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Black Sea Basin Joint Operational Programme 2007-2013

BSBEEP
Black Sea Buildings Energy Efficiency Plan

GA1: Knowledge and information collection and dissemination – Analysis of external current situation

Activity GA1.1

Collection and comparison of institutional framework at EU, national and local level concerning energy efficiency issues focused on buildings construction sector

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Black Sea Buildings Energy Efficiency Plan (BSBEEP)

Black Sea Basin Joint Operational Programme 2007-2013

Black Sea Buildings Energy Efficiency Plan (BSBEEP*)* project aims at the establishment of strong regional partnerships and cooperation schemes in Black Sea area through the reinforcement of administrative capacities of local authorities and bodies in a very crucial sector (energy efficiency in buildings) having major environmental and economic impacts locally and globally.

The ultimate goal is to achieve change in the way they treating energy for buildings; facilitating change in the way local societies are acting. Furthermore, the project focuses on the establishment of a knowledge and experience exchange network aiming at the promotion of buildings energy efficiency. The network will engage a wide spectrum of organizations such as local and regional authorities, universities and research centres and NGOs which will help promoting energy efficiency in buildings at local and regional level. Meanwhile it will focus on raising awareness and mobilising private sector and leverage funds to support future initiatives.

Ten partners are partirticipating in the BSBEEP Project from six different countries; Municipality of Kavala (GR), Municipality of Galati (RO), Municipality of Cahul (MD), Municipality of Mykolayiv (UA), Municipality of Samsun (TR), Municipality of Tekirdag (TR), Democritus University of Thrace (GR), University Dunarea de Jos of Galati (RO), American University of Armenia (AM) and Renewable Resources and Energy Efficiency Fund (AM).

The specific study is one out of five studies, of GA1 of BSBEEP Project, which is a group of activities aiming to identify the external environment that all ten partners are working on (GA1: Knowledge and information collection and dissemination – Analysis of external current situation).

More details about BSBEEP Project are available on its website: **www.bsbeep.com**.

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1. Introduction

Current situation

Although energy efficiency is a matter of optimal use of energy and of coping with the new economic and social challenges, having major positive impacts on environment and on financial situation of all energy consumers, only at last few years took the appropriate publicity, raising top of political agendas.

Currently, energy efficiency is considered one of the top community policy, which is defined as well by the EU Strategy 2020 – the flagship of the Europe. EU member states following the pace of EU are speeding up, establishing initiatives and financing actions and projects. Neighbouring countries with their own resources are trying to follow, closing the gap. Greece and Romania, as EU member states are profiting from intensified EU efforts for efficient use of energy in buildings.

At the national level, Greece has put in force an appropriate legislative framework (e.g. obligatory energy audit for all housing buildings, national record for energy inspectors), as also has put in action funding lines such NSRF 2007-2013 and national resources funded "Green Fund" calling building owners to retrofit their homes, to install photovoltaic panel over the roofs etc. Specifically, municipality of Kavala, since 2008 has incorporated in its yearly operational plans actions for renovation of municipal buildings. At the same time, schools were the objects that benefited primarily of the projects designed for improved energy consumption of the buildings. Municipality of Kavala has been active and succeeded to benefit a lot from Greek NSRF ROP EMTh 2007-2013 (Priority Axis no. 6 "Integrated interventions in urban areas").

In Romania, last decade starting from 2000 with Law no. 199/2000 (Regarding the efficient use of energy, modified and completed by Law 56/2006), has put in force a complete legislative framework concerning thermal rehabilitation, energy performance of buildings and energy efficiency and promotion of renewable energy resources. Recently, a new legislative proposal "Regarding energy performance of buildings in Romania" was filed on 25th of May 2011. At the same has issued a wide spectrum of initiatives (national energy strategy, national action plan on energy efficiency etc.) promoting energy efficiency in building sector. Galati municipality has gained a lot from Romanian NSRF ROP 2007-2013 (Priority Axis no. 3 "Improving social infrastructure), renovating 3 schools, 1 hospital and 1 social centre.

University "Dunarea de Jos" of Galati, last eight (8) years has implement four research projects related with energy efficiency funded from national research programme and EEA financial mechanism, while has implement a project for the "Experimental house built-up in University "Dunarea de Jos" of Galati for

measurement of energy consumption". The university will strengthen his efforts on energy efficiency, developing new services.

In Turkey, the related legislative framework is advancing (2023 National energy program, Law for energy efficiency in 2007, Regulations for energy performance of buildings in 2008), while municipalities decisively took action. Municipality of Samsun, executed energy audits for many municipal buildings while gain a lot from methane gas facility. Energy audits to town hall, schools and other municipal buildings have been implemented from municipal servants. Municipality targets are to cut energy costs in the middle term as also to differentiate energy resources mix including more RES originated energy accordingly to yearly action plans. Municipality of Tekirdag, has not implemented such projects, but is planning to incorporate energy efficiency issues on its yearly action plans.

In Armenia, National energy strategy and Renewable energy roadmap are supporting buildings retrofitting initiatives.

In Moldavia, legislative framework is following the pace. Municipality of Cahul, since 2009 has incorporated in its yearly operational plans actions for renovation municipal buildings. A non exhaustive list of buildings including town hall, schools and community centres has been prepared for energy audit inspection and further on for renovation works that will lead to efficient use of energy.

Municipality of Mykolayiv, since 2009 has intensified its efforts to incorporate energy efficiency issues in its yearly operational plans actions as to act by implementing a series of energy audits and studies. Retrofitting of municipal building is a priority targeting to major municipal buildings hosting administration, education and health uses.

Problems to be addressed

In Greece, last two years both legislation and financing manage to integrate in a coherent framework, boosting private initiatives (e.g. programmes "Photovoltaic on roofs" for small scale production of solar energy, "Saving energy" for retrofitting houses etc). But public sector is lagging behind. Only few public buildings have been inspected for optimal use of energy. Even fewer have been retrofitted. Municipality of Kavala, is now sensitive on energy efficiency issues incorporating them on planning procedures. There is a lot to do on implementation phase.

In Romania central government is striving to diffuse the idea, to integrate institutional framework and to motivate public and private sector. Some initiatives are undergoing, where business and residential sectors are the main beneficiaries. Galati municipality is decisively active profiting from abundant finance mainly from Romania ROP. But there is a lot to do, keeping in mind that Galati municipality has been inherited an immense property including a vast social housing property that is aging and downgrading fast.

In Turkey, at national level both institutional and financial framework are complete and active but initiatives are missing. Municipality of Samsun, has incorporate energy efficiency issues on planning procedures but action is still behind. At municipality of Tekirdag, nothing has been done on implementing energy efficiency actions. In contrary at political level, it has been agreed that municipality should speed up its efforts to implement a series of actions profiting both economically and environmentally.

In Armenia, government is applying a sufficient framework which needs reinforcement. Municipalities are not active enough in political level while there is a vast space for action. Universities are active enough trying to bridge public and private sector to consolidate initiatives but there is a lot to do.

In Moldova, the legal framework is still developing with the purpose to address the problems of energy efficiency in all sectors of the national economy. Secondary legislation, as National Program on Energy Efficiency and Energy Strategy until 2030 have been approved already, which need a lot of efforts to undertake in order to be implemented. Municipality of Cahul, is planning to elaborate a program and action plan for promoting energy efficiency and is making efforts to put it on the ground. Cahul is discussing to elaborate a more specific plan dedicated to manage social housing including energy efficiency actions.

Municipality of Mykolayiv, is accelerate to integrate a framework for energy efficiency at local level, addressing to citizens and local actors. Mykolayiv is also facing a crucial challenge about managing the vast social housing property

Challenges

Even each participating country has initiated or implemented different initiatives for improved building energy efficiency, municipalities have to strive for a more inclusive national and local policies, programs and action plans designed for best use of the available resources. Also, such efforts should lead to attracting new investments in energy efficiency for all buildings, regardless of the types of ownership.

In order to improve the capacities of local governments in addressing issues related to energy performance of buildings, a stronger regional partnerships and cooperation schemes in BS area through the reinforcement of administrative capacity of local authorities and bodies is needed. Public institutions such as municipalities originated from BS area have very differentiated administration cultures created from very different political, social, cultural and economic backgrounds. This is a challenge to face while EU is trying to establish permanent cooperation bonds with neighboring countries. Public administration and its capacity are the first subjects to focus on. Establishing regional partnerships and cooperation schemes is the most appropriate way to achieve understanding and smooth neighbouring.

Joint Action specific objective is to reinforce the administrative capacities of local authorities and bodies in a very crucial sector (energy efficiency in buildings) having major environmental and economic impacts locally and globally. Buildings energy efficiency is a subject that affects everyone. Taking in account that urbanisation rates are speeding up, the question of how we can improve our living conditions becomes crucial. BSBEEP will try to give some answers spreading the knowledge and experience contributing to the dissemination of good lessons and feasible examples to specific groups and different types of counterparts.

Experience

Each Partner has certain experience in implementing activities, including for promotion and development of energy efficiency in buildings. It refers both to elaboration of planning documents as well as to elaboration of projects for building retrofitting with energy efficiency component.

Municipalities of Kavala and Galati had initiated different projects for buildings' improved energy performance and benefitted of funding under Greek NSRF ROP EMTh 2007-2013 (Priority Axis no. 6 "Integrated interventions in urban areas") and Romanian NSRF ROP 2007-2013 (Priority Axis no. 3 "Improving social infrastructure"), respectively. Thus, for a number of years municipality of Kavala had incorporated energy efficiency measures for municipall buildings in its yearly operational plans. Similarly, municipality of Galati had implemented a numver of energy efficiency projects in 3 schools, 1 social center and 1 hospital.

University "Dunarea de Jos" of Galati, last eight (8) years has implement four research projects related with energy efficiency funded from national research programme and EEA financial mechanism, while has implement a project for the "Experimental house built-up in University "Dunarea de Jos" of Galati for measurement of energy consumption". The university will strengthen his efforts on energy efficiency, developing new services. Energy audits to town hall, schools and other municipal buildings have been implemented from municipal servants. Municipality targets are to cut energy costs in the middle term as also to differentiate energy resources mix including more RES originated energy accordingly to yearly action plans.

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2. EU level analysis

The European Union (EU) recognizes that energy efficiency is one of the crucial objectives of the EU. Also, energy efficiency rated as a master key to enhance security of energy supply and diminish emissions of Green House Gases (GHG). Buildings play a key role in the EU's energy efficiency policy, as nearly 40% of final energy consumption and 36% of greenhouse gas emissions come from houses, offices, shops and other buildings. Since now, approximately only about half of the energy efficiency improvement potential is really realised due to market obstructions and ineffective implementation of the relevant legislation. Stimulation of investment actions have already took place in EU via initiation of the building construction and renovation sector.

2.1 Legal framework

Given the commitments undertaken by the States Parties to the Kyoto Protocol on reducing greenhouse gas emissions and the CO_2 emissions a legislative framework conducive to targets determined by the commitment was developed by the European Parliament and Council. This legislation covers all activities generating greenhouse gases that can lead to dangerous climate change. Given the objective of the project will analyze and synthesize, in the following, the regulations concerning energy efficiency in buildings.

UN Framework Convention represented an important contribution to the establishment of key principles in the global fight against climate change. It defines, in particular, the principle of "shared responsibilities but differentiated". Also, the Framework Convention has contributed to greater public awareness on issues related to global climate change. However, the Convention does not contain figures and detailed commitments for each country in terms of reducing emissions of greenhouse gases.

European Community signed the Protocol on 29 April 1998. In December 2001, the European Council in Laeken confirmed the Union's desire that the Kyoto protocol to enter into force before the World Summit on Sustainable Development in Johannesburg (August 26 to September 4, 2002). To this end, Decision 2002/358/EC approves the Protocol on behalf of the European Community[1]. Annex II to Decision has commitments to limit and reduce emissions agreed by the Community and the Member States for the first commitment period (2008-2012). Romania has been the first country from Annex II signing the Kyoto Protocol in 2001. Kyoto Protocol deals with the problem of emissions of six greenhouse gases:

- Carbon dioxide (CO_2);
- Methane (CH_4);

[1]http://europa.eu/legislation_summaries/environment/tackling_climate_change/l28060_en.htm

- Nitrous oxide (N_2O);
- Hydrofluorocarbons (HFC);
- Perfluorocarbons (PFC);
- Sulfur hexafluoride (SF_6).

To achieve these objectives, the Protocol proposes various means:

- Building and implementing national policies to reduce emissions (energy efficiency, promotion of sustainable forms of agriculture, development of renewable energy, etc.);
- Cooperation with other Parties (or exchange of information, coordination of national policies through emission permits, joint implementation and the clean development mechanism).

The Parties shall establish national systems for the estimation of anthropogenic emissions and absorption by sinks of all greenhouse gas emissions (not covered by the Montreal Protocol), no later than one year before the first commitment period.

Table 2-1: Brief presentation of legislation at EU level.

European Level		
No. crt.	**Enactment/Issuer**	**Description**
1.	Council Directive 93/76/EEC of 13 September 1993 to limit carbon dioxide emissions by improving energy efficiency (SAVE) Council of the European Communities	Directive aims to achieve by the Member States of the objective of limiting carbon dioxide emissions by improving energy efficiency, particularly through the development and implementation of programs in the following areas: - Energy certification of buildings; - Billing of heating, air conditioning and hot water based on actual consumption; - Third-party financing for energy efficiency investments in the public sector; - Insulation of new buildings; - Regular inspection of boilers; - Energy audits of undertakings with high energy consumption. Programs can include laws, regulations, economic and administrative rules and tools, information, education and voluntary agreements whose impact can be assessed objectively.
2.	DIRECTIVE 2003/87/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 13 October 2003 establishing a system for trading greenhouse gas emissions trading within	The Directive establishes a system of trading emission of greenhouse gases (hereinafter "the Community") to promote reductions of greenhouse gas emissions in a cost-effective and economically. Directive encourages the use of efficient technologies for energy, including combined production of heat and electricity, producing less emissions per unit of production and future

	the Community and amending Council Directive 96/61/EC The European Parliament and EU Council	Directive of the European Parliament and of the Council on the promotion of cogeneration based on heat demand useful internal energy market will specifically promote technology combined heat and power production.
3.	Directive 2006 / 32/CE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC The European Parliament and EU Council	It aims to enhance the cost-effective improvement of energy end-use efficiency in Member States by: (a) providing the necessary indicative targets as well as mechanisms, incentives and institutional, financial and legal frameworks to remove existing barriers and market imperfections that impede the efficient end use of energy; (b) creating conditions for the development and promotion of a market for energy services and for the provision to end users other energy efficiency improvement measures.
4.	Directive 2010 / 31/UE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 19 May 2010 on the energy performance of buildings Parliament and EU Council	It promotes improved energy performance of buildings within the Union , taking into account outdoor climatic and local conditions as well as indoor climate requirements and cost - effectiveness. Directive establishes requirements regarding: (a) the common general framework for a methodology for calculating the integrated energy performance of buildings and units; (b) the minimum requirements for the energy performance of new buildings and new units; (c) the minimum requirements for the energy performance of : - Existing buildings, building units and building elements that are subject to major renovation ; - Elements that are part of the building envelope and have a significant impact on the energy performance of the building envelope when they are upgraded or replaced; - Technical building systems, wherever they are installed, replaced or upgraded.
5.	Directive 2006 / 32/CE A European Parliament and of the Council of 5 April 2006 on energy end-users and energy services and repealing Council Directive 93/76/EEC Parliament and EU Council	It aims to enhance the cost-effective improvement of energy end-use efficiency in Member States by: (a) providing the necessary indicative targets as well as mechanisms, incentives and institutional, financial and legal frameworks to remove existing barriers and market imperfections; (b) creating conditions for the development and promotion of a market for energy services and for the provision to end users other energy efficiency improvement measures.

Directive 2010/31/EU

On 19 May 2010, the European Parliament and the Council of the European Union accepted the Energy Performance of Buildings Directive (EPBD) Directive 2010/31/EU recasting Directive 2002/91/EC. The recast took place after experiencing the implementation of the first EPBD Directive 2002/91/EC in the Member States and following a proposal for a recast of the Energy Performance of Buildings Directive from the Commission in 2008, which was based on a detailed impact assessment. During 2009, the proposal went through the approval process of the European Parliament and Council and a political agreement was achieved 17 November 2009. Today, the new Directive is the main legislative instrument to reduce the energy consumption of buildings.

Applying this Directive, Member States must introduce a framework for measuring energy performance, create and set minimum energy performance requirements for new and existing renovated buildings, ensure the certification of building energy performance, and require regular inspection of boilers and air conditioning systems in buildings. Furthermore, the Directive requires Member States to ensure that by 2021 all new buildings are so-called “nearly zero-energy buildings”.

The new Directive 2010/31/EU illuminates, organizes, strengthens the energy performance requirements and enhances the scope and some of the provisions of the old Directive (2002/91/EC). The most important modifications include[2,3]

- Development of a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements.
- Extension to all buildings (removal of 1000m^2 floor area threshold) of requirement to set minimum energy performance levels when a major renovation takes place, including for building envelope elements that are retrofitted or replaced.
- All new buildings should consume nearly zero energy level and the energy will be 'to a very large extent' from renewable sources by 31 December 2020 (31 December 2018 for buildings that own or occupy a new building by public authority).
- The definition of very low energy building was agreed to: "nearly zero energy building means a building that has a very high energy performance, determined in accordance with Annex I. The nearly zero or very low amount of energy required should to a very significant level be covered by energy from renewable source, including renewable energy produced on-site or nearby."
- Obligation for Member States to make appropriate financial incentives to facilitate the evolution towards nearly zero energy levels in buildings.

[2]European Union. Summaries of EU legislation, Energy, Energy efficiency. Available at: http://europa.eu/legislation_summaries/energy/energy_efficiency/en0021_en.htm
[3]European Commission. Concerted Action EPBD (Energy Performance of Buildings Directive). www.epbd-ca.eu

- Obligatory and detailed energy certification for all buildings constructed, sold or rented out, and for all public buildings over 500m^2 or those frequently visited by the public.
- Improved heating and cooling system inspections and reporting requirements.
- Requirement for Member States to establish consequences for non-compliance. Member States shall opine for the rules on penalties applicable to infractions of the national provisions, which are adopted in accordance with EPBD Directive and shall take all measures necessary to ensure the implementation of EPBD Directive.
- Minimum requirements for components are introduced for all replacements and renovations, although for major renovations, the holistic calculation methodology is the chosen process. In large scale renovations, performance calculations, which based on component requirements, are acceptable as a complement or alternatively.

The aim of this revision was to clarify and simplify certain provisions, extend the scope, make some impacts more effective, and provide for the leading role of the public sector. The new Directive intents to an additional 5-6% energy saving of total EU energy consumption[4].

Directive 2010/31/EU had been corrected by 32010L0031R(01) and 32010L0031R(02). Moreover, Directive 2010/31/EU was supplemented by the Delegated Regulation (EU) No 244/2012, which was adopted by EU on 16 January 2012. The Delegated Regulation intends to establish a comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements for buildings and building elements.The harmonization of Member States Legislation by Directive 2010/31/EU and the determination of the specific requirements are left to Member States.

Directive 2002/91/EC

The first organized legislative effort to upgrade the buildings energy efficiency was European Directive 2002/91/EC of the European Parliament and of the Council of 16 December 2002 on the energy performance of buildings (EPBD). Validity of this Directive ended in 08/07/2010 and was repealed by Directive 2010/31/EU, of the European Parliament and of the Council of 19 May 2010.

The objective Directive 2002/91/EC was to promote the improvement of the energy performance of buildings within the Member States Community, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost-effectiveness. Directive offered a holistic approach towards more energy efficient buildings[5].

[4]ODYSSEE- MURE 2010, Available at: http://www.odyssee-mure.eu/publications/national-reports/energy-efficiency-greece.pdf
[5]European Commission, Concerted Action EPBD, http://www.epbd-ca.org/Medias/Pdf/CA3-BOOK-2012-ebook-201310.pdf

The following obligations were established and set in all Member States:

- A common methodology to calculate and rate the integrated energy performance of buildings.
- Minimum standards, which are regularly updated, on the energy performance of new buildings and existing buildings that are subject to major renovation.
- A system of energy certification and advice for new and existing buildings, with display requirements for public buildings. Certificates must be less than five years old.
- Regular inspections and assessment of boilers and central air-conditioning systems.
- An assessment of heating installations in which the boilers are more than 15 years old.
- Minimum energy performance standards for new buildings and for existing buildings that undergo major renovation with a useful floor area over 1000 m^2.

The common calculation methodology should include all the aspects which determine energy efficiency and not just the quality of the building's insulation. This integrated approach should take account of aspects such as heating and cooling installations, lighting installations, the position and orientation of the building, heat recovery, etc.

Directive 2002/91/EC had been amended several times as it is shown below:

- Amended by 32008R1137 Amendment Article 13 from 11/12/2008
- Amended by 32008R1137 Replacement Article 14 from 11/12/2008
- Amended by 32008R1137 Amendment Article 3 from 11/12/2008

Finally Directive 2002/91/EC was recast in the interests of clarity by Directive 2010/31/UE.

Additional Legal Framework

Besides, EPBD Directive 2010/31/EU, there are a number of other Directives affiliating with energy issues in the buildings context intending to contribute significantly to energy efficiency of the European Union's buildings sector.

- Eco-design requirements of Energy-related Products Directive 2009/125/EC (recast of Energy-Using Directive 32/2005/EC),
- Labelling Framework Directive 2010/30/EU of 19 May 2010 (recast of 75/1992/ EC) on the indication by labelling and standard product information of the consumption of energy and other resources by energy-related products,
- Directive 2012/27/EU of 25 October 2012 on energy efficiency (Energy Efficiency Directive, EED),
- Directives on the Promotion of the Use of Energy from Renewable Sources.

Appropriate provisions on buildings can also be found in the Construction Products Directive 89/106/EEC. Energy Efficiency Directive (EED) 2012/27/EU repeals Cogeneration Directive (2004/8/EC) and the Energy End-Use Efficiency and Energy Services Directive (2006/32/EC), and amends Directives 2009/125/EC and 2010/30/EU. The EED intends to bridge the existing framework Directives and

national/international measures on energy efficiency and the 2020 EU target for energy savings. It covers all sectors except transport, and includes, for the first time in an "energy efficiency" directive, measures for supply side efficiency. The EED also sets an important focus on targets. The first target concerns the indicative 20% energy consumption saving for the entire EU of no more than 1474 Mtoe of primary energy and/or no more than 1078 Mtoe of final energy in 2020[6]. The second target concerns the public sector. Article 5 indicates that each Member State shall ensure that, as from 1 January 2014, 3 % of the total floor area of heated and/or cooled buildings owned and occupied by its central government is renovated each year[7]. The third goal refers specific energy savings from an energy efficiency obligation. Thus in accordance with Article 7: "That target shall be at least equivalent to achieving new savings each year from 1 January 2014 to 31 December 2020 of 1,5 % of the annual energy sales to final customers of all energy distributors or all retail energy sales companies by volume, averaged over the most recent three-year period prior to 1 January 2013."

These and other not mentioned are part of combine instruments to promote sustainable construction and use of the EU buildings Member States and shall also take them into full account when developing policies for the sector. For example Energy Efficiency Directive (EED, 2012/27/EU) includes a requirement for Member States to develop long term renovation strategies for their national building stocks.[8] Also, this Directive establishes a common framework of measures for the promotion of energy efficiency within the Union in order to ensure the achievement of the Union's 2020 20 % headline target on energy efficiency and to prepare the way for further energy efficiency improvements beyond that date. It lays down rules designed to remove barriers in the energy market and overcome market failures that impede efficiency in the supply and use of energy, and provides for the establishment of indicative national energy efficiency targets for 2020.

2.2 Administrative framework

Directorate - General of the European Commission is the main entity of the European Union for the energy efficiency of buildings. Cohesion Policy Managing Authorities plan and deploy sustainable energy investments in buildings within Operational Programs. Also, these Authorities use financing mechanisms to support sustainable energy projects within an Operational Program.

With the adopted Energy Efficiency Directive, the recast of the Energy Performance of Buildings Directive, a comprehensive regulatory framework for energy efficiency in buildings is in place. The European Commission monitors Member State implementation and take all necessary actions to ensure full compliance with the relevant EU regulatory framework. The Commission also continues to assist exchange of best practices between the Member States through Concerted Actions for the

[6]European Commission, DG Energy, http://ec.europa.eu/energy/efficiency/buildings
[7]European Commission, Energy, Energy Efficiency, Energy Efficiency Directive. Available at: http://ec.europa.eu/energy/efficiency/eed/eed_en.htm
[8]European Commission, BUILD UP initiative, Available at: http://www.buildup.eu/

implementation of the Energy Performance of Buildings Directive (EPBD) and the Energy Efficiency Directive (EED).

Additionally, the Commission is reviewing whether the rules for state aid as applying to energy efficiency need to be adapted in light of the provisions of the EED to maintain a clear framework for allowing financial support for energy efficiency measures.

The European Union (EU) recognizes that energy efficiency is one of the crucial objectives of the EU. Also, energy efficiency rated as a master key to enhance security of energy supply and diminish emissions of Green House Gases (GHG). Buildings play a key role in the EU's energy efficiency policy[9], as nearly 40% of final energy consumption and 36% of greenhouse gas emissions come from houses, offices, shops and other buildings[10]. Since now, approximately only about half of the energy efficiency improvement potential is really realised due to market obstructions and ineffective implementation of the relevant legislation.

Stimulation of investment actions have already took place in EU via initiation of the building construction and renovation sector.

Building efficiency has substantial importance to achieve the EU's energy, climate and resource efficiency long-term strategies:

- To achieve the long-term de-carbonization goals, the EU Roadmap for moving to a competitive low carbon economy in 2050 (European Commission, 2011a) recognizes potential CO_2 emissions drop of 88% to 91% by 2050 compared to 1990 levels, that are related to the residential and services sectors.
- Moreover, the Energy Roadmap 2050 (European Commission, 2011b) considers that the high "energy efficiency potential in new and existing buildings is key" to achieve a sustainable energy future in the EU, contributing significantly to the reduction of energy demand, the security of energy supply and the increase of competitiveness.
- Finally, the Roadmap to a Resource Efficient Europe (European Commission, 2011c) identifies buildings among the three key sectors responsible for 70% to 80% of all environmental impacts. Thus, better construction and use of buildings in the EU could affect about 35% of the CO_2 emissions, 42% of the final energy consumption and more than 50% of all extracted materials.

In a generalized sense, the administrative system of a country or union of countries can be defined as a coherent set of structures, institutions and regulations which achieves inter-government activities as the real process. Evolution administrative systems in most states, has shown that, under the pressure of national solidarity and technical imperatives, the trend of nationalization of a large number of missions is increasingly higher. The central tasks conferred or ministries or specialized

[9] European Commission, DG Energy, http://ec.europa.eu/energy/efficiency/buildings/
[10] European Commission, DG Energy, Available at: http://ec.europa.eu/energy/efficiency/consultations/doc/2012_05_18_eeb/20120912_financial_support_for_energy_efficiency_in_buildings_consultation_report.pdf

administrative bodies. Local tasks are fulfilled, so hierarchically subordinated institutions administrations or specialized central bodies and autonomous decentralized organ.

EU policy on energy efficiency in the building underwent a series of changes which will be described, as below.

The achievement of a common policy on trade, agriculture, transport and the environment:

- elimination between Member States of customs duties and quantitative restrictions on entry and exit of goods;
- the free movement of people, capital and goods;
- health and the establishment of a common social policy.

In the Green Paper "*Towards a European strategy on security of energy supply*" - COM (2000) 769 of 29 Nov.2000, the EU Commission outlined three aspects which need to promote energy saving:

1. Security of energy supply because if no action is taken , import dependency will reach 70 % in 2030, compared to 50% today;
2. Environmental issues are becoming more pronounced, 94 % of greenhouse gas production occurs in the processes of generation and use of energy , so think and difficulties in meeting the requirements of the Kyoto Protocol the EU has a limited influence on the conditions of supply energy . Therefore , it is essential to intervene on the energy needs (DSM) by promoting energy savings in buildings and transport sectors.
3. Residential and tertiary sectors (offices , shops, hotels , restaurants, schools, hospitals, gyms, indoor pools, but industrial buildings) are the largest consumers of final energy , particularly for heating , lighting, appliances and equipment. Numerous studies and practical experience have shown that in these areas there is a great potential for energy savings.

COM 88 final on 8 March 2000: "*European Climate Change Programme*" - includes issues of saving energy in buildings and possible measures that will lead to achieving the great potential existing here. Community actions require energy issues DSM and energy savings represent a commitment and Candidate Countries , where, in general, there is a great potential for energy savings in the residential and tertiary sectors.

Noting that programs promoting new technologies has not been very effective so far and that there are considerable differences between the levels of energy performance required by current standards of the Member States, European Parliament and Council adopted Directive 2002/91/EC on the EU Energy Performance of Buildings. The main objective of this Directive is to promote improved energy performance of buildings within the EU , subject to an integrated approach so that only efficient measures to be implemented economically.

Given the lifespan of buildings (between 50 and 100 years) , the greatest potential for improving energy performance in the short and medium term is the existing stock of buildings. Directive aims to establish a framework that will lead to better coordination between national laws in this area. Directive has the following four objectives:

A. Establish a framework for a common methodology for calculating the integrated energy performance of buildings.
B. Application of minimum energy performance standards for new buildings and some existing buildings (eg . , Greater than 1000 m2) , where they are refurbished .
C. Certification Scheme for new or existing buildings based on the above standards and public exposure of energy performance certificates and recommended indoor temperatures and other climatic factors relevant public buildings and buildings frequented by the public. Certificates must not be older than five years , include recommendations to improve energy performance and are available in stand when buildings are sold or rented.
D. Specific inspection and servicing of boilers and heating / cooling : regularly inspected boilers with a rated power between 10 and 100 kW inspected every two years boilers with a nominal power of 100 kW ; inspection of the whole system in If the boilers are more than 10 kW and older than 15 years. Have recommended alternatives that could reduce energy consumption. Similar measures should be taken and cooling systems , especially for large buildings.

The Green Paper (COM (2000) 769 of 2000), the Commission re- affirm a target older: every year, to improve the energy intensity of final consumption by 1 % more than would otherwise have been achieved. For the building sector , this goal would result in energy savings of 55 Mtoe , equivalent to avoiding the 100 Mt / year CO2 emissions or about 20 % of the EU's Kyoto commit itself . Achieving this objective would also achieve the two thirds of the savings potential available in this sector, while allowing price fluctuations and possible "side reaction " (weather studies indicate a potential emission reduction of 130 Mt / year and 160 Mt / year).

Studies in the EU Member States have indicated that by 2010, it can save a percentage of 22 % of present consumption in buildings for heating , hot water , air - conditioning and lighting . In this regard, it states that firm action is needed for energy efficient buildings in various aspects , such as those related to:

- Building envelope - the average loss of heat in new buildings in the EU are about half of those made in the stock of buildings built before 1945 (55 W/m2 from 100 W/m2) . The result is a potential energy saving of approx. 50%.
- Boilers - In the EU, there are 10 million boilers older than 20 years. Their replacement would result in a savings of 5% in energy used for heating.
- Lighting - might save 30-50 % by using the most effective components of control systems by integrating natural light and other technologies.
- Cooling - energy used for air conditioning will double by 2020 . A 25% could save by imposing minimum efficient air conditioning equipment.

- Generating green energy - saving potential can be associated with local generation of renewable energy , an electricity cogeneration plants and heat, a network connection to district heating / cooling and heat pumps.
- bio- climatic design - energy demand could be reduced by up to 60 % through a design and active and passive solar systems , a daylighting and natural cooling use.

European issues "Energy Performance of Buildings[11]*"*

Programmes to promote new technologies had different significant expected impact in European countries from the point of view of the standardized levels of achievement. In this respect, *Directive 2002/91/EC* on the energy performance of buildings creates a common framework for the promotion and improvement of the energy performance of buildings, being part of the current initiatives of the European Communities on Climate Change (Kyoto Protocol agreements) and security of energy supply (Green Paper "Towards a European strategy on security of energy supply ").

The Directive targets residential and tertiary sectors covering most of the building stock in the EU.Other EU documents impact on energy efficiency in buildings are:

- Directive 2002/91/EC on the energy performance of buildings;
- Directive 93/76/EEC (" SAVE ") - to limit carbon dioxide emissions by increasing energy efficiency;
- Directive 92/42/EEC - on efficiency requirements for new hot water boilers;
- Directive 89/106/EEC - the products used in construction;
- COM (2000) 247 - Action Plan to improve energy efficiency in the European Community.

The existing "harmonized" Regulations can be used to implement the Directive:
- Thermal insulation (based on EN 832);
- Heating and DH (based on EN 14335) for new building stock;
- Ventilation (based on EN 14335) for new building stock;
- Pitch and guidance (based on EN 832);
- Use of renewables (based on EN 14335) for new building stock.

A common approach to energy appeared embryo in 1996/1997 (the first energy package Internal Market) . Determining steps in the consolidation of a common EU energy policy were made mostly after 2007, namely[12]:

- Adoption package 20-20-20 targets of the European Council in 2007 (20% increase in energy efficiency , 20% reduction in emissions of greenhouse gas emissions and increase to 20 % the share of renewable energy);
- Adoption of the third internal market energy package in 2009;

[11] http://www.enero.ro/proiecte/opetbuilding/doc/ef-energ-clad.pdf
[12] http://www.mae.ro/node/1624

- Signing the Lisbon Treaty for the first time , a legal basis for common energy policy in Article 194 . Common energy policy objectives are: competitiveness, security of supply and sustainability ;
- Organizing the first European Council dedicated to Energy (and innovation) , 4 February 2011;
- Launching a dedicated financial instrument proposed for energy infrastructure in 2014-2020 financial framework (Connecting Europe Facility) in October 2011;
- The launch in 2011 of a visionary exercise for Union Energy 2050 (Energy Roadmap 2050) with the intention of establishing interim milestones for 2030.
- Events at Fukushima in March 2011, strengthened the nuclear dimension of EU energy policy , by conducting a comprehensive exercise on stress tests at nuclear installations in the EU (and neighboring countries) in 2011-2012. The European Commission announced that there would be strengthened legislative proposals on nuclear safety in the EU.
- In 2011 the Council of Europe formalized the external dimension of EU energy policy by adopting the Council Conclusions TTE - Energy 24 November 2011. The need to create an external dimension of EU energy policy was perceived as a natural extension of intra- EU coordination , the indispensable necessity for strengthening the EU profile in relation to external partners.
- Following the discovery of unconventional gas reserves in various EU countries (with the largest reserves in Poland) , the Union began an evaluation of the effects of exploitation of resources on the environment and human and natural habitats. It is expected a Communication from the European Commission by the end of 2013.

2.3 Challenges and opportunities

The challenges and opportunities are summarized below[13].

- Support EU citizens to improve the energy efficiency of their houses.
- Put efforts to alter consumer behaviour and energy consumption practices.
- Properly navigation between policy-making and human behaviour.
- Help the implementation of Directive 2010/31/EU to Member states.
- Assist construction industry to build better quality buildings.
- Increase the skills and capacity of the EU work force.
- New production and distribution facilities will have to be constructed.
- Large cost-efficient energy saving potential remains unexploited.
- On time monitoring of primary energy consumption in order to be reduced by 20 % in 2020.

[13]European Commission Energy Efficiency Financial Institutions Group (“EEFIG”) (2014). Energy Efficiency – the first fuel for the EU Economy: How to drive new finance for energy efficiency investments. Available at: http://ec.europa.eu/energy/efficiency/studies/doc/2014_fig_how_drive_finance_for_economy.pdf

- Implementation of efficiency measures in the residential, public and industrial sector to ensure that new energy practices (i.e. heating, cooling, and lighting) remain affordable.
- Locate financial instruments for the requested high level of investment and apply purposeful incentives.
- Better illustration of economic, societal (fuel poverty, health, unemployment), environmental and energy systems benefits.
- Potential submerged market and technical problems.

Challenges also include the identification of start points and the development of respective regulations that could be used to encourage building energy performance improvement, the improvement of all public buildings to high energy performance levels, the integration of renewable energy technologies, and the removal or the implementation of measures to overcome restrictive tenancy laws that hold back energy performance improvement. Improperly regulated and managed renovation work, due to rapid increase in demand and therefore rapid growth of suppliers, could lead to poor workmanship and probably some serious failures. Therefore, appropriate regulated and managed procedures are required. Construction techniques and processes need more time-consuming development and testing.

Very frequently, complete renovation can only be executed in an unoccupied building, which will involve administrative, practical and financial issues when the building is occupied. Thus, an appropriate regulation could be established when a major renovation is taking place between the tenant and the owner. Establishing unified climate zones throughout Europe would benefit the harmonization of directives and regulations and enhance the development of energy efficiency results in buildings. Also, certification and training of installers would be coordinated for instance under the EUCERT scheme in order to allow free movement of work force within Europe.

Although national administrative systems take actions to energy efficiency and European integration challenges, different national administrative structures have various responses, which sometimes are only focused on bureaucracy conformance. Such constrains might show the way to administrative convergence and improvements, institutional transformation, and better integration between politics and administration-society.

Concluding, energy efficient building constructions and renovations will improve people's health, quality of life and productivity, but also, it will cut energy costs for businesses and households, and generate hundreds of thousands local-based jobs, mainly in the depressed construction sector.[14,15,16]

[14]European Commission, DG Energy (2012). Local investments options in Energy Efficiency in the built environment, Available at: http://ec.europa.eu/energy/efficiency/buildings/doc/local_investments__energy_efficiency_built_environment_case_studies.pdf

[15]LAUSTSEN Jens (2008), ENERGY EFFICIENCY REQUIREMENTS IN BUILDING CODES, ENERGY EFFICIENCY POLICIES FOR NEW BUILDINGS, www.iea.org/publications/freepublications/publication/Building_Codes-1.pdf

2.4 Problems and constraints

Although, there are some keen initiatives to improve the energy performance of Europe's building stock, it is obvious that a range of barriers are limiting the achievement of the full potential. Barriers can be categorized in four sections; institutional - administrative, financial, societal and technical. Institutional – administrative constraints include regulatory & planning issues, institutional, structural, and problems with multiple stakeholders.

The complication of the sector and the existence of market failures result potential social, economic and environmental benefits to be reduced at EU level. Furthermore, the ambition to implement the related energy efficiency Legislation-Directives by some Member States is low.

The main problems and constraints are described as follows.[17],[18]

- Administrative and financial problems including difficulties in financing, relatively long pay-back periods and local credit risk associated with energy efficiency investments.
- Lack of funds and finance on adequate quantities are commonly one of the most significant barriers for energy efficiency investments.
- Low national response to integrate European Legislation by different administrative systems.
- National administrative systems focused mostly on formal/institutional aspects.
- Difficulties to process approvals for building integrated renewable technologies.
- Disintegration, setback and gap s in the regulatory action of public planning, which affect the public sector.
- Autonomous regions within Member States have implemented EPBD Directive in different level and rates.
- In some countries there are multiple owners and renters of buildings, which are very difficult to agree on energy saving investments.
- Lack of skills, competence and knowledge related to building professionals.
- Lack of information, advice, awareness and understanding of the potential of energy savings.
- Complexity and indeterminacy of the separation of expenditure and benefit between landlord and tenant.
- High initial investment costs. The required time to return the initial investment cost is high, although, it has relatively high Internal Rate of Return (IRR).
- Energy efficiency investments are low priority for householders and business.

[16]Staniaszek Dan et al (2013), A GUIDE TO DEVELOPING STRATEGIES FOR BUILDING ENERGY RENOVATION, www.bpie.eu/documents/BPIE/Developing_Building_Renovation_Strategies.pdf
[17]Economidou M. et al. (2011) Europe's Buildings Under the Microscope.
[18] BPIE (2011). www.bpie.eu/eu_buildings_under_microscope.html

- Financial crisis in some European countries, which has as a result to avoid taking risks for citizens, organization and financial institutions.
- Ellipse of awareness and expertise regarding energy efficiency, which obstructs further uptake of energy efficiency improvements.
- Despite the significant potential for cost effective savings, energy consumption in the household sector continues to rise.

