

In addition the average percentages of final energy consume in the residential buildings shows that most energy consuming domestic activities are heating and hot water. Therefore a proper renovation would reduce the domestic energy consumption in buildings in these countries.

The analysis of the legal framework shows that there are specific measures and obligatory regulations in force in every target country. Not only are these measures obligatory but they also include economical incentives for energy efficiency building renovation. Consequently the number of buildings going through a renovation process is expected to increase considerably in the next years.

Due to the facts highlighted above it is reasonable to think that the need for construction workers qualified in energy efficiency building renovation is to arise in the target countries.

On the other hand the results of the second part of the study in which the training needs were analysed indicate that there is an important lack of training offer and materials. This topic is generally covered indirectly and a complete well structured programme on energy efficiency renovation of residential buildings is urgently needed. In some other cases there are training programmes available but they are designed for higher level professionals and they do not adjust to the real training needs of construction workers or foremen.

Similarly a lack of training materials has been detected in this particular subject and for this particular professional level. Most companies claimed that the training offer available is not enough and training centres admitted the lack of suitable training materials.

Both teachers and professionals involved in this sector agreed that the guide to train construction workers in energy efficiency renovations should be easy to use, practical, task focused, interactive and e-learning based.

In the light of these conclusions, the development of a e-learning guide for training workers in energy efficiency renovation of buildings in the target countries is necessary and that the guide should be developed and adapted following the advice provided by teachers and professionals in the target countries.