The current financial crisis is hitting all European countries, some more than others, while the lending markets have also been badly affected. Consumers and financial institutions are less willing to take risks.

3. National and local level analysis

3.1 Armenia (national level)

3.1.1 Legal framework

In the Republic of Armenia, energy efficiency in buildings is governed by a complex set of laws and regulations. Fundamental to these laws are two articles in the Republic Armenia's constitution—viz., Articles 10 and 34—and Armenia's international legal obligations.

Article 10 states that "The state shall ensure the protection and regeneration of the environment and the reasonable utilization of natural resources." Moreover, Article 34 states that "Every citizen shall have the right to a standard of living adequate for himself/herself and for his/her family, including housing as well as improvement of living conditions. The state shall take the necessary measures for the exercise of this right by the citizens."

Key among the international obligations that impact energy efficiency in buildings is the UN Framework for Convention for Climate Change (UNFCCC). In addition, more recently Armenia agreed to the "Strategy for Sustainable Housing and Land Management in the Economic Commission for European Region for the period 2014-2020." This strategy was adopted by the Ministerial Meeting on October 8, 2013 in Geneva.

The sections below will discuss national legislation that organizes development and adoptions of laws, regulations, and standards with respect to energy efficiency in buildings. They will also discuss the enforcement, monitoring, and quality assurance mechanisms in the country. Moreover, key trends in legislative reform as well as harmonization with international standards (e.g., EU directives) will be discussed.

A. National authorities charged with energy efficiency, particularly for the building sector

Key national authorities for energy efficiency for the building sector are the Ministry of Urban Development (MUD) and the Ministry of Energy and Natural Resources (MENR). A third entity, the Public Services Regulatory Commission (PSRC) has indirect influence on energy efficiency by setting utility prices in the country. MUD and MENR cooperate with each other through various means, including:

- Requesting opinion and comments from each other on drafts of decrees, laws, regulations, programs, concepts and other documents,
- Participating in inter-ministerial discussions and working groups,
- Expressing views during the Prime Minister led weekly Government sessions.

In case of conflict between MUD and MENR, the Prime Minister's office is the main arbiter.

RoA Ministry of Urban Development

According to Government of the RoA decision N1294-N dated July 25, 2002, *the Ministry of Urban Development* is a national body with executive power that develops and implements government policy in the Republic of Armenia in the urban development sector. Among urban development policy directions of the RoA, the ministry is tasked with:

> 5) Formation of "green urban development" principle, ensuring development that is harmonized and complementary with natural and cultural landscapes.
>
> 5.1) promotion of design and construction of energy saving and energy efficient buildings and urban development systems, provision of elaboration of legislative field necessary for that.[19]

The ministry carries out the following functions for implementation of its goal and tasks:

- Development of programs aimed at improving the urban environment, reducing the negative effects of urbanization on the environment, as well as climate change adaptation improvement for spatial development. In particular:
  - To initiate and implement measures aimed at improvement of legislation related to energy saving and energy efficiency in the urban development sector, elaboration of normative-technical documentations, harmonization of those to the new European and international standards;
  - To develop and coordinate programs aimed at improvement of energy saving and energy efficiency of buildings, cooperate with appropriate international organizations within the framework of those issues, ensure provision of information on energy saving technologies.
- Conducting and coordination of development and approval of the sector's national normative-technical documentations (excluding national standards) as well as adoption and enactment of interstate normative-technical documentations in the territory of the RoA.

The energy efficiency and energy saving related tasks and functions were added just one year ago by government of the RoAdecision N225-N dated March 134, 2013.

Other tasks and functions, which have impact on buildings and their energy efficiency, are the following:

> Tasks: 15) State supervision over the fulfilment of requirements of the laws and other legal acts regulating the sector during construction and exploitation.[19]

[19]Government of the RoA decision N1294-N dated July 25, 2002

Functions:

10) Creation of necessary conditions for realization of constitutional right on improvement of housing conditions, multi-apartment buildings maintenance, safe exploitation and capacity development of management bodies as well as communal infrastructure development. …[20]

28) Carrying out of client's functions for urban development programs funded by state budget, etc.[20]

An analysis of practical enforcement of tasks and functions shows that MUD does not fully utilize its role as one of the main stakeholders in building's energy efficiency sector.[21]In particular, the investment programs carried out by the Ministry still lack adequate thermal protection measures in their design.In addition, many legislative initiatives are still in draft status and are not movingforward. Moreover, building codes specifying energy efficiency norms and standards are not being updated (see Sections below for additional discussion).

MUD is also the main governmental body in charge of implementation of all state-funded construction programs. Nearly all of this construction is related to therestoration of the areas that suffered from the disastrous earthquake in 1988. The construction projects are organized and managed by "Urban development project implementation unit" state institution. Energy efficiency practices in state funded projects are not accepted yet.

RoA Ministry of Energy and Natural Resources

According to Government of the RoA decision N654-N dated May 15, 2008, *the Ministry of Energy and Natural Resources (MENR)* is a national body of executive power that developsand implements policy of government of the Republic of Armenia in the sectors defined to its jurisdiction by law, other legal acts and its charter. Practically, the ministry is the main responsible authority for energy policy development and implementation (including energy efficiency).

Of the goals and tasks of the Ministry are:

1) Ensuring of elaboration and implementation of policy of energy saving and renewable energy, and mineral sectors.

For implementation of the above-mentioned, the Ministry carries out the following functions:

1) Development of state programs on energy saving and renewable energy and monitoring of their implementation;
2) Development of energy saving and energy efficiency standards.

[20]Government of the RoA decision N1294-N dated July 25, 2002

[21] This is based on cooperation between MUD and staff of "Improving energy efficiency in buildings"UNDP/GEF/00059937 project, which is being implemented since June 2010 and is expected to end June 2015).

MENR has been instrumental in drafting several energy sector (including energy efficiency) laws, government strategies, action plans, and other documents. The list of documents is provided in Appendix 1.In particular, MENR has drafted the:

- Law "On energy efficiency and renewable energy" (as of June 2014, updates to this law are finalized by MENR and will soon be circulated among government agencies. See Section H below for discussion of proposed changes.)
- Law "On energy" (as of June 2014, updates to this law are being considered by the Armenian National Assembly for adoption. See Section H below for discussion of proposed changes as they relate to buildings.)
- National Program on Energy Saving and Renewable Energy (currently being reviewed, see Section H).
- National Energy Efficiency Action Plan (currently being reviewed, see Section H).
- RoA Government Protocol Decision N 50 December 22.12.2011 "Energy Security Provision Concept of the Republic of Armenia",
- RoA Government Decision N 1481-A of 22.11.2012 "On approving the combined list of legal acts subject to harmonization in the energy sector as envisaged by the draft EU-RA association agreement",
- RoA Presidential Decree 182-N 23.10.2013 "Energy Security Concept of the Republic of Armenia",
- National 2014-2020 Action Plan on Presidential Decree182-N 23.10.2013 (as of June 2014, draft of this Plan is presented to the Government and is expected to be approved within a month. See Section H below for discussion of proposed actions.)

Based on the recommendations of NEEAP, MENR led the effort for other relevant ministries (e.g., MUD, Agriculture, Transportation and Communication) to adopt energy efficiency related tasks and functions in their charter.

Public Service Regulatory Commission

There is another government institution - Public Services Regulatory Commission (PSRC) – that has indirect impact on building's energy efficiency. For example, electricity and natural gas tariffs, set up by PSRC, can have differentiated modes, which will change the level of energy expenditures of buildings. More about these issues are presented in "Tariffs and Energy Efficiency" section. The PSRC functions, administrative and other issues are defined by several laws including the law "On energy", law "On public services regulatory body", the Water Code.

B. Administrative processes for approval of building plans and energy-efficiency measures

There are several key steps for approval of building plans and energy-efficiency measures and supervision of construction activities. The first is obtaining the

architectural-planning technical scope from the municipality in which the construction will take place. Second is developing the plans and construction drawings. Third is evaluating the construction documents to ensure it is compliance with the technical scope and all building codes. Fourth is obtaining the construction permit. Fifth is technical supervision during construction and issuance of occupancy permit.

Step 1. Receiving the architectural-planning technical scope

In property development processes, the first step is getting the architectural-planning technical scope. This technical scope is commonly referred to APZ, which is the Russian abbreviation of Arkhitecturno-Planirovochnoe Zadanie. To obtain this technical scope, the developer prepares schematic drawings for the proposed site or building and, along with a completed application, submits it to the municipality in which the construction will take place.

The architectural-planning technical scope defines mandatory conditions, requirements and constraints of design document development, development stages of design documents, necessary baseline data and design technical terms of engineering infrastructure (water supply, wastewater removal, electricity, etc.) of urban development object in the subject area.

The provision of architectural-planning technical scope is regulated by the procedure established by decree #1473-N of the Government of Republic of Armenia dated 29.08.2002. Particular necessary steps that should be implemented by developers are defined. The validity of the technical scope should not exceed 2 years. The developer applies for the technical scope, if the construction works need a construction permit to implement. Technical terms of engineering infrastructure are given together with the technical scope and are of indivisible part of the latter. Within the administrative area of community, the head of community issues the architectural-planning technical scope. The technical scope and the technical terms are given free of charge. The maximum time allowed for the public agency to issue the architectural-planning technical scopediffers by based on category of construction objects.[22]For:

- Category I, no architectural-planningtechnical scopeis required;
- Category II, technical scope has to be issued in 10 days,
- Category III,technical scope has to be issued in 15 days and
- Category IV & V,technical scope has to be issued in 20 days.

In practice, typically construction projects do not receive their architectural-planning technical scope within these time limits. This is because often

[22]Construction objects per risk degree are classified by five category based on their volume, designation, significance and complexity, as well as of people's and surrounding environment safety (decree #711 of the Government of Republic of Armenia dated 06.05.2010 *"On establishing the order of auditing of urban development documentations"*.

documentation is missing in the application or additional research or analysis is necessary. At present in many cases, the required information and conditions that should be included in the technical scope are not fully provided by the municipality. This may be due to bureaucratic negligence, lack of information of issues by public authorities in charge of preparing the technical scope, etc.

Step 2. Building and Site Design

After receiving the architectural-planning technical scope from the municipality, the developer needs to prepare the design documentation. The developer often commissions a professional design firm to prepare these documents. The main requirements for the structure and content of design documentation of buildings and structures are defined by decree N273-N of the Minister of Urban Development dated 29.11.2006 *"On approval of rules for defining of the structure and content of design documentation of habitable, public, production buildings and structures"*. The development of design documents are based on the architectural-planning technical scope, design task submitted by developer, technical condition report in case of reconstruction/reinforcement/modernization of the object, engineering-geological surveys materials and technical terms for connecting to the communal services and other primary data. The design documents can be developed in one stage: "Working design" or in two stages: "Design" and "Working documents". For each stage the structure of necessary documents are defined in which separate sections are included. The sections have text materials and drawings. At present, professional design companies do not develop several required components in design documents such as environment impact assessment report, construction coordination plan, cost-estimate documents, etc.

By the decree #812 of the Government of Republic of Armenia dated 3.12.1998 "On establishing the order of designing, expert evaluation, confirming, approving and changing of habitable, public, industrial buildings and structures drawings" main requirements are set up for designing, expert evaluation, confirming, approving and changing of drawings activities.

Step 3. Expert evaluation (i.e., Plan Check)

By the decree #711 of the Government of Republic of Armenia dated 06.05.2010 *"On establishing the order of evaluation of urban development documentations"* main requirements are set up for the evaluation activity. The main goal of the design evaluate is to ensure the appropriateness of selected design solutions with the requirements of the legislation and normative-technical documents of the Republic of Armenia. Design evaluation is not required for works not requiring construction permit. Based on the importance of urban development documentations as well as with the complexity of objects being implemented there are three types of design evaluation: special complex evaluation, complex evaluation, and simple evaluation.

Legal persons licensed according to the order set up by legislation can carry out design evaluation of urban development documents. The urban development

documents are submitted for evaluation by developer (or its representative) as well as by design organization in case of agreement with developer.

Prior to 2012, there were about 40 licensed design evaluation organizations operating in the country, which exclusively conducted design evaluations. The situation was worsened after 2012, as the licenses for design and design evaluation were merged, in other words, now there are about 400 organizations, which can perform both activities – design and design evaluation.[23]This gives rise to serious conflict of interest and corruption risks.

At present it is quite possible to get evaluation report for the same object's design documents from more than one evaluation organization, for example to get an evaluation report on architectural-construction section from one organization and a second report on, say, engineering sections from another. Allowing for this makes it possible that serious defects and mismatches between the different drawings to be missed. It is necessary to legally ban such a practice.

A critical defect in the current evaluation system is that reports are incomplete and do not conduct an analysis of design documents as required by legislation. In their reports, they often simply reiterate what is stated in the design documents, without analysis, comments or recommendations. This is not a legislative gap but rather a gap in implementation of legislation.

Step 4. Receiving the construction permit

Construction permit is a documentthat confirms the developer's right for implementing certain construction activity. Construction permitting is regulated by the RoA Government Decree #91 dated 02.02.2002 *"Order on permission for construction and demolition in the RoA"*. Construction permit is given for a 2-yearperiod, unless otherwise agreed to. Construction permit is not needed for ongoing repairs, interior finish work (e.g., painting, changing flooring, cabinetry, etc.) and landscaping and similar improvements.

Construction permit is given by the head of the community in which the construction activity is taking place. The head of the community, which can be the mayor, district head, or village head compares the architectural-planning technical scope with the design documents and the evaluation of this design. If all after conditions are met, the head of community then issues the construction permit together official approval of the design documents (stamping of these documents).

According to current legislation, developers have 2 years to commence and complete construction, unless otherwise specified in the permit. In reality, however, developers often violate this time constraint due to various reasons. If the delay is caused by the developer and not public agencies, two things happen:

[23] 2012 amendments to the Law on Licensing, AL-193 (30.05.2001)

a) The developer has to pay an administrative penalty of 1% of the total construction cost. By the way, a section failure to comply with permit time limits will impose a 10% administrative penalty.
b) The developer can reapply for the permit and if no additional requirements are posed, it can be reissued a construction permit for a duration that is consistent with time needed to completed the incomplete portion of the construction.

Step 5. Construction technical supervision and issuance of "Completion Act"

Technical inspect of construction quality is conducted by licensed entities. For greater detail see Section D below. Once a building complies with all requirements as set forth by the architectural-planning technical scope, the municipality issues and "Completion Act" for the building. After that,the building can be utilized.

C. Process of Adopting New Energy Efficiency Norms (in buildings and other sectors)

The list of existing building norms and standards are provided in Appendix 1. Detailed procedure for development and approval procedures for normative documents is provided in "System of normative documents in construction: main provisions" 10.01-2014 building norms of the RoA. The procedure is universal and are not only for energy-efficiency related building norms.

As per the RoA "Law on Procurement," legal entities with relevant work experience develop, update, or localize norms and codes on a contractual basis. For building and urban development norms, MUD prepares the terms of references for the task, basing it on Government of Armenia's approved programs. MUD also manages the process of circulating drafts submitted by the contractor for review by all relevant state agencies and other stakeholders (e.g., specialized organizations). Comments and recommendations of all interested parties about the draft document are included in a summary of opinions. Once all comments and recommendations are reviewed and incorporated, the final version of the reviewed draft is approved by the Minister of Urban Development. Later, the adopted document is submitted to the Ministry of Justice (MOJ) for state legal audit and state registration.

Drafts of manuals of building norms are developed and agreed upon by similar procedure as that for building codes. The drafts are approved and put into force by the order of the Minister of Urban Development without state legal audit provided by MOJ.

In recent years, MUD has initiated an update and developed several building norms and handbooks/manuals. These include:

- The "Building Climatology" code,[24]

[24]The update was supported by UNDP/GEF/00035799 project "Armenia – Improving the Energy Efficiency of Municipal Heating and Hot Water Supply."

- The advisory handbook of technical solutions for thermal insulation of envelopes of residential, public and industrial buildings, which was approved by the MUD,[25]
- Establishment of an interagency working group under the Ministry of Urban Development (by the Ministers Decree N125 dated 11 November 2010). The aim of this working group is to support the process of implementation of activities planned under donor projects in the field of energy efficiency.

In developing and coordinating energy efficiency programs, MUD together with the Ministry of Nature Protection has been coordinating the UNDP/GEF project since June 2010. The Ministry also collaborates with EBRD, KfW, WB, Habitat for Humanity Armenia, INOGATE, ESIB projects. Normative documents should be updated no later than once every 5 years.

D. Administrative processes for ensuring compliance to norms and standards

Overview of quality control

Urban development in the Republic of Armenia is regulated by RA law "On urban development" along with its subordinate regulatory and legal acts. RA Government has procedures of designing and approval of urban development documentation (see Section B, above).The whole system of normative-technical documentation related to urban development is a public tool aimed at regulating urban development activities. Fulfillment of requirements stated by urban planning normative-technical documentation is compulsory for all entities engaged in urban development activity. Besides a number of norms and rules, RA law "On urban development" defines *quality management terms for designing, construction and operation of the facility.*

In Armenia, Ministry of Urban Development issues licenses to firms or individuals for engaging in urban development activities, such as construction of buildings, technical evaluation of plans, etc. Over the course of construction, the builder must implement mandatory technical control of construction quality, the procedures for which are determined by *RA Building Code I-3.01.01-2008 Building Norms (Chapter X, Construction quality technical control).*

In the territory of RA, *public administrative supervision* of urban activity is carried out by urban development inspection of the Ministry of Urban Development of the RoA. According to RA law "On technical regulations," mandatory conformity assessment of building materials (specifically concrete and reinforcement bars) is carried out in the Republic of Armenia. These testing labs are registered with the RA Ministry of Economy's Accreditation Council.

The main objective of the above-stated controls is to ensure proper construction quality and compliance with building norms of the Republic of Armenia.

[25]This effort was supported by UNDP/GEF/00059937 project "Improving Energy Efficiency in Buildings"

Construction quality control

The builder is obliged to develop his activity under the order established by the law in accordance with approved architectural-building design and based on building *license*, as well as to ensure the *examination of urban development papers* and *quality technical control* of the construction of town-planning units. He also must carry out his town-planning activity (except current reparation works) exclusively in compliance with specified urban development documentation, and get the architectural-planning task for the carrying out urban development activity delivered by appropriate local authorities.

Construction technical control represents a complex of events. It is carried out over all stages of building-assembly operations and aims at revealing the compliance of implementing operations with quality standards, building norms, as well as preventing timely the carrying out of poor constructions.

The construction technical supervision is done under the following building areas:

- Residential, public and industrial
- Transport
- Hydro technical
- Energy
- Communications

Technical supervision of construction quality is exercised through test checkups - inspection, measurement, qualitative criteria assessment and laboratory tests. Laboratory tests are carried out by certified laboratories according to orders made by the contract of building organization and the company responsible for the technical control. Construction organization may order to accomplish current tests, whereas supervising organization orders supervision tests.

There are two types of quality control - input and operative control. The goal of quality input control is to verify:

- Availability of required documents,
- External design of building constructions, units, goods, materials and equipment and their compliance with technical regulations, valid national standards and works papers,
- Availability of references and certificates.

The goal of operative quality control consists in identification defects during construction, in their elimination and statement of preventing measures. Operative control supposes integrated events aimed at maintenance of construction works technologies and compliance with designing papers, normative rules and standards.

In accordance with RA Government decision in case of any normative violation in architectural-building designing papers, the construction works are suspended and an alternative examination of designing papers is required.

The executors of construction have the right not to use building materials, articles, patterns and engineering equipment delivered by builders if they do not meet the requirements of the valid standards or normative.

Builders that execute construction have to possess the license authorizing to develop the appropriate activity. They also must fill the requirements covered by normative-technical papers of approved project during construction, as well as eliminate by own resources the defects occurred during contraction time (but not late than over the course of one year after getting the commissioning act of construction) if they have occurred in consequence of violations made by themselves during construction.

Public supervision of urban development activity in the territory of the Republic of Armenia is executed by branch public authorized body – State Inspectorate for Urban Development.

At the stage of buildings exploitation the owners, and in some cases appropriate managers or residents of buildings have to maintain the exploitation quality state of urban unit in compliance with requirements specified by normative-technical documents. The systems of the assessment of buildings and constructions technical state and certification are also operating.

Gaps in construction quality control

Principal gaps of the existing system forurban-development supervision are in all stages of a building's life--design, construction, commissioning and operation. The gaps are in legislation, normative-technical documentation, equipment of organizations implementing control and tests, and the level of vocational training of personnel in charge of quality control. Below, each one the gaps are discussed in greater detail.

Normative gaps
The urban development standards and norms of RoA are not yet fully developed. A number of interstate building norms valid in the Commonwealth of Independent States (CIS) are not yet adopted in Armenia.In addition, technical regulations and National Standards specifying requirements for building materials and components are missing.

Current Armenian building energy standards do not require special attention to be paid to "energy efficiency." In design stage, for instance, there is no form or place in the drawings or construction documents that describe or demonstrate the energy efficiency of the building. This was done in Russia and many other CIS countries using MSN 2.04-02-2004 "Thermal Protection of Buildings." This standard requires a separate energy efficiency section in construction documents, development of building energy passport during design and then operation of the building.

Gaps in technical preparedness and specialist qualification

The testing laboratories certified in the construction field are generally furnished with laboratory equipment and tools intended for solidity tests of concrete and reinforced concrete constructions. On the other hand, laboratories are not often sufficiently equipped and skilled with respect to testing of thermal characteristics of buildings or construction materials. This is in part due to lack of regulatory or market demand for such tests. Low level of awareness among consumers about the benefits of energy efficiency of materials, products, and buildings is also a contributing factor.

Moreover, there is a lack of high-skilled specialists with appropriate knowledge in construction technical supervision. In addition, practicing specialists need updating in their professional training and qualification.

Lack of supervision over energy performances of buildings

In spite of the fact that the RA law "On Energy Saving and Renewable Energy" was adopted in 2004, adequate "tools" ensuring fulfillment of the requirements of law are not yet in place. The same is true for the set of normative-technical documentation on energysavings in buildings. These are not yet fully or sufficiently elaborated.

RA law "On Energy-saving and Renewable Energy" has provisions for development of regulations on energy inspection. Decision N1399-N of 31.08.2006 "On adoption of energy inspection regulating order and modifications in RA Government Decision N 2200-N of 09.12.2005" outlines the energy inspection regulating order that emphasizes the importance to prepare energy certificate of buildings and constructions. However presently no energy inspection is carried out in buildings and constructions. Energy inspection is voluntary and carried out at the initiative and by own funds of building owner. In addition, there is no normative basis regulating buildings energy inspections (MSN 2.04-02-2004 "Thermal Protection of Buildings" which has been in use in Russia and other CIS countries for many years is not operating in RA). The set of normative-technical documents related to assessment of the energy efficiency and operational performance of buildings is also missing.

Another barrier preventing the implementation of buildings energy performances conformity assessment and certification is the facts that testing laboratories certified in construction are not equipped with modern equipment needed to carry out the inspections. This may be due to high cost of the necessary equipment and lack of demand in Armenia.[26]

In order to operate with building energy testing equipment specialists with appropriate knowledge and experience are needed. The issues of their training,

[26]In 2013 two entities (namely "Shincertificate" LLC and Yerevan architectural construction state university) were equipped with building physics laboratories including thermal characteristics measurement tools. The funding was provided by "Improving energy efficiency of buildings" UNDP/GEF project.

vocational qualification and retraining are urgent as well. More generally, similar vocational training needs are urgent for all levels of system related to building energy efficiency, including designers, quality technical inspectors, and builders.

Therefore, the necessity of energy certification of residential buildings is carried out but is voluntary. In practice, however, energy certification is not sought by developers. As of June 2014, there is only one building in Armenia and the South Caucasus region that is seeking US Green Building Council's LEED certification.

The lack of public awareness about relative advantages of construction insulating materials, buildings energy performances and energy efficient buildings in terms of energy resources saving is also important. Consumers (buyers) are not informed adequately on energy performances of apartments, thus they have no opportunity to compare and make well-grounded choices.

Recommendations aimed at improving the construction quality control

To eliminate gaps presented in the sections above,the following recommendations are made:

- Adopt technical regulation "On safety of buildings, constructions, materials, and pre-fabricates".[27]
- Continue harmonization with appropriate EU standards.
- Organize vocational training and retraining courses for persons involved in construction quality control and public supervision, with a focus on energy efficiency.

Improvements in normative acts on building energy performance

The following are suggested for improving the normative frame and its implementation "tools:"

- Include "energy efficiency" section in buildings design papers.
- Adopt the interstate Building Code "Buildings Thermal Protection".
- Energy certifying of residential buildings operation must be compulsory (mandatory), final construction documentation must involve energy certificate.
- Create integral set of normative-technical documentation that covers buildings and constructions energy efficiency assessment and operating performances. Specify buildings energy audit norms and procedures taking into consideration available international best practice.
- Through legal and normative acts directed at the improvement of buildings energy efficiency, create favorable conditions for builders and businesspersons in order to promote use of energy-efficient technologies in buildings.

[27]Draft of this regulation was presented to the RoA Government in April 2013. However, discussion on it was declined by the Ministerial Committee on Regional Development and Nature Protection. It was clarified the draft refers to an array of issues that require additional discussion. Re-submission is expected in 2014.

- Organize communications campaign on public awareness raising concerning energy-saving technologies and "tools" in existing buildings and buildings under construction. Outcome of communications campaign must be information package supporting customer to do well-grounded purchase.
- Implement rating system of residential buildings based on their energy efficiency.

E. Existing Energy Efficiency Norms (in buildings and other sectors)

Types of Norms Used in Armenia

The main principles of the normative documentation system of the construction sector of the RA, the types and content of construction norms and their wording, the general requirements for their wording, as well as the procedure for their development, adoption and application are established by the construction norms RACN 10-01-2014 "System of Normative Documents in Construction. Main Provisions". Pursuant to RACN 10-01-2014, the existing standards in the area of urban development in the RA are as follows:

- Construction norms of the Republic of Armenia – RACN
- Collection of design and construction rules of the Republic of Armenia –RARC
- National standards in the construction sector – AST
- Standards of organizations – OST

In addition to the above, within the Republic of Armenia the following can apply:

- Interstate building norms – MSN
- Collection of interstate rules for design and construction – CIR (includes the former construction norms manuals, CNM)
- Interstate standards of the construction sector – GOST

The new code RACN 10-01-2014 eliminates the following types of norms and codes:

- Building norms established by the USSR's GosStroy – SniP
- Departmental Building norms, approved by the USSR's GosStroy: VSN, CN.

Listing of Norms

The construction standards and codes in force in the Republic of Armenia are listed in a document called "List of Normative Technical Documents for the Urban Development Sector in the Republic of Armenia". This list is published and updated by MUD. The most recent version published on December 15, 2013. The list categories standards and codes in 15 subject areas. Area 7, for instance, is called "Protection from Climate Conditions", Area 8 is called "Protection from Impacts of Building Operation", and Area 9 is called "Urban Development" and so on.[28] There are 17 norms and standards dispersed in the various Areas that are relevant to energy efficiency in buildings. These 17 are identified in italics in Appendix 1.

[28] Full lists can be downloaded from http://mud.am/am/lows/shin_norms

Issues with Specific Norms

The existing RACN II-7.02-95 "Construction thermo physics of the building envelopes, design norms" and the CNM II-7.102-98 Construction thermo physics of envelopes" manual fail to meet the modern requirements for energy efficiency in buildings, such as thermal performance of buildings allowing flexible design, building energy passports, monitoring of energy performance, building classification according to energy efficiency, and the like.

In 2004, the RoA adopted the following ICN Interstate Scientific and Technical Commission for Standardization, Technical Norms and Certification in Construction of CIS countries (MHTKC):

- MSN 2.04-02-2004 Thermal protection of buildings and
- MSN 3.02-04-2004 Multi-apartment residential buildings.

However, these have not been adopted by the RoA as a national norm. The principal differences between the MSN 2.04-02-2004 and the existing building code in the RoA is that MSN 2.04-02-2004:

- Provides classification of buildings from energy efficiency's point of view,
- Gives free opportunity to design buildings within limits of approved energy intensity indicators,
- Gives as elements norm setting of buildings thermal protection as well design rules of energy efficiency indicators,
- Given supervision methods of conformity of thermal protection and energy efficiency normative indicators as during design as well in exploitation (with application of energy passports),
- Creates a possibility unveil those exploited buildings which are subject for immediate reconstruction from energy efficiency's point of view,
- Elaborated per consumption principle.

According to the consumption principle, three requirements are developed with regard to thermal protection of buildings:

- Benchmarking energy consumption for heating buildings during heating season
- Providing thermal comfort in building's habitable areas
- Preventing formation of condensation on internal surfaces of building's envelope.

With this consumption principle, the building is considered as a unified thermo-technical system.

The following climatic parameters are set up by the new code:

- Duration of heating season, average temperature of external air and degree-days
- Design temperature of ambient air
- Overall sun radiation on horizontal surfaces in accordance with real conditions of cloudiness
- Design speed of wind

In spite of its advantages, the MSN 2.04-02-2004 poses several concerns, particularly related to the absence of qualified specialists and sufficient financial resources for preparing energy passport for buildings, absence of necessary measures (in the building code) in cases of non-compliance with established criteria.

At present there are two building codes (Building Code of the RoA II-7.02-95 Building physics of building envelope: Design norms and Building Code of the RoA IV-12-02.01-04: Heating, ventilation and air conditioning) that have direct impact on energy consumption indicators of buildings. They do not include direct provisions on building's energy efficiency. Ensuring a building's energy efficiency is the responsibility of developers.

According to RoAlegislation, building codes are subject to revision once each five years. The Ministry of Urban Development each year presents a list of building codes subject to revision to the Government of the RoA. However, due to the absence of necessary financial resources and an appropriate experience, in reality few codes are revised on time.

The normative system should be constantly revised to keep up with trends and requirements of new technologies and markets.

Marginal costs related with usage of energy efficient materials, equipment, prefabricates, and solutions during construction of a new building are relatively low in comparison with application of such measures in existing buildings. Thus, it is meaningful to have separate standards for new building and existing buildings. It is critical to develop standards for existing buildings, as they constitute the overwhelmingly large portion of the housing stock. Without energy efficiency for existing buildings, major headway in overall energy efficiency cannot be made.

Introduction of the new norms should be done gradually, in order to allow specialists to adjust with the high requirements for energy efficiency and prevent unjustified growth of prices of construction materials. It should be accompanied with strengthening of the supervision system towards non-compliance of the norms.
Taking into account the above-provided analysis it is necessary to implement the following measures:

1. Harmonize and officially register the interstate building code "Thermal performance of the buildings";
2. Develop code on thermal performance design of buildings;
3. Develop and officially register the building code "One apartment residential buildings";
4. Develop and adopt program on improvement of the system of construction quality technical control.

F. Legislative and regulatory incentives for energy efficiency

The two laws regulating building's energy efficiency sector, namely "Energy Efficiency and renewable energy" and "On urban development" do not provide any

significant legislative and regulatory incentives for improving buildings' energy efficiency. Clause 1b of Article 20 of the law "On energy efficiency and renewable energy" states the following:

> "The state administration authorized body in the area of energy saving and renewable energy shall submit proposal to the Government to make required additions to the Customs Code of the Republic of Armenia and Republic of Armenia law 'On the Approval of List of Products imported by organizations and individual entrepreneurs eligible for zero (0) rate customs duty and excise duty exemption, for which the customs service does not calculate or charge value added tax'".

However, the two legal acts (code and law) do not provide any incentives, say, for importers of energy efficient materials, machinery, or technologies.On the other hand,Clause 1a of Article 20 states:

> "The Public Services Regulatory Commission of the Republic of Armenia shall define the conditions for integrated operation/activities between the autonomous producers using renewable energy resources and the electric energy network with the pre-condition of electric energy exchange".

While this (i.e. the PSRC's relevant decree) does not provide significant incentive to electricity producers using PV panels, it does, however, set up power exchange on the "net-metering" principle. It would be beneficial to consider giving possibility to those producers to get financial compensation as an electricity surplus by the end of a year.

Possible legislative and regulatory incentives include:

1. Grants or low interest rate loans, tax privileges for energy efficient construction, including renovation
2. Subsidies to electricity and thermal energy producers from renewable energy sources in buildings,
3. Tax privileges for importers of energy efficient materials, machinery, technologies (e.g. for importers of electric appliances with A+ rating to extend VAT payment time for 3 years, or customs tariff waivers for importers of PV or solar thermal technologies, etc.),
4. Introducing demand-side management measures in residential buildings by electric and gas utilities, etc.
5. Loan guarantees by the state on energy efficiency or renewable energy investments
6. Offering technical assistance, training, and information campaigns to professionals and households.

To strengthen arguments for introducing legislative and regulatory incentives, it is highly recommended to conduct economic and financial cost-benefit analysis of energy efficient buildings.

G. Tariffs and Energy Efficiency

Tariffs for delivery of electricity, thermal energy and natural gas are regulated by Public Services Regulatory Commission (PSRC), the activities of which are based on the law "On Energy", "On regulatory body" and other relevant legal acts.

PSRC has increased tariffs for energy several times over the last decade. For example tariffs for electricity have increased by 60 percent for residential customers from 2006 to 2013. Currently electricity tariffs (adopted July 7, 2013) for residents are the following: 38 drams/kWh and 28 drams/kWh during night hours (23:00-7:00).

One may say that this promotes electricity saving by residents (therefore buildings at larger scale). In reality this tariff structure does not significantly promote energy consumption during night hours. One of the main reasons is the modest difference between the day and night tariffs: 10 drams or 26 percent. Before the new tariffs came into force, the tariffs were 30 and 20 drams, respectively for daylight and night hours and the difference was 10 drams or 33 percent. Electricity in individual apartments is used on lighting, electrical appliances (TV, computers, refrigerators, air conditioners, etc.) and heating (for some residents[29]). For common purposes electricity is used in lighting (stairwells, entrance, building's surrounding), water pumps and lifts.

It is believed that the cost structure should be revised so to widen the difference between the daylight and night hours, ideally to have a 50 percent of difference. This type of cost structure can promote individual apartments' and building's electricity usage during night hours, however the potential for savings is limited.

Tariffs for natural gas also were increased since July 7, 2013. Comparison between tariffs shows that tariffs were increased by 240% during 2006-2013.Current tariff for monthly consumption less than 10,000 $Nm^3$is 156 AMD per cubic meter, whereas for more than 10,000 Nm^3it is 276,98 USD or 114393 AMD. According to "Lessons learned from the UNDP-GEF project in Armenia: Improving Energy Efficiency of Municipal Heating and Hot Water Supply" UNDP/GEF/00035799 project the existing single-part tariff system adopted in 1997 is obsolete in the current economic environment and promotes energy wastage rather than energy savings.

Theoretically, higher tariffs may encourage energy savings by end users, however there is no direct relationship between the two. This is due partially to the fact that there are several barriers in application of energy efficiency measures in existing housing stock as well to new construction of buildings.

[29]Households heating expenses survey commissioned by UNDP/GEF project in 2012 has shown that about 15 percent of residential households in buildings use electricity for heating purposes.

H. Trends and other critical legislative and strategy issues

Law "On energy efficiency and renewable energy"

As of June 2014, updates to the Law "On energy efficiency and renewable energy" are finalized by MENR and will soon be circulated among government agencies. The main changes include:

a) Adding a phrase to the voluntary basis of adhering to energy efficiency norms that allows for legislation to make it mandatory;
b) Allowing for the government to classify sectors of the economy per energy intensiveness (high, medium, low), regulate energy intensive sectors of the economy by setting mandatory energy efficiency and energy savings measures;
c) Regulating energy auditing;
d) Labeling of energy consuming equipment and appliances; and
e) Preparation of annual energy balance of the country.

Law "On Energy"

As of June 2014, updates to the Law "On Energy" is being considered by the National Assembly of RoA for adoption. It has had the first of its 3 readings already. The main amendment that can relate to buildings is the following: "Electricity generated by plants that use renewable-energy sources (wind, solar, geothermal, and biomass) is to be purchased for 20 years per market rules."[30] This means that the producer can be guaranteed a purchase contract of 20 years from the electricity distributor at a price set by the Public Services Regulatory Commission.

Draft law "On developing the smaller centre of Yerevan"

The Ministry of Urban Development in collaboration with key stakeholders has developed a draft law "On developing the smaller centre of Yerevan." As of June 2014, this draft is being discussed by the government of the RoA. Among other provisions, the draft law is setting up energy saving and energy efficiency mandatory requirements in a"specialized regulated zone" (Article 28). The reasons for setting up such requirements are to decreasethe negative impacts of real estate development on people's health and environment as well as improving buildings qualitative characteristics and comfort.

The requirements will apply to category IV and V buildings as well as structures with total area of 1000 square meter or more. The requirements will be as follows:

1. Implementation of energy audit,
2. Preparation and application of energy passports of buildings and structures,

[30] Draft Law "on Amendments and Additions to the RA Law on Energy" (April 30, 2014)

3. Determination of energy efficiency class of buildings and structures, ensuring certification and labelling of energy indicators according to the procedure defined by the government of the RoA, and
4. Usage of certified thermal insulation building materials.

This draft law is introduced with a package of amendments to seven other legal acts including RA Law "on Urban Development," and RA Land Code, Law on Self-Government in the City of Yerevan, and others.

Besides the mandatory requirements, developers can implement voluntary measures such as application of alternative energy systems (renewable sources, heat pumps), "green" roofs and walls and other architectural elements.

Draft government decision "On application of measures directed towards increasing of energy saving and energy efficiency in objects constructed by state means"

The Ministry of Urban Development is also working on development and submittal of draft government decision "On application of measures directed towards increasing of energy saving and energy efficiency in objects constructed by state means". The draft decision is due in July 2014.

National Programs and Plans

The National Program on Energy Saving and Renewable Energy as well as its supporting National Energy Efficiency Action Plan (NEEAP) is currently (as of June 2014) being assessed with respect to their accomplishments. Additional measures or reforms may result, depending on the outcomes of this assessment.

As a way of background, NEEAP identifies two measures to be incorporated in the urban development sector. These are a) improving the norms on energy efficiency and b) establish quality control and quality assurance standards with respect to energy efficiency of construction materials.

Additionally, section 4 of NEEAP points out that the improvement of energy saving of buildings and construction needs to pay attention to EU directives. NEEAP further identifies as one of the barriers of the urban development sector to be the absence of legislation (laws, standards, norms) that sets requirements for energy saving construction. NEEAP also points out the absence of mechanisms promoting the enforcement of legislation.

In 2013 the President of the RoA adopted the Energy Security Provision Concept of RA. In fulfillment of the mentioned Concept, a list of measures (which includes also buildings' energy efficiency issues) has been developed by the Ministry of Energy and Natural Resources. The list is submitted to the government for approval. As of June 2014 the following, which can affect buildings, are included in the draft of the National 2014-2020 Action Plan on Presidential Decree182-N 23.10.2013:

a) Regulate energy efficiency and energy saving minimal requirements in the State construction and procurement tenders. This will impact the RA Law on Urban Development and the RA Law on Energy Efficiency and Renewable Energy.
b) Introduction of Measurement, Reporting, and Verification (MRV) system for reduction of greenhouse gas emissions, which may be required by external donors or investors. Government shall maintain a cadaster of anthropogenic emissions of greenhouse gases and establish a baseline level of greenhouse gas emissions from Armenia's energy system.
c) Reduce greenhouse gas emissions through improvements in energy efficiency by developing national plan for climate change mitigation to attract foreign financing that will enable investments in energy efficiency

With regard to information provision on energy efficient technologies, MUD, besides the above-mentioned advisory handbook, has approved replicable designs of energy efficient single-family dwellings in communities of Armenia. The floor plans and specifications for these approved designs are compiled in a catalogue available to the public on the Ministry's website. A database of construction insulation materials and pre-fabricates is also posted on the above-mentioned website. Development of the two documents was supported by UNDP/GEF project.

I. Brief update on EU legislative harmonization efforts

Paragraph 26 of the Protocol Decision N17 of the RA Government dated 6 May 2010 approved the "Concept Paper on the System of Normative-Technical Documentation in Urban Development" which establishes the development directions of the standards system for the area of urban construction from 2010 to 2020 and includes a summary of the current issues, objectives, principles of and fundamental provisions on development of technical norms and standardization in the area of urban development. The Concept Paper was developed based on the provisions of the "EU-Armenia Partnership and Cooperation Agreement" and the commitments of the RA for the elimination of technical barriers to trade. The concept paper serves as a basis for making of a modernized action plan for the complete system of the use of urban development norms in compliance with the international and European standards.

Para. 17 of the Protocol Decision N51 of the Government of the RA dated 30 January 2011 approved the "2011-2013 Programme on the Priority of Harmonization of the Existing Urban Development Norms in the RA with the norms of European Standards".

Within the framework of "Improving Energy Efficiency of Municipal Heating and Hot Water Supply" UNDP/GEF/00035799 project the following international (ISO), European (EN) and CIS (MSN) construction norms and standards were localized in the RA related to the energy efficiency in buildings:

1. ISO 16818 Building Environment Design. Energy Efficiency. Terminology
2. ISO 23045 Building Environment Design. Energy Efficiency Assessment Guide for New Buildings

3. EN 15316-1 Heating Systems in Buildings. A Method for Calculation of System Energy Demand and System Efficiency
4. EN 15217 Energy Performance of a Building. Methods for Expression of Energy Performance and Energy Efficiency Certification of a Building
5. EN 15603 Energy Performance of a Building. Shared Energy Use and Determining Energy Efficiency Ratings
6. AST 1434-1-2010 Heat Meters: Part 1. General Requirements
7. AST 1434-1-2010 Heat Meters: Part 6. Installation, Operation Delivery, Work Control and Maintenance

Within the framework of "Improving energy efficiency in buildings" UNDP/GEF project technical Regulation on "Safety of buildings and constructions, construction materials and prefabricates" was developed based on available international best practice, discussed with professional organizations and submitted to the Ministry of Urban Development for consideration. In particular, Chapter 6 of the Technical Regulation sets up requirements for energy saving and thermal protection of buildings that are a legal basis for adoption of the above-mentioned codes.

The basis for elaboration of the above-mentioned TR were Directive on Building Products 89/106/ EEC, Regulation on Construction Products 305/2011/EU, building norms and standards of the Republic of Armenia, as well as appropriate technical regulations of the CIS countries, and draft of technical regulation of Eurasian Economic Community (Evrazes). The draft TR was discussed with EU Advisory Expert Group. At present, the draft TR is submitted to the Ministry of Justice for state legal expertise.

In 2013 the above-mentioned technical regulation has passed state legal audit. The draft technical regulation was submitted to the RA Government by the RA Ministry of Urban Development for approval according to the defined procedure. However, discussion of the issue was declined by the 16.04.2013 session of the ministerial committee of the RA Government on regional development and nature protection. It was clarified that the draft refers to an array of issues that required additional discussion. Re-submission of the draft to the RA Government is envisaged in 2014.

In accordance with the RA Government decision N 1481-A of 22.11.2012 "On approving the combined list of legal acts subject to harmonization in the energy sector as envisaged by the draft EU-RA association agreement", harmonization of Directive N 2010/31/EU of the European Parliament and of the Council "On the Energy Performance on Buildings" of 19.05.2010 is envisaged among others.

Harmonization and enforcement of EU/2010/31 building energy performance directive and its supporting standards is important from the point of view of strengthening legal basis for improvement of energy efficiency of existing and newly constructed buildings. For that purpose in 2013 the Ministry of Energy and Natural Resources initiated the harmonization process of the relevant directives and standards in cooperation with the "Improving energy efficiency in buildings" UNDP/GEF project. The contractor organization has already submitted the draft

standards, which are subject for discussion in interagency working group under the Ministry of Urban Development.

The list of standards already harmonized is the following:

EN ISO 13790	Energy performance of buildings – Calculation of energy use for space heating and cooling
EN ISO 13789	Thermal performance of buildings – Transmission and ventilation heat transfer coefficients – Calculation method
EN ISO 10211	Thermal bridges in building construction – Heat flows and surface temperatures – Detailed calculations
EN ISO 14683	Thermal bridges in building construction – Linear thermal transmittance – Simplified methods and default values
EN 15242	Ventilation for buildings – Calculation methods for the determination of air flow rates in buildings including infiltration
EN ISO 9251:1996	Thermal insulation – Heat transfer conditions and properties of materials – Vocabulary

3.1.2 Administrative framework

Public supervision of urban development activity in the territory of the Republic of Armenia is executed by branch public authorized body – State Inspectorate for Urban Development.

RA State Inspectorate for Urban Development is a state body executive authority operating under Ministry of Urban Development of RA that provides supervision services and applies amenability measures in urban development field on behalf of the Republic of Armenia. Inspectorate is managed by RA Urban Development minister (hereafter minister). Direct management of Inspectorate is carried out by the Head of Inspectorate – Public General Inspector of Urban Development of RA.

The goals and objectives of the inspectorate consist in implementing public supervision towards:

- Fulfillment of requirements stated in legal acts regulating urban development activity developed by urban activity entities,
- Fulfillment of requirements stated in urban development project papers by public and local authorities,
- Fulfillment of requirements stated in urban development normative-technical papers by entities executing construction works,
- Safety of people and environment during construction (pulling down) and exploitation of buildings and constructions,
- Prevention and suspension of unauthorized construction (pulling down), as well as elimination of its consequences according to the established order.

In order to carry out its goals and objectives, the Inspectorate implements the following functions through checkups according to the order established by RA legislation:

a) During the checkups carried out in administrations of urban development under regional councils (municipality of Yerevan), as well as in regional companies and organizations the objects of examination are the compliance of developed urban development activity with urban development project papers, whereas in case of their modification or non-conformity with the requirements of regulations established by the RA government.
b) Inspections of construction entities in order to supervise the activity of entities developing construction works, as well as to ensure the quality of developed construction, their urban development documentations and the conformity with legal acts and normative-technical requirements.
c) Inspections in buildings and constructions under development and exploitation in circumstances threatening people and environment safety, as well as on the basis of citizens' complaints and the communications (reports) made by non-governmental organizations, author's and technical supervisors, bodies authorized to license the urban development, other public and local authorities.
d) Conformity of architectural-planning tasks with orders established by RA Government decisions, the compliance of the processes of buildings and constructions designs drafting, examination, harmonization, approval and modification with the requirements of the appropriate Decision of RA government, awareness processes on forecast modifications of environment, availability of construction (pulling down) authorization and the compliance of its issuance with the requirements stated in RA Government Decisions, the compliance of the elaboration of finalizing acts with the requirements stated in RA Government Decisions, other processes relating to unauthorized construction prevention, suspension, urban development.

In the city and rural local administration areas the governor supervises fulfillment of requirements of architectural-planning tasks delivered to builders out of community administrative bounders, targeted urban use of lands and attached landed estate, prevents and suspends incidents of unauthorized construction and ensures the elimination of their consequences according to the order established by RA law.

The governors also control the activity of community authorities in urban development area.

Community authority controls the fulfillment of urban legislation requirements of residential sites, architectural-planning tasks delivered to the builders, the targeted use of lands and landed estate, as well as prevents, suspends the incidents of unauthorized construction and eliminates their consequences according to the order established by the RA law in the territory of urban and rural communities.

3.1.3 Challenges and opportunities

There exist several opportunities in buildings energy efficiency such as the following:

- The MUD charter has been added with new tasks/functions related to energy efficiency;
- Loans being provided for energy efficiency renovation of apartments/houses by several banks;
- On-going donor funded projects (e.g. UNDP/GEF, WB, IFC, EBRD, etc.) working towards creating appropriate environment for energy efficiency in buildings;
- Already built/thermal modernized energy efficiency buildings (e.g. Goris building for socially vulnerable households, Avan panel building, AMAAA LEED school (still on-going), etc.);
- Seminars conducted for architects, engineers, designers;
- Educational modules for energy efficient design of buildings have been developed and being incorporated into curricula of Yerevan State Architectural-Construction University;
- Activity of several designers/architects already involved in energy efficient design of buildings;
- Two laboratories for testing energy efficient construction materials are operational;
- New energy efficient construction materials are being produced (tested/certified) and imported;
- Several energy audits have been conducted for multi-apartment buildings;
- Energy efficient buildings voluntary rating system being developed;
- Technical documentations related to buildings' energy efficiency were developed recently, e.g. technical solutions on insulation;
- New legislative initiatives (laws "On energy efficiency and renewable energy", "On urban development", "On Yerevan smaller centre development") are underway for improving the legal framework.

3.1.4 Problems and constraints

- *Absence of clearly defined requirements for building's energy efficiency in legal acts*
  Energy saving and energy efficiency requirements for buildings and urban development objects are missing in the law "On urban development" and other legal acts of urban development sector, while the Law "On legal acts" requires that any requirement to be imposed to legal and physical persons should be adopted by legal acts. On another hand, the building code on thermal physics, which defines requirements for building's thermal resistance, is not properly registered with the Ministry of Justice. The list of building codes adopted by the Minister of Urban Development was registered with the Ministry of Justice while each building code should have been submitted separately and registered properly.

- *Existence of outdated building codes*
  Existing building codes do not comply with integrated building design approach and are not flexible as modern building codes. Current building code on thermal physics only specifies thermal resistance values for building envelope while modern building codes in the meantime specify overall building performance, e.g. kWh/m^2.year.

- *Low enforcement capacity*

  Supervision over construction works related to thermal protection by construction quality control organizations and state urban development inspectorate is week. Many organization and state inspectors are not aware of building norms, technologies, etc. related to building's energy efficiency.

  Energy audit of buildings is not practiced which would determine their actual performance with building codes.Energy audits are reliable tools to assess building code compliance and demonstrate the economic benefits of energy savings.

  Recently the Ministry of Urban Development applied to INOGATE programme for supporting development of roadmap for introducing energy performance certification system in the country.

  Construction materials and prefabricates are not certified for energy performance which makes impossible to ensure that the buildings made of those construction materials comply with building codes requirements and measure energy performance. It is worth mentioning that currently there is a non-solvable problem related to testing and certification of windows and doors in the country. This is due to a lack of appropriate testing equipment (climate camera) which is costly and is not demanded by market at large.

- *Low level of awareness among population, private and public sectors*
  There is a low level awareness of energy efficiency benefits and opportunities in buildings, moreover appropriate public awareness campaigns related to buildings energy saving and energy efficiencyare absent. Customers, especially for apartments mostly do not have any idea about energy performance of their apartments and buildings where they are located.

- *Low capacity of construction sector actors*
  Most of the designers/architects, design evaluation specialists, builders have low capacity in designing and constructing energy efficiency buildings. Several trainings have been conducted for construction sector actors, however it is not sufficient.

- *Immature market for EE products and services*
  Many construction companies use do not use energy efficient materials, prefabricates and technologies. Although, recent demonstration projects

have created demand for energy efficient products and services, it still needs further enhancement and development.

- *Inflexible investment decision-making practices (least cost versus operational expenses)*

Public procurement rules which are based on least cost approach do not promote use of energy efficient materials, prefabricates and technologies. There are well-documented evidences for energy saving benefits for energy efficient public buildings taking into account their operational expenses. As mentioned above, the Ministry of Urban Development is drafting a government decree on approving energy performance targets for buildings built/reconstructed by public means. Once adopted, it will start addressing this barrier.

3.1.5 Yerevan (local level)

3.1.5.1 Legal framework

The same analysis as provided in national level. The Ministry of Urban Development has drafted the law "On developing the smaller center of Yerevan". Article 28 of this draft law envisions setting up energy saving and energy efficiency mandatory requirements in the specialized regulated zone. At present the draft law is being considered by Government.

3.1.5.2 Administrative framework

Community authority controls the fulfillment of urban legislation requirements of residential sites, architectural-planning tasks delivered to the builders, the targeted use of lands and landed estate, as well as prevents, suspends the incidents of unauthorized construction and eliminates their consequences according to the order established by the RA law in the territory of urban and rural communities. In Yerevan city supervision over the urban development is carried out by Yerevan mayor.

3.1.5.3 Challenges and opportunities

The same analysis as provided in national level. For the city of Yerevan, there is an opportunity for joining to Covenant of Mayors, which will enable to participate in EC funded tenders for allocation of energy efficiency measures promotion grants.

3.1.5.4 Problems and constraints

The same analysis as provided in national level.

3.2 Greece (national level)

3.2.1 Legal framework

Directive 2002/91/EC on Energy Performance of Buildings Directive (EPBD) was the first specific regulation initiative in Greece regarding the assessment of energy performance and certification of buildings. Also, national implementation of Directive 2002/91/EC was the first coordinate attempt to improve the energy performance of Greek buildings.

Directive 2002/91/EC on Energy Performance in Buildings Directive (EPBD), was published in the official Journal the 16th of December 2002, intents to improve the energy performance of buildings and provide a high-quality indoor environment in buildings. The harmonization of the above directive in Greek legislation took place with the implementation of Law 3661/2008 "Measures for decreasing the energy consumption of buildings" in May 2008 (Government Gazette: 89/B/2008).

The main new regulations that Law 3661/2008 foresees are:

- Minimum energy performance requirements for all new buildings, and also for substantially refurbished buildings of tertiary sector and dwelling buildings having an area above 1000m^2.
- Elaboration of energy performance study (EPS) for all new buildings and also for substantially refurbished buildings having an area above 1000m^2. The energy performance study is submitted to the relevant urban planning office.
- Issue of energy performance certificate (EPC) for all new buildings and substantially refurbished buildings, and also in case of buying / selling and renting. This certificate stands for 10 years (maximum).
- Regular inspection of boilers, heating/cooling installations and air conditioning systems.
- Issue of the Regulation of Energy Performance in Buildings (KENAK).
- Issue of the relative a Presidential Decree for the energy inspector/auditors.

The Law 3661/2008 was amended by article 10 of Law 3851/2010 (Government Gazette/85/A/1010) on the energy performance of buildings. Law 3661/2008 along with Law 3851/2010 on accelerating the development of Renewable Energy Sources (RES) deal with climate change and other regulations in topics under the authority of Ministry of the Environment, Energy and Climate Change (YPEKA), and specify new criteria in respect to the permitting procedures and the obligation to cover total primary energy consumption by means of resource-efficient technologies (renewable energy sources, cogeneration, district heating and high energy efficiency heat pumps).

Particularly, Law 3851/2010 supplements Law 3661/2008 requiring the coverage of 60% for hot water needs in new buildings by solar thermal systems or RES after 1 January 2011. Furthermore, all new building constructions and existing buildings exceeding 50 m^2 undergoing a major renovations impose minimum energy efficiency requirements and require a complete Energy Performance Study including energy

conservation and cost/benefit analysis of the utilization of RES, district heating, and heat pump systems. Finally, the Law 3851/2010 specifies that until 31.12.2019 future new buildings must cover the total primary energy consumption using RES, Combined Heat and Power (CHP), district heating on a large area scale/block scale, or/and heat pumps.

Law 3851/2010 sets also definite targets for the integration of RES in the building stock. In particular,

- Article 10(3) defines that after 01/01/2011, new buildings will cover 60% of their need in hot water from solar thermal systems.
- Article 10(4) defines that by 31/12/2019, all new buildings will install RES, CHP, district heating on a large area scale/block scale and heat pumps covering the total primary energy consumption.
- Also, Article 10(4) specifies that after 31/12/2014, all new public and broader public sector buildings will be supplied with RES, CHP, district heating on a large area scale/block scale and heat pumps covering the total of their primary energy consumption.

The application of Law 3661/2008 was intervened by Ministerial Decision No: Δ6/Β/οικ. 5825 30.03.2010 (Government Gazette/407/B/2010, 9.4.2010) "Regulation of Energy Performance in Buildings" (KENAK) since October 1st 2010[31]. This Regulation details building regulations and directives in order to transact the requirements of Directive 2002/91/EC (EPBD). In sum, KENAK regulates the energy usage in buildings, the energy performance in new buildings and existing buildings under detailed conditions, and the issues of energy certificate for public and private buildings. Furthermore, the regulation specifies the methodology for the energy consumption calculation in buildings, defines the minimum energy performance requirements for new buildings and for existing buildings exceeding 1000 m^2 undergoing major renovation, requires an energy performance study to provide an energy performance certificate[32], prescribes the inspection of boilers and cooling/heating systems, and appoints the implementation of energy auditors / inspectors[33]. More specifically KENAK determines:

- the calculation methodology of the energy performance of buildings in order to evaluate the energy consumption of buildings for Heat, Ventilation and Air-conditioning (H.V.AC), lightning for the tertiary sector and Hot Water (H.W),
- the minimum energy performance requirements and the classification of buildings according to their energy performance,
- specifications for bioclimatic architectural design, the thermal properties of the structural elements in building envelope and the electro/mechanical systems installations,

[31]Bakogianni Efi, Municipality of Piraeus. (2013). Available at: http://republic-med.eu/files/Workshop1/RepublicMed_ERDF_Piraeus_Works.pdf
[32]Markogiannakis G., at al. (2013). EPBD implementation in Greece – status at the end of 2012. Available at: http://www.buildup.eu/sites/default/files/content/CA3-National-2012-Greece-ei.pdf
[33]ENFORCE (2010). Available at: http://www.enforce-een.eu/wp/eng/wp-content/uploads/2012/02/National-EPBD-Implementation-Reports-Greece1.pdf

- the content of building's energy performance study,
- the format and the content of the energy performance certificate of buildings,
- the energy audit procedure and the procedure of regular inspection for boilers, heating and air-conditioning systems.

In order to support the implementation of KENAK, the Ministry of Environment, Energy and Climate Change issued the Ministerial Decision No 17178/2010 (Government Gazette/1387/B/02.09.2010), which approves the following Technical Instructions of the Technical Chamber of Greece.

a. Technical Instruction 20701-1/2010 "Analytical national standards parameters for calculating the energy performance of buildings and the energy efficiency certificate" (revised in April 2012, 2nd edition).
b. Technical Instruction 20701-2/2010 "Thermo physical properties of building materials and control insulating efficiency of buildings".
c. Technical Instruction 20701-3/2010 "Climate data Greek regions" (revised in April 2012, 2nd edition).
d. Technical Instruction 20701-4/2010 "Instructions and forms of energy inspections of buildings, boilers and heating installations, and air-conditioning" (2nd edition).
e. Technical Instruction 20701-5/2012 "Cogeneration of Electricity, Heating and Cooling: Installations in buildings", April 2012.

The texts with the necessary clarifications, additions and amendments were submitted by the Technical Chamber and approved by the Ministerial Decision 1192 "Clarifications and Addendums of Technical Instructions" (Government Gazette 1413/B'/30.04.2012). This Ministerial Decision includes the second edition of the Technical Instructions 20701-1, 20701-3, and 20701-4, along with the Technical Instruction 20701-5/2012

Also for the implementation of KENAK, the following Circulars have been issued:

a. "Implementation of KENAK" (οικ. 1603/04.10.2010)
b. "Clarifications for the proper implementation of KENAK" (οικ.2279/22.12.2010)
c. Circular 2366/05.01.2011 with additional clarifications.
d. Circular 22/26.01.2011 of the Notary Committee Association.
e. "Clarifications for the implementation of KENAK" (οικ.2021/14.06.2012)

In Parallel, the Technical Chamber has developed special software for the calculation of the energy performance and the classification (ranking) in buildings during energy audit procedure and for the energy performance study. The software applies the necessary algorithms for the calculation of the building energy performance in Greece. It is based on the methodology European standards (ΕΛΟΤ EN ISO 13790, etc.), and the relative national standards and Technical Instructions of the Technical Chamber of Greece (TOTEE).

Table 3.2-1: Valid Technical Instructions.

Number of Technical Instruction	First Edition	Second Edition	Clarification & Additions
20701-1/2010		**ΤΟΤΕΕ 20701-1 /2010**	**ΔΠ1/(20701-1/2010)**
20701-2/2010	ΤΟΤΕΕ 20701-2 /2010		
20701-3/2010		**ΤΟΤΕΕ 20701-3 /2010**	**ΔΠ1/(20701-3/2010)**
20701-4/2010		ΤΟΤΕΕ 20701-4 /2010	ΔΠ1/(20701-4/2010)
20701-5/2010	**ΤΟΤΕΕ 20701-5 /2012**		

Previous to Directive 2002/91/EC, energy efficiency related regulations were the Greek Thermal Regulation, which was implemented in 1981 and specified the limits for U-values and restricted heat transfer through the building envelope, and the following Technical Instructions of the Technical Chamber of Greece (TOTEE):

- 2421/86 for the installation of boilers for the heating of buildings.
- 2423/86 for the installation of cooling systems in buildings.
- 2425/86 for the calculation of cooling loads in buildings.

The Thermal Insulation Regulation of Buildings (Government Gazette 362/04.07.79), was removed and replaced with the thermal-insulation sufficiency inspection, which introduces strict U-value limits. According to "KENAK", the thermal insulating sufficiency is introduced as an integral part in the Energy Performance Study.

As it was indicated above, Directive 2002/91/EC was recast by Directive 2010/31/EU issued on 19 May 2010. The harmonization Greek legislation to the 2010/31/EU Directive occurred with Law 4122/2013 on the energy performance of buildings.

Law 4122/2013, among other provisions, has the following most important points:

- It specifies the time limits for meeting the "nearly zero-energy requirements" for new buildings
- It creates a methodology for calculating the energy performance of buildings.
- It sets out minimum energy performance requirements taking into account cost-optimal levels calculated through a comparative methodology.
- It addresses several issues related to energy audits and the issuance of Energy Performance Certificates (EPCs).

Presently, government administration put efforts in order to fulfill the new requirement of EPBD recast. These efforts will lead to almost zero energy demand buildings by the end of the decade.

Law 3855/2010 (Government Gazette, 95/A) on "Measures for the improvement of energy efficiency in end-use, energy services and other energy provisions" defines the legal frame and the financial means in order to achieve energy efficiency in the final use and sets the national final energy savings target at 9% by 2016 (16.46 TWh), as compared to average final energy consumption for the period 2001-2005. The Law applies Directive 2006/32/EC into Greek legislation. The 9% objective remains unchanging and the progress is being monitored by the National Energy Efficiency Action Plans (NEEAP). NEEAP helps national strategy, and sets policies and measures to improve energy end-use efficiency[34]. The 2nd NEEAP implements Directive 2006/32/EC and the Law 3855/2010 and integrates the methodology of Ministerial Decision D6/7094/2011 "Framework methodology for measuring and verifying energy savings for achieving the national indicative energy end-use savings target-list of indicative eligible measures to improve energy efficiency-energy content of fuels for end use" in order to monitor the 2016 national energy savings target.

This special target was defined at a rate of 9% in end-use until 2016 in order to achieve energy savings. Also, other measures and actions have been applied at national level, which developed the institutional and regulatory framework for implementing policies, obligations and strategies in all end-use sectors[35]. In particular, the following main subject-matters have been developed:

- The institutional framework for the energy efficiency and certification of buildings.
- The technical specifications of new buildings, the obligations of the public sector and energy providers.
- The method to monitor and evaluate improvement in the realization of the national target implementing proper technical guides, databases, records.
- The requirements of the public sector and energy providers.

However, the deep economic recession in Greece became the most critical factor for evaluating the success of implementing specific measures to improve energy efficiency and analyzing the energy savings in end-use.

It should also be mentioned the Presidential Decree No 100 on "Energy inspectors/auditors Register" (Government Gazette 177/A) issued in October 2010, which describes in details the conditions and the requirements of the energy auditors[36], and the training and certification procedure. The Ministerial Decision No Δ6/B/14826/17.6.2008 "Measures to improve energy efficiency and energy savings in public and broader public sector", which is mainly related to public sector and determines certain measures for the improvement of the energy performance and the saving of energy in the public sector.

[34]European Commission, DG Energy (2013). Guidance for National Energy Efficiency Action Plans. Available at: http://ec.europa.eu/energy/efficiency/eed/doc/neep/20131106_swd_guidance_neeaps.pdf
[35]European Commission, DG Energy, Energy Efficiency, (2013). National Report (Greece). Available at: http://ec.europa.eu/energy/efficiency/eed/doc/reporting/2013/el_2013report_en.pdf
[36]http://www.buildingcert.gr/ (in Greek only)

In Greece the Special Secretariat for the Environment and Energy Inspectorate (SSEEI) of the Ministry of Environment, Energy and Climate Change has been established under Law 3818/2010. The framework and the responsibilities of the SSEEI are analyzed in the next paragraph.

3.2.2 Administrative framework

The Ministry of the Environment, Energy and Climate Change[37] (MEECC, YPEKA) is the main governmental organization dealing with energy efficiency issues. The Ministry has the overall responsibility for energy efficiency policy in Greece[38]. Inside MEECC, the Renewable Energy Sources and Energy Saving Directorate and the Special Service of Energy Inspection are actively involved in energy efficiency policy development and implementation[39].

Also, the General Secretariat for Energy and Climate Change, the General Secretariat for Regional Planning & Urban Development, and the Special Secretariat for the Environment and Energy Inspectorate (SSEEI) are associated with building energy efficiency.

The General Secretariat for Energy and Climate Change conducts the following:

- Policy making in the energy sector and the development of mineral resources; undertakes the necessary measures for the implementation of the respective policies; exercises supervision over the institutions and bodies with competence for the development of domestic energy and mineral resources.
- Coordinates the activities of individual organizational units in order to design, promote and implement energy, oil and mining policies.
- Exercises market surveillance, establishes the legal framework, the technical and quality standards, validates and checks the inputs and outputs, as well as the implementation of regulations concerning production, installation, storage, transfer, delivery, supply, security of energy and mineral resources, products and services.
- Supervises the implementation of the regulations which concern the power plant licensing process, energy transfer and delivery; Responsible for the introduction of the appropriate national regulatory framework for the electricity market.
- Is Responsible for the representation of the Ministry at National, European and International bodies, institutions and organizations regarding issues which concern its competences

The Special Secretariat for the Environment and Energy Inspectorate (SSEEI) is responsible for the management of the central, regional and local related

[37]Ministry of the Environment, Energy and Climate Change. http://www.ypeka.gr
[38]European Environment Agency (2011). Available at: http://www.eea.europa.eu/themes/economy/resource-efficiency/resource-efficiency-policies-country-profiles
[39]ODYSSEE- MURE, Enerdata (2012). Energy Efficiency Trends in Buildings in the EU. Available at: http://www.odyssee-mure.eu/publications/br/Buildings-brochure-2012.pdf

departments, the implementation of the relevant environmental - energy legislation, and quality management.

The SSEEI consists of:

- The Hellenic Environmental Inspectorate (HEI). The main responsibility of the Inspectorate is to undertake inspections in order to monitor compliance with the environmental permits for projects of the private and public sectors.
- The Office for Demolition of Illegal Constructions, reporting to the General Inspector of the Hellenic Environmental Inspectorate. This Office, with the technical assistance of "Ktimatologio S.A." (Hellenic Cadastre), is responsible for locating illegal constructions in specific areas in the Attica Prefecture (areas destroyed by the fires in August 2009, as defined under article 1 – par. 1 of Law 3818) and implementing the relevant demolition acts for any illegal building.
- The Independent Coordination Office for the Implementation of Environmental Liability, established through Presidential Decree 148/2009 on environmental liability (harmonization to the Directive 2004/35/CE of the European Parliament and the EU Council on environmental liability with regard to the prevention and remedying of environmental damage).
- The Hellenic Energy Inspectorate (Special Service of Energy Inspectors, SSEI). Its mission is to monitor the achievement of the objectives of the national energy policy on energy saving and energy efficiency and to implement articles 1 to 12 of Law 3661/2008 on "Measures for the reduction of energy consumption in buildings" (harmonization to the Directive 2002/91/EC of the European Parliament and EU Council on the energy performance of buildings).

The Special Service of Energy Inspectors (SSEI) is also responsible for inspecting and monitoring the implementation of the Law 3661/2008 and its specified measures regarding, among others, the diminution of energy consumption of buildings. Additionally, the SSEI is in charge of issuing Energy Performance Certificates (EPC). Currently, there are 590 inspectors resident in the region of East Macedonia and Thrace, from whom 111 have registered office in the Municipality of Kavala.

The Ministry of Infrastructure, Transportation and Networks, the Ministry of Development and Competitiveness, and the Ministry of Finance also affect the energy efficiency administrative framework.

The Centre for Renewable Energy Sources and Saving (CRES)[40], which is under the supervision of YPEKA, also promotes renewable energy and energy efficiency at a national level, assists national energy planning, helps the formulation of energy policies and is involved in the development of R&D activities.

[40]Centre for Renewable Energy Sources and Saving (CRES), http://www.cres.gr/kape/index_eng.htm

The CRES is the Greek national entity for the promotion of renewable energy sources, rational use of energy and energy conservation. The CRES is energetically active, in the frame of the national and Community policy and legislation, for the protection of the environment and sustainable development. The organization develops state of the art of technology and implements innovative projects and significant activities for the promotion and market penetration of new energy technologies regarding RES and energy savings.

The CRES promotions and works on Renewable Energy Sources (RES), Rational Use of Energy (RUE) and Energy Saving (ES) applications at a national and international level, as well as supports related activities.

The Center has been appointed as the national co-ordination centre in its area of activity and was founded in September 1987 by Presidential Decree 375/87. It is a public entity, supervised by the Ministry of Environment, Energy and Climate Change and has financial and administrative independence.

The CRES management includes representatives from the General Secretariat of Research and Technology (Ministry of Education and Religious Affairs, Culture and Sports), the Public Power Corporation and the Hellenic Federation of Enterprises. It has a scientific staff of more than 120 highly qualified and experienced multidisciplinary scientists and engineers and comprises of the following units and offices:

- Division of Renewable Energy Sources
- Division of Energy Efficiency
- Division of Energy Policy and Planning
- Division of Development Programs
- Division of Financial and Administrative Services
- Furthermore, there are two separate offices
- Quality Assurance Office
- Legal Services Office

The Regulatory Authority for Energy (RAE)[41] is an independent administrative authority in Greece. RAE has financial and administrative independence by the provisions of the law establishing it. RAE was established on the basis of the provisions of L. 2773/1999, which was issued within the framework of the harmonization of the Hellenic Law to the provisions of Directive 96/92/EC for the liberalization of the electricity market.

RAE duties include with respect to access tariffs to electricity and gas networks, the terms and conditions for the provision of balancing services in natural gas, as well as on issues related to security of electricity and natural gas supply. Furthermore, on the basis of the modifications introduced with the abovementioned laws, RAE acts as

[41] http://www.rae.gr/site/en_US/portal.csp

a dispute settlement authority with respect to complaints against transmission or distribution system operator in both electricity and natural gas sectors.

The duties and responsibilities, among others, assigned to RAE relate to the following subjects:

- Monitoring the operation of all sectors of the energy market (Electricity, Natural Gas, Oil Products, Renewable Energy Sources, Cogeneration of Electricity and Heat etc.).
- Collection and processing of information from companies in the energy sector while respecting the principles of confidentiality.
- Participation in the pre-parliamentary legislative process through recommendation to the Minister of Development of the appropriate measures related to compliance with competition rules and to the overall protection of the consumers in the energy market.
- RAE issues a report every two years on security of supply both for electricity and natural gas, which is published and submitted both to the Minister of Development and the Commission, pursuant to the provisions of laws 3426/2005 and 3428/2005.
- Advice under the form of a simple opinion, with respect to the enactment of the secondary legislation, with the exception of the Electricity Grid Operation Code, the Power Exchanges Code, the Distribution Network Operation Code, where RAE enjoys the right of a consenting opinion. Furthermore, with respect to natural gas, RAE gives a consenting opinion for the issue of the Operation Codes of the National Natural Gas System as well as of the Independent Natural Gas System, while it approves the appropriate methodologies and details for the implementation of both Operation Codes.
- Advice under the form of a simple opinion, with respect to the terms and conditions for access to the transmission and distribution networks. Approval of the methodologies for the access tariffs to electricity transmission and distribution networks.
- Monitoring of the exercise of the activities undertaken by licensees and access to information.
- Advice, under the form of a simple opinion, in the procedure for the approval of electricity retail tariffs with the exception of access tariffs.
- Imposition of financial sanctions, particularly fines to the violators of the primary and secondary energy legislation.
- Arbitral resolution of disputes between parties on electricity and natural gas legislation.
- Dispute settlement authority with respect to complaints against electricity transmission or distribution system operators and the owner of the electricity network, as well as against Natural Gas System and Distribution Operators on infringements of primary and secondary electricity and natural gas legislation.
- Cooperation with Regulatory Authorities of other countries, international Organizations and the European Commission.
- Reporting on an annual basis to the Commission on market dominance, predatory and anticompetitive behavior on the basis of the appropriate information submitted by the Competition Authority.

LAGIE S.A. is the operator of electricity market in Greece and implements the regulations for the operation of the electric energy market in accordance with Law 4001/2011. LAGIE S.A. was established by Law 4001/2011 (Government Gazette 179/22.8.2011)

In this framework LAGIE S.A. carries out the following activities:

- Manages the Daily Energy Planning
- Cooperates with the relevant energy operators
- Keeps the special energy market participant registry
- Provides the necessary in time information to the electric energy market participants
- Participates in joint ventures and electric energy market in order to establish peripheral markets.
- Conclude electric energy contracts with RES and cogeneration production installations. These installations should be in the connected system.
- Performs the arrangement of monetary transaction in the framework of daily energy programming

The Green Fund[42] also plays a key role in monitoring the collection, control and allocation of Green Resources for the implementation of measures and actions to improve energy efficiency. The Green Fund is legal persons governed by public law. The fund established by Law 3889/2010 and is under the supervision of the Ministry of the Environment, Energy and Climate Change. The fund is the continuation of the Special Implementation Fund of Regulatory and Urban Planning.

The scope of Green Fund is to strengthen the development through environmental protection supporting programs, measures, implementations and actions, which aimed to promote and restore the environment. Support includes administrative, financial, and technical services. In addition, the fund intends to support the environmental policy of the country and to service public interest.

The responsibilities of the "Green Fund" are described as follows:

- Monitoring of money collection,
- Inspection and performance assurance of Green Resources in according with the relative ordinance.
- Program formation to finance measurements and actions related to environmental protection, upgrading and recovery, within the framework of energy and environmental policy.
- Evaluation and selection of proposals and financed programs as well as their monitoring and implementation assurance.
- Proposal development and advisement of the general accession criteria and programs selection to the Minister of the Environment, Energy and Climate Change.

[42] http://www.prasinotameio.gr/index.php/en/

- Suggestion of measurements, actions and programs to the Minister of the Environment, Energy and Climate Change.
- Realization of the necessary procedures for the selection of the appropriate implementation bodies of the above mentioned actions.
- Agreement creation with the implementation bodies for the terms and the financing conditions from Green Recourses.
- Monitoring of the implementation and the financing of the above mentioned agreements from Green Recourses.
- Informing the Environmental Policy Strategic Committee and the Minister of the Environment, Energy and Climate Change.
- Proposals development and introduction of them to the Minister of the Environment, Energy and Climate Change and the Strategic Committee. These proposals are related to the achievement of the environment protection and climate change policy targets.
- Maintenance of the public data base that includes the Green Recourses legislation.
- Organization, monitoring and publication - dissemination of programs and actions
- Annual programs performance report.
- Finding additional financial sources from public or private bodies, and conducting any necessary operations ensuring funds from any source, such as acceptance of donations, subsidies and third party contributions.
- Preparation and publication of the annual financial report of the Green Resources.
- Subcontracting to third parties any supporting study and consultancy services to optimize the preparation and administrations of the funding programs. Specifically, the subcontracting intends to improve planning, evaluation, monitoring, and implementation control of the programs. Also, subcontracting supports the Environmental Policy Strategic Committee on demand.
- Grant, subsidy, financing and lending of local authorities, legal persons governed by public or private law, utilities, and other public and broader public sector organizations. Public and broader public sector organizations are determined by the Law 1256/1982 regarding program implementation, execution of works, and financing the execution of works.
- Financing by any means the legal persons, which are supervised by the Ministry of the Environment, Energy and Climate Change or other Ministries, and have, as specific purpose, the implementation of actions and interventions that aim at the environmental protection and climate change actions.
- Specialization of the structure and planning specifications regarding funding programs, and management, monitoring, evaluation and implementation control procedures.

Additional responsibilities and functions of the Green Fund are described in article 9 (paragraph 5) of the Law 3855/2010.

The resources of the Green Fund are described in articles 3 and 8 of the Law *3889/2010 and in* article 9 (paragraph 5) of the Law 3855/2010. There are also additional provisions for the resources of the fund. The fund resources are detailed in Ministerial Decision 4503/23.11.2012.

Generally, with the term "green resources" mean all revenues and resources from:

- The Special Implementation Fund of Regulatory and Urban Planning
- The Blue Fund
- The Special Forest Administration Body
- The Environmental Balance Fund

3.2.3 Challenges and opportunities

Many challenges and opportunities, which are indicated before in the EU level, are relevant in National level. The adoption of Directive 2010/31/EU in Greek legislation and the relative functional progress will lead to almost zero energy demand buildings. Challenges also includes the supply of the rest required energy applying renewable energy sources, such as photovoltaic, solar thermal collectors, heat pumps, small wind turbines, etc.

The intense and long-lasting financial crisis and rising energy costs in Greece put emphasis on the necessity to search new technologies and opportunities rising from renewable and energy conservation measures.

The challenges and opportunities at local level are synopsized below:

- Enabling legal framework.
- Put efforts to lead to nearly zero energy demand buildings.
- Setting performance requirements when a major renovation is to be carried out.
- Support the energy performance certificates, inspections of heating and air-conditioning systems, and energy performance requirements, without increasing bureaucracy.
- Provide local authorities and interested parties with a calculation instrument to show the cost benefit of energy efficiency.
- Better understand the factors that affect energy performance of buildings decisions in order to design and implement policies that will more effectively push energy efficiency investments and actions.
- Develop frameworks for higher market uptake of low or zero energy and low carbon buildings.
- Apply at administrative level one-stop shop model that manages administrative barriers by having one agency to provide simple and full services for the beneficiaries.
- Initiate skills and training programs covering the key professions and disciplines.
- Develop packaged solutions that can be readily replicated in similar building types.

- Introduce quality standards/certification systems for installers & products (including packaged solutions).
- Apply and search new technologies on renewable energy sources and energy conservation measures.
- Support research, development and demonstration projects using new & improved technologies for energy efficiency and renovation of buildings including how to extent demonstration projects.
- Encourage development of local supply chain industry for maximizing macro-economic benefits and to minimize embedded CO_2 emissions
- Deploy knowledge and experience-sharing networks across regions.
- Develop promotional and dissemination activities that sensitize building owners to opportunities for deep renovation.[43],[44],[45]

The above mentioned challenges and opportunities will direct, not only to conform to new regulations, but also, to diminish building carbon footprint, reduce the operational cost of buildings, and maintaining a healthy and comfortable indoor environment.

The implementation of energy efficient buildings will lead to higher efficiency standards in the near future such as:

- Low energy buildings
- Passive houses
- Zero energy buildings and zero carbon buildings
- Pleonasm energy buildings

In Greece, a number of regulations and initiatives[46] provide incentives for improved energy efficiency in buildings, as it is shown below:

- Ability to sell energy from rooftop photovoltaic systems, as it is defined in the Law for renewable sources.
- Some banks provide special loans for the integration of photovoltaic systems in buildings.
- The Greek Government has lately developed financial incentives that co-financed from the European Union (ERDF-Greece) for the implementation of energy efficiency improvement renovations and interventions.

After the completion of the legal framework in Greece, on energy efficiency in buildings, the Ministry of the Environment, Energy and Climate Change (YPEKA) launch a significant financial incentive in residential buildings, through the "Energy Efficiency at Household Buildings" program "EXIKOMISI KAT' OIKON". This program

[43]Ministry of the Environment, Energy and Climate Change. Programs. Available at: http://ec.europa.eu/energy/efficiency/buildings/doc/gr_-_letter.pdf
[44]Ministry of the Environment, Energy and Climate Change. Energy efficiency at buildings. Available at: http://exoikonomisi.ypeka.gr
[45]http://www.ktizontastomellon.gr/
[46]ODYSSEE- MURE, Enerdata (2012). Energy Efficiency Trends in Buildings in the EU. Available at: http://www.odyssee-mure.eu/publications/br/Buildings-brochure-2012.pdf

subsidizes and provides incentives to house owners to implement energy efficiency renovation and interventions actions under specific rules.

The types of households, which are eligible for subsidy during the program, are single buildings comprising of only one property (detached house), one single building or complex of buildings (block of flats) comprising more than one properties, and a property in a block of flats used as a residence (apartment). All the above mentioned residences must meet the criteria described below:

- They are located in areas with a zone price, as it is shown on the Single Real Estate Fee (ETAK), lower than or equal to 2100 €/m^3, as set by 31.12.2009.
- They have a building permit or relevant legalization document, which verifies that the building is legal.
- They have been classified, according to the Energy Performance Certificate (EPC), as lower than or equal to class D (low energy efficiency buildings).
- The owners meet specific low income criteria.
- They have not been marked for demolition.
- Only one application can be submitted for each eligible residence.

Legal framework of the above program includes the **Buildings' Energy Efficiency Regulation** (Ministerial Decision: Δ6/B/5825/30.03.2010, KENAK) and the Presidential Decree 100/30.09.2010 concerning energy inspectors.

3.2.4 Problems and constraints

Many barriers slow down energy efficiency in buildings, such as insufficient finance for efficiency improvement, not enough information, users' lifestyle choices, and increased initial cost of new buildings. Furthermore, administrative standard operating procedures and informal practices may hold back responsiveness.

Although there are some purposeful incentives, additional energy efficiency investments in buildings have been decelerated due to high initial investment costs, national financial problems, credit risk and rather extended redeem periods.

The development of most buildings focuses on construction costs with very little concern for running costs. The weight of energy efficiency in buildings is traditionally low due to the warmer climate in Greece, although, there are many building with relatively poor insulation and fuel prices are high.

In general there is lack of experience, skills and expertise regarding subsidized EU programs in public and building sector. Thus, the implementation of complicated and large scale programs is difficult.

The existing financial crisis has stricken Greece much harder than the rest of the EU. The lack of liquidity in the banks causes them to demand high collateral and interest rates for loans. This particular difficult situation has as a result to put everything on a hold, and no money is lent. On top of that, the economic crisis forces drastically cut government expenses. Currently in Greece, the housing market, building sector

and construction sector is near to collapse, which makes investment in buildings less attractive. However, for the Greek government it seems that EE investments in the building sector could be an attractive option to create employment and stimulate economic improvement.

Lastly, a problematic situation at national level refers to informal settlements. Usually, these settlements have significant importance in energy efficiency legislation. In Greece, such buildings are relatively well built and number nearly one million across the country. Building efficiency legislation and regulations should take account this social and economic issue, which requires a combined approach at technical and administrative level.

3.2.5 Kavala (local level)

3.2.5.1 Legal framework

In general, the existing legislation, building codes, and standards for energy efficiency are the same among the municipalities and around the country. This is due to minor climatic variations around the country and the relatively small area of the country. Thus, it is insignificant to building codes and standards for energy efficiency adjusted to the local conditions.

Installations and small scale works in buildings must be notified to local authorities and the relevant license must be obtained from local authority. Also, article 10 of the Law 3851/2010 imposes the submission to the town planning authorities a technical, environmental and financial feasibility study, on the installation of at least one alternative system for energy supply for all new buildings.

3.2.5.2 Administrative framework

Municipal Authorities are in charge for approval of the building permit and thus, they approve the mandatory energy efficiency study, which is issued by the energy auditors and required by Ministerial Decision No: Δ6/Β/οικ. 5825 (Government Gazette/ 407/Β/2010, 9/4/2010), as it is shown in paragraph 3.1.

At local level, energy auditors play a key role in energy efficiency since they verify the compliance of new buildings with the energy performance requirements of the Ministerial Decision Δ6/Β/οικ. 5825, complete audits, and issue the required energy performance certificate. It should be noted that Energy certificate is mandatory requirement on completion, on sale, and on rental of building.

The Municipality of Kavala has voluntarily to improve energy efficiency in the municipal area. The municipality decides the reduction of CO_2 emissions by 20% until 2020 comparing to CO_2 emission of 2011. The municipality has already implemented

Sustainable Energy Action Plan[47]on its territory, with the aim of cutting CO2 emissions by at least 20% by 2020.

3.2.5.3 Challenges and opportunities

The following opportunities exist at local level:

- Skills and expertise improvement of institutional and administrative local organizations.
- Investigation of public buildings with poor energy efficiency and energy management.
- Find materials and techniques to renovate building having pure insulation.
- Establish and local management scheme to improve and monitor the energy performance of existing public buildings and the progress of the microclimate of open spaces
- Analysis of the potential of buildings heating systems to provide efficient and low carbon energy.
- Proper monitoring and enforcement of compliance with building codes.
- Reducing unnecessary bureaucracy during work permission.
- Continuation of financial incentives
- Establish publicly accessible information databases demonstrating energy performance of buildings.
- Launch information databases demonstrating deep renovation benefits.
- Start educational and training programs covering the key professions and disciplines in order to enhance skills.
- Demonstrate that the implemented efficiency measures in the residential sector remain affordable.
- Inform about the synergetic benefits of energy efficiency measures such as environmental and social benefits.
- Communicate regularly and provide publicly on progress with the renovation strategy.

3.2.5.4 Problems and constraints

All the problems and constraints that are mention in paragraph 3.2.4 apply at local level. The main portion of CO_2 emission at local level comes from the electrical energy consumption (64%). In particular, the contributions in electrical energy consumption are 42% from houses, 30% from the tertiary sector installations and buildings, and 22% from transportations. Therefore, the Municipality of Kavala has determined, as a priority axis for CO_2 emission reduction, the electrical energy saving in buildings and tertiary sector.

The participation of local citizens in energy efficiency actions seems necessary; however, information action plans and measures are not many. The percentage of buildings, which constructed before 1979, is approximately 65%. Usually, these

[47]Municipality of Kavala, Sustainable Energy Action Plan, Greece (2012). Available at: http://helpdesk.eumayors.eu/docs/seap/2557_1354360050.pdf

buildings do not have thermo-insulation. Additionally, almost 50% of all buildings have high U-value.

The vast majority of buildings are equipped with high energy consuming lighting systems and have inefficient quality of natural lighting consuming high amount of electricity. In addition, 23% of buildings have old and energy insufficient installations for heating systems with incorrect maintenance.

The main local disadvantages at municipal level are described below.

- Confusion of responsibilities.
- Large number of management offices and departments.
- Delay in administrative decision-making process.
- Absence of suitable instrument to monitor and control procedures and project process.
- Indefinite separation of administrative and political responsibilities and field of action.
- Inadequate internal communication.

Finally, the basic problem of the Greek reality is the ellipse of “energy culture”. The final building and energy installations user plays the important role in energy efficiency.

3.3 Moldova (national level)

3.3.1 Legal framework

Energy efficiency development in Moldova has encountered some development since the beginning of 2000 when the first Law on energy conservation No. 1136 as of 13.07.2000 was adopted and published in the Official Monitor No. 157-159 as of 21.12.2000.

According to that Law, National Agency for Energy Conservation was created and acted as the specialized state institution responsible for promotion and implementation of energy efficiency in Republic of Moldova. In 2007 this Agency was liquidated and all responsibilities were transferred to the Ministry of Energy.

Currently, Law on Energy Efficiency No. 142 as of 2010 which transpose the provisions of Directive 2006/32/CE on energy efficiency for final consumers and energy services was approved on 02.07.2010 by the Parliament.

The Ministry of Economy has the overall responsibility for the energy efficiency development in Republic of Moldova. According to the provision of the new Law, two new institutions were created: Energy Efficiency Agency (AEE) and Energy Efficiency Fund (FEE).

FEE is an independent, self-governed institution that provides different financing tools for energy efficiency projects. The budget of FEE is created from the state budget resources and represents a 180 mln MDL (apr. 10 mln Euro) for 2014.

AEE is a separate state institution specialized on promotion and development of energy efficiency and use of renewable energy sources. It is subordinated to the Ministry of Economy and has its own staff and budget.

Provisions of Law no. 142 on energy efficiency include inter-alia the following:

- Energy auditing
- Elaboration of energy efficiency programs and action plans
- Responsibilities of central and local governments.

There are several development policy documents that envisage the development of energy sector and subsectors, namely:

- National Development Strategy of Republic of Moldova until 2020, (hereinafter ‘Moldova 2020 Strategy’); and
- Energy Development Strategy until 2030, (hereinafter ‘Energy Strategy’).

Elaboration of Moldova 2020 Strategy was performed by the Government of Moldova as part of an extensive consultation process with civil society and development partners, where charting the country’s development path.

The National Development Strategy of Republic of Moldova until 2020 represents the basic strategic country development policy document, which covers all economic and social sectors and sets certain strategic targets in seven key areas, one of which is "Energy: Delivered Safely, Used Efficiently".

Moldova 2020 Strategy acknowledges that the Moldovan energy sector still faces a lot of challenges related to security of supply, energy efficiency, use of renewables, obsolete infrastructure, high debts in heat sector and undeveloped energy market.

A 95% share of energy resources are imported from a limited number of energy suppliers[48], which leads to high risks to the energy security. According to Moldova 2020 Strategy, the risks should be diminished through the energy sector development based on the following pillars: (i) ensuring the country's energy security; and (ii) increasing energy efficiency.

Strengthening of the energy security is envisaged to be achieved through energy market liberalization in compliance with Energy Community Treaty provisions, integration into the European energy market, development of energy transmission interconnections and creation of new energy production capacities.

The reduction of energy intensity in residential, industrial, transport and agricultural sectors, implementation of energy efficient technologies, involvement of local energy resources, including renewable energy sources represent the measures proposed to address the second pillar – increase of energy efficiency.

Heat production decreased by 20% from 2001 to 2009. Massive disconnections of heat consumers from the district (centralized) heating systems are a driving factor of this trend. Heat losses are still high both on supply side (approx. 21%) and on the demand side (potential for thermal energy savings is up to 50% by conservative estimates); the losses should be reduced to the average European level.

Energy intensity in Moldova is up to three times higher than the average European level, which has a detrimental impact on economic performance and competitiveness, specifically in case of industrial production.

A stable improvement of energy efficiency by 10% would result by 2020 in 880 mln. MDL (approx. 75 mln. USD) annual savings[49]. This would boost GDP annual growth rate by at least 0.2%.

The main sectorial policy document, the Energy Strategy until 2030[50] was approved in 2013. The Strategy was elaborated in accordance with EU-Moldova Action Plan and

[48]Currently there is only one supplier of natural gas – Gazprom, and two major electricity suppliers – MGRES thermal plant in the break-away region of Transnistria and Energoexport/Ukraine.
[49]Moldova 2020 Strategy
[50]Energy Strategy until 2030, Gov. Decision No. 958, as of 16.01.2013.

the Acquis Communitaire in order to align the Strategy to European Union energy objectives.

Residential sector still represents the biggest energy consumer with more than 46% in comparison with EU level of 26.5% while the industrial sector has a small share in energy consumption of 6.9% in comparison of 24.2% in EU.

The objectives of the Moldova 2030 Strategy are set for two time periods: until 2020 and 2020-2030. Specific objectives to be achieved by 2020 in the energy sector refer as well to the improved energy efficiency.

The objectives for 2021-2030 period refer additionally to the following:

1. Ensure the increase of renewable energy sources use. On long run period, development of CO2 reduction efforts through promotion of capture and storage of CO2 which could influence the energy mix structure in the future.
2. Improved energy efficiency
3. Development of smart grid concept on the energy market.

In order to achieve the Objectives of the Strategy, a number of targets for 2020 have been developed and described in the Strategy, as follows:

a. Construction of interconnection lines: natural gas 40 km; electricity – 139 km;
b. Reach 20% of RES out of the total energy mix, with an intermediary target of 10% by 2015;
c. Share of biofuels in total fuels balance – 10%;
d. Increased power generation capacities – 800 MW[51];
e. Share of renewable energy in power production – 10%.
f. Reduced energy intensity by 10%;
g. Reduced transportation and distribution losses by 11% (13% by 2015) for electricity, by 39% for natural gas and by 5% for heat.
h. Reduced greenhouse gas emissions by 25% (as compared to 1990 baseline).
i. Reduced energy consumption in buildings by 20%.

Also, Moldovan authorities need to develop new financing mechanism for EE and RES development.The intentions of the Government of Moldova in the area of EE and RES promotion and development are described in the 'National Programme on Energy Efficiency for the years 2011 – 2020', which includes the following specific objectives:

- Promotion of power and heat production in cogeneration as one of the most efficient way of power and heat production;
- Review of the Concept on development of heat supply, approved by Governmental Decision no. 189 as of February 20, 2003, where the priority should be given to combined heat and power production and use of RES;
- Reduction of power losses from 13% in 2011 to 7-10% by 2020;
- 100% metering of natural gas consumption;

[51] In 2011 there were about 350 MW of installed electricity generation capacities (on the right bank).

- Certificates for buildings energy performance;
- Increase the number of 'energy passive buildings';
- Formation of energy managers;
- Elaboration of normative indicators on energy and environmental performance for products with energy impact used by final consumers;
- Elaboration and approval of Law and regulations on energy performance of buildings;
- Elaboration of an energy efficiency Program for the industrial sector.

In 2012, Ministry of Economy had elaborated draft Law on labelling of products with energy impact, which was approved in 2014. Also, in 2012 Ministry of Construction and Regional Development had elaborated two documents:

- Draft Road Map on energy efficiency in buildings
- Draft Law on Energy Performance of Buildings

The Road Map includes the steps and timeframe for the implementation of Law on Energy Performance of Buildings and was approved both by the Ministry of Construction and Regional Development and by the Agency for Energy Efficiency.
The Draft Law on Energy Efficiency of Buildings was approved by the Government and was submitted for approval to the Parliament and transposes the Provisions of the Directive 2010/31/UE of the European Parliament and European Council as of May 19 2010 on Energy Performance of buildings.

Energy Efficiency Agency elaborated the normative framework required for energy and environmental performance evaluation of products with energy impact. The set of normative acts are under review process and according to Energy Efficiency Agency representatives, this secondary legislation will be approved in 2012. Ministry of Construction and Regional Development is working on the draft Law on buildings energy performance, which is also expected to be approved in 2012.

Even if the residential sector is the biggest heat consumer (more than 70% in urban areas and more than 80% in rural areas) there are no practical financing mechanisms launched by central or local governments to address the issue of energy efficiency (EE) or use of RES for heating purposes.

One of the biggest barriers for development and implementation of RES and EE projects in residential sector is the legal and institutional framework in place. According to statistical data, 98% of apartments are privately owned and according to the Law on Privatization of Housing Stock and Housing Code Home Owners Associations (HOAs) or Condominium Associations (CA) should be formed in existing and new constructed building stock in multifamily buildings, up to the moments these forms of ownership and management represent only about 23% of the housing stock.

Still, the existence of HOAs and CAs do not offer a real possibility to develop and implement EE or RES projects given the fact that neither of the form of organization

has a right of ownership that could be used to leverage commercial financing sources or act as a trustful counterpart on a Third Party Financing Contract. The largest share of housing stock is still maintained and operated by old soviet type organizations called 'Municipal Enterprises for Housing Stock Maintenance' that do not have ownership right over any housing stock area.

Given the importance and potential for energy consumption reduction in residential sector, a Moldovan Residential Energy Efficiency Credit Line[52] (MoREECL) was initiated in 2011 by EU under Neighborhood Investment Facility (NIF) with a total budget of 28,5 mln Euro, including a 5 mln Euro grant. Under this initiative, EBRD had developed and launched in 2012 Moldovan Residential Energy Efficiency Financing Facility (MoREEFF), which represents a facility that aims to give householders, Condominiums/Association of Apartment Owners, Housing Management Companies, Energy Service Companies or any other eligible service companies across Moldova an opportunity to realize the benefits of energy efficiency home improvements by providing them with loans and investment incentives through local participating banks.
The project envisages as well improvement of the legal framework as well as the institutional framework in order to facilitate loan contracting by HOAs and CAs and supporting the formation of residential sector energy auditors.

3.3.2 Administrative framework

According to the Law on Energy, the Central Government Authority empowered with energy sector administration, has the following responsibilities:

- elaboration and promotion of state policies in energy sector;
- elaboration of concepts and programs on energy sector development;
- monitoring the implementation of development and investments programs;
- elaboration of normative documents in the field of energy;
- development of international energy relations, including on acquisition of strategic energy resources, attracting investments, development of energy interconnections, and development of the energy market;
- state energy property management;
- support competition and limit the monopolistic presence in the energy sector.

Currently the Ministry of Economy is the Central Authority for energy policy-making in the Republic of Moldova. Ministry of Economy has the responsibility to elaborate all energy sector related policy documents, strategies, and programs. According to its responsibilities, the Ministry has to elaborate state policies in the energy sector taking into consideration the economic, social and energy security realities, opportunities and risks.

[52] Project lead - EBRD

As concerns the regulation of the energy sector, according to the same Law, a separate, independent agency is performing the regulatory activity – National Agency for Energy Regulation (ANRE), which has the following competences[53]:

- supervises the enforcement of energy laws;
- promotes and ensures fair competition and efficient operation of energy markets;
- according to Law on Natural Gas, Law on Electricity, Law on Oil Products, issues licenses for authorized activities on energy market;
- monitors the fulfillment of activities authorized by licenses and applies the provisions of laws listed above;
- promotes an adequate tariff policy following the interest of both producers and consumers;
- approves tariffs calculated based on approved methodologies and monitors their application;
- supervises the application of required and justified costs principle by regulated operators for regulated activities;
- supervises the consumers rights protection.

According to the Law on Energy Efficiency, a separate state Agency for Energy Efficiency (AEE), subordinated to Ministry of Economy, was created in 2010. The Agency's mission is to oversee development of the situation in the field of energy efficiency and renewable energy sources, to ensure preparation and submission of summaries of programs, investment evaluation of projects in the field, the development projects of normative acts, as well as the development of an information database in its areas of activity.

In fact, EEA in the process of achieving its mission, it is responsible to ensure achievement of the objectives and to support national program to improve energy efficiency, allowing for necessary assistance to the development of and plans for local energy efficiency and monitoring their completion.

In particular, AEE is responsible for the elaboration of National Program on Energy Efficiency and National Action Plans on Energy Efficiency – two major documents that qualify and quantify the required efforts to be taken by local and central governments to achieve the set objectives in the Energy Strategy.

The role of the Agency as a state institution for the development and EE and RES is to implement the state policy in the energy efficiency and use of RES. In order to accomplish its role, according to the Law on Energy Efficiency No. 142, Governmental Decision No. 833 regarding National Program on Energy Efficiency for 2011-2020 and Governmental Decision No 1173 as of 21.12.2010 regarding the Agency for Energy Efficiency, the Agency performs a number of activities such as:

[53] www.anre.md

- coordination of local EE Programs and Action Plans funded by state budget, international institutions or organizations, based on governmental agreements;
- authorization of fisical and legal persons for conducting energy audit;
- elaboration and submission for approval the minimum requirements of energy performance for imported and produced machinery and equipment;
- contribution to the elaboration of legal acts, including draft technical regulations and standards on EE and RES;
- contribution to elaboration of EE and RES National Programs and Action Plans;
- elaboraton of EE and RES pilot projects;
- providing informational support to local and central authorities for elaboration of EE and RES Programs;
- coordination of Programs and Action Plans elaborated by local authorities, as well as programs o EE funded by international institutions and organizations, based on Governmental agreements;
- ensuring information dissemination on EE, including the EE funding mechanisms, legal and financial framework approved to achieving the set national goals, as well as dissemination of information on RES use;
- providing consulting and information assistance to energy managers, energy servicing companies, businesses, as well as physical persons that activate in EE and RES areas;
- authorization of energy auditors and setting up a certification mechanism for energy auditors;
- evaluation of EE potential in the national economy;
- cooperation with international institutions and organizations on improving EE and RES use in Moldova;
- setting up a database on EE and RES and providing information based on inquiries from businesses or state institutions;
- organization of seminars, conferences and exhibitions for promotion of EE and RES use.

State Energetic Inspectorate

Is the state institution subordinated to Ministry of Economy, which has the following responsibilities:

- control of efficient use of electricity and heat by all sectors of national economy and implementation of energy efficiency measures;
- control of fulfillment by end consumers of the limits and consumption regime of electricity and heat;
- setting up improved accountability and quality of electricity and heat supplied to consumers;
- improving requirements for end consumers on technical exploitation and safety of electrical devices use;
- improved control on reduction of costs for electricity consumption for street lightning, heat supply, technological processes, etc.

Ministry of Regional Development and Construction

The Ministry for Regional Development and Construction shall be responsible for:

a) elaboration of legal and regulatory framework for buildings energy certification;
b) implementation the energy certification process;
c) Promotion of financing mechanisms required for elaboration and implementation of EPC;
d) establishing the committee for examination and examination of experts;
e) keeping list of certified persons;
f) publishing the list of certified persons on its website.

The Ministry or an organization authorised by it, shall be responsible for trainings, which are not obligatory for applicants. The Ministry or an organization authorised by it, shall be responsible for keeping record of and analysing the results of energy certification. The rules of registration and record keeping of the energy certificates shall be governed by individual legal provision.

3.3.3 Challenges and opportunities

The existing legal framework already puts a lot of pressure on the central and local governments to cope with the requirement to achieve the set goals on energy consumption reduction by 2020. Approval of new Law on Building Energy Performance is a task for the Ministry of Construction and Regional Development that has to be accomplished as soon as possible, since this Law sets clear technical requirements for the energy consumption of buildings.

At the same time, the increased energy prices during the last few years had put pressure on the consumers as well thus increasing the interest for reduction of energy consumption.

Building sector in Moldova is the largest energy consumer covering about 47% of the total energy balance, which is almost double in comparison with EU average. Given the construction standards used during soviet period, the efficiency of building stock is very low, having a lot of energy consumption reduction potential.

Enabling the existing and coming up legal framework on energy efficiency and energy performance of buildings requires certain level of expertise, capacities and abilities of local and central government that would allow elaboration and implementation of EE projects in public buildings.

Residential sector is the largest and at the same time the most difficult sector to be addressed since there is no adequate legal and institutional framework that would allow for implementation of EE projects. Unfortunately, there are no real projects implemented so far that would prove a feasible approach from the legal, technical and financial point of view.

Challenges and opportunities for the central and local authorities in improving the EE in building sector are the following:

- Elaboration and approval of the Law on Energy Performance of buildings;

- Enabling of the existing legal framework on energy efficiency;
- Monitoring of EE projects results and elaboration of recommendations for improved measures;
- Set up a database of the EE projects implemented by local and central authorities;
- Elaboration of feasible financing mechanisms for public, businesses and residential buildings;
- Conducting good quality energy audits and analisys;
- Elaboration of local EE Programs and Action Plans;
- Integration of EE programs into the municipalities development documents;
- Develop and implement the mechanism for elaboration of energy performance certificates;
- Elaborate a database on materials and equipment that would provide support to local authorities with information on the technical and efficiency characteristics, as well as price references;
- Develop mechanism for improved market reaction on the energy efficient buildings/apartments;
- Improve the certification process for materials and equipment as well as the control of the fulfillment of the quality standards upon the use of such materials and equipment;
- Organize tranings for local and central authorities representatives on EE projects, financing mechanisms and materials used;
- Develop and implement awareness raising campaign and information dissemination for interested stakeholders.

Central and local authorities have challenges and at the same time possibilities to develop good quality EE projects, to develop feasible financing mechanisms that would lead to achievement of the set goals and to the improved environment through the reduced carbon emissions in each municipality.

3.3.4 Problems and constraints

Central and local authorities are facing several problems in regard with the energy efficiency development in the building sector. The major problems faced are the following:

- Lack of vast experience of central and local authorities in elaboration and implementation of EE projects.
- Limited capacities and expertise in energy efficiency;
- Very limited financial resources available for energy efficiency projects;
- High prices of materials and equipment for EE;
- Low level of information on potential of energy efficiency benefits for different categories of buildings.

The above mentioned problems along with other create a number of impediments for energy efficiency development in building sector.Two big problems should be underlined that desrve a primary attention of the authorities:

a) Financing of EE projects;

b) Incentives for local authorities to implement EE projects;
c) Quality of materials and works used for implementing EE measures in the building sector;
d) Public acquisition constraints.

Along with the country wide financing problems caused by deficient state budget, EE should have a higher importance to central government due to immediate positive effects as on local and state budget as on the energy security of the country. Still, even there is a Fund on Energy Efficiency, the process of approval and disposing the financial means for EE projects is quite slow that leads to no use of available funds dedicated for energy efficiency projects.

Currently, local authorities do not have big incentives for energy efficiency projects because of the budgetary process, where state budget still sets limits for energy consumption/expences depending on the level of consumption. A real financial descentralization is required in order to give free hands to local authorities to manage the expences of energy consumption and to be interested in reducing such costs, while the saved money could be used for other needs that local authorities considers as appropriate.

The existing system of quality control of the materials and equipment used for EE projects has a number of deficiencies that lead to use of low quality materials and thus to lower efficiency of the measures implemented. Central authorities have to take measures, including legal framework improvement that would not allow for verndors delivering low quality materials. Also, central authorities have to improve the public acquisition rules in order to avoid procurement of low quality materials based on the lowest price principle only.

3.3.5 Cahul (local level)

3.3.5.1 Legal framework

Law on Local Public Authorities No. 436 as of 28.12.2006 stipulates the responsibilities of local authorities both for municipal council and mayor. According to the Law, local administration is responsible for the management and maintenance of the public buildings owned by the local authorities. Taking into consideration the coming Law on Energy Performance of Buildings, local authorities will have certain technical requirements for le level of buildings insulation and energy consumption to be fulfilled.

The requirements are similar for all municipalities and no differences are between different zones or municipalities in the country, which makes no need for each municipality to adjust the buildings energy performance specifications.The role of local authorities is to promote high energy performance standards through the administrative tools like elaboration of technical specifications for the materials and works to be performed under a given project, issue of construction authorizations, elaboration of energy sector local policies and programs, etc.

3.3.5.2 Administrative framework

According to the Law on Local Public Administration there are executive and legislative powers, which are Mayor and executive staff and Local Council, respectively.The competences of each power are as follows:

Local Council:

- has the right for any initiative within the given municipality;
- manages all public fixed assets;
- decide upon the rent, concession of public fixed assets;
- decide upon the privatization, commercialization, concession, or rent of private state assets;
- approves the local budget, use of special and reserve funds;
- approves studies and development programs of the municipality;
- etc.

The competences of the Mayor are the following:

- fulfillment of Local Council decisions;
- ensures the elaboration of draft local budget;
- acts on behalf of the municipality as the borrower;
- manages the state public and private assets;
- manages, coordinates and controls the operation of municipal utilities;
- ensures the elaboration of feasibility studies and submits for approval the lists of assets and services of local public interest for implementation of Public PrivatePartnership (PPP) projects;
- ensures monitoring and control of PPP projects;
- ensures elaboration of local Development Programs and Action Plans; etc.

Both executive and legislative power are coordinating the activities in order to achieve the goals set by the ruling parties in the Council, which form the governing majority. If no decision during 6 consecutive months is not taken by the Local Council, according to the Law, Council is to be dissolved and new local elections performed.

3.3.5.3 Challenges and opportunities

Challenges and opportunities of Cahul are much similar to those on the national level. At the same time, municipality has to struggle further for the implementation of the administration descentralization process, which was declared as a need by local governments.

Also, municipality of Cahul has to look for increasing the local budget through the development of the economic sector of the municipality, which impose the need to identify and implement attractive conditions for businesses.

3.3.5.4 Problems and constraints

Municipality of Cahul is striving for a better analysis of the current situation in the building sector, which can be ensured through different projects and programs that can involve high qualified experts. Also, local authorities are looking to elaborate a database on the building sector and to acquire a calculation tools that would help decision makers to prioritize the efforts of the local administration.

Of course, as on the national level, one of the biggest problem is the financial burden and no possibilities to afford at least most important initiatives on energy efficiency in public buildings, which bring a lot of benefits such as financial, social and environmental.

3.4 Romania (national level)

3.4.1 Legal framework

Applicable EU legislation is not fully transposed into national law and part of the applicable requirements are not fully implemented and enforced. Thus, Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings has been only partially implemented in national legislation by adopting GEO 69/2010, which provides for the acquisition features of boiler and rehabilitation of residential buildings with subsidized interest rates for 5 years, but fully supported direct payment beneficiaries and with the financial participation of municipalities. Later, in 2011, two laws were adopted, which provide tax incentives for the rehabilitation of the building through thermal insulation: Architectural Law no. 153 which applies to all buildings and improvements in terms of thermal performance and Energy Law no.158 with reference to blocks of flats.

In terms of minimum energy performance requirements for new and renovated buildings, energy performance certificate (EPC) for both new and old buildings, as well as for the testing of boilers and air conditioning, applicable laws and regulations in force should be better enforced.

In Romania, the market prices of buildings and apartments are still influenced by class energy performance of the building, as certified by a CPE. Because of the difficulties encountered, Romania has decided to postpone the energy certification of existing buildings for trading purposes until 2013. By 2013, EPC was required only for transactions financed under the "First House" programme as a prerequisite to bank loans.

Other inconsistencies in the national legislation include, for example, Romania's Energy Strategy - SER for 2007-2020, updated in 2011, that disregards the elements of "conflict" between the use and conservation of natural resources, such as the relationship between energy capacity (hydro, wind, etc.) and Natura 2000 network of protected areas. New Energy Policy of the European Union provides, inter alia, reduction of greenhouse gas (GHG) emissions by 20% by 2020 compared to 1990; 2011 to 2020 SER sets no clear target in this sense in the context of the energy sector, contributing with about 70 % of GHG emissions at national level. The document does not contain a summary of the results of previous energy strategy, results necessary to ensure that the objectives are achievable, sustainable and efficient in terms of costs.

For SOP was observed a lower degree of engagement on a range of topics such as theme 43 Energy efficiency, cogeneration, energy management, in relations to the EU allocation, which is 5.35%. Also, priority themes, such as 34 Electricity (TEN-E) or 36 Gas (TEN-E) were not contracted until 30 December 2011, as a result of delays in launching applications and submission of projects for KAI 4.3 - *Diversification interconnection networks in order to increase security of energy supply.*

Until 30 June 2012 , the SOP under PA 4 , KAI 4.1 *Efficient and sustainable energy* 41 contracts were signed for funding, EU contribution representing 28.11 % of the EU funds for the period 2007-2013 for this domain. In order to improve the technical condition of public electricity networks, it is necessary to sustain investment in the modernization of programmes developed to increase the reliability and quality of services provided to users of the network and reducing power losses.

However, to reduce losses in transmission and distribution of the heating networks, it is important to implement specific measures to increase energy efficiency. Thus, under Ordinance 22/2008 on energy efficiency and promotion of the end consumers' use of renewable energy, all economic operators that annually consume an amount of energy over 1000 toe (tons oil equivalent) are required to conduct an energy audit and undertake measures to improve energy efficiency and to prepare programs to improve the energy efficiency measures, including short, medium and long term.

In terms of increasing the energy performance of buildings within the entire territory of Romania, rehabilitation of about 2 million old apartments with a total investment cost of approximately 10.000 million is necessary. Final annual energy savings can reach about 40 PJ or 1,000 ktoe. Thermal rehabilitation measures should be implemented together with the implementation of energy performance certificates in order to obtain sustainable economy. However, given the higher specific energy consumption recorded for non-residential buildings - including in the context of a higher share of electricity use in these buildings to increase energy efficiency and reduce overall consumption of energy - it is required the installation of intelligent systems energy management. Schematically this process can be exhaustively represented as follows:

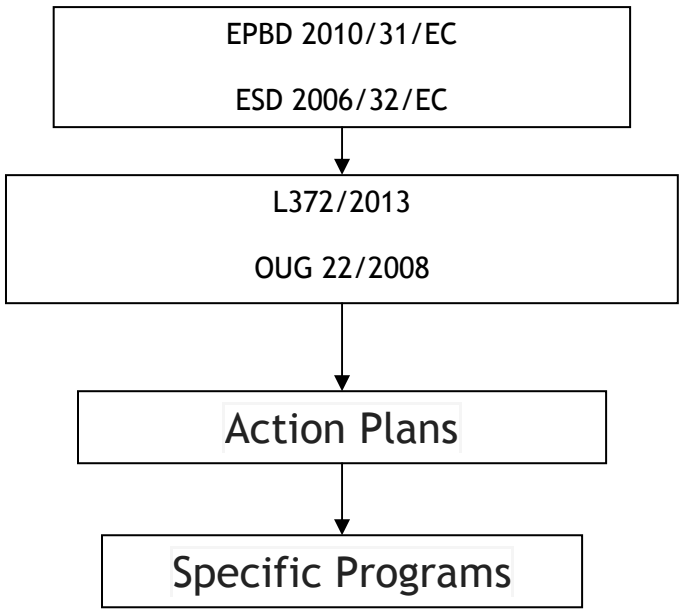


Figure 3.4-1: Process of increasing the energy performance of buildings in Romania.

Table 3.4-1: The applicable national legislation in the area of energy performance of buildings[54].

National Level		
No. crt.	**Legislation/Issuer**	**Description**
1.	Law 372/2013 on the energy performance of buildings Romanian Parliament	The law promotes the energy performance of buildings, taking into account outdoor climatic and site conditions, the indoor temperature requirements and economic efficiency . The law establishes the conditions of: a) the general framework of the methodology for calculating the energy performance of buildings ; b) the application of minimum requirements on the energy performance of new buildings ; c) the application of minimum requirements on the energy performance of existing buildings that undergo upgrading works; d) energy certification of buildings; e) periodic technical inspection of boilers and inspection systems / air conditioning in buildings and in addition to the evaluation heating boilers are older than 15 years. f) zoning permits for new buildings will require minimum energy performance requirements and sun study on the use of Renewable Energy Sources (RES). g) The new buildings that will be received since 31/12/2020 will be buildings with energy emissions close to 0. For public buildings, this requirement will apply from 31.12.2018 .
2.	Ordinance. 18/2009 - on improving the energy performance of residential buildings Government of Romania	Extraordinary situation under article 115 para. (4) of the Constitution of Romania , republished , is the need to reduce energy consumption for heating residential buildings that ensure and maintain indoor thermal environment in apartments, integrated programs promoting national energy efficiency plan. Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services and repealing Council Directive 93/76/EEC provides, inter alia, that Member States take all measures to improve energy efficiency to end users and establish a national target of 9% energy savings for the 9th year of application of the Directive. Reducing energy consumption for heating the housing blocks has the effect of reducing the cost of

[54] District Energy and Energy Efficiency, Available at: www.fonduri-ue.ro

		maintenance of heating, mitigating climate change by reducing emissions of greenhouse gases, increasing energy independence by reducing fuel use in the preparation of heating and the upgrading of the urban establishments. Intervention works in the thermal insulation of flats set by the Ordinance are: a) thermal insulation of exterior walls ; b) replacement of existing windows and exterior doors , including carpentry related to access in block of flats, with energy performance windows; c) thermal and hydro/thermal insulation slab over the top floor's roof; d) thermal insulation of the basement, where the design of the block provided on the ground floor apartments; e) removal of equipment mounted on the façades / terrace housing block and reinstalling them after the insulation works; f) thermal insulation finishes the restoration work . Completion of the intervention aims to increase the energy performance of housing blocks, so specific annual energy consumption for heating calculated to fall below 100 kWh/m2 usable area in terms of economic efficiency . Upon the intervention works and these works can be executed surgery, technically justified in technical expertise and / or energy audit : a) repairs to structural elements showing potential danger of detachment and / or affect the functionality of the housing block , including rehabilitation intervention areas ; b) intervention works to distribute the heating plant for heating related to the common parts of the block of flats.
3.	Law no. 159/2013 amending and supplementing Law no. 372/2005 on the energy performance of buildings Romanian Parliament	The law's purpose is to promote measures to increase the energy performance of buildings, taking into account outdoor climatic conditions and location, interior comfort requirements for optimal in terms of cost, energy performance requirements and to improve urban appearance of settlements. Increasing the energy efficiency of buildings by designing new buildings with low energy consumption and the thermal rehabilitation of existing buildings and buildings proprietariloraadministratorilor correct information in the energy performance certificate represents shares of general public interest and in

		the context of energy savings in buildings the improvement of the urban built environment.
4.	Law 238/2013 approving Government Emergency Ordinance No. 63/2012 amending and supplementing Government Emergency Ordinance No. 18/2009 on increasing the energy performance of housing blocks Romanian Parliament	The law establishes intervention works to enhance energy performance of housing blocks built by projects developed in the period 1950-1990, and the steps necessary to accomplish the work, their funding obligations and accountability of the public administration and homeowners associations

3.4.2 Administrative framework

At the central level, the Ministry of Economy plays a key role in energy policy in Romania, while the Ministry of Regional Development and Public Administration is responsible for carrying out government policy in areas related to housing, residential buildings, thermal rehabilitation, management and development housing and urban infrastructure. National Regulatory Authority for Energy (ANRE) and the National Regulatory Authority for Local Public Services (ANRSC) are independent regulatory bodies sectors of electricity and gas and the public service of heat supply system centralized. Local authorities have a key role in the implementation of energy efficiency interventions in Romania.

Ministry of Economy

Ministry of Economy elaborates legal and institutional framework for the energy sector (including energy efficiency) in Romania. It also has responsibilities regarding the transposition of the EU directives on energy.

Ministry of Regional Development and Public Administration

Ministry of Regional Development and Public Administration initiates, finances and/or manages/implements the law, programs and projects of national, regional and local housing construction and the thermal rehabilitation of buildings.

National Regulatory Authority for Energy

ANRE has the role of independent regulator of the energy sector in Romania (electricity , heat and natural gas) , subordinated to the Romanian Parliament. ANRE is financed entirely from its own revenues. ANRE duties include:
(a) Provision / modification / suspension / withdrawal of licenses or authorizations, for example, the production of electricity and heat in cogeneration;
(b) Approval of regulated prices and fees and methodologies for setting these rates and charges;

(c) Preparation of draft secondary legislation;
(d) Establishment of facilities to be granted to vulnerable consumers, except for financial aid;
(e) Development of legal framework for energy efficiency;
(f) In the case of electricity and heat produced in CHP - covered pricing , taking into account the gradual liberalization schedule for electricity produced from cogeneration sold under regulated contracts, establishing framework contracts for the sale of electricity on the regulated market;
(g) Incentive / bonus scheme type support – approving incentive schemes (and their associated secondary legislation) and monitoring their implementation.

National Regulatory Authority for Local Public Services (ANRSC)
ANRSC is the regulatory authority in the field of public service supply of thermal energy supplied by a centralized system . In this regard, it issues licenses to operators that have heat production as main activity (exclusively or along with providing transportation services, distribution and supply of thermal energy), monitors compliance by operators and issues related to acts of secondary legislation. ANRSC shares its duties with ANRE for heat produced in cogeneration. ANRE licenses, regulates and monitors cogeneration, while monitoring the transmission and distribution of heat produced in cogeneration is a part of ANRSC tasks.

Although the ANRE / ANRSC licensing procedure can be a way of controlling the quality of public heat supply centralized system , the extent to which ANRSC/ANRE can use this competence in practice is questionable. District heating is monopolized mainly because of a lack of competition in third party heat generation segment and it could be problematic, due to social and political reasons.

3.4.3 Challenges and opportunities[55]

According to preliminary results of the 2011Census, the housing stock in Romania is made up of 5,117,777 buildings, of which 99.75 % are residential buildings. Number of households was 8,459,052, up 4 % compared to 2002. According to the Romanian Energy Strategy for 2007-2020 updated for 2011-2020, the national potential energy savings by reducing energy losses, is estimated at 27-35% of primary energy in the building sector. The energy use should be reduced by minimum 40%.Thermal rehabilitation of buildings is therefore a clear opportunity for investment to achieve significant results in terms of energy efficiency.

Institutional
Institutionally, the following operate: the National Regulatory Authority for Electricity and heat produced in cogeneration , natural gas and energy conservation (ANRE) , transmission and distribution operators for electricity and natural gas, electricity market operator OPCOM.

[55]Ministry of Economy, Energy Strategy 2011-2035 , on access to : www.minind.ro/dezbateri_publice/2011/strategia_energetica_20112035

Thermal energy is governed by the National Regulatory Authority for Local Public Services (ANRSC). The situation still remains that heat production is coordinated by two Authorities - ANRE ANRSC.

National legislation can be found on two levels:

a. primary legislation: laws adopted by Parliament , ordinances and government decisions.
b. secondary legislation (institutional): orders and regulations of regulatory authorities .

These two levels are added to the applicable EU legislation. The legal framework for the energy sector and the environment has been developed and adapted to relevant Community legislation, in view of Romania's accession to the EU and then as a member, and in the transition to a functioning market economy.

Laws are in place for electricity, natural gas, mining, petroleum, nuclear activities, public utility services and energy efficient use of the system for the promotion of electricity from renewable energy sources to promote high efficiency cogeneration, all harmonized with EU legislation in the field. Main regulatory framework of the electricity market in Romania includes:

- Commercial Code of the wholesale electricity market (revised version)
- Network Codes (Code for transmission network - the revised Code for the distribution network)
- Measuring Code
- Technical and commercial regulations
- Methodologies for setting fees
- Permits and Licenses
- Rules on the network connection.

For the energy production sector, the Community legislation on environmental protection has been fully transposed and is currently implementing the provisions of Directive 2001/80/EC.

Opportunities

- Favorable geographic position to actively participate in the development of pan-European projects, mainly regarding oil and natural gas ;
- The existence of physical energy markets and opportunities for access to regional markets for electricity and natural gas;
- Available capacity in the national gas transport can ensure taking requests users;
- Attractive investment climate for both foreign and domestic investors, including the privatization of various companies currently owned by the state;
- Increased confidence in the functioning of the capital market in Romania, which allows successful listing on the Stock Exchange of energy companies;
- Increased opportunities for investment in energy efficiency and renewable energy resources;
- EU structural funds for energy projects;

- A major hydropower sector capable of supplying the required amount of ancillary services;
- The existence of long experience in mining and extraction and processing of hydrocarbons and important infrastructure for the exploitation of coal and uranium;
- The existence of considerable coal reserves.

Risks and Vulnerabilities

- Economically exploitable reserves of oil, natural gas and uranium are limited, given that there will not be discovered important new deposits;
- The volatility of oil prices in international markets;
- The trend of changing climatic characteristics and hydrological instability;
- The possibility of adverse effects on competition in the European energy sector, due to the concentration of energy industry trends;
- Uncertainties in increasing energy and economic recovery;
- The existence of arrears of companies in the sector;
- Significant share of the population that has a high degree of vulnerability in terms of practicing energy prices akin to the European average;
- Lack of effective fiscal instruments to support investment in energy efficiency programs and development of energy services;
- Reduction of coal mining activity, due to the accumulation of historical liabilities and EU policy on subsidizing this activity;
- Difficulties in operating activities of lignite due to the lack of specific rules to ensure the best interest of public lignite reserves, with a straight and fair compensation to landowners.
- Selection, retention and motivation in free market conditions of human capital necessary for the safe operation of facilities owned by the state in the energy sector;
- High costs of uranium mining due to variation in mineralization parameters and its discontinuity;
- Opposition of local government and authorities to the opening of new production capacities in the exploration of uranium;
- Possible sharp rise in the world price of uranium;
- Possible change in public attitudes towards the construction of new nuclear power plants and radioactive waste landfills;
- -Difficulties in providing ancillary services during dry periods.

3.4.4 Problems and constraints

The main measures envisaged to increase energy efficiency target are:

- Application of State aid scheme related to high efficiency cogeneration;
- Strengthen public information campaigns and business;
- Continuation of the " 2006-2015 District buildings and comfort";
- Mandatory energy performance certificates since 2010 for apartments in existing homes that are sold or leased;
- Continuing the thermal rehabilitation of residential buildings;

- Continuing certification of energy auditors for both buildings and industrial activities;
- Modernization of passenger and freight rail and underground transport;
- Enforcement by public authorities and local art. 7 of Ordinance no. 22/2008 on energy efficiency and promoting the end users of renewable energy;
- Extending the National Energy Efficiency Program (heating system rehabilitation, rehabilitation of public buildings and public lighting efficiency) for the period 2011-2015.

Influence:

- During the current economic and financial crisis and the evolution of the GDP
- Energy consumption is influenced by economic developments and economic adjustments;
- Application of environmental legislation - applying the ETS Directive has the effect of improving the energy efficiency side.

Limitations that could lead to failure to target:

- Reluctance of banks to grant loans for energy efficiency projects;
- Low purchasing power and financial situation of the owners of buildings;
- Understaffed at institutional level;
- Failure due to current financial constraints, public authorities and local measures provided for in art . 7 of Ordinance no. 22/2008.

Nationally some local authorities have opted for the direct management and others for delegated management. Ability of operators to invest in network rehabilitation SACET component is limited by the reduced capacity for payment of the population and the need to secure a lower price and supply of heat. Heat is subsidized from the budget and, in parallel, given as welfare for disadvantaged people. It was expected that the District 2006-2015" program" would be an important way to contribute to the achievement of such works, but economic and financial difficulties in recent years have made that reality to be below initial expectations.

3.4.5 Galati (local level)[56]

3.4.5.1 Legal framework

Organization and functioning of public administration of Galati is based on conditions existing within the legal framework - Law 215/2001 on local public updated and Law 738/2001 on the approval of Government Emergency Ordinance 74/2001 for completing article 152 of Law 215/2001 and GD 998/2008 that designates national growth poles in which investments are carried out through community and national funding programs.

[56]Galati, 2008 Local Development Strategy 2008 -2013 Galati City

Law 215/2001 updated the general scheme of local autonomy and the organization and functioning of local government. Under this law the administrative apparatus can be represented graphically as follows:

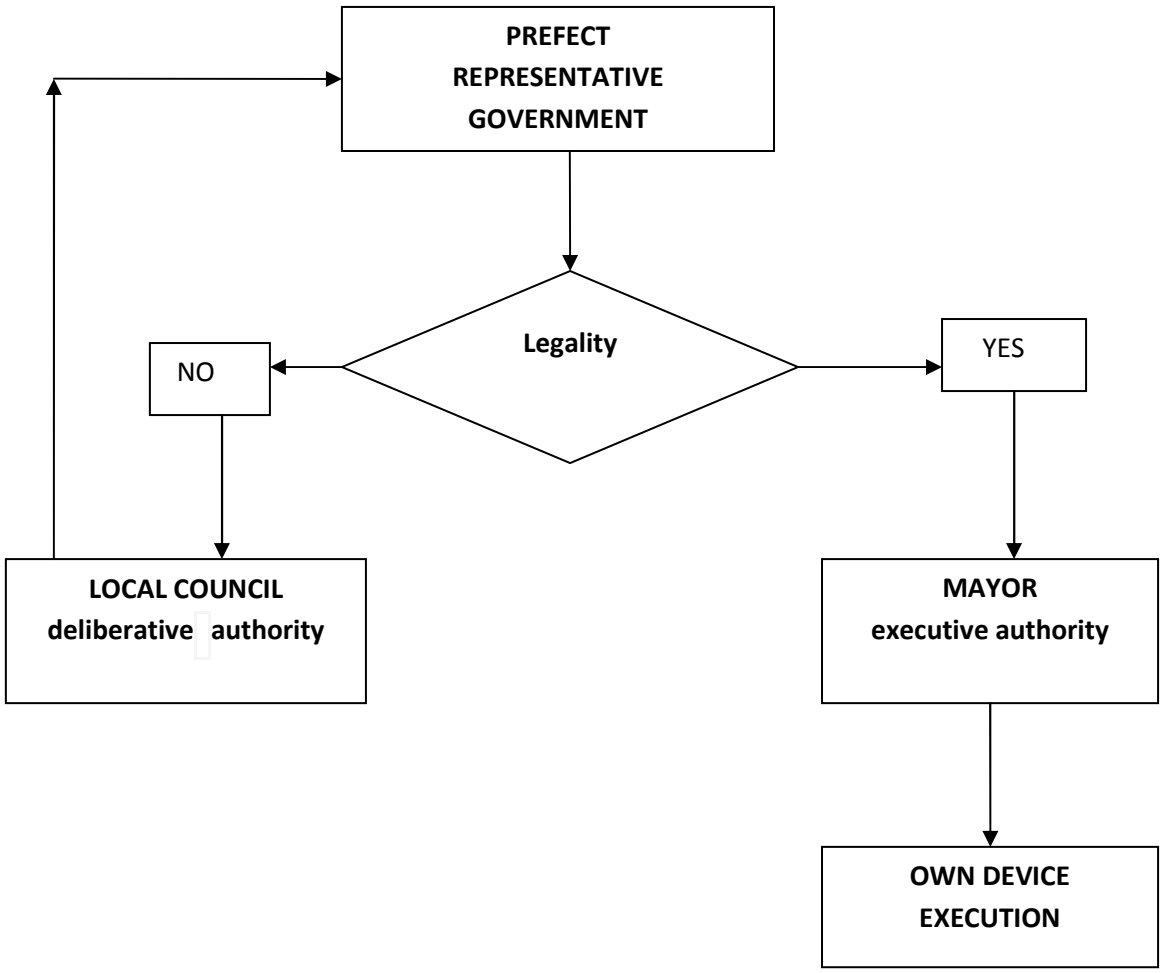


Figure 3.4-2: Administrative apparatus. Local autonomy is only administrative and financial limits are prescribed by law.

In the city of Galaţi , SC Apaterm SA supplies the hot water and heating. The main source of heat is the SC Electrocentrale Galati SA. The primary heat transport network has a length of about 182 km. Heat distribution is achieved through the thermal and secondary network, which measures the length 592.31 km, of which 1.1 km above ground. Segments are composed of aging thermal equipment with a high degree of wear. The pipes connecting the equipment, valves circuits and heating systems are highly overused, plants are not equipped with devices for automation. Heat distribution networks auxiliary heating and the water consumption are used in a proportion of 66,68%.

At local council level a number of decisions were taken which aim at increasing the thermal comfort by increasing the energy efficiency of residential buildings. In addition, local council decisions (HCL) approving the heat billing rates for population and approval of grants were issued, such as:

- HCL 4/31.01.2008 70/26.02.2009, HCL 126/29.04.2010 ;
- HCL 399/23.07.2009 approving the granting of emergency aid consisting of firewood for the winter and measures were taken for the rehabilitation and modernization of heat distribution (eg . HCL 312/13.05.2008 , HCL 674/22.12.2009).

Another local initiative is represented by the preparation of 19 technical documents with a total of 1086 apartments for thermal rehabilitation of housing through the financing mechanism of GO 18. These technical documents were approved by the Local Council of Galati by HCL 406/23.07.2009 on approval documents for increasing the energy efficiency of apartment buildings.

It should be noted that the municipality, through its duties, in accordance to Law no. 215 of Public Administration updated and republished annually, conducted repairs and maintenance of buildings (eg: schools, kindergartens, etc.) to increase the energy efficiency of these buildings (repairs to heating and cooking systems, insulation and roof restorations, etc). These works were conducted with funding from the Galati local budget.

Another source of funding was represented by the national budget funds available to cities by Ordinance no. 18/2009 - On increasing the energy efficiency of residential buildings that provide intervention works at the insulation of flats.

By implementing the projects included in the Integrated Urban Development funded by the Regional Operational Programme 2007-2013 (ROP), Priority Axis 3 "Improving social infrastructure", Key Area of Intervention 3.4 “Rehabilitation / modernization / development and equipping of undergraduate, graduate and continuous professional training infrastructure” rehabilitation works were carried out for a number of two secondary schools and two school groups.

To increase the energy efficiency of residential buildings pilot project were funded through the 2007-2013 Regional Operational Programme (ROP) Priority Axis 1 "Supporting the sustainable development of cities - urban growth poles", Key Area of Intervention 1.2 “Support for investments in energy efficiency blocks of flats”.

Galati has prepared technical documentation for a total of 19 blocks and 1120 apartments. An opportunity is the EBRD program - Energy Efficiency Pilot Program in the public sector, in which Galati is trying to become a pilot city . Depending on the results of the pilot program the ESCO investments in Romania will be developed.

3.4.5.2 Administrative framework[57]

Local authorities have an important role in managing service heating and in some programs to rehabilitate housing / residential buildings (such as the program implemented by the Government Emergency Ordinance no. 18/2009 on increasing the energy efficiency of the blocks housing).

[57]www.primaria.galati.ro/portal/

Local authorities are both owners of district heating networks and the authorities responsible for the establishment, organization, monitoring and control of public service supply heat . Local authorities have responsibilities in energy planning, uniform heating areas, fees regulation, implementation and monitoring of metering.
Uniform heating areas could be a target on which local authorities could focus more, in terms of energy efficiency and fuel poverty reduction front . As discussed in " Roundtable to fuel poverty", organized by UNDP in December 2012, local authorities still need to make efforts for a full application of the principle of "a condominium - a heating system". Therefore, the Romanian energy regulator could consider the appropriateness of introducing stringent rules regarding the implementation of uniform heating zones.

Galati city is located in eastern Romania, Moldova southern extremity of the plateau, 45° 27" north latitude and 28° 02 " east longitude. Located on the left bank of the Danube, occupies an area of 241.5 km^2 , at the confluence of the Siret River (west) and Prut (east) , near Brates Lake, the largest body of water in this part of the country.

The climate is temperate continental with an average annual temperature of 10° C , with a variation in winter from 0 - 28° C, and an average summer around 22° C. In a cycle of 10-12 years, the Danube freezes 5-6 consecutive years, 42 days per year on average.

Due to its position, opening to the Romanian Plain and the steppes of northern winds in Galati are quite common on the N - NE and S - SE without causing disaster, but influencing navigation. Galati city lies on three terraces: City Valley, with height between 5-7 m and the other two , drawn almost fan-shaped, first with an altitude of 20-25 m (the core of the medieval town, now city center) and the second with heights exceeding 40 m (modern city).

3.4.5.3 Challenges and opportunities

Challenges

The main challenge is the low standard of living of the population, because it can not assured a self-financing for share owners' association involved in a project of this kind. Galati is undergoing a socio - economic transformation unprecedented in its history. Implementing new technologies in the city's economy, as well as national and regional organization put the city in the face of challenges and opportunities which we must face.

Following the signing of the Kyoto Protocol in 1997 by Romania, legislative measures have been taken to implement it. These legislative measures should lead to the reduction of greenhouse gases (mainly CO_2) is a challenge both at national and local level. In accordance with national measure, the government has the opportunity to be involved in increasing the energy efficiency of buildings in the city. Analysis of the

main social aspects of living in Galati city include assessing the existing housing stock and socio-demographic characteristics of the population.

Table 3.4-2: Social and sociological indicators of housing.

Indicator	Value
Number of buildings in public ownership:	3.549
Number of private equity houses:	100.107
Floor area (m^2):	3.336.735
Living area in public property (mp):	56.943
Living area in private property (mp):	3.268.793

Opportunities

Urban regeneration involves, inter alia, rehabilitation, modernization, housing renewal, improvement of environmental quality in residential areas to meet the comfort needs of the population. Urban regeneration involves, inter alia, rehabilitation, modernization, housing renewal, improvement of environmental quality in residential areas to meet the comfort needs of the population.

An important role in the implementation of NAPs measure had the EBRD initiative through the "Romania: Public Sector Energy Efficiency Programme" study in which the energy services market conditions were analyzed in detail, a portfolio of projects was identified and important aspects of the application were clarified through RECORD CPE signed in October 2010 between ANRE, ANRMAP and MFP.

Table 3.4-3: Energy saving measures in Galati.

Energy saving measure		Promoting energy saving measures in energy performance contracts in the public sector
Description	Deadlines	Start : 2010 Completion: 2016 We foresee major changes, amendments, improvements: - New EE funding mechanism for public buildings; - Increased capacity for rehabilitation of public buildings;
	Objective / short description	- Empower local authorities in Romania to prepare, launch and conduct auctions for private companies to finance investments in energy saving and taking over public buildings, to be recovered from future energy savings; - Creating markets for businesses in Romania offering energy saving performance contracts in agreements with the public sector; - Establish mechanisms and tools for

		providing investment funds to finance energy saving projects, calling these public- private arrangements;
		The ultimate goal is reducing energy consumption by 20% in public buildings rehabilitated
	Final target	Local Authorities
Information on implementation	List and description of energy saving actions based on measures	- The creation of the legal framework and guidelines necessary to implement energy performance contracts; - Promoting the concept of energy performance contract to local authorities in order to increase confidence in this type of agreement and related energy services; - Exchange of information with experienced EU countries; - Identification and promotion of pilot projects - Technical assistance from the GEF to local authorities to initiate and support the creation of infrastructure; - EBRD financing provided or mediated by specific financial instruments to provide long-term funds in the results; - Energy performance contracts, possibly in conjunction with credit lines to local banks to directly finance energy service companies; An advantage to this approach is that the payments are calculated so that the total amount for EPC and energy requirements after completion of the investment does not exceed what the customer (i.e. municipality or entity controlled by the city budget) spent on energy investment. Once the energy performance contract is finalized and investment recovered (usually 5-7 years) customer enjoys all the benefits of energy savings. Another advantage of this approach is that it allows a large number of energy service companies to participate in multiple projects based on short-term commercial funding available for commercial markets .

	Budget and sources funding	To develop such programs in Romania, the EBRD will provide the sum of $4.57 million from the Global Environment Facility (GEF) to finance the necessary technical assistance and support program for cities of Romania in preparing and launching contracts to improve public heritage buildings. EESI project with a grant of 41.444 euro provided by the EACI will run until June 2012. 40% of the total budget of the National Energy Efficiency Program (NEEP) will be allocated for the rehabilitation of public buildings. Draft Ordinance for approval of the Government for 2011-2013 is under evaluation at Ministry level.
	Implementation Body	ANRE implementation in cooperation with NARMPP, MFP and EBRD
	Authority monitoring	MECMA
Energy savings	Energy savings methods to monitor / measure savings resulting	Project on monitoring procedure
	Savings made in 2010	Four pilot projects resulted in energy cost savings of 25 % - 40% to 63 % buildings and public lighting
	Energy Savings 2016 estimated	Minimum 100 public buildings rehabilitated
	Energy Savings estimated for 2020 (if available)	no
	Assumptions	EBRD ESCO Fund
	Links , effect multiplication synergy	Possible multiplier effect by combining EPC structural funds used for public buildings

Since June 30, 2010 , the Romanian Government adopted a scheme to increase the energy efficiency of buildings. Government Emergency Ordinance no. 69/2010 regarding the thermal rehabilitation of residential buildings financed by bank loans with government guarantee and the Government Decision no. 736/2010 for approval of the application of GEO no. 69/2010 regarding the thermal rehabilitation of residential buildings financed by bank loans with government guarantee.

Scheme offers government guarantee and interest subsidy for loans to execute intervention works on the thermal rehabilitation of residential buildings. Associations of single family housing benefit homeowners and owners of such facilities in contracting bank loans for thermal rehabilitation of residential buildings constructed and received by the end of 2000.

3.4.5.4 Problems and constraints[58]

In the city of Galați, the second large city as number of housing blocks in Romania, after Bucharest, SC Apaterm SA supplies the hot water and heating. The main source of heat is the SC Electrocentrale Galati SA. The primary heat transport network has a length of about 182 km. Heat distribution is achieved through the thermal and secondary network, which measures the length 592.31 km, of which 1.1 km above ground. Segments are composed of aging thermal equipment with a high degree of wear. The pipes connecting the equipment, valves circuits and heating systems are highly overused, plants are not equipped with devices for automation. Heat distribution networks auxiliary heating and the water consumption are used in a proportion of 66,68%.

Performing scheduled to proper operation of rehabilitation and modernization of existing buildings and thermal energy involves a significant technical, technological, organizational and financial effort. Currently the majority of the population owns homes and together with the state (both as owner and as an institution) are the two stakeholders in triggering an action to modernize the housing blocks. Some of the major problems encountered in the implementation of building energy efficiency are: An investment for the relief of thermal protection is not currently considered a worthwhile investment, given its great value and its long recovery.

Revenues and reserves a majority of the population as the state's financial capabilities are very limited. In the case of a block of flats, the upgrading cannot be done apartment by apartment, but only the assembly of a block section. Housing blocks are characterized by the diversity of tenants' income- at least 50% have the ability to invest.

The state, currently facing a variety of problems to be solved, has the capacity to invest in construction , especially housing fund to be upgraded, which is large and requires huge funds.

- CET performances are affected by mandatory operation of thermal and electrical loads well below rated capacity, especially in summer, because the actual heat demand is much lower than it was in the design of the plant;
- Disagreements on international energy markets
- Increasing energy costs and the existing heating system to be reformed - an operation which requires large financial investments.

[58] Municipality of Galati , in 2008, Local Development Strategy of the Municipality of Galati in 2008 -2013

3.5 Turkey (national level)

3.5.1 Legal framework

The legal framework for building energy efficiency in Turkey is based on a number of legal acts and regulations summarized in Table 5 below, with the Building Energy Performance (BEP) Regulation and TS 825 being the key ones.

Table 3.5-1:Turkish Law and Regulations related with building energy efficiency.

Law/Regulation	Regulates	Latest Version
National Standard of Thermal Insulation Requirements for Buildings (TS 825)	Insulation standards of a building	May 2008 (minor revision) May 2000
Energy Efficiency Law 5627	Energy efficiency of a building	May 2007
Law on Renewables 5346	Utilization of renewable Energy Resources for the purpose of generating electrical energy	May 2005
Energy Efficiency Regulation	Authorization of ESCO's, Chambers and Universities for EE activities, energy managers, training program of EM, public entities EE program, etc.	October 2008
Building Energy Performance (BEP) Regulation	Energy performance of the building, its calculation, use of RE, and HVAC systems	December 2008
Regulation on Heat Insulation in Buildings	Thermal performance owing to insulation	Revised August 2008

The main aim of the strategy is identifying the measures and preparation of a road map to increase energy efficiency in industry, buildings, transportation and municipalities. Afterwards Turkey issued Energy Efficiency Law 5627 in 2007. This law aims to create an adequate institutional framework for supporting energy efficiency measures, including provision of an EE Coordination Board, authorized institutions, and ongoing support for establishment of energy efficiency consulting companies (ESCOs, or EVD in Turkish). Training, audits, consultancy, monitoring activities, and other specific support and/or incentives for energy efficiency projects are regulated by this law as well.

The main entity assigned responsibility for the implementation of the law is General Directorate of Renewable Energy of Energy and Natural Resources Ministry (former General Directorate of Electrical Power Resources Survey and Development

Association EIE). The provisions of the EE law specifically addressing building energy efficiency include[59]:

- appointment of energy managers at commercial and public buildings over specified size and accreditation of ESCOs;
- implementation of minimum energy performance (MEPs) criteria for buildings;
- establishment of "Building Energy Efficiency Certificates"
- application of heat meters for buildings with central heating system
- Training and awareness raising
- Establishment of administrative structure
- Mandate and authority of YEGM (former EIE)
- Requirements and responsibilities for the Energy Management
- Training and awareness
- Energy performance of buildings
- Minimum energy efficiency requirements
- Subsidies and support provided for promotion of EE
- Monitoring
- Fines and penalties for non-compliance

The implementations to be realized to increase energy efficiency under the Law 5627 related with buildings are[60]:

For energy management;

- The management, or in its absence the owners, of commercial buildings, service buildings or public sector buildings with at least 20,000 m^2 of construction area or with annual energy consumption at five hundred TOEs or more shall appoint an energy manager or procure service from energy managers.
- Government buildings with total construction area of minimum 10,000 m^2 or with total annual energy consumption of 250 TOE and more
- Principles and procedures relating to the functions and responsibilities of the energy managers and energy management units shall be laid down in a regulation to be issued by the Ministry. Principles and procedures relating to appointing an energy manager in the schools under the Ministry of National Education shall be laid down in a regulation prepared in cooperation with the Ministry and issued by the Ministry of National Education.

For monitoring, analysis & projection studies;

- The General Directorate shall, in cooperation with authorized institutions, prepare and issue inventories and future projections for the development of

[59] Promoting Energy Efficiency in Buildings Project Document, UNDP, available at http://www.tr.undp.org/content/dam/turkey/docs/projectdocuments/EnvSust/project_00074059/EEbuildings.pdf

[60]Energy Efficiency Law of Turkey 2007, available at http://www.google.com.tr/url?sa=t&rct=j&q=&esrc=s&frm=1&source=web&cd=1&ved=0CCYQFjAA&url=http%3A%2F%2Fwww.eie.gov.tr%2Feie-web%2Fenglish%2Fannouncements%2FEV_kanunu%2FEnVer_kanunu_tercume_revize2707.doc&ei=gHQCU6W4Fqii0QXP5oCYBw&usg=AFQjCNGqPh7R7G1sdZomHTGijqBCPXXnIw

energy efficiency in the country, industrial establishments and buildings by region and sector, and the General Directorate shall prepare and issue the annual reports containing facts and assessments for the public sector.

- Industrial establishments and the owners and/or management of buildings which must employ an energy manager shall submit the required information to the General Directorate, and those public agencies and institutions which must employ an energy manager shall submit the reports in the format laid down the General Directorate and containing energy consumption information and own assessments by the end of every March. Industrial establishments shall allow access for the General Directorate for on-site examinations.
- Buildings with a central heating system shall use systems that allow the distribution of heating costs based on the quantity of heat consumption by central or local heat or temperature control devices. Projects prepared contrary to this shall not be approved by the relevant authorities.
- A regulation to be jointly prepared by the Turkish Standards Institute and the General Directorate and issued by the Ministry of Environment and Urbanization (MEU) (former Ministry of Public Works and Housing) shall lay down the principles and procedures for the energy performance in buildings that covers norms, standards, minimum performance criteria, data collection and control procedures on architectural design, heating, cooling, heat insulation, hot water, electrical installation and lighting to be used in buildings used for residential purposes with total construction surface areas as indicated in the regulation, commercial buildings and service buildings. In case of acts contrary to the provisions of the regulation, the relevant administration shall not permit the utilization of such buildings.
- An energy identity certificate shall be issued under the construction projects prepared according to the regulation to be issued by the MEU. The energy identity certificate shall, as a minimum, have the information on the building's energy requirements, insulation characteristics, efficiency of heating and/or cooling systems, energy consumption classification. The other information that must be included in the certificate and procedures and principles relating to the practice including the renewal of the certificate and existing buildings shall be laid down in a regulation to be jointly prepared with the Ministry and issued by the MEU. For buildings outside the adjacent areas and with less than one thousand square meters of construction surface area, it is not mandatory to have an energy identity certificate.
- Principles and procedures for the classification and minimum efficiency specification of electric motors, air-conditioners, electrical home appliances and light bulbs shall be laid down in a regulation to be jointly prepared with the General Directorate and issued by the Ministry of Science, Industry and Technology (former Ministry of Industry and Commerce), and those not meeting the minimum thresholds shall not be allowed to sell.

Regulations and communiques related with Energy Efficiency Law are as follows;

- Increasing efficiency in energy resources and consumption 2011
- Energy performance of buildings 2008
- Cost sharing at central heating systems 2008

- Energy efficiency in transportation 2008
- Energy Efficiency supports for SMEs 2010
- Energy managers assignment in public schools 2009
- Efficiency requirements of gas or liquid fuel boilers 2008
- Energy Labeling for Air Conditioners 2006
- Energy efficiency requirements for refrigerators and freezers 2006
- Labeling for refrigerators and freezers
- Energy Efficiency requirements for lighting 2006

The national standard for Thermal Insulation Requirements for Buildings TS 825, issued in June 1999, provides a backbone for national efforts to improve energy performance in buildings by limiting heat loss through the envelope (all other energy components, like lighting, cooling are outside of its scope). TS 825 standard became mandatory in June 2000; it complies with international standards (ISO 9164 & EN 832).

The standard;

- sets the thermal insulation requirement for new and existing buildings where renovation of at least 15% of the total area is carried out;
- defines the rules for calculation methods for heating energy requirements in buildings and determination of the highest heating energy permitted (as annual kWh/m^2/year)
- divides Turkey into four climatic zones (depending on average degree days) and limits the heat loss from the buildings in those regions

Ministry of Public Works and Settlement (now The Ministry of Environment and Urbanization) modified the Regulation on Heat Insulation in Buildings for new buildings (enacted May 2000, revised in 2002 and 2008) and developed the Building Energy Performance (BEP) Regulation which was enacted in December 2008 and supersede the regulation of Heat Insulation in Buildings in 2009. The BEP supports the adaptation of the European Union's Energy Performance for Buildings Directive (EPBD). The BEP regulation's main objectives are[61]:

- Efficient use of energy,
- Effective energy saving,
- Alleviating environmental concerns,
- Compliance with relevant EU directives.

The main purpose of the BEP regulation is to determine and regulate the calculation models for evaluation of buildings' energy consumption by taking into account external climate conditions, indoor requirements, local conditions and cost effectiveness, to classify the building according to primary energy and carbondioxide (CO_2) emissions and to determine minimum energy performance requirements of new and existing buildings that will go through deep renovation, to evaluate the usage of renewable energy sources, to control the heating and cooling systems, to limit

[61] Building Energy Performance Regulation (translated from Turkish), available at, http://www.bep.gov.tr/BEPTRWEB/Default.aspx#.UwR_W_l_uQc

greenhouse gas emissions, the identification of building performance criteria principles and practices and protection of the environment.

Building Energy Performance regulation covers;

- The calculation models, standards, methods and minimum performance cirterias for the preparation and implementation of subjects related with the energy consumption of the building like architectural design, mechanical installation, lighting, electrical installation and preparation of energy identification certificates,
- Preparing energy identity certificates (EKB), authorizations for building controls and auditing activities,
- Using cogeneration and renewable energy sources for energy needs,
- Generating and keeping the building inventory up to date across the country, the improvement of the energy culture and efficiency awareness by trainins and awareness raising activities.,

in new and existing buildings.

The Building Energy Performance Software (BEP-TR) planned under the scope of BEP regulation, the national software for the calculation method was completed by the end of 2010. All the buildings are required to get Energy IdentityCertificate by 2 May 2017 according to Energy Efficiency Law.

With the implementation of incentive and finance mechanisms the improvement of all existing buildings energy performance within the framework of the BEP Regulation is expected to spread across the country. The Ministry is still working on the incentive and finance mechanisms.

With the help of the database of BEP-TR national software, it will be possible to determine the maximum CO2 emissions of a new building according to building's function (otel, hospital, residential, school, shopping mall, etc), the climatic conditions of the region (temperature, wind effect, etc), architectural design (orientation, etc) and mandatory standards (TS 825 Thermal Insulation Standard, etc) to be constructed. The maximum annual energy demand of the building is calculated in terms of heating, cooling, ventilation, hot water and lighting. The maximum CO2 emission to be emitted is determined by using energy effiency measures and/or clean energy resources and technologies. Construction of new buildings exceeding the specified CO2 emissions are not permitted and required to decrease their energy need.

As envisaged in the European Union's 2010/31/EU Directive it is expected to increase the use of renewable energy sources in buildings with the implementation of Building Energy Performance Regulation and Energy Identity Certificate in Turkey. In accordance with this goal it can be seen how much renewable energy the building is using in the Energy Identification Certificate. The data collected with the BEP-TR database will be evaluated through out the years and the utilization of renewable resources will be increased.

After the provision of the incentives the target is to have thermal insulation that provide the standards and energy efficient systems within all the commercial and service buildings along with 10 million resident by 2023.

For the effective implementation of the legislation in force personnel of the relevant authorities, local governments, building inspection companies and Energy Efficiency Consulting Companies (EVDs) are being trained. The communiques on;

- National Calculation Method of Building Energy Performance,
- Trainings for Energy Identification Certificate specialists, Training Institutions and Trainers,

  are issued.

In 2008 the Energy Efficiency Regulation came into force to describe how ESCOs will be established, their training and how they will be authorized. It also sets rules for EE in public buildings. Main features of the regulation are as follows[62]:

- establishment of the Energy Efficiency Coordination Board;
- establishment of a national energy information center in (YEGM);
- authorization (accreditation) of entities (universities, engineering chambers) to provide applied energy manager training services to industrial enterprises and buildings, to provide training to consultants, and to accredit energy efficiency consulting firms (through consultancy certificates) to perform energy efficiency services across various end-user sectors (i.e. project preparation and implementation, energy manager training, etc.);
- certification of energy managers, to be employed by large end users (industries > 1.000 TOE/year, buildings > 20.000 m^2 or >500 TOE/year, etc.)
- preparing regulations for building energy performance (building energy efficiency codes), and issuance of energy identity certificate;
- preparing regulations for minimum energy performance standards (MEPS) and labeling systems for end-use appliances and equipment;
- providing financial incentives (up to 20%) for viable energy efficiency projects (<500.00 TL, and payback period <5 years);
- providing financial incentives (20% subsidy on energy expenditures) to industries that have committed to reducing energy intensities through voluntary agreements.

The aim of the Directive for the Efficient Utilization of Energy Resources and Energy Utilization issued in October 2011 is to regulate the rules and procedures for the efficient use of energy, energy waste prevention, easing the burden of the financial costs of energy on the economy and to increase efficiency of energy sources and energy consumption for the protection of environment. The Directive covers the procedures and principles related with[63];

- orientation and dissemination of studies and services related with EE

[62]Promoting Energy Efficiency in Buildings Project Document, UNDP, available at: http://www.tr.undp.org/content/dam/turkey/docs/projectdocuments/EnvSust/project_00074059/EEbuildings.pdf

[63] Directive for the Efficient Utilization of Energy Resources and Energy Utilization; available at: http://www.resmigazete.gov.tr/eskiler/2011/10/20111027-5.htm

- authorization of univerisites, professional chambers, energy efficiency consulting companies
- energy management practices, duties and responsibilities of energy managers
- EE training and certification activities
- studies and projects
- support of voluntary agreement implementations
- demand side management
- increase energy efficiency in electric power production, transmission, distribution and consumption
- use waste heat of thermal power plants
- lighting of open space
- encourage the use of alternative fuels like biofuels and hydrogen
- administrative sanctions

In 2012 MENR, published Energy Efficiency Strategy Paper[64] to determine a political set supported with result focused and concrete targets and to define the to be made activities necessary for reaching targets together with the enterprises responsible for making these activities; to act in the framework of a collaboration and participatory approach of public and private sector and NGOs. It is targeted with this document to decrease at least 20% of amount of energy consumed per GDP of Turkey in the year 2023 (energy intensity).

The main objectives of the strategy paper is to;

- To reduce energy intensity and energy losses in industry and services sectors
- To decrease energy demand and carbon emissions of the buildings and to promote sustainable environment friendly buildings using renewable energy sources
- To provide market transformation of energy efficient products
- To increase efficiency in production, transmission and distribution of electricity; to decrease energy losses and harmful environment emissions
- To reduce unit fossil fuel consumption of motorized vehicles, to increase share of public transportation in highway, sea road and railroad and to prevent unnecessary fuel consumption in urban transportation
- To use energy effectively and efficiently in the public sector
- To strengthen institutional structures, capacities and collaboration; to increase use of state of the art technology and awareness activities and to develop financial mechanisms except public.

Strategical Purposes of the Strategy Paper related with buildings are;
SP-02: To decrease energy demand and carbon emissions of the buildings; to promote sustainable environment friendly buildings using renewable energy sources

02/ST-01: In year 2023 the heat insulation and energy efficient heating systems providing current standards shall be existed in all commercial and service

[64]Energy Efficiency Strategy Paper 2012-2023; available at http://www.eie.gov.tr/verimlilik/document/Energy_Efficiency_Strategy_Paper.pdf

buildings having total usage area of more than 10.000 m^2 with the dwellings having building group class 3 or more from the defined building groups in the Communiqué About Approximate Unit Costs of the Buildings, which put into force annually, in metropolis contiguous areas from the buildings having usable attribute in the scope of Urban Transformation Law and Earthquake Regulation.

Subject of the Activity: To bring the buildings maximum energy requirement and maximum emission limitations.

With the revision of the legislation in force in parallel to the EU applications, the minimum annual energy demand covering the subjects of heating, cooling and lightening etc shall be determined according to the conditions of suitable construction of the building by function (hotel, hospital, dwelling, school, shopping center etc), by climate conditions of the region it has been (temperature, wind effect etc), by its architectural design (orientation etc) and by mandatory standards in force (TS 825 Heat Isolation Standard etc) and the maximum CO2 emission amount to be permitted shall be determined by taken as the bases to provide the mentioned energy demand from energy efficient and /or clean energy sources and technologies and no permission shall be given to the new building constructions exceeding these limit values. Approximating to these limit values shall be encouraged by rehabilitation of the existing buildings.

Administrative sanction shall be applied to the buildings having amount of carbondioxide on the Energy Identification Certificate, arranged according to the procedures defined in SA-02/SH-01/E-01, exceeding the defined minimum value with the revision of related legislation.

Ministery of Environment and Urbanization is responsible for this strategy in collaboration with the MENR, Turkish Standard Institution.

SP-02/ST-02 **:** At least one fourth of (1/4) building stock in the year 2010 shall be made as sustainable building by the year 2023.

Subject of the Activity: In holding the licenses of commercial buildings and luxory dwellings and residences having usable area more than ten thousand meter square (10.000 m^2) to request attribute of sustainability as of the date of eighteenth (18) months following the issue of license, to promote this application as covering the buildings defined in SA-02/SH-01 by the year 2017.

The related legislation shall be revised. In this context the newly constructed buildings, by taking care of the developing levels of the attached municipality, building development schemes, land values and natural energy facilities around the environment, shall be requested to have certificate having comperable characteristic in the framework of the applied criteria in the national or international level showing that they shall be sustainable.

The utilizing facilities of renewable energy sources and cogeneration or microgeneration, central and regional heating and cooling and heat pump systems shall be analysed in the public housing projects, the applications corresponding to at least 10% of the dwelling cost shall be encouraged in the

framework of the criteria defined by the ministry and until the legislation in the context of the activity SA-02/SH-01/E-01shall be in force.
Minister of Environment and Urbanization and MENR are responsible for this strategic purpose.

SP-03: To provide market transformation of energy efficient products

SP-03/ST-01: The market transformation of lamps, refrigerators and electrical motors over the minimal energy efficiency class shall be completed until at the end of 2012 and however market transformation of heating/cooling systems and other energy efficient products shall be accomplished in parallel to the EU implementations.

The "Energy Labelling of the Energy Related Products" Directive of EU numbered 2010/30/EU shall be harmonized and be published in the Official Gazette as a framework regulation and under this to be published framework regulation (2010/30/EU) and the regulation Environmentally-Conscious Design of Energy Related Products (2009/125/EC) published in Official Gazette of October 7, 2010; the application arrangements (refrigerator, lamp, television, external power supply and electrical motors included with priority) in the basis of product groups shall be made in parallel to the EU applications and the corporate capacity, giving possibility to monitor the development in the product sales and to make market inspection efficiently, shall be developed.
Ministry of Science, Industry and Technology shall be respobisable for this strategic purpose in collaboration with MENR and Turkish White Good Manufacturer Association (BESD)

SP-06: To use energy effectively and efficiently in the public sector

SP-06/ST-01: Annual energy consumption in the public enterprises buildings and facilities shall be decreased as ten percent (10%) by the year 2015 and as twenty percent (20%) by the year 2023.

Subject of the Activity: To be activated efficiency improvement applications in the buildings and facilities of public enterprises. The efficiency improvement projects shall be prepared by making energy audits in the buildings and facilities of the public enterprises and the budget allowances of the maintenance shall be used for these projects with priority. Prime Ministry circular numbered as 2008/2 shall be revised in this direction by ETKB and the public bodies and public institutions shall enforce arrangements like internal regulations, directives, circular, instructions etc which would be prepared by the public bodies and public institutions directed to their employees in the direction of Prime Ministry circular. All public sector will be responsible in collaboration with MENR, Ministry of Development (KB), Ministry of Finance (MB), Energy Efficiency Consultancy Companys (EVD)

Subject of the Activity : Not to buy or not to make the ones that not providing minimum efficiency criteria, determined by the Ministry, in commodity and service procurements and construction works having energy use in public procurements. The Ministry shall define the minimum efficiency criteria for

the commodity and service procurements and construction works in the public procurements and the necessary changes shall be made in the legislation related to the public procurement or in the specifications for requiring as a mandatory criteria during the procurement or construction of these. After the legislation, defined in the context of SA-02/SH-01/E-01, shall be in force, the buildings, which are not met the limit value related to emission and defined maximum energy consumption, shall not be rented. MENR, Ministry of Finance, Public Procurement Authority (KİK) will be responsible for the action.

Subject of the Activity: To realize efficiency improvement applications in the buildings and facilities belong the public sector with Energy Performance Agreements. Arrangements shall be made which would provide to make long term, performance guaranteed Energy Performance Agreements with Energy Efficiency Consultancy Companies for applications related to efficiency improvement projects of public enterprises and establishments. Allowance proposals of public enterprises and establishments related to efficiency improvement projects shall be evaluated with priority.

SP-07: To strengthen institutional capacities and collaborations, to increase use of state of the art technology and awareness activities, to develop financial mechanisms except public financial institutions.

SP-07/ST-01: The institutional structure, capacity and mutual cooperation of implementing organizations shall be strengthened until the end of 2012.

Subject of the Activity: In the related authority and private sector to develop the necessary capacity for not licencing to the buildings contrary to the Building Energy Performance Legislation and applying "Energy Identification Certificate" in the buildings

The authorization process, in increasing the number of Energy Efficiency Consultancy Companies to display activity in the buildings, shall be rearranged and training programs for the staff of construction supervisory companies and local authorities shall be made.

Ministry of Environment and Urbanization, YEGM (within MENR) are responsible for this strategic purpose.

SP-07/ST-04: The awareness and encouragement activities carried on as part of the "National Energy Efficiency Movement" shall be promoted with the collaboration of public sector, private sector and NGOs.

Global Climate Change and Turkey

Turkey's Current Position

Turkey, as a member of the OECD, was included in Annex-I and Annex-II of the UNFCCC together with the developed countries when it was adopted in 1992. At the COP7 held in Marrakech in 2001, the name of Turkey was removed from Annex-II of the Convention (Decision 26/CP.7) and Turkey remained as an Annex-I Party of the UNFCCC, in a position that is different than other Annex-I countries. Turkey acceded to the UNFCCC as the 189th Party on 24 May 2004. Turkey became Party to the Kyoto

Protocol on 26 August 2009, after the deposit of instrument of accession to the 2 United Nations following the adoption of the Law (No. 5836) approving Turkey's accession to the Kyoto Protocol to the United Nations Framework Convention on Climate Change by the Turkish Grand National Assembly on 5 February 2009 and adoption by the Council of Ministers of the Cabinet Decree (No. 2009/14979) on 13 May 2009. As Turkey was not a Party to the UNFCCC at the time the Protocol was adopted, it was not included in the Annex B of the Protocol which defined quantified emissions limitation or reduction commitments for Annex I parties. Therefore, Turkey does not have a quantified emissions limitation or reduction commitment in the first commitment period between the years 2008-2012 under the Protocol.

Turkey's Perspective on the post-2012 Climate Change Regime

Recognizing that global problems require global solutions, Turkey attaches a great importance to the regional and international cooperation on combating climate change. Turkey is willing to contribute to international efforts by taking a part in cooperative action in the post-2012 period with a view of a new agreement establishing a fair mechanism providing flexibilities for countries to take appropriate mitigation and adaptation action based on their national circumstances and levels of economic development. Turkey actively engaged in the negotiations and provided its views on the long-term global cooperative action in its submissions and statements since the launch of the process.

National Climate Change Strategy, Action Plan of Turkey

Turkey is also making progress in implementing the provisions of the Convention at the national level. In this context, Turkey is preparing its National Climate Change Action Plan and National Adaptation Action Plan, which are also called for by the 9th National Development Plan (2007- 2013). Moreover, several studies are commissioned by the government to relevant institutions to assess the country's potential for greenhouse gas (GHG) mitigation and related costs involved. Besides these national level initiatives, in 2009, Turkey devised a "National Strategy Paper on Climate Change" in order to contribute to the global efforts to reduce the impacts of climate change on the basis of its special circumstances and capacities. The Strategy Paper formulates Turkey's strategy to tackle global climate change and its effects at the national and international level. The paper contains policy actions to be implemented in specific areas, including mitigation actions in the energy, transport, industry, waste management, land use, agriculture and forestry sectors. It also lists some possible adaptation measures. The strategy paper defines Turkey's national vision within the scope of "Climate Change" as to become a country which has integrated its climate change policies into the development policies.

The short, medium and long term strategies that covers buildings are listed below[65]:

Short Term

- Energy Identity Certificate practice for new buildings

[65]National Climate Change Strategy Paper 2010-2020, available at http://iklim.cob.gov.tr/iklim/Files/Stratejiler/%C4%B0DES_ENG.pdf

- Renewable energy systems will be installed at new buildings, with an initial investment cost consistent with energy economics, with payback periods of 10 years for new buildings with floor space less than 20.000 m^2 and 15 years with floor space equal or greater than 20.000 m^2.
- Solar power collectors for central heating and sanitary hot water will be installed at new hotels, hospitals, dormitories, other non-residential buildings used for accomodation purposes as well as sports centers with a usage area of more than 1.000 m^2.

Medium Term

- Energy efficiency potantial in the building sector shall be evaluated and realized at maximum levels, priority porjects on energy efficient construction materials and technologies will be identified in cooperation with the industry.
- The infrastructure for the production of "Energy Identity Certificate" practices will be developped for existing buildings and heat isolation and other efficiency increasing measures will be encouraged.
- Energy management in compliance with standards shall be ensured in the industrial and building sectors by certified energy managers

Long Term

- By 2020 energy intensity shall be decreased with reference to 2004 levels.
- Improvements shall be ensured in energy consumption at existing public buildings and facilities.
- 7% CO emission limitation in the reference scenario 2 shall be targeted in the energy sector for 2020.

Turkey will take her part in the solution by committing herself through laying down short-, mid- and long-term policy actions on mitigation, adaptation, technology development and transfer, financing, education, capacity building and institutional structure. Some examples of the actions listed in the strategy are presented below:
For Mitigation of Greenhouse Gases related with buildings are[66]:

Purpose E1: Reducing energy intensity

- Target E1.2 Develop the capacity for energy efficiency by 2015
- Target E1.3 Support R&D activities on energy efficiency
- Target E1.4 Increase the amount of incentives given by MENR for energy efficiency applications by 100% until 2015

Purpose B1: Increase energy efficiency in buildings

- Target B1.1: Establish heat insulation and energy-efficient systems meeting standards in commercial and public buildings with usable areas larger than 10 thousand square meters and in at least 1 million residential buildings by 2023

[66]National Climate Change Action Plan 2011-2023, available at http://www.cem.gov.tr/erozyon/Files/faaliyetler/dis_iliskiler/iklim_degisikligi_cerceve_sozlesmesi/Cevre_Bak_Ulusal_Eylem_Plani_ing_2011_2023_2_.pdf

- Target B1.2: Effective implementation of the Regulation on Energy Performance in Buildings (EPB) and other energy –efficiency regulations until 2017
- Target B1.3: Develop instruments that will provide the necessary financial support with regard to energy efficiency, renewable energy and EPB until the end of 2013
- Target B1.4. issuing "Energy Performance Certificates" to all buildings until 2017
- Target B1.5 Decrease annual energy consumption in the buildings and premises of public institutions by 10% until 2015 and by 20% until 2023

Purpose B3: Limit greenhouse gas emissions originating from settlements

- Target B3.1. Reduce greenhouse gas emissions in new settlements by at least 10% per settlement in comparison to existing settlements (which are selected as pilot and the greenhouse gas emissions of which are identified until 2015) until 2023

3.5.2 Administrative framework

The Ministry of Energy and Natural Resources (MENR) is the main organization responsible for formulation and implementation of general energy policies. The General Directorate of Renewable Energy (YEGM) (former General Directorate of Electrical Power Resources Survey and Development Administration – EIE) one of the major organizations under the MENR, has been involved in energy efficiency policy and programs, including energy audits, trainings and public awareness activities since early 1980's and is the main government entity responsible for the implementation of EE law and by-laws. Additionally, YEGM has been conducting energy efficiency and renewable energy projects in Turkey in collaboration with international donor organizations such as the World Bank, EU and Japan International Cooperation Agency (JICA).

As per the provisions of Article 4 of the EE Law, an Energy Efficiency Coordination Board (EECB) has been established and is functional.

Energy Efficiency Coordination Board members are:

- Ministry of Energy and Natural Resources(Chairman)
- Directorate General of Renewable Energy (Secretariat)
- Ministry of Internal Affairs
- Ministry of Finance
- Ministry of Education
- Ministry of Environment and Urbanization
- Ministry of Transport, Maritime Affairs and Communications
- Ministry of Science, Industry and Technology
- Ministry of Energy and Natural Resources
- Ministry of Water and Forestry
- State Planning Organization
- Treasury

- Energy Market Regulatory Authority
- Turkish Standard Institution
- Scientific and Technological Research Council of Turkey (TUBITAK)
- Union of Chambers of Turkish Engineers and Architects
- The Union of Chambers and Commodity Exchange of Turkey
- Union of Turkish Municipality

The Board has the following functions, authorities and responsibilities[67]:

a. *Prepare national energy efficiency strategies, plans and programs, assess their effectiveness, coordinate their revision as necessary, taking and implementing new measures.*
b. *Steer energy efficiency studies carried out by the General Directorate, approve the authorization certificates issued by General Directorate to chambers of profession and universities in promoting energy efficiency services.*
c. *Approve the implementation projects prepared, or procured through the companies, by the industrial establishments which wish to benefit the practice under subparagraphs of the law.*
d. *Establish ad hoc specialty commissions by the participation from the relevant public agencies and institutions, universities, private sector and civil society organizations, with expenses covered from the General Directorate's budget, under the functions assigned to the Board and where it deems necessary.*
e. *Set the agenda of, and identify the participants in, the advisory committee meetings organized by the General Directorate every November by the participation of authorized institutions, companies, chambers of profession in the nature of public institutions and civil society organizations, and approve proposals for measures.*
f. *Set and publish the fees for authorization certificates and energy manager certificates every January.*

YEGM shall also monitor the implementation of the decisions made by the Board and provide secretariat services. The EECB is chaired by undersecretary of MENR.

The Ministry of Environment and Urbanization (MEU) is responsible for design project preparation, construction and major repairs of public buildings, construction of housing in conformity with the principles of housing policy, taking necessary measures for the manufacturing and use of standardized construction materials in the most economic way for the country's requirements; setting standards for master plans of various scales and for urban infrastructure projects; preparing and publishing regulations, directives, ordinances, model contracts, terms of references and annual unit prices for building materials and construction services. The Ministry is responsible for implementation and monitoring of the BEP regulation.

Housing Development Administration (TOKİ) is the government agency set up to increase housing production at national level. TOKI supports the construction

[67] Residential Energy Efficiency Study in Turkey, prepared by MWH for EBRD, May 2013

industry related to housing construction or those who are involved in this field. It is also subcontracting any research, projects and commitments where deemed necessary. Since 1984, TOKİ has been acting effectively in providing affordable housing for the low and middle income groups through innovative financial mechanisms. It has provided housing loans to approximately 1.2 million housing units by the end of 2004.

Union of Turkish Engineers and Architects (UCTEA); is a corporate body and a professional organization defined in the form of a public institution and as December 31, 2008, the number of Chambers has increased to 24, while the number of members reached 423.360. Graduates of some 70 related academic disciples in engineering, architecture, and city planning are members of the Chambers of UCTEA. The union is a member of the Energy Efficiency Coordination Board.

Associations of building material producers (IMSAD) – a range of non-governmental organizations operate in Turkey representing the interests of the local manufacturers of the various construction materials. These could provide valuable contributions to the project, including the EE studies, trainings and awareness raising activities.

The Scientific and Technological Research Council of Turkey (TÜBİTAK) is the leading agency for management, funding and conduct of research in Turkey. It was established in 1963 with a mission to advance science and technology, conduct research and support Turkish researchers. The Council is an autonomous institution and is governed by a Scientific Board whose members are selected from prominent scholars from universities, industry and research institutions.

The Technology Development Foundation of Turkey (TTGV) is a foundation that combines 24 private sectors, 5 public institutions, 11 umbrella organizations and 15 individuals into one institution. Since it was established through the signing of an international loan agreement by the Republic of Turkey and the World Bank, the TTGV is a foundation established by law whose status is one of only four foundations. TTGV is subject to all foundation related legislation in the Republic of Turkey. The private sector and the public come together for TTGV with the mutual purpose of increasing the competitiveness of the Turkish private sector in international markets by supporting R&D activities. It, is the first and the only "Public-Private Sector Partnership" that has been established so as to support R&D and innovation in Turkey TTGV is a non-profit organization. Any and all gains that TTGV receives from its activities are used to meet TTGV's expenses and for the development of current support programs.

The Turkish Green Building Association (ÇEDBİK) aims to contribute to the building industry's development by means of the spread of principles of sustainability. Turkish Green Building Association was established in 2007. Turkish Green Building Association organises educational programs, develops pilot projects with government and universities and conducts lobbying activities to increase public awareness about the necessity of green building while also encouraging the building industry to develop along principles of sustainability. Turkish Green Building Association is

currently working to fill this void by adapting an environmental certificate system for buildings specific to the geographical, climatic, political, social and technological context of Turkey.

Small and Medium Enterprises Development Organization (KOSGEB) is a public organization which was established in 1990 in accordance with the Law No. 3624 in order to develop the positions of Manufacturing Industry Enterprises within the economy. KOSGEB's studies for manufacturing industry SME's between 1990-2009 have been appreciated and the task of developing the sectors which are not in manufacturing industry was given to KOSGEB in 2009. SME sectors, development of which KOSGEB is responsible for, was determined with the Council of Ministers' Decision taken on September 18, 2009. KOSGEB has been supporting projects for energy efficiency consultancies of SME's.

Turkish Standards Institution (TSE) has been established by the law numbered 132, dated 18.11.1960 for the purpose of preparing standards for every kind of item and products together with procedure and service. The Institute is responsible to the Prime Ministry.

The Institute is a public founding which is conducted according to the special rules of law and has a juristic personality. Its abbreviation and trademark is TSE. This mark is represented in different ways. These standards are voluntary and can be made compulsory by the approval of the ministry that the standard is relevant to. It is essential that a standard be a Turkish one so that it could be made compulsory. The standards made compulsory are published in Official Gazzette.

3.5.3 Challenges and opportunities

Turkey, with vital statistics putting it squarely in the category of emerging economies for the last decade, exhibits demographic, urban spatial and economic attributes much in common with upper middle income countries such as Brazil, Mexico, Malasia and South Africa. Relatively high urbanization rates and a growing economy has resulted in a construction industry in Turkey that is one of the largest in the world. The direct contribution of the sector to GDP is around 6-7% but when put together with the large number of materials and services sub-sectors associated with it, it commands a 30% share in the overall economy and contributes at least 10% of the total employment. With median technological sophistication on the avarage, the construction sector has a positive balance of trade as opposed to i.e. automotive and machine building with large import components input towards finished parts. The construction industry uses fundamentally local input. Traditionally the Turkish construction sector is a good indicator of GDP growth in the Turkish economy as can be seen in the figure below.

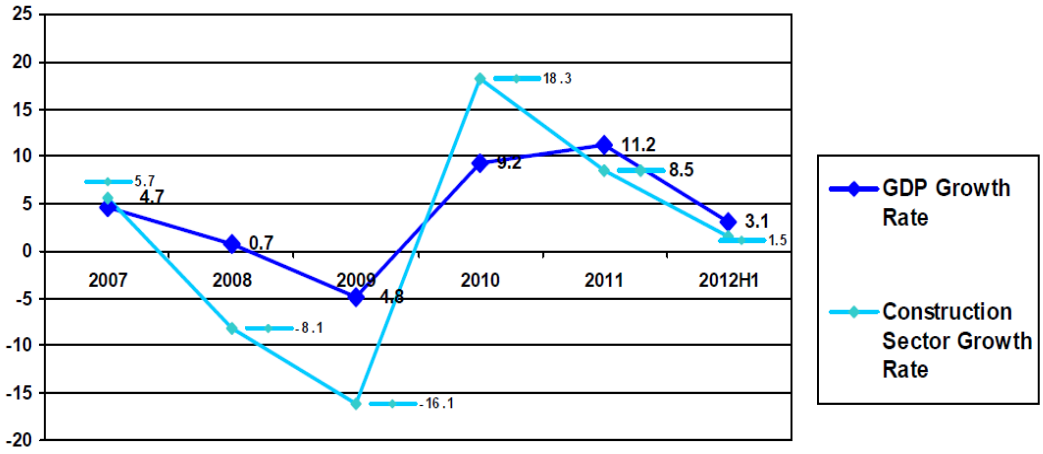


Figure 3.5-1: The correlation of Turkish economic growth with the construction sector[68].

Turkish construction firms are highly active internationally as well. Over 30 companies were ranked among the world's top 225 international construction firms as reported in the "Engineering News Record - ENR" of 2011. By the end of 2012, international projects undertaken by Turkish firms in 94 countries had topped 200 billion USD. Around 18% of the construction market in the Russian Federation, 17% in Turkmenistan, 9% in Kazakhstan and 10% in Iraq was controlled by Turkish firms. The country is also ranked 12th in the production of building materials such as glass, steel, cement and ceramics which gives a large boost to the industry.

Current urban migration rates are recorded to be some of the highest in the world with growing urban centers such as İstanbul, Ankara, Antalya, İzmir, Bursa, Adana, Mersin attracting populations at much higher rates than the avarage population growth rate of the country. The table below shows forecasts on Turkish urbanization until 2023.

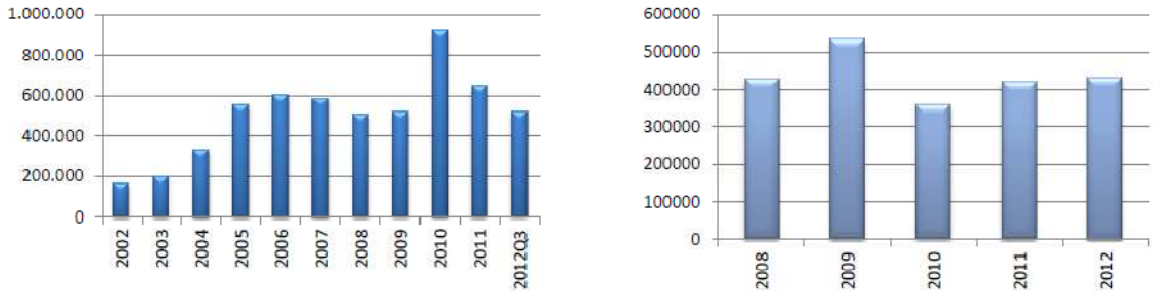
Table 3.5-2: Urbanization and predictions on number of households to 2023[69].

Year	Population	Urbanization (%)	Urban Population (000)	Urban household size (person)	Numbers of urban households (000)
2011	74,727	76.8	57,368	4.12	13,930
2012	75,658	77.4	58,559	4.10	14,263
2017	80,053	80.0	64,363	3.97	16,212
2023	84,692	84.0	71,141	3.79	18,770

Urban land has thus become one of the most attractive sectors for investment with Turkey the 4th most attractive real estate market among the emerging economies.

[68] Banco Sabadell Report on the Turkish construction industry, 2012
[69] Turkish Real Estate Investment Trusts Association, Vision 2023

The figure below shows the fundamental supply and demand problem in the Turkish housing market;



Building permits (# flats) **# flats sold**

Figure 3.5-2: The large discrepancy between supply and demand in the Turkish housing market[70].

As of August 2012, the stock surplus in housing was around 800.000 units. This number is estimated to be over 1.000.000 in the second half of 2013. A detailed statistical account of the Turkish residential sector regarding its ownership structures, housing categories, age of stock, number of residents per dwelling, geographic distribution of typologies, new trends and building costs were given in the report prepared for the EBRD in May 2013[71].

Up to 75 % of all construction is residential and close to 10 % of all residential construction in the last 10 years has been built by TOKİ (Housing Development Administration of Turkey). Between 2002 and 2012, TOKİ has built over 500.000 residences out of a total of 5.5 million. Its official website announces that, as of October 2013, 608.000 housing units, 140 student residences, around 500 shopping centers, close to 1.000 schools, 1.000 sport halls, 500 mosques, 14 stadiums and a variety of other public buildings were built by the organization. This public body, that is connected directly to the Prime Minister of Turkey, deserves a closer look regarding its critical role in the residential and other real estate markets development in the Turkish urban context. A government office with a mandate to renew one third of the housing stock in the country (6-7 million units), through massive 'urban regeneration' programs, would have a crucial role in any energy efficient transformation targeted by any funding program.

Turkish Urban Development and GHG Emissions

The first impression of Turkish urban development can be said to be its 'unplanned' nature. Contruction booms accompanied by urban sprawl characterizes the hi-carbon urban development of Turkish cities and urban regions. Coupled with fossil-based power production, the latest figures announced by the government indicate that Turkish GHG emissions have reached 422 million tons in 2011, an increase of 124%

[70] Konutder, Turkish Housing Association, 2013

[71] Residential Energy Efficiency Study in Turkey, prepared by MWH for EBRD, May 2013

over 1990 emissions and 5.1% increase compared to 2010. Three quarters of the increase comes from energy production for the increasingly urban population. Industrial emisssions are dominated by the cement and iron-steel industries largely powering the urban boom. Per capita emissions have now reached 5.6 tons and projected to rise to 7.2 tons per capita in 2020, radically overshooting the global avarage of 2 tons, forecast by the IPCC to stabilize the climate. Building GHG emissions have multiplied from around 23 million tons to over 50 million, transport emissions have soared to over 50 million tons also indicating the unsustainable and distinctly climate un-friendly urban character of Turkish development.

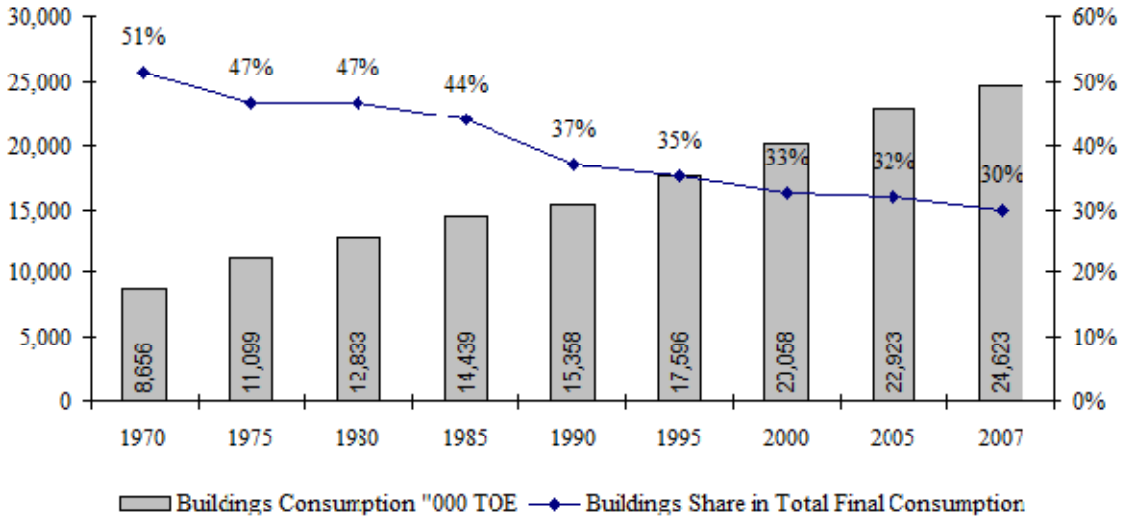


Figure 3.5-3: Building energy consumption, share in total final consumption[72].

In terms of sectoral breakdown, the residential sector accounts for the largest share (29%) of the overall TFC, as presented in the chart below (based on IEA data). Industry and transport trail behind, each taking up 26% and 20% of the TFC.

Studies by various agencies, such as the General Directorate of Electric Affairs and Research (EIE), show that Turkey compares unfavourably with other countries in terms of energy efficiency. In the industrial sector, Turkey has an energy savings potential of around USD 3 billion per year, about 8 million toe per year in industry, or about 25% of 2007-level energy consumption in the sector. Industry is dominated by energy intensive industrial subsectors—energy costs comprise between 20% and 50% of their total production costs.

High Energy Savings Potential in the Residential and Building Sectors

In the Building Sector, Turkey has an energy savings potential of about 30%, which is over 7.0 million toe per year or 7% of total energy consumption in Turkey, according to analysis conducted by the World Bank in 2011[73]. Due to the rising living standards

[72]MENR

[73]"Tapping the potantial for energy savings in Turkey, Sustainable Department of Worldbank, 2011, available at http://siteresources.worldbank.org/TURKEYEXTN/Resources/361711-1294661147811/TurkeyEE-en.pdf

linked to economic growth (including increased use of appliances and air conditioning), together with a substantial increase in the national building stocks, residential energy demand has tripled since 1990. In such context, savings potential for the Residential Sector is about 30% or over 7 million toe per year.

Based on the inventory conducted on flats in 2011, there are over 18.000.000 dwellings[74] in Turkey, and only 14% of which have central heating and 10% have insulation. The main energy consumption issue in buildings is heating/cooling, which accounts for 69% of the total energy consumption. Therefore, most energy saving potential is associated with the increased use of thermal insulation to avoid heat loss. The second important primary energy demand is hot water, which accounts for 15% of the total consumption.

The main characteristics of the residential EE market in Turkey are:

- Turkish housing stock is new with more than 75% of the dwelling stock less than 30 years old.
- 85% of buildings have individual heating systems and single glazed windows.
- Only 15% of homes have double glazing and thermal insulation.
- About 80% of the urban residential housing stock is connected to natural gas, and there is a strong increase in the number of air conditioning units.
- In rural areas, more than 80% of households are using solid fuels (mainly coal and wood) as their primary heating source.

In terms of CO_2 emissions, the building sector in Turkey is directly responsible for 53.4 Mt of CO_2eq emissions in 2009, or about 13.5% of total emissions. The sector's energy consumption in the same year was 29.5 million toe, or about 40% of TFC, and it is estimated to reach 47.5 million toe in 2020 meaning that the CO_2eq emission figures from the sector will double compared to 2009[75]. The projected increase could be curbed by enhanced EE policies, such as transposing EU Directives to Turkey and by eliminating hard coal subsidies. These policies would contribute to reducing building EE transaction costs by providing carbon abatement benefits ranging from EUR 100 to EUR 300 per tCO_2-eq abated.

It should be highlighted that the existing barriers for residential and building EE, arguably face higher transaction costs than any other core sectors. This sector is characterised by:

i) high market fragmentation;
ii) very low market awareness of its benefits among stakeholders;
iii) limited local implementation capacity;
iv) lack of available financing mechanisms;
v) complex and incomplete regulatory framework.

[74] The Association of Real Estate Investment Companies
[75] Ministry of Environment and Urbanization, National climate change action plan 2011–2023

3.5.4 Problems and constraints

Current EE regulations' lack of ambition and/or insufficient scope

Thermal Insulation Requirements for Buildings Standart TS 825 and related implementing regulations address predominantly heating energy conservation – designed to allow for at least 50% more energy consumption for heating that their EU counterparts, while overlooking such important elements as cooling, lighting, ventilation, indoor thermal comfort, use of renewable sources of energy. In addition special attention is required in hot and dry climatic areas of Turkey for less energy consumption in summer. Therefore, the current approach is not sufficient to improve the real energy balance of the buildings ally in the southern parts of Turkey.

Inadequate level of compliance with the current regulations

Countrywide code compliance rate was an estimated 25-30% and that, even in buildings where compliance with insulation requirements is being sought, untrained laborers cannot ensure proper mounting of the insulation. Additionally, some insulation materials do not meet the criteria stated on the product packaging and the methods to install insulation are frequently field designed.

Low awareness of cost effective opportunities for improving energy performance of buildings

Architects and engineers perform their tasks without synchronizing their efforts at the project's outset. This outdated architectural practice does not allow multiple disciplenes to be integrated at project beginning and synergistic benefits in the building's energy budget is no realized. This also means that there are no consideration of bioclimatic features, building orientation, and or use of passive or active energy saving tactics including use of renewable energy. The constructions in the north of Turkey have quite similar characteristics with the ones in the south. It is also the case for east and west part of Turkey. Although thay all have totally different climatic characteristics the buildings are similar.

Lack of replicable investment models in energy efficient buildings

Despite few demonstrations the practice of emphasizing energy efficiency in buildings is still relatively new in Turkey with the associated limited experience and trust of the building's performance and financial viability. The payback periods of EE projects may be long and there is not yet a finance mechanism developped for the building sector. Additionally, tenant-owner return on investment ratios are not clear so that the economic viability of the EE investments to owners or householders is not understood. Recently, a number of public and private banks which are intermediaries of international donors like World Bank, EBRD, French Development Agency (ADF) and others, expressed interest in financing viable EE buildings.

Weak energy management

Under the existing regulations energy managers are required to be employed by large end users. Since 2006, YEGM (former EİE) has been running a training course for building energy managers, however its scope and coverage are inadequate to fully meet the demand in the market in response to the EE law and revisions of building

codes. Necessary tools to facilitate better energy management in buildings are lacking.

Degree of poverty in the population and affordability of energy services

CEE Bankwatch Network defines energy or fuel poverty as the difficulty in maintaining sufficient warmth at an affordable cost rather than lack of access to infrastructure, and this is the case in Turkey. The main problem in Turkey in maintaining sufficient warmth inside apartments relates to the affordability of energy services rather than accessibility to infrastructure.

The heating system used in the building contributes in large measure to the costs associated with residential expenses. In Turkey fuel is quite expensive with additional taxes. Apart from natural gas as main fuel source for residential properties, many other thermal sources (other fossil fuels, electric heaters, heat pumps etc.) are used.

The figure below shows the array of heating systems used in households in 2011. The Income and Living Conditions Survey of 2012, again by TUIK, suggests that 41.7% of people in Turkey experienced heating problems in their dwellings due to bad insulation.

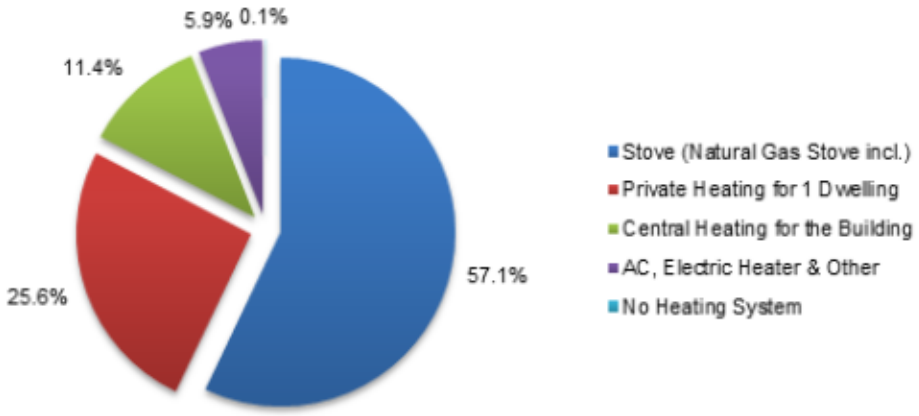


Figure 3.5-4: Heating Systems Used in Turkish households[76].

Overall 64.6% of Turkish people can afford the cost of heating. It seems quite alarming that 35.4% of people in Turkey cannot heat their residences adequately. This figure means that over 25 million Turkish citizens are unable to provide sufficient heating to their houses.

The following figure compares the statistics of Turkey to new, eastern EU member states and the EU average. Turkey is among the countries with the highest percentage in terms of an inability to keep homes sufficiently warm.

[76] Residential Energy Efficiency Study in Turkey, Prepared by MWH for EBRD, May 2013

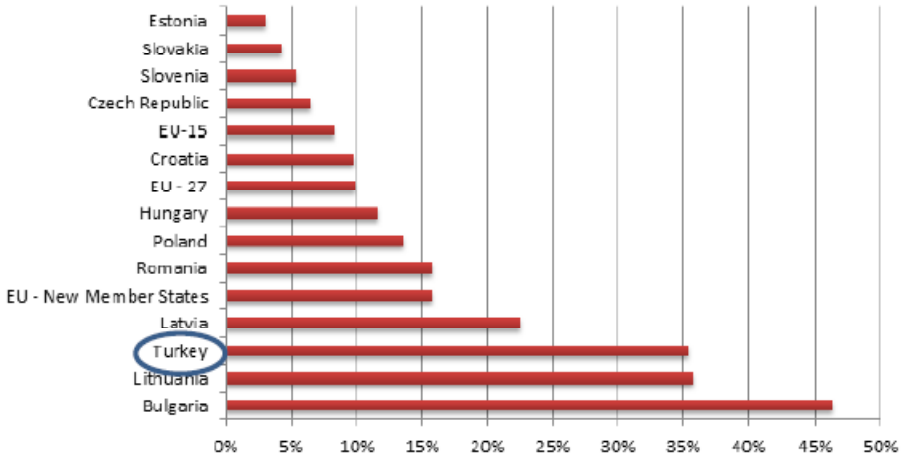


Figure 3.5-5: Percentage of households unable to keep their home adeqquately warm.

Ability of households to invest and borrow

Around 50% of the Turkish population is deemed not to be creditworthy, based on the feedback from local banks. A study carried out by Garanti Bank reports that the unbanked population in Turkey is estimated to be 27 million. The Central Bank of Turkey also reported, in one of its studies, that banknotes and coins in circulation account for around 40% of the total money supply, indicating a high reliance on cash transactions. The Interbank Card Centre of Turkey reports that, in January 2013, a total of 54.702.403 credit cards were in circulation, and all transactions made within a month totalled 32.608 billion TL.

Even without specific statistics on the affordability of the cost of improving building insulation for an apartment, it can be inferred that the majority of Turkish people cannot afford these type of expenditure, unless supporting mechanisms are set-up, which allow both the Local Banks to provide loans with good financial conditions to Turkish residents and Turkish people to understand the mid-term benefit of EE implementation measures.

Even though Turkey has gone a long way to create a regulatory environment favorable for investments in Energy Efficient buildings, there are still a number of critical barriers hampering further development of the market.

3.5.5 Samsun (local level)

3.5.5.1 Legal framework

In terms of legislative framework of energy efficiency in buildings, there are no differences on national and local level. All applicable laws and regulations at the national level regarding with energy efficiency in buildings are applied in the same manner at the local level, because of constitutional structure of Turkey.

There are no measures and legislative acts that are specifically for Samsun as all legislative frameworks in Turkey are legislated by the central government. On the

other hand there are several avenues open to local governments in Turkey to have an impact on energy efficiency. These may be listed as follows;

- Municipalities have budgets and are legal entities possessing relative autonomy. They are also large consumers of energy themselves. The first and foremost area for action regarding local government is to lower energy consumption in its own buildings, street lighting and other power consuming operations as well as initiating low carbon public transport and urban transport policy encouraging pedestrian and cycling modes. Here the local government acts as a good example for the public as well as creating a market for energy efficient goods.
- Municipalities physically have the task of planning the city through which they can impose in the medium term low carbon morphologies and development. Here local government acts as designer.
- Municipalities can facilitate to gather stake holders around the issue of energy efficiency, bringing together firms, professional organizations, NGO's and local government functionaries. In this way they act as facilitator.
- Municipalities are given the task of running the city through important local government legislation pertaining to a) the spatial planning of the city, b) environmental protection and c) the local administration regulations. Through these frameworks, local governments can stipulate physical limits to the building stock, green areas and transportation modalities. Acting in the role of example, designer, facilitator and regulatory authority, they have the possibility of influencing market decisions in the vast area of city services and goods.

3.5.5.2 Administrative framework

Introduction to Administrative framework

Municipal authorities and MEU's local office are in charge of energy efficiency related topics but since the capacity of the institutions are not enough there is not much being done related with energy efficiency. Several of the relevant stake holders have been listed below who can play an active role in the conversion to a energy efficient building stock.

According to the Municipality Law numbered 5393 the Metropolitan Municipalities of Samsun and Tekirdağ are responsible for urban development, water and sanitation, transportation, urban infrastructure, geographical and urban information systems, environment and environmental health, sanitation and solid water, local traffic, reforestation, park and green spaces, housing services. These are only the services that can be related with environment and energy efficiency. The municipality has the below mentioned sanctions she can use to propagate energy efficiency measures.

- Under the authority of the law on municipal regulations, the municipality can remove and put municipal bans, apply the laws, impose penalties specified in laws.
- Another responsibility of the municipality is to give license or permit with regard to the activities of real and legal persons specified in the law

Under the municipality the Zoning and Urban Planning Directorate is responsible for new building permits, modification of licensed permits, license renewals. Planning and Project Directorate of the Municipality; is responsible for creating standards for urban design, façade design and façade improvements of the city.

Building Inspection and Building Materials Branch Office of Ministry of Environment and Urbanization's Local Office is directly responsible for all the necessary work regarding the Energy Efficiency Law, Energy Performance of Buildings Regulation (BEP).

Multi-figure Administration on Energy Efficiency

As it is indicated by the articles mentioned above, Energy Efficiency Law is a framework law which gives important responsibilities to all public and private institutions, voluntary organizations, local administrations and citizens across Turkey. Organizations from various levels should collaborate in a sense of governance in order to improve the policies concerning the law and implement these policies. Performing a multi-level governance (national, regional, local) with participation of administrations from various levels will be a platform on which central administration organizations and other public and private organizations come face to face with each other to develop policy and implement it.

Understanding of multi-level governance makes it easier to understand vertical and horizontal relationships between various figures and administrations. In such an understanding of administration, central government identifies priorities, determines strategies, signs international agreements, taxes energy resources and thusly makes balanced regulations. Local and regional administrations implement national energy efficiency policies; pay attention to energy efficiency while investing, providing local services, building and renovating residences. They also try to raise awareness of local people on energy efficiency and encourage them.

In a multi-figure governance model there are vertical and horizontal relationships; regulations from top to down, from down to top between central administration and regional administrations; private sector and voluntary organizations. The vital point in such multi-dimensional administration relationships is how central administration encourages application by recognizing local administrations. Legal regulations may offer options to local administrations and enable voluntary gatherings. Approach of multi-level and multi-figure governance improves relationship between administration levels; fill the gaps between vertical and horizontal collaboration mechanisms and administration levels.

Within this framework, vertical (hierarchical) relationship refers to the relationship between central administration and local administration while horizontal relationship refers to collaborations between cities and regions; and horizontal collaborations between these two and central administrations(district municipalities in metropolitans, related ministry organizations). Multi-figure governance takes it into consideration that central administration cannot implement national energy efficiency policies effectively unless it collaborates with local and regional

administrations and nongovernmental organizations intimately. It also asserts that local administrations cannot conduct local action plan in an isolated way from central administration. Horizontal collaborations make easier the participation of universities, private sector organizations and voluntary organizations to action plans and processes of policy development.

The positive outcomes of a successfully implemented multi-figure and multi-level governance approach are as follows:

- It makes easier the implementation of national policies on energy efficiency thanks to powerful local action plans.
- Experiences on local scale and good application examples test the policies of government.
- Collaboration between central administration, which aims at increasing capacity for energy efficiency, and local administrations creates opportunities for local administration to develop good cost efficient applications.
- Consistency on efficient energy use may cause to occur inter-sectorial regional and urban development strategies which will be the prime mover of regional economic developments.

Role of Municipalities

As being city administrators, municipalities can play 4 major roles in using energy efficiently and reducing CO2 emissions:

- Municipalities, as being autonomous administrations having budgets and legal entities, are also important consumers. Municipalities can restrict their energy consumption by their own plans and programmes. For example municipalities can use energy more efficiently in their own buildings and facilities, transform buses into green buses, use energy efficient bulbs for lightening cities. These examples and the others are the actions which municipalities can carry out directly and thusly can save energy.
- Acting as intermediaries, municipalities can maintain collaboration and coordination between other figures like private sector organizations, voluntary organizations in city. They can create partnership agreements between public and private sector for city services. Thanks to energy action plans, they can sign protocols with private sector organizations operating in cities, non-governmental organizations, chambers, companies building residence and transportation authorities in order to use energy efficiently.
- Being providers of many city services, municipalities influence life style and consumption pattern of a city by means of transportation services, construction activities like residence, road, bridge, metro, subway, overpass, infrastructure activities like water and sewage services. Hence, they are important figures of energy policy implementations on local level since they own many public goods, services and facilities in cities.
- Being regulators with public authority, municipalities carry the authorities of making regulation within laws, implementation, making environmental plan that determines present and future development tendency of city, preparing and implementing construction plans and programmes; supervising constructions, regulating traffic flow, licensing residences and places of

business. They can also make rules for securing people in city and implement these rules by municipal polices.

Authorities of Municipalities on Energy Efficiency

Being city administration units, municipalities are authorized by the related laws like Municipal Law, Construction Law and Environment Law in order to reduce greenhouse gases in city and using energy efficiently. These authorities are as follows:

- They can perform very important urban arrangements like protecting environment in city by preparing a construction plan (physical plan), increasing number of parks in city, making environment friendly regulations, transportation system, renovating old parts of city, determining building height and density, protecting shores and forests, recognizing the Eco city concept in new settlements, setting the standard of using renewable energy in new settlements.
- By means of strategic plan, determining their short, medium and long term objectives, they can declare their resources, mission and authorities of various service units, coordination structure between units, collaboration opportunities with other public organizations and other figures in city to the public.
- They can provide some city services under free market conditions being free from the strict rules of public administration by means of establishing company. For instance Istanbul Metropolitan Municipality has 23 corporations in various urban service areas. Two of these corporations are energy related. The fields of other corporations are as follows: Planting, sea transportation, natural gas distribution, asphalt and concrete production, waste management, construction, transportation, residence, bus, sport.
- They can set standards of energy efficiency while supervising buildings and approving projects of residences and places of business which are licensed and approved for construction and usage by themselves.
- They can build residences especially for people with low income and apply energy efficient projects to those buildings. Some metropolitan municipalities have their own construction companies (for instance KİPTAŞ is the residence company of Istanbul Metropolitan Municipality).
- They can regulate the projects of lightening public domains according to energy efficiency. They can also change the present system.
- They can pay attention to energy efficiency while preparing contracts of infrastructure projects that they lead private companies to do by means of bidding or in projects that they do themselves. They can add energy efficiency condition into bidding contract.
- They can set standards and programmes on energy efficiency and energy saving in their own buildings and facilities.
- They can modify billboards within the concept of energy efficiency and urban aesthetics.
- They can carry out projects and take measures which take into consideration energy efficiency and energy saving in transportation vehicles (trolley, bus, sea bus, minibus, public bus). Istanbul Metropolitan Municipality's green bus application, decision of buying electrical bus, prioritization of rail and public transportation systems are some examples of it.

- They can have energy saving measures applied in new buildings while approving electricity, boiler, plumbing, heating projects. While approving the renovating projects of present or especially historical buildings, they can impose these measures as conditions.
- They can charge water consumption in a way that encourages saving on water. They can modify water supply, pump stations in terms of energy saving. Some municipalities do that.
- They can put notes about saving on the back sides of gas and water bills.
- They can make modifications in traffic flow regulations in city, crossroad, signalization and traffic signs in terms of energy saving. Solar energy can be used for the energy required by signalization. Such applications have been performed in some cities.
- They can widen pedestrian spaces in urban design and transformation and motivate using bike. In Bursa, the Municipality of Nilüfer has implemented an effective Bike Road Project and motivates people to use bike.
- They can impose energy efficiency as pre-condition in purchase contract while purchasing materials and equipment.
- They can establish Energy Efficiency Commission or establish a sub-commission dealing with this issue within Environment Commission.
- They can raise public awareness on energy efficiency and energy saving within the context of consumerism.
- Bringing forward energy efficiency and energy saving issues in city councils, they can create joint programmes with NGOs and other figures in city.
- They can carry out joint programmes with neighborhood muhtars and building managers on energy saving and energy efficiency in present buildings, especially in renovating buildings. A municipality is authorized for licensing (permitting) a renovation work.

There will be a big amount of energy saving if municipalities and metropolitan municipalities, as being city administration units, give priority to energy saving and using energy efficiently in all their activities. Especially metropolitan municipalities and affiliated organizations and companies manage a considerable budget. More than half of the population living in cities lives in metropolitans. We have mentioned the importance of cities for energy consumption and CO2 emissions. It should be accepted that metropolitans play a major role in carrying out the programmes prepared for energy efficiency. Metropolitans are important service and investment organizations. Even if metropolitans and their companies pay attention to energy efficiency only in their own buildings, facilities and purchasing, a big amount of energy can be saved.

Metropolitan Municipalities

In metropolitan areas, metropolitan municipality model was first begun to be used in Turkey as a local administration unit with the Decree Law no: 3030 in 1984. The metropolitan municipalities were first established in Istanbul, Ankara and Izmir and then established in 13 more cities (Adana, Sakarya, Antalya, Bursa, Diyarbakır, Erzurum, Eskişehir, Gaziantep, Mersin, Kayseri, Kocaeli, Konya, Samsun)

Metropolitan Municipality Law no: 5216 of 2004 authorizes metropolitan municipalities to perform important duties concerning environment across metropolitan. Metropolitan Water and Sewerage Administrations in every metropolitan are in charge of environmental protection services like providing tap water, establishing sewage system, treatment facilities and rain-water drainage systems. In addition to duty and authorities of other municipalities, metropolitan municipalities are in charge of important duties like making Environment Plan and Land Use Plan across metropolitan; providing water and sewage, transportation, waste disposal and treatment, gas distribution, coordination of transportation services. All of these services are closely concerned with efficient energy use.

All duties of metropolitan municipalities assigned by Metropolitan Law are directly related with environment health, environment planning, environment protection and combating environmental pollution.

According to Metropolitan Municipality Law no: 5216, duties, authorities and responsibilities of metropolitan municipalities to environment are as follows:

- Taking into consideration the opinions of district and first level municipalities, it prepares strategic planning, annual objectives, investment programmes and the budget of metropolitan municipality in accordance with those mentioned.
- It makes, approves and applies land use planning in every scale between 1/5.000 and 1/25.000 within metropolitan municipality and neighboring area borders on condition that it complies with environment planning. It approves and supervises application construction plans that municipalities within metropolitan prepare in line with land use plan, changes in these plans, subdivision plans and construction stabilization plans. It makes application construction plans and subdivision plans of district and first level municipalities which have not completed their application construction plans and subdivision plans in one year since land use plan goes in effect.
- It licenses and supervises places of businesses in the areas established or managed by metropolitan municipality and businesses in the areas that are in responsibility of metropolitan municipality.
- It makes and applies main metropolitan transportation plan; plans and coordinates transportation and public transportation; specifying number of all types of service and mass transportation vehicles and taxicabs on highway, waterway and railway, carfares, timetable and routes; running or renting stations and parking lots on streets, squares and similar places. It conducts all businesses required by traffic regulations, which are assigned to municipalities by law.
- It constructs and maintains streets, avenues, squares and highways, determines advertising areas, names and enumerates squares, avenues, streets and the buildings on them.
- It establishes geographical and urban databases.
- It protects environment, agricultural areas and water basins in line with sustainable development principle; makes planting; gathers non-healthy businesses, entertainment venues and other places influencing public health and environment into specific areas of city; specifying building materials, scrap storage and sale areas, excavation soil, rubble, sand and gravel storage areas, sale

and disposal areas of wood and coal; takes measures against the pollution that may be caused by transportation of these materials; makes a Metropolitan Solid Waste Management Plan or has it made; provides services concerning reevaluation, storage and disposal of solid waste and excavation, establishes facilities for that purpose; provides services concerning industrial and medical wastes, establishes facilities for that purpose; collects and purifies the wastes of sea vehicles.

- It licenses and supervises first class non-healthy businesses including those concerning food. It establishes laboratories in order to analyze food and beverages.
- It conducts municipal police services at places where metropolitan municipality is authorized.
- It establishes and manages social recreation areas, parks, zoos, animal shelters, libraries, museums, sport, entertainment and such places, has them established or has them managed; supports non-professional sport clubs when necessary, organizes sport competitions between non-professional clubs, rewards sport men/women who show success in domestic and foreign competitions according to Municipal Council decision.
- It establishes buildings and facilities for health, education and cultural services if necessary; repairs and maintains the buildings and facilities concerning these services which belong to public institutions.
- It protects cultural and natural properties, historical texture and maintains places which are important for city history; renovates places that are impossible to protect.
- It conducts mass transportation services in metropolitan and establishes and manages required facilities for that purpose, has them established or has them managed; licenses mass transportation vehicles including land and sea taxicabs and service vehicles within the borders of metropolitan.
- It conducts water and sewage services, establishes and manages the required dams and other facilities for that purpose or have them established; reclaims galleys; markets natural spring waters.
- It establishes and manages all types of wholesales markets and slaughter houses, has them established or has them managed; licenses and supervises special wholesales markets and slaughterhouses established on areas indicated in construction plan.
- It makes planning and takes precautions against natural disasters; supervises the businesses whether they are taking measures against fire and other natural disasters; licenses on this issue.
- It conducts all types of social and cultural services, establishes social facilities, health centers, hospitals, mobile health units for this purpose; opens vocational courses, collaborates with universities, high schools, vocational schools, public institutions and NGOs while providing these services.
- It establishes and manages central heating systems, has them established or has them managed.
- It evacuates and wrecks the buildings that are dangerous for life and property security.

Metropolitan municipalities should use their authorities in accordance with construction plan and acknowledge the related municipality. They can transfer these duties to district and first level municipalities in accordance with municipal council decision or accomplish together with them.

Thanks to this regulation of the law, metropolitan municipalities are authorized for almost everything about environment within the borders of metropolitan municipality. District municipalities in metropolitan area are authorized to provide services concerning environment in the areas which are out of authorization of metropolitan municipalities.

12.7 million People, which constitute 17.8% of the population of Turkey, lives in Istanbul. There lives 4,5 million in Ankara, 3,8 million in Izmir, 2,5 million in Bursa, 2 million in Adana, 2 million in Konya, 1,6 million in Gaziantep, 1,6 million in Mersin, 1,5 million in Şanlıurfa and 1,25 million in Samsun. 82,6 % of the country population live within municipal borders, whereas 17,4% of it live out of municipal borders. 54,7% of the population living within municipal borders are in metropolitan municipal borders whereas 45,3% of it are in other municipal borders. (TÜİK, 2008 population census results)

Istanbul has an important place among other metropolitans in economic and social terms. The city, which has a bigger economy than the total income of 127 countries in the world, has 55% share in foreign trade, 42% share in tax revenue, 28% share in tourism revenue of Turkey. 40% of export and 41% of import of Turkey take place in Istanbul. 38% of the industrial enterprises of the country is in Istanbul. 23% of GDP of Turkey (2007) is created in this city. Istanbul, with a GDP of 133 billion dollars, is the 34th out of 100 cities which influences world economy.

“In 2009 our consolidated budget was determined as 17.765.659.000 TL. The part of this total that belongs only to Istanbul Metropolitan Municipality is 6.200.000.000 TL. Having shown an outstanding performance in our budget we realized 99.67% in expense budget and 92.65% in revenue budget. We have tried to use our sources as efficient as possible. We have allocated a considerable ratio of our budget, 61%, to investments as usual. I am glad and honored to say that the services, investments and activities conducted by our municipality in 2009 contribute to beauty and life quality of Istanbul and support the city to become among the leading metropolitans of the world.” (Dr.KadirTopbaş, Introduction İBB Activity Report,2009)

More than half of the urban population of Turkey (54%) lives within the borders of metropolitan municipalities. Only this indicator can be enough to prove the importance of metropolitan municipal administrations. Metropolitans and their affiliated organizations and companies manage a considerable budget. We have mentioned the importance of cities for energy consumption and CO2 emissions. It should be accepted that metropolitans play a major role in carrying out the programmes prepared for energy efficiency. Metropolitans are important service and investment organizations. Even if metropolitans and their companies pay attention to

energy efficiency only in their own buildings, facilities and purchasing, a big amount of energy can be saved.

3.5.5.3 Challenges and opportunities

Energy Efficiency Law,as it is indicated by the articles mentioned above,is a framework law which gives important responsibilities to all public and private institutions, voluntary organizations, local administrations and citizens across Turkey. Organizations from various levels should collaborate in a sense of governance in order to improve the policies concerning the law and implement these policies. Performing multilevel governance (national, regional and local) with participation of administrations from various levels will be a platform on which central administration organizations and other public and private organizations come face to face with each other to develop policy and implement it. Consistency on efficient energy use may cause to occur inter-sectorial regional and urban development strategies which will be the prime mover of regional economic developments.

Samsun Metropolitan Municipality can play four major roles in using energy efficiently and reducing CO2 emissions as being city administrator:

Samsun Metropolitan Municipality, as being autonomous administration having budgets and legal entities, is also important consumer. Samsun Metropolitan Municipality can restrict their energy consumption by their-own plans and programmes. For example Samsun Metropolitan Municipality can use energy more efficiently in their own buildings and facilities, transform buses into green buses, use energy efficient bulbs for lightening cities. These examples and the others are the actions which Samsun Metropolitan Municipality can carry out directly and thusly can save energy.

Samsun Metropolitan Municipality acting as intermediaries can maintain collaboration and coordination between other figures like private sector organizations, voluntary organizations in city. They can create partnership agreements between public and private sector for city services. Thanks to energy action plans, they can sign protocols with private sector organizations operating in cities, non-governmental organizations, chambers, companies building residence and transportation authorities in order to use energy efficiently.

Samsun Metropolitan Municipality being providers of many city services influence life style and consumption pattern of a city by means of transportation services, construction activities like residence, road, bridge, metro, subway, overpass, infrastructure activities like water and sewage services. Hence, they are important figures of energy policy implementations on local level since they own many public goods, services and facilities in cities.

Samsun Metropolitan Municipality being regulators with public authority carries the authorities of making regulation within laws, implementation, making environmental plan that determines present and future development tendency of city, preparing

and implementing construction plans and programmes; supervising constructions, regulating traffic flow, licensing residences and places of business. Samsun Metropolitan Municipality can also make rules for securing people in city and implement these rules by municipal polices.

As a result of the studies prepared by Samsun Metropolitan Municipality within the scope of the BSBEEP Project, two grant projects called as "samSUN Solar Energy Project" and "Hydro Power Plant (HPP) Construction Project with Innovative Approaches at SelahattinEreren Drinking Water Treatment Facility", presented by Samsun Metropolitan Municipality have successfully approved by Middle Black Sea Regional Development Agency.

As part of the "samSUN Solar Energy Project", establishing 8 unit and each is 6 kWh in total 48 kWh power solar energy system with solar tracking system to Samsun Blue Lights Training, Relaxation and Rehabilitation Center-Camp is considered. Since solar tracking system that will be used on planned GES Project theoretically brings 30% increase in capacity, being 7.8 kWh in each solar system, producing totally 62,4 kWh electric energy is planned. Solar power plant (SPP) which is planned to be established as part of "samSUN Solar Energy Project" will have the feature of being the first and unique facility that generates electrical energy from renewable energy sources among public institutions and organizations both in Samsun and other region provinces.

In our other project, "At Selahattin Ereren Drinking Water Treatment Facility HPP Construction Project with Innovative Approaches", the mini-hydro power plant that will be built with renewable methods, on conveyance line brought to SelahattinEreren Drinking Water Treatment Facility from the basis of Çakmak Dam that provides drinking water requirements of Samsun province and locates in Samsun province Tekkeköy district, it is planned to build infrastructure that will generate 570 kWh electric power.

Hydroelectric plant (HPP) which is planned to be established as part of "At SelahattinEreren Drinking Water Treatment Facility HPP Construction Project with Innovative Approaches" will have the feature of being the first and only facility that generates electrical energy from renewable energy sources among public institutions and organizations both in Samsun and other region provinces.

"Making students think creatively about energy efficiency improves their environmental awareness."

Samsun Metropolitan Municipality has additionally prepared the booklet called as "Efficient Energy Use with Uncle Engineer" which teaches primary school children using energy efficiently at buildings in accordance with the BSBEEP Project's communication plan for making energy efficiency part of our community.

Education and training activities that are part of the BSBEEP Project are resulting in real energy savings in buildings.

Students are being motivated to think about energy saving and renewable sources through the activities implemented in the scope of BSBEEP Project. Thanks to the booklet, SMM is planning to reach approximately 60.000 primary school students, who should be considered as adults of our future.

Samsun Metropolitan Municipality is happy to share the booklet with all other project partners, who will introduce Uncle Engineer with their youngsters for efficient energy use in their countries in accordance with BSBEEP Communication Plan.

3.5.5.4 Problems and constraints

Samsun Metropolitan Municipality was responsible for the center of Samsun serving a population of almost 750.000 people, while Tekirdağ Metroplolitan Municipality was responsible for the center of Tekirdağ serving a population of almost 180.000 people. With the issuance of the Law 6360 regarding the establishment of 13 new Metropolitan Cities, Samsun and Tekirdağ will be a Metropolitan Administration covering all the provincial borders of the city with a total population of approximately 2.000.000 people totally. The merger process will create additional work for the human resource which will be trying to adapt to the new situation as well as Samsun Metropolitan Municipality.

Problems and constraints of SMM and TMM on energy efficiency in buildings can be described and summarized as below:

- Among others, the budget is the biggest constraint, regarding capital expenditures aiming for energy efficient technologies and procedures.
- There are local, national and international funding opportunities present but the capacity of public authorities should be raised in order to apply and manage projects with different partners.
- Main energy source of the residential buildings is still coal. There are local producers and incentives on coal prices. Population under the average welfare level will continue to use coal for a while.
- High initial costs for changing low operational efficiency of older technologies is a big constraint over new technologies with higher energy efficiency.
- The low income of citizens does not allow them to carry out repairs and modernization of premises, buildings, to use energy-efficient technologies. There are not enough funding or incentives to motivate citizens.
- There are not enough awareness campaigns, incentives to inform citizens regarding the financial benefits of EE.
- The control mechanisms for the implementation of existing regulations are not strict and properly monitored
- Final user awareness pertaining to the control of energy self-consumption is non-existent. Especially own energy use with metering (cooling/heating, electrical devices, natural gas, lighting, etc)
- A significant percentage of the building stock is regarded as unlicensed and/or illegal making it very difficult to implement any energy efficiency measure.

It is evident that all these problems constrain the modernization of the building stock visa for energy efficiency.

On one hand UN and other international organizations try hard for global heating and climate change across the world, on the other hand many district and city administration take initiatives for using energy more efficiently , reducing CO2 emissions and collaborate on local, regional and global level. In recent years, local and regional administrations, especially in OECD countries play more active role in climate change and energy efficiency. Many metropolitans plan their own Climate Change Action and take more drastic measures than their governments to reduce greenhouse gases.

Big cities, other medium and small scaled cities plan environment and climate friendly actions for energy use, renewable energy resources, public transportation, infrastructure, urban planning, wastes and parks. Many city administrations have stricter standards than their countries'. For instance Stuttgart (Germany) has stricter standards for buildings than national standards. In line with these developments, collaboration between local, regional administrations and city administrations on environment and climate change issues improves rapidly. For example, ICLEI (International Council for Local Environmental Initiatives) has 1.074 members of local administration or local administration union representing a population of 300 million in 68 countries.

Many cities and regional administrations develop policies and create action plans in order to reduce their own region's or city's contribution to climate change. Even if they do not have an action plan for this, they accept the policies of green building or renewable energy. City administrations have standards for energy efficiency and reducing CO2 emissions in especially buildings, electricity production & distribution, cooling & heating, waste disposal, transportation, physical planning (territory usage plan), water management issues, and carry out these standards.

Today there are many ways for local and regional administrations to use energy more efficiently (like building insulation, using energy efficient bulbs for lightening, waste-to-energy systems). Using energy efficiently, reducing greenhouse gases, greening buildings and cities create new employment areas. Developments like energy efficient tools and green buildings are encouraging for new consuming areas and new technologies in cities.

Examples from the world on the issues like electricity production of cities and local/regional administrations from renewable energy resources, using it for cooling & heating, using energy efficiently in city services, buildings and facilities, reducing greenhouse gases have been compiled from "State of the World 2007,2008,2009" reports published annually by World Watch Institute.

3.5.6 Tekirdag (local level)

3.5.6.1 Legal framework

There are no measures and legislative acts that are specifically for Tekirdağ as all legislative frameworks in Turkey are legislated by the central government. On the other hand there are several avenues open to local governments in Turkey to have an impact on energy efficiency. These may be listed as follows;

- Municipalities have budgets and are legal entities possessing relative autonomy. They are also large consumers of energy themselves. The first and foremost area for action regarding local government is to lower energy consumption in its own buildings, street lighting and other power consuming operations as well as initiating low carbon public transport and urban transport policy encouraging pedestrian and cycling modes. Here the local government acts as a good example for the public as well as creating a market for energy efficient goods.
- Municipalities physically have the task of planning the city through which they can impose in the medium term low carbon morphologies and development. Here local government acts as designer.
- Municipalities can facilitate to gather stake holders around the issue of energy efficiency, bringing together firms, professional organizations, NGO's and local government functionaries. In this way they act as facilitator.
- Municipalities are given the task of running the city through important local government legislation pertaining to a) the spatial planning of the city, b) environmental protection and c) the local administration regulations. Through these frameworks, local governments can stipulate physical limits to the building stock, green areas and transportation modalities. Acting in the role of example, designer, facilitator and regulatory authority, they have the possiblity of influencing market decisions in the vast area of city services and goods.

As Tekirdağ becomes a Metropolitan Administration as of April the 1st, 2014, its legislative power will be enhanced to better affect such measures and strategies.

3.5.6.2 Administrative framework

Municipal authorities and MEU's local office are in charge of energy efficiency related topics but since the capacity of the institutions are not enough there is not much being done related with energy efficiency. Several of the relevant stake holders have been listed below who can play an active role in the conversion to a energy efficient building stock.

Municipality of Tekirdağ according to the Municipality Law numbered 5393 the municipality is responsible for urban development, water and sanitation, transportation, urban infrastructure, geographical and urban informations systems, environment and environmental health, sanitation and solid water, local traffic,

reforestation, park and green spaces, housing services. These are only the services that can be related with environment and energy efficiency. The municipality has the below mentioned sanctions she can use to propagate energy efficiency measures.

- Under the authority of the law on municipal regulations, the municipality can remove and put municipal bans, apply the laws, impose penalties specified in laws.
- Another responsibility of the municipality is to give licence or permit with regard to the activities of real and legal persons specified in the law

Under the municipality the Zoning and Urban Planning Directorate is responsible for new building permits, modification of licensed permits, license renewals. Planning and Project Directorate of the Municipality; is responsible for creating standards for urban design, façade design and façade improvements of the city.

Building Inspection and Building Materials Branch Office of Ministry of Environment and Urbanization's Local Office is directly responsible for all the necessary work regarding the Energy Efficiency Law, Energy Performance of Buildings Regulation (BEP). There are a lot of problems related with environmental issues since there is heavy industry within Tekirdağ especially around Çerkezköy. Since there is a lack of capacity the MEU's local office is focused on environmental legislations; environmental permits, waste-water treatment, environmental legislation, environmental control, clean production and urban transformation which is the case for most of the cities in Turkey. The capacity of the related units can be increased in the near future.

Chamber of Mechanical Engineers and Chamber of Civil Engineers are quite active in Tekirdağ. There is an energy efficiency working group within the central Chamber of Civil Engineers but there is no action in Tekirdağ about EE. By building up a capacity for EE within the professional organizations Energy Efficiency Companies (EVD); most of the EVD companies authorized (there are only 32 of them all around Turkey by February 2014) are located in İstanbul and there are no EVD companies neither for buildings nor for industry in Tekirdağ. The EVD companies will play a key role to verify the compliance of new buildings with the BEP requirements and till 2017 all the existing buildings will have get Energy Identification Certificates from EVD companies. The certificate will be mandatory for the rental or sale of the building after 2017.

3.5.6.3 Challenges and opportunities

The migration rate of Tekirdağ is among the highest of all Turkish cities. The urban population is increasing every year while rural population is decreasing. According to the Trakya Regional Plan Draft prepared by Trakya Development Agency (one of the 26 local agencies of Turkey under the Ministry of Development) Tekirdağ population will increase by 23% and reach 1.073.331 by 2023 compared to 872.817 (2013

population)[77]. The central government is planning to increase the number of "Organized Industrial Zones" addition to the existing ones. A big port is being build and customs will be moved to Tekirdağ in order to partially take the burden of of İstanbul.

As urban migration continues, it further increases pressure on local governments for urban service provision which far exceed their budgetary and human resource capabilities. The economic realities also give result to higher income disparition and in equalities which increase social exclusion. These circumstances create additional demands on local governments that are much closer to the local population. Such pressures are already upon Tekirdağ and this will also be accompanied by increases in the consumption of energy in Tekirdağ. This situation presents a large opportunity for the Municipality also. The opportunity is to be able to guide this growth towards an energy efficient path and decrease the energy intensity of the city.

Tekirdağ city electric subscribers increased by almost 20% and electricity consumption increased by 10% between 2008 and 2012. Increase in urbanization and increased income lead to increases of energy consumption. Since the penetration of natural gas is relatively low, the consumption of natural gas is expected to increase exponentially. In 2013 the natural gas consumption was above 125 million m^3 and is expected to increase to by 30% and reach 163 million m^3 in 2014.

Increasing energy prices with the effect of additional taxes on fuels make it easier to convince citizens to take EE measures. The main fuel consumed in housing sector, is coal and most of the houses have low energy characteristics. There are still government incentives on coal and it is affordable for most of the families. Energy efficiency measures for those using natural gas have become particularly important because of the additional taxes on gas.

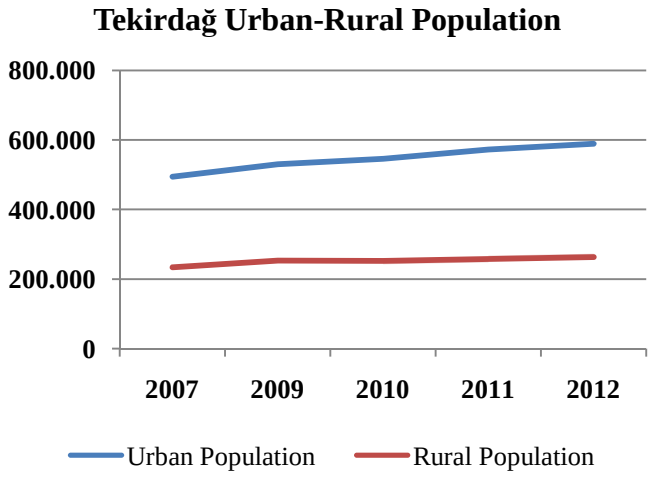


Figure 3.5-6: Tekirdağ Urban-Rural population by years[78].

[77] Trakya Regional Plan 2014-2023, by Trakya Development Agency; available at http://www.trakya2023.com/haberler-20142023_bolge_plani_taslagi.html?id=126#.UwSGP345mM8
[78] Turkish Statistical Institute (TUİK)

Table 3.5-3: Electricity consumption of Tekirdağ[79]

Building type	2008	2009	2010	2011	2012
Public	43.000,79	45.904,88	51.089,22	65.770,09	65.702,58
Residential	479.204,32	697.266,28	514.883,35	542.115,81	540.971,30
Commercial	185.878,19	177.194,95	173.725,81	172.258,95	185.457,81
Industry	2.438.714,05	2.645.463,59	1.879.483,65	1.637.217,85	2.394.025,02
Others	320.801,78	82.123,68	294.329,09	302.494,89	312.153,89
Total	3.467.599,13	3.647.953,38	2.913.511,12	2.719.857,58	3.498.310,60

Tekirdağ has a number of big industrial enterprises, some of which are owned by big international groups. Tekirdağ local government units can benefit from the experiences and trained personnel of these businesses.

Ministry of Environment and Urbanization (MEU) started a major infrastructural program referred as "Urban transformation" to identify buildings that are vulnerable to disasters such as earthquakes and rebuilt them all around Turkey. There are regions that will go through "Urban Transformation" in Tekirdağ as well. It will be possible to take energy efficiency measures if the municipality and other public authorities can work together to regulate the rules to rebuild those buildings in compliance with EE concepts. This will result in rapid deceleration in energy consumption of the building stock, in particular residences.

Most of the building stock was built before the Thermal Insulation legislation. The insulation standards included within the legislation are not strict enough to sufficiently insulate buildings in Tekirdağ's climatic conditions. This situation also presents itself as an opportunity to increase EE measures in buildings.

The challenges and opportunities facing Tekirdağ are listed below;

- Lack of experts and collaboration between local administration and existing institutions.
- Insufficient investigation regarding public buildings with poor energy efficiency and energy management.
- Establishing local management scheme to improve and monitor the energy performance of existing public buildings
- Analysis of the potential of buildings heating systems to provide efficient and low carbon energy.
- Ensuring the implementation of regulations and laws, proper monitoring.
- Financial incentives for EE in buildings
- Establishing publicly accessible information databases demonstrating energy performance of buildings.
- Demonstrate good practice examples and the benefits of EE.
- Enhance the capacity of key professionals with educational programs, training
- Demonstrating that the efficiency measures in the buildings are affordable.

[79] TREDAŞ, Electricity distributor of Tekirdağ

- Providing inform about the synergetic benefits of energy efficiency measures such as environmental and social benefits.

3.5.6.4 Problems and constraints

Tekirdağ Municipality was responsible for the center of Tekirdağ serving a population of almost 180 thousand people. With the issuance of the Law 6360 regarding the establishment of 13 new Metropolitan Cities, Tekirdağ will be a Metropolitan Administration covering all the provincial borders of the city with a total population of 873 thousand people. The merger process will create additional work for the human resource which will be trying to adapt to the new situation.

- Among others, the budget is the biggest constraint, regarding capital expenditures aiming for energy efficient technologies and procedures.
- There are local, national and international funding opportunities present but the capacity of public authorities should be raised in order to apply and manage projects with different partners.
- Main energy source of the residential buildings is still coal. There are local producers and incentives on coal prices. Population under the average welfare level will continue to use coal for a while.
- High initial costs to change low operational efficiency of older technologies is a big constraint over new technologies with higher energy efficiency.
- The low income of citizens does not allow them to carry out repairs and modernization of premises, buildings, to use energy-efficient technologies. There are not enough funding or incentives to motivate citizens.
- There are not enough awareness campaigns, incentives to inform citizens regarding the financial benefits of EE.
- The control mechanisms for the implementation of existing regulations are not strict and properly monitored
- Final user awareness pertaining to the control of energy self-consumption is non-existent. Especially own energy use with metering (cooling/heating, electrical devices, n.gas, lighting, etc)
- A significant percentage of the building stock is regarded as unlicensed and/or illegal making it very difficult to implement any energy efficiency measure.

It is evident that all these problems constrain the modernization of the building stock vis a vis energy efficiency .

3.6 Ukraine (national level)

3.6.1 Legal framework (national)

The relations in the field of development of urban activity regulated by the Constitution of Ukraine, by the Land Code of Ukraine, laws of Ukraine "On general planning scheme in Ukraine", "On the regulation of urban development"[80], "On the fundamentals of urban development"[81], "On architectural activity"[82], "On the complex reconstruction of obsolete housing stock", "On land management", other legal acts.

The management in urban development activities is carried out by the Verkhovna Rada of Ukraine, the Cabinet of Ministers of Ukraine, by the Verkhovna Rada of the Autonomous Republic of Crimea, by the Council of Ministers of the Autonomous Republic of Crimea, by the central executive authority which ensures the formation of public policy in the field of urban development, by the central executive body which implements the state policy in architecture, by local administrations, local authorities. The management of urban development activities is carried out by:

- spatial planning at the regional and local levels;
- monitoring of the status of the development and implementation planning documentation at all levels;
- determination of the public interest in the development and planning documentation;
- licensing and professional certification;
- development and adoption of building codes, standards and government regulations;
- implementations of international codes and standards;
- monitoring compliance with legislation in the sphere of urban development activities, requirements of building codes, standards and government regulations, rules of urban planning documentation at all levels, basic data for the design of urban planning and design documentation.

Private or juridical person should receive all the necessary conditions and limitations for the object of construction. The conditions and restrictions may include requirements for architecture and engineering solutions. A set of conditions and requirements to ensure the engineering construction must comply with the parameters of design, in particular, water, heat, electricity and gas supply, sewerage, wired radio, illumination, storm water drainage system, systems of telecommunications, technological safety and others. The project documentation for the construction of facilities developed in accordance with "The procedure for the preparation of project documentation for the construction", which was approved by the Order of the Ministry of Regional Development, Construction and Housing and

[80]Закон України. Про регулювання містобудівної діяльності. Available at: http://zakon4.rada.gov.ua/laws/show/3038-17/page. (Date of access: 19/11/2013).
[81]Закон України. Про основи містобудування. Available at: http://zakon4.rada.gov.ua/laws/show/2780-12. (Date of access: 19/11/2013).
[82]Закон України. Про архітектурну діяльність. Available at: http://zakon4.rada.gov.ua/laws/show/687-14. (Date of access: 19/11/2013).

Communal Services of Ukraine 16.05.2011 No. 45[83]. The composition and content of design documentation for construction at all stages of design are determined in accordance with the building regulations and should be sufficient to evaluate design decisions and their implementation. The compulsory examination of projects construction is provided if:

- the projects refer to IV and V categories of difficulty (compliance to the standards of sanitary and epidemiological welfare of the population, environmental, health, compliance to the standards of the consumption of energy resources, nuclear and radiation safety, reliability and durability of buildings and structures, their operational safety);
- the projects of construction are produced in the areas with difficult engineering-geological and technogeneous conditions – in terms of strength, reliability and durability of buildings and structures;
- the projects of construction are produced from the budgetary funds, due to state and municipal enterprises, institutions and organizations, as well as loans granted under the state guarantees.

The terms of beginning preparatory work for construction and construction works are set out in the law "On the regulation of urban development"[84]. The adoption of the completed works of construction the 1st – 3rd categories of complexity and objects, whose construction was carried out on the basis of passport building, is effected by registration authority of state architectural and building control without payment provided the customer submit the declaration of preparedness the object to the operation. The adoption of the completed works of construction of the 4th and the 5th categories of complexity, occurs on the basis of the act of readiness of object for the operation, with issuing a state certificate, in the manner specified by the Cabinet of Ministers of Ukraine.

The competences of Cabinet of Ministers of Ukraine in the sphere of urban development include:

- determination of the order of the state control in urban planning;
- coordination of the activities of the executive power in the sphere of urban development;
- implementation of urban planning policy of Ukraine;
- development of state, interstate urban development programs and projects;
- development of the general scheme of the territory of Ukraine, planning schemes of individual parts of the territory of Ukraine;
- carrying out basic and priority research on urban planning, maintaining the traditional environment human settlements and restoration works;
- development and adoption of state standards, rules and regulations in the field of urban development;
- licensing of certain economic activities in construction;

[83] Порядок розроблення проектної документації на будівництво об'єктів. Available at: http://zakon4.rada.gov.ua/laws/show/z0651-11#n15. (Date of access: 19/11/2013).
[84] Закон України. Про регулювання містобудівної діяльності. Available at: http://zakon4.rada.gov.ua/laws/show/3038-17/page. (Date of access: 19/11/2013).

- establishing procedures for the examination of planning documentation for projects specific objects;
- establishing procedures for providing baseline data for the design of urban development.
- The competences of the regional and district councils in the field of urban development on their territory include:
- identification of areas and provision of land for urban needs in accordance with the law;
- development of planning of areas and urban development programs of the region;
- adoption of the regional urban development programs;
- setting and changing the boundaries of settlements.

The competence of the Regional Council includes the approval of appropriate planning documentation. The competences of the village councils and city councils in the field of urban development in the relevant territory include: approval of master plans of the respective localities, of zoning plans, detailed plans for the territories in accordance with the laws.

Legislation of Ukraine in the sphere of standardization in the construction consists of the following laws of Ukraine: "On the construction standards"[85], "On the fundamentals of urban development"[86], "The responsibility for offenses in the field of urban development" and other normative acts regulating relations in this sphere.
The application of building codes or their individual provisions is mandatory for all entities regardless of ownership which are engaged in construction, development of the plan of architectural works and ensuring the manufacture of products for construction purposes. International, regional and national building codes, regulations, standards are used in Ukraine in accordance with the international treaties which are approved by Verkhovna Rada of Ukraine. Building codes may contain requirements for conformity assessment of construction products with legal requirements.

The terms which confirm suitability of new building products for use in respect of which there is no requirements of building codes, regulations and other documents in the construction industry, established by the Cabinet of Ministers of Ukraine.If there are references to standards in building codes, these standards are mandatory for use.
The state control of the economic entities is performed by a central executive body implementing the state policy on construction.

The basic law defining the basis of energy conservation policy in Ukraine is the law of Ukraine "On energy saving" adopted by the resolution of the Verkhovna Rada of

[85]Закон України. Про будівельні норми. Available at: http://zakon4.rada.gov.ua/laws/show/1704-17. (Date of access: 19/11/2013).
[86]Закон України. Про основи містобудування. Available at: http://zakon4.rada.gov.ua/laws/show/2780-12. (Date of access: 19/11/2013).

Ukraine of 01.07.94 No.75/94-VR[87]. The law defines the legal, economic, social and environmental rules of energy saving for all businesses, associations and organizations located on the territory of Ukraine, as well as for citizens. The law defines economic measures to ensure energy conservation, which include:

- the integrated use of economic incentives to guide management, scientific-technical and economic performance of enterprises, institutions and organizations on the rational use and saving of energy resources;
- determining the sources of financing energy conservation;
- establishment of the basis for the implementation of economic measures in the form of energy-saving control system of state standards that include indicators of specific consumption of energy resources for major energy-intensive productions and processes in all sectors of the economy;
- usage of the system of state standards in energy efficiency when determining the economic incentives and economic sanctions;
- provision of businesses and individual subsidies, grants, taxes, credits and other incentives to encourage the development of energy-saving technologies, equipment and materials.
- The incentives for energy conservation in accordance with the Law shall be effected by:
- tax limitations for the companies which produce of energy saving equipment, machinery and materials, means of measurement, monitoring, equipment for use of alternative and renewable energy sources and alternative fuels;
- providing tax limitations to companies that use equipment that operates on alternative and renewable energy sources, alternative fuels.
- The development of Ukraine energy legislation is one of the priority objectives and areas of implementation of the latest approaches in the internal policy of Ukraine.
- The ranges of tax, credit and other benefits are established under the laws of Ukraine.
- In Ukraine the following laws and regulations have been developed and adopted which stimulate the introduction of energy saving measures and technologies:
- The program of phased equipment of the existing housing stock by means of accounting and regulating consumption of water and heat in 1996-2007, approved by resolution of Cabinet of Ministers of Ukraine No. 947 of 27.11.1995;
- The national energy program of Ukraine till 2010, approved by the resolution of the Verkhovna Rada of Ukraine No. 191/96-BP, 15.05.1996;
- The comprehensive state energy saving program of Ukraine approved by the resolution of the Cabinet of Ministers of Ukraine No. 148, 05.02.1997;
- The program of state support of developing alternative and renewable sources of energy and small hydro- and heat power engineering, approved by the decree of the Cabinet of Ministers of Ukraine No. 1505, 31.12.1997;

[87]Закон України. Про енергозбереження. Available at: http://zakon0.rada.gov.ua/laws/show/74/94-%D0%B2%D1%80. (Date of access: 19/11/2013).

- Regulations of the state expertise on energy saving, approved by the Cabinet of Ministers of Ukraine No. 1094, 15.07.1998;
- The instruction on the procedure of transfer of documentation and carrying out the state expertise on energy saving, approved by the order of the State Committee of Ukraine for Energy Conservation No. 15, 09.03.1999;
- Regulations of the order of organization of energy inspections, approved by order of the State Committee of Ukraine on Energy Saving, No. 27, 09.04.1999;
- The program for reconstruction of residential houses of the first mass series, approved by resolution of Cabinet of Ministers of Ukraine, No. 820 dated 14 May 1999;
- The resolution of the Cabinet of Ministers of Ukraine No. 1040 of 27.06.2000, «On the urgent measures on the implementation of the comprehensive state program on energy saving in Ukraine»;
- The sectoral program of energy saving in the construction complex, housing and communal services for 2001-2005 and for the future, approved the resolution of the Board of Gosstroy of Ukraine No. 96, 09.10.2001;
- The main provisions for the regulation of specific expenses of fuel and energy resources in the public sector, approved by order of the State Committee of Ukraine for Energy Conservation No. 112, 22.10.2002;
- The law of Ukraine «On the national program on adaptation of Ukrainian legislation to European Union legislation» No. 1629-IV, 18.03.2004, (includes legislation on energy efficiency);
- Technical regulation of construction products, buildings and structures, approved by the Cabinet of Ministers of Ukraine No. 1764, 20.12.2006;
- The energy strategy of Ukraine until 2030, approved by the order of the Cabinet of Ministers of Ukraine No. 145-R, 15.03.2006;
- The resolution of the Cabinet of Ministers of Ukraine No. 436 from 27.07.2006 «On approval of action plan for 2006-2010 on implementation of the energy strategy of Ukraine until 2030»;
- The law of Ukraine «On the complex reconstruction of obsolete housing fund» No. 525-V, 22.12.2006;
- The resolution of the Cabinet of Ministers of Ukraine No. 838-p, 11.06.2008 «About equipping of the housing fund of means of accounting and regulating consumption of water and heat»;
- The sectoral program on energy efficiency in construction for 2010-2014, approved by the order of the Ministry of Regional Development and Construction of Ukraine No. 257, 30.06.2009;
- The sectoral program of energy efficiency and energy saving in housing and communal services for 2010-2014, approved by the order of the Ministry of Housing and Communal Services No. 352, 11.10.2009;
- The state target economic program of energy efficiency and development of energy production of renewable energy sources and alternative fuels for 2010-2015, approved by resolution of the Cabinet of Ministers of Ukraine No. 243, 01.03.2010;
- The procedure of competitive selection of energy efficient projects for state support at the expense of funds envisaged in the state budget for the

implementation of the state target economic program of energy efficiency and development of the energy production from renewable energy sources and alternative fuels for 2010-2015, approved by the Ministry of economic development and trade of Ukraine No. 105, 06.10.2011;

- The plan of measures of the legal provision of implementing the energy efficiency policy of heat consumption and modernization in the sphere of heat supply, approved by the order of the Cabinet of Ministers of Ukraine No. 588-R, 30.07.2012.

The development of Ukraine's energy legislation is one of the priority objectives and areas of implementation of the latest approaches in the area[88]. One of the energy legislation main objectives is to create favourable conditions for the efficient use of fuel and energy avoiding any intervention with the economic activities of business entities.

An interrelated, effective and transparent system of energy efficiency legislation is developed to achieve this goal. This system includes legal regulations that would stipulate an adequate combination of tools of state regulation and stimulation of economic entities and the population to efficiently use of fuel and energy, and bring the Ukrainian legislation for regulating efficient use of energy resources and energy efficiency in line with the European Union legislation.

In accordance with the agreement on partnership and cooperation between Ukraine and European Communities, Ukraine undertook to take measures to progressively align the national legislation with the EU legislation. These spheres include technical regulations and standards. The commitments are implemented in accordance with the national program of adaptation of Ukrainian legislation to the legislation of the European Union.

Now the total number of harmonized standards in Ukraine is only about a third of the existing ones in the EU. Today in the field of standardization and technical regulations in Ukraine there are:

- the law of Ukraine "On standards, technical regulations and conformity assessment procedures" of 1st December 2005 No. 3164-IV[89]. This law defines the legal and organizational basis for the development and application of national standards, technical regulations and conformity assessment procedures, as well as the fundamental principles of the state policy in the sphere of standardization, technical regulation and conformity assessment;

[88]Rethinking The Strategy of Development: 2010-11 National Report About Implementation of the Energy Efficiency State Policy / M. Pashkevych, V. Hryhorovskyi, V. Gavrylenko, O. Zaporozhets, Ya. Movchan [et al.] – Kyiv, SAEE-NAU-LAT & K, 2012. – 270 p. Available at: http://saee.gov.ua/wp-content/uploads/2013/09/NR-2010-2011.pdf. (Date of access: 19/11/2013).

[89] Закон України. Про стандарти, технічні регламенти та процедури оцінки відповідності. Available at: http://zakon1.rada.gov.ua/laws/show/3164-15. (Date of access: 19/11/2013).

- the law of Ukraine "On standardization" of May 17, 2001 No. 2408-III[90]. This law establishes the legal and organizational bases of standardization in Ukraine and is aimed at providing a unified technical policy in this sphere;
- the law of Ukraine "On conformity assessment" dated May 17, 2001 No. 2406-III[91]. The law defines the legal and organizational basis of confirmation of conformity of products, quality systems, quality management systems, environmental management systems, personnel and is aimed at ensuring a common state technical policy in the sphere of conformity acknowledgement;
- "Technical regulation of construction products, buildings and structures" approved by the Cabinet of Ministers of Ukraine dated December 20, 2006 No. 1764[92].
- The existing structure of the regulations involve a significant part of the normative documents of the former USSR, partly of national documents, partly of the documents harmonized with the EU and partly those harmonized with the countries of the CIS.

The letter designations of main normative documents are followings:

- ДБН - The national building code of Ukraine;
- ДНАОП, НПАОП - The state legal acts on labor protection;
- ДСанПіН - The state sanitary rules and norms;
- ДСТУ - The state standard of Ukraine;
- ДСТУ Б - The state standard of Ukraine for the construction;
- ГОСТ - The state standard (the former USSR Standard which is not cancelled);
- НАПБ - The national acts on fire security;
- РСН - The national building regulations (the former USSR Standard which is not cancelled);
- РНиП - Restoration standards and rules (the former USSR, the effect of which in Ukraine is not canceled);
- СТ СЭВ - CMEA standard (the standard of the former COMECON countries, the effect of which in Ukraine is not cancelled);
- СНиП - Construction norms and rules (the former USSR, the effect of which in Ukraine is not canceled);
- СН - Building norms (the former USSR, the effect of which in Ukraine is not canceled).

The normative regulation of energy efficiency in housing and communal services and the construction industry provides complex of standards on energy saving, a complex of norms and standards in construction and the system of standards in the housing sector. A set of standards for energy conservation, covers all types of activities connected with the use of fuel and energy resources, regardless of the sources of

[90]Закон України. Про стандартизацію. Available at: http://zakon4.rada.gov.ua/laws/show/2408-14. (Date of access: 19/11/2013).
[91]Закон України. Про підтвердження відповідності. Available at: http://zakon1.rada.gov.ua/laws/show/2406-14. (Date of access: 19/11/2013).
[92]Про затвердження Технічного регламенту будівельних виробів, будівель і споруд. Available at: http://zakon1.rada.gov.ua/laws/show/1764-2006-%D0%BF. (Date of access: 19/11/2013).

energy supply, production and consumption of energy resources. The requirements of a complex of standards are mandatory for all enterprises (regardless of their ownership forms). A set of standards for energy conservation includes:

- terms and definitions of basic concepts in the field of energy saving;
- organizational and methodological bases of energy saving;
- indicators of efficiency of use of energy resources and the order of their entry in the technical documentation;
- methods of testing and certification of objects in conformity with the requirements of energy saving;
- methods of calculation of energy balances of production processes, technologies and enterprises;
- methods of calculation and analysis of the reduction of losses of fuel and energy;
- norms of the consumption of fuel, thermal and electric energy, methods of determination of indicators of efficiency of their use;
- requirements to the quality of energy resources, as well as methods for their determination;
- methods of collecting and processing information about fuel and energy;
- requirements to the metrological support of power consumption and energy saving;
- requirements to energy-saving technologies and equipments;
- requirements to the utilization and usage of secondary energy resources;
- requirements to sources of energy (non-conventional and renewable);
- database requirements in the sphere of energy saving.

Standardization of energy saving is applied for technological processes, energy consuming equipment, vehicles, home appliances mass use, buildings and structures. The most comprehensive list of current normative base in the sphere of housing is available on the website of the Ministry of Regional Development, Construction, Housing and Communal Services (http://npa-mrb.gov.ua). There is a list of the current state building norms and regulations on technical conditions compliance, which indicates compliance with the requirements of technical regulations of building products, buildings and structures (http://minregion.gov.ua).

The national regulatory framework in the field of energy efficiency of buildings was developed in the following way:

- 1994-1996 – increase in the requirements to the heat transfer resistance enclosing structures of residential and public buildings by 2,0-2,5 times;
- 2006-2007 – introduction of new state construction regulations on energy performance of buildings;
- 2008-2010 – introduction of state norms and standards regulating the requirements and methods of control of indicators of energy efficiency.
- The result was the establishment of a regulatory framework for energy efficiency of buildings, the basic documents being the following:
- ДБН В.2.6-31:2006 “Structures of buildings and facilities. Thermal insulation of buildings” in which the indicators of energy efficiency of buildings are regulated;

- - ДСТУ-Н Б А.2.2-5:2007 “Design. Guidelines for developing and preparing energy certificates of buildings for new construction and reconstruction” in which the design rules for new construction, reconstruction, and overhaul are regulated;
- ДСТУ Б А.2.2-8:2010 “Design. Section “Energy efficiency” included in the design documentation of assets” - this standard sets rules for energy classification of buildings, taking into account characteristics of heat insulating lining and utility equipment of buildings.
- ДБН В.2.6-33:2008 “Structures of external walls with façade heat insulation. requirements for design, installation, and operation”;
- ДБН В.2.5-23-2010 “Utility equipment of buildings and facilities. Design of electrical equipment of civil facilities”;
- ДСТУ Б В.2.2-19:2007 “Method of determining air penetration of enclosing structures under natural conditions”;
- ДСТУ Б В.2.2-21:2008 “Method of determining the specific heat consumption for heating buildings”;
- ДСТУ Б В.2.6-34:2008 “Thermal insulation and finishing façade systems of buildings and facilities. Classification. General technical specifications”;
- ДСТУ Б В.2.6-35:2008 “Thermal insulation façade systems with finished industrial elements. Structures with a ventilated air layer. General technical specifications”;
- ДСТУ Б В.2.6-36:2008 “Thermal insulation façade systems with finished plasterwork”;
- ДСТУ-Н Б В.2.6-83:2009 “Guidelines for designing translucent elements of enclosures”;
- ДСТУ-Н Б В.2.6-88:2009 “Structures of external walls with façade thermal insulation. Guidelines for technical approbation, technical control, and monitoring”;
- ДСТУ Б В.2.7-182:2009 “Methods of determining the time of efficient operation and heat conductivity of building thermal insulation materials under estimated and standard conditions”;
- ДСТУ-Н Б В.2.5-43:2010 “Utility equipment of buildings and facilities. Guidelines for installing solar heat supply systems in residential and public buildings”;
- ДСТУ Б В.2.5-44:2010 “Utility equipment of buildings and facilities. Design of heating systems in buildings with heat pumps. General technical specifications”;
- ДСТУ Б В.2.6-100:2010 “Methods of determining thermal resistance of enclosures”;
- ДСТУ Б В.2.6-101:2010 “Methods of determining heat transmission resistance of enclosures”.

On December 15, 2010, the Verkhovna Rada of Ukraine ratified the protocol on Ukraine’s accession to the treaty for founding the Energy Community. The law of Ukraine “On ratification of the protocol for Ukraine’s joining the Energy Commonwealth Foundation Agreement” took effect on January 14, 2011. According

to the formal procedure of accession, Ukraine became a member of this organization on February 01, 2011.

As a result, it is necessary to implement European Union 2010/31/EU Directive in Ukraine's legislation. On August 03, 2011, the Cabinet of Ministers of Ukraine approved the "Action plan for discharging commitments under the agreement for foundation of the Energy Community"[93]. This plan specifies 15 measures aimed at implementing the EU directives, bringing in line the legal framework, etc. These measures have to be implemented over a period from 6 months to 6 years.

At present, the Ministry of Regional Development, Construction, Housing and Communal Services is focused on amending the state construction standards as regards enhancement of the thermal resistance indicators of enclosing structures and applying the requirements for recuperation, life support system management in blocks of flats of IV and V complexity categories.

The scientific and technical council of the Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine (04.10.2011 No. 13) approved the plan of development of the normative base and the introduction of European normative documents on energy efficiency of construction of objects on the territory of Ukraine in accordance with this plan the following standards should be implemented[94]:

- ДСТУ Б EN 15603:2008 «Energy performance of buildings. Overall energy use and definition of energy rating» (introduced from 01.01.2014);
- ДСТУ Б EN 13790:2008 «Energy performance of buildings. Calculation of energy use for space heating and cooling» (introduced from 01.07.2013);
- ДСТУ Б EN 15459:2007 «Energy performance of buildings. Economic evaluation procedure for energy systems in buildings»;
- ДСТУ Б ISO 7730:2005 «Ergonomics of the thermal environment. Analytical determination and interpretation of thermal comfort using calculation of the PMV and PPD indices and local thermal comfort criteria (introduced from 01.07.2013);
- ДСТУ Б EN 15251:2007 «Indoor environmental input parameters for design and assessment of energy performance of buildings corresponding to indoor air quality, thermal environment, lighting and acoustics» (introduced from 01.07.2013);
- ДСТУ Б EN 15217:2007 «Energy performance of buildings. Methods for Calculating energy performance and energy certification of buildings»;
- ДСТУ Б EN 15378:2007 «Heating systems in buildings. Inspection of boilers and heating systems»;

[93]Про затвердження плану заходів щодо виконання зобов'язань в рамках Договору про заснування Енергетичного Співтовариства. Available at: http://zakon2.rada.gov.ua/laws/show/733-2011-%D1%80#n8. (Date of access: 19/11/2013).

[94]ПЛАН розвитку нормативної бази та впровадження європейських нормативних документів з енергоефективності будівельних об'єктів на території України. Available at: http://zakon.nau.ua/doc/?uid=1041.47260.0. (Date of access: 19/11/2013).

- ДСТУ Б EN 15239:2007 «Ventilation for buildings. Energy performance of buildings. Guidelines for inspection of ventilation systems»;
- ДСТУ Б EN 15240:2007 «Ventilation for buildings. Energy performance of buildings. Guidelines for inspection of air-conditioning systems»;
- ДСТУ Б EN 15241:2007 «Ventilation for buildings. Calculation methods for energy losses due to ventilation and infiltration in commercial buildings»;
- ДСТУ Б EN 15316-1:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 1: General» (introduced from 01.01.2013);
- ДСТУ Б EN 15316-2-1:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 2-1: Space heating emission systems» (introduced from 01.01.2013);
- ДСТУ Б EN 15316-2-3:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 2-2: Space heating distribution systems» (introduced from 01.01.2013);
- ДСТУ Б EN 15316-3-1:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 3-1: Domestic hot water systems, characterisation of needs (tapping requirements)»;
- ДСТУ Б EN 15316-3-2:2007 «Heating systems in buildings- Method for calculation of system energy requirements and system efficiencies. Part 3-2: Domestic hot water systems, distribution»;
- ДСТУ Б EN 15316-3-3:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 3-3: Domestic hot water systems, generation»;
- ДСТУ Б EN 15316-4-1:2008 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 4-1: Space heating generation systems, combustion systems»;
- ДСТУ Б EN 15316-4-2:2008 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 4-2: Space heating generation systems, heat pump systems»;
- ДСТУ Б EN 15316-4-3:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 4-3: Space heating generation systems, thermal solar systems»;
- ДСТУ Б EN 15316-4-4:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 4-4: Space heating generation systems, the performance and quality of CHP electricity and heat»;
- ДСТУ Б EN 15316-4-5:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 4-5: Space heating generation systems, the performance and quality of district heating and large volume systems»;
- ДСТУ Б EN 15316-4-6:2007 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 4-6: Space heating generation systems, the performance of other renewable sources heat and electricity»;

- ДСТУ EN 15316-4-7:2008 «Heating systems in buildings. Method for calculation of system energy requirements and system efficiencies. Part 4-7: Space heating generation systems, biomass combustion systems»;
- ДСТУ Б EN 15243:2007 «Ventilation for buildings. Calculation of room temperatures and of load and energy for buildings with room conditioning systems»;
- ДСТУ Б EN 15251:2007 «Indoor environmental input parameters for design and assessment of energy performance of buildings addressing indoor air quality, thermal environment, lighting and acoustics» (introduced from 01.07.2013);
- ДСТУ Б EN 15193:2007 «Energy performance of buildings. Energy requirements for lighting»;
- ДСТУ Б EN 13363-1 "Solar protection devices combined with glazing. Calculation of solar and light transmittance. Part 1: Simplified method";
- ДСТУ Б EN 13363-2 "Solar protection devices combined with glazing. Calculation of total solar energy transmittance and light transmittance. Part 2: Detailed calculation method";
- ДСТУ-Н Б EN ISO 16484-1:2010 «Building automation and control systems (BACS). Part 1: Project specification and implementation»;
- ДСТУ Б EN ISO 16484-2:2004 «Building automation and control systems (BACS). Part 2: Hardware»;
- ДСТУ Б EN ISO 16484-3:2005 «Building automation and control systems (BACS). Part 3: Functions»;
- ДСТУ Б EN 15500:2008 «Control for heating, ventilating and air-conditioning applications. Electronic individual zone control equipment»;
- ДСТУ Б EN 15450:2007 «Heating systems in buildings. Design of heat pump heating systems».

The Ministry of Regional Development, Construction, Housing and Communal Services of Ukraine also prepared the draft law «On energy efficiency of residential and public buildings». According to July 1, 2013 change No.1 to the ДБН В.2.6-31:2006 «Structures of buildings and facilities. Thermal insulation of buildings» again increased requirements to the heat transfer resistance enclosing structures of residential and public buildings.

Also from 1 January 2014 introduced new state construction regulations ДБН В.2.5-67:2013 «Heating, ventilation and conditioning» and ДБН В.2.5-74:2013 «Water supply. External networks and constructions. Basic principles designings».

3.6.2 Administrative framework

The major organizations that carry on regulatory activity at the state level in the energy construction and housing and communal sectors are:

- The State Architectural and Building Inspectorate of Ukraine;
- The State Agency on Energy Efficiency and Energy Saving of Ukraine;
- The National Commission for the State Regulation of Energy;
- The National Commission of the State Public Utilities Regulation;
- The State Sanitary and Epidemiological Service of Ukraine;

- The State Department of Fire Safety.

The State Architectural and Building Inspectorate of Ukraine ensures the implementation of state policy on state architectural and construction control and monitoring in the sphere of housing and communal services[95]. The State Architectural and Building Inspectorate of Ukraine controls works in regions directly via its regional offices – Inspectorates of State Architectural and Building Control, in the Autonomous Republic of Crimea, regions, cities of Kyiv and Sevastopol. The State Architectural and Building Inspectorate of Ukraine takes completed projects, logs messages and declares the beginning of preparatory and construction works, declares the willingness to objects to start the operation; issues permits for construction works, issues licenses to business entities, cancels the licenses; maintain the uniform register.

The State Agency on Energy Efficiency and Energy Saving of Ukraine is the central executive body, whose activities are directed and coordinated by the Cabinet of Ministers of Ukraine. The main tasks the State Agency on Energy Efficiency and Energy Saving of Ukraine are[96]:

- implementation of state policy in the sphere of efficient use of energy resources, energy conservation, renewable energy and alternative fuels;
- implementation of state control in the sphere of efficient use of energy resources;
- increasing the share of renewable energy sources and alternative fuels in the energy balance of Ukraine.

The State Agency on Energy Efficiency and Energy Saving of Ukraine has the following tasks:

- to submit proposals to the Minister for the formation of public policy in the field of efficient use of energy resources, energy conservation, renewable energy and alternative fuels and ensure their implementation;
- to develop and coordinate the state, sectoral and regional programs in the field of efficient use of energy resources, energy conservation, renewable energy and alternative fuels and also monitor the implementation of state programs in these fields;
- to provide monitoring of indicators and energy balance of Ukraine and participate in the development of national and regional energy balances;
- to organize and carry out state expert examinations of energy efficiency;
- to administer a system of energy audit and introduction the energy management system;
- to administer a system of rationing specific expenses of fuel and energy resources in social production;
- to develop state rules, regulations and standards;
- to carry out state control in the sphere of efficient use of energy resources;

[95]Державна архітектурно-будівельна інспекція України. Available at: http://dabi.uss.gov.ua/index.php. (Date of access: 19/11/2013).
[96] Державне агентство з енергоефективності та енергозбереження України. Available at: http://saee.gov.ua/pro-agentstvo. (Date of access: 19/11/2013).

- to maintain a register of alternative fuels;
- to provide informational activities;
- to ensure international cooperation for efficient use of energy resources, energy conservation, renewable energy and alternative fuels, etc.

In Ukraine the National Commission for the State Regulation of Energy (NCSRE) carry out the state regulation of economic activities of monopolies in natural resources use and subjects of economic activities working in affiliated sectors of the sphere of electricity generation, heat supply, heat production at central heating stations, thermal power plants, nuclear power plants and cogenerating installations and installations generating energy from non-traditional or renewable energy sources (heat supply), the markets of natural gas, oil (associated) gas, gas (methane) of coal mines, shale gas (natural gas), oil and oil products[97,98]. The Commission is the state collegiate body subordinated to the President of Ukraine and accountable to the Verkhovna Rada of Ukraine. The Commission was established according to the decree of the President of Ukraine 23.11.2011 No. 1059/2011.

The NCSRE according to its Statute accomplishes the following:

a) issues licenses for economic activities in the sphere of electricity generation, heat supply, gas sector, as well as licenses for conducting activities related to:

- rights to generate electricity above the level established according to the license;
- combined generation of heat and electricity;
- transmission and supply of electricity;
- heat production at central heating installations and installation of unconventional or renewable energy sources;
- transportation of oil, oil products by trunk pipelines, transportation of natural gas, gas (methane) of coal mines by pipelines and their distribution;
- supply of natural gas with the regulated and unregulated tariffs;
- storage of natural gas, gas (methane) of coal mine in amounts exceeding the licensed amount;

b) establishes:

- prices (tariffs) for electricity, tariffs on its transportation and supply;
- prices for the tank gas of own extraction to entities designated by law;
- retail prices for natural gas used for household consumption;
- top prices for natural gas for institutions and organizations financed from the state and local budgets, industrial customers and other economic entities;
- top prices for natural gas for businesses that produce thermal energy, including block (modular) boilers installed on roofs and in annexes (based on

[97]Національна комісія, що здійснює державне регулювання у сфері енергетики. Available at: http://www.nerc.gov.ua/?id=6794. (Date of access: 19/11/2013).
[98] Rethinking The Strategy of Development: 2010-11 National Report About Implementation of the Energy Efficiency State Policy / M. Pashkevych, V. Hryhorovskyi, V. Gavrylenko, O. Zaporozhets, Ya. Movchan [et al.] – Kyiv, SAEE-NAU-LAT & K, 2012. – 270 p. Available at: http://saee.gov.ua/wp-content/uploads/2013/09/NR-2010-2011.pdf. (Date of access: 19/11/2013).

the quantity of natural gas used for heat generation and heating and hot water services for population and religions organizations, the availability of automatic control and accounting of heat and hot water);
- tariffs for transportation of natural gas, oil gas and gas (methane) of coal mine by trunk and distribution pipelines;
- regulated tariffs for supply of natural gas and gas (methane) of coal deposits;
- tariffs for pumping, storage, and selection of natural gas, gas (methane) of coal deposits;
- tariffs for pipeline transportation of oil, petroleum products and ammonia;
- tariffs for heat energy produced by central heating systems, thermal power plants, nuclear power plants and cogenerating installations and installations using alternative or renewable energy sources.

The National Commission of the State Public Utilities Regulation was established in 2011 (decree of the President of Ukraine as of 23.11.2011 No. 1073)[99]. The National Commission of the State Public Utilities Regulation is the collegial body.

The tasks of the Commission are to regulate and license the range of activities concerning generation, transmission and supply of heat, centralized water supply and sewerage.Under the control of the Commission there are the following enterprises:

- enterprises of centralized water supply and sewerage which provide services of centralized water supply and sewerage in settlements of not less than 40,000 inhabitants or systems of centralized water supply and sewerage which are located on the territory of two or more regions, joint ventures and enterprises with foreign investments;
- enterprises specializing in generation and supply of heat to the consumers in volumes exceeding 20,000 Gcal per year;
- enterprises specializing in transmission and supply of heat from heating systems and units to the consumers in amounts exceeding 18,000 Gcal per year;
- waste recycling enterprises and waste disposal enterprises serving localities with population of over 100,000 people and recycling or disposal capacity of over 50,000 tons or 200,000 m^3 of waste per year.
- The main tasks of the Commission are:
- to implement state regulation of natural monopolies and economic entities in the related markets:
- to balance the interests of economic entities, consumers and the government;
- to protect consumers of goods and services;
- to form and ensure predictability of pricing and tariff policy.
- The Commission participates in forming and implementing the state policy of heat supply, water supply and sanitation, processing and disposal of household waste. The Commission provides:
- licensing of economic of activity;
- developing procedures for formation of utility tariffs;
- controlling the use of funds;

[99]The National commission of the state public utilities regulation. Available at: http://nkp.gov.ua/en/scms/view/341. (Date of access: 19/11/2013).

- setting the tariffs on utility services;
- creating a level playing field for production of services;
- providing consistent markets research;
- developing and approving the rules for using thermal energy;
- ensuring international cooperation, etc.

The State Sanitary and Epidemiological Service of Ukraine is the central authority executive authority that ensures the implementation of state policy of sanitary and epidemiological welfare of the population[100]. The tasks of the State Sanitary and Epidemiological Service of Ukraine are as follows:

- to implement the priority measures for preventing infections, of diseases, occupational diseases;
- to implement sanitary measures to protect the territory of Ukraine;
- to issue permits, conclusions, hygienic certificates and other documentary permits stipulated by the legislation;
- to conduct the state sanitary and epidemiological expertise;
- to approve national standards, state building codes, technical regulations and other regulations for products, sale and technology;
- to implement international cooperation;
- to form the state order for special training, etc.

The State Department of Fire Safety is the central executive authority, which manages the system of fire protection[101]. The tasks of the State Department of Fire Safety are as follows:

- to participate in the implementation of the state policy of fire safety;
- to implement state fire supervision;
- to perform the functions of managing Fire Service;
- to organize cooperation with international organizations within its competence;
- to organize the development and implementation of organizational, scientific and technical measures for fire safety;
- to perform registration functions in accordance with the laws and regulatory licensing;
- to organize and performs state fire supervision in accordance with the laws;
- to performs licensing of certain types of economic activities, examination of project documentation in accordance with the law and within its authority;
- to coordinate and control the established procedure for the activities of fire safety of central, as well as departmental, local (rural) executive bodies;
- to organize the maintenance of the state statistical accounting of fires and their implications, as well as state statistical reporting in fire safety sphere;

[100]Державна санітарно-епідеміологічна служба України. Положення. Available at: http://www.dsesu.gov.ua/wses/dsesu.nsf/prSlj/0318A3151151AC71C22578DB0034C2A1?OpenDocument&ID=UA. (Date of access: 19/11/2013).

[101]Державна служба України з надзвичайних ситуацій. Державний департамент пожежної безпеки. Available at: http://www.mns.gov.ua/content/ddpb_struktura.html. (Date of access: 19/11/2013).

- to organize investigation into the causes and circumstances of fires in due order;
- to submit proposals to the relevant executive authorities and local self-governments for the construction of residential, administrative, industrial, social and special purpose buildings.

The State Inspectorate for Energy Supervision of Heat and Energy Consumption Modalities (hereinafter – State Energy Supervision) controls all electric power facilities, including distribution networks as strategic assets of the united energy system of Ukraine, 42 electric transmission organizations, subjects of relations in the sphere of heat supply, heat transmission and heat supply organizations, about 500 thsd. Juridical persons dispersed all over Ukraine who are consumers of electricity and heat and 18 millions of domestic consumers of electric energy, according to article 9 of the law of Ukraine "On electricity" and article 14 of the law of Ukraine "On heat supply state supervision"[102].

The tasks and functions of State Energy Supervision are defined in “The regulation on state energy supervision of heat and energy consumption modalities” approved by resolution of the he Cabinet of Ministers of Ukraine from 07.08.96 No. 929 (as amended), the main of which are:

- state power supervision of electrical, thermal, heat, heat using installations and networks of electric energy subjects, subjects of economic relations in the sphere of heat and energy supply and consumers;
- control of subjects of electric energy sector, subjects of relations in the sphere of heating and electricity consumers, concerning their compliance with legal requirements and engineering regulations in the production, supply and consumption of energy;
- submission of proposals in the sphere of electricity and heat supply for public policy.

3.6.3 Challenges and opportunities

The housing fund of Ukraine consists of 6.74 million houses with the total area of 1,086 million m^2, including[103]:

- individual houses – 6.5 million, the total area of 622 million m^2;
- multi-family houses – 240 thousand houses with total area – 464 million m^2.

Belong to the category of emergency homes 46.9 thousand (0.6% of the total residential units of the country), with a total area of 3.9 million m^2, which are home to 95.5 thousand people.

[102] ДП "НЕК "Укренерго". Завдання та функції Держенергонагляду. Available at: http://www.ukrenergo.energy.gov.ua/ukrenergo/control/uk/publish/article?art_id=35405&cat_id=35376. (Date of access: 19/11/2013).
[103] Паспорт житлово-комунального господарства України. Available at: http://www.minregion.gov.ua/attachments/content-attachments/1215/Ukrein.pdf. (Date of access: 19/11/2013).

Belong to the category of dilapidated homes 13.2 thousand homes (0.16% of homes of the country), with a total area of 1.2 million square meters, which are homes to 23.1 thousand people.

Residential and public buildings, built mostly between 1950 and 1990, have unsatisfactory thermal characteristics that leads to the excessive loss of heat during their operation. The heat loss in homes of the mass construction accounts to through walls – 42%, through windows – 16%, through roofs – 7%, through basements – 5%, ventilation – 30%. Annually, housing and utilities consume electricity – about 10.0 billion kW • h, natural gas – about 14.0 billion m^3, coal – about 1.5 million tons. The housing and utilities consume alternative and renewable sources of energy of about of 0.87 million tce. Energy costs per unit of production are more than 1.5 times higher than in EU. Excess fuel consumption leads to an increase in greenhouse gases in the atmosphere.

Ukrainian housing and public utility sector is characterized by a high level of wear of fixed assets (more than 60%), a low level of equipment of metering devices. The housing and public utility sector accounts for almost 30% of the total energy consumption in Ukraine. In 2011, boiler houses consumed 15924.426 thousand tce to generate heat energy[104].

In 2011, the specific consumption of energy resources to generate 1 Gcal of heat energy was 174.7 kgce/Gcal, while in the world the specific consumption of energy resources to generate 1 Gcal of heat energy – from 140 to 150 kgce. The main fuel, which consumed in housing sector, is natural gas.The Institute of Gas of NAS of Ukraine assessed the prospects for reducing the consumption of natural gas in Ukraine. The assessment assumed the consumption in the post-crisis 2010 year as a starting value for assessments. The level of this reduction and its distribution by major consumers of gas are presented in the Table 3.6-1[99].

The energy intensity of the national economy is higher by 2.1-3.7 times than the relevant indicators in economically developed countries; as a result, Ukraine is extremely sensitive to the terms of importing natural gas and it is impossible to guarantee normal conditions of life activities of our citizens and public institutions.
Energy efficiency measures have become particularly important following an increase in natural gas prices.
The major part of the housing stock (up to 70%) was developed in the 1960-1990s. It means that most families live in buildings with low energy characteristics. Therefore, implementation of energy efficient measures in buildings has the highest potential for reducing the heating energy consumption.

[104] Rethinking The Strategy of Development: 2010-11 National Report About Implementation of the Energy Efficiency State Policy / M. Pashkevych, V. Hryhorovskyi, V. Gavrylenko, O. Zaporozhets, Ya. Movchan [et al.] – Kyiv, SAEE-NAU-LAT & K, 2012. – 270 p. Available at: http://saee.gov.ua/wp-content/uploads/2013/09/NR-2010-2011.pdf. (Date of access: 19/11/2013).

The technical condition of most buildings and energy systems makes it impossible to ensure an adequate level of energy characteristics of buildings by means of organizational measures and needs replacement of equipment and overhaul of buildings. Residents of blocks of flats equipped with central heating systems are usually technically unable to regulate consumption of heat supplied via the centralized heating system and/or are technically incapable of paying for heat energy they actually consume. As a result, end consumers are not encouraged to save energy.

In Ukraine, practically the entire housing stock, which was builded before 1995, needs thermal modernization. First and foremost, 18140 buildings that were built in the period from 1971 to 1980 with the total area surface of 105.1 mln. m^2, need to be thermally modernized. They include large panel buildings with the surface area of 43 mln. m^2, brick buildings with the surface area of 62.1 mln. m^2. The specific weight of those buildings in the housing stock of Ukraine totals 22%[105].

Thermal modernization works also need to be carried out in 22270 buildings built from 1981 to 1990s accounting for 27% of the total housing stock. Their total surface area amounts to 134.5 mln. m^2, including 76 mln. m^2 of large panel buildings and 58.5 mln. m^2 of brick ones.

The buildings built from 1991 to 2010 with the total surface area of 96.8 mln. m^2 (their specific weight amounts to 20%) are the next ones that should be subject to thermal modernization. They include large panel buildings with the surface area of 33.2 mln. m^2, brick buildings with the surface area of 55.3 mln. m^2, and carcass-monolithic buildings with the surface area of 8.4 mln. m^2.

The buildings built before 1970 accounting for 31% with a total surface area of 148.2 mln. m^2 (including: large panel buildings – 35.7 mln. m^2, brick buildings – 35.7 mln. m^2) need to be thermally modernized by overhauling or reconstructing.

It is also very important to solve the problem of equipping housing and utilities by installing controls for consumption of energy and water. This will help in saving energy resources.

[105] Rethinking The Strategy of Development: 2010-11 National Report About Implementation of the Energy Efficiency State Policy / M. Pashkevych, V. Hryhorovskyi, V. Gavrylenko, O. Zaporozhets, Ya. Movchan [et al.] – Kyiv, SAEE-NAU-LAT & K, 2012. – 270 p. Available at: http://saee.gov.ua/wp-content/uploads/2013/09/NR-2010-2011.pdf. (Date of access: 19/11/2013).

Table 3.6-1: Potential volumes of savings of natural gas in Ukraine.

Consumers	Gas consumption (2010, bln. m3)	Savings, bln. m3		Saving measures
		Optimistic scenario	Pessimistic scenario	
Population	17.6	5.3-5.8	2.89	~ 5.0 bln. m3 are used for cooking. The partial replacement of gas stoves for electric stoves is possible. Savings - ~ 0.5-1.0 bln. m3; ~ 12.6 bln. m3 are used for heating. Heat insulation of 30 % of buildings corresponds to 12.6 · 0.3 = 3.78 bln. m3; Transition to electric heating saves 1.0 bln. m3 (estimate)
Budgetary institutions	0.953	0.29	0.14	Thermal modernization of buildings - 30%: 0.953 • 0.3 = 0.29 bill.m3
District heating company	8.845	3.54	2.21	8.845x0.4=3.538 30% - Thermal modernization of buildings; 4% - modernization of energy generation; 6% - losses during fuel transport 8,845 x0.4 = 3.538
Electrical energy industry	5.32	0.4	0	
Metallurgy	6.74	3.47	2.7	cast iron, steel, and finished steel production consumes 60% of gas ~ 4.0 bln. m3, including: iron - 2.2, steel - 0.6, finished steel - 1.2 bln. m3. Possible savings: - in the blast furnace gas saving from use of dust coal injection - 2.2 bln. m3; - in steel production - 0.4 bln. m3;

				- in finished steel production - 0.6 bln. m3 (by continuous casting machine and furnaces upgrade). Total - 3.2 bln. m3
Chemical industry	6.3	0.86	0	Due to the reconstruction of ammonia and nitrogen installations and increase of their capacity, decommissioning of obsolete installations and optimization of energy balances the total natural gas consumption will be reduced by 0.86 bln. m3/y (reducing specific gas consumption from 1250 to 1000 m3/t of ammonia).
Ukrcement	0.227	0.227	0	Replacement by pulverized coal fuel
Machinery building	0.566	0.17	0.17	Upgrading of heating equipment boilers
Other industrial consumers	5.8	1.74	1.74	Due to the modernization of industrial central heating stations, boilers and replacement of gas with alternative fuels
Gas-transport system	4.264	1.0	0	Increasing the average efficiency of compressor station from 28 to 36% by replacing them for electrical usones
Total	57.722	17.49	10.35	

According to the Ministry of Regional Development, Construction, Housing and Communal Services, equipment of the housing stock of January 01, 2011 is as follows:

- cold water meters: 55885 buildings or 43.69% of the total number of buildings with centralized cold water supply (127920);
- hot water meters: 7008 buildings or 15.93% of the total number of buildings with centralized hot water supply (43992);
- heat energy meters: 28170 buildings or 38.31% of the total number of buildings with centralized heating (73523).

The local executive bodies in charge of implementing the above activities explain that a low level of equipment with meters is due to critical lack of funds in local budgets and a small amount of funds allocated for the purposes from the state budget.

3.6.4 Problems and constraints

The long-term crisis in the housing and communal services of Ukraine is caused by the following factors:

1. In the sector of residential buildings:
   - expiring the term of exploitation of some apartment houses and the lack of funds for the resettlement of their tenants;
   - absence of planned capital repairs of residential buildings for a long time because of lack of funds;
   - low volumes of financing the renovation of residential buildings;
   - high heat loss through the enclosures of the majority of the buildings because of their construction according to construction norms with low thermal resistance;
   - high heat losses due to high infiltration of outside air through the damaged and deformed window and door constructions;
   - the absence of a single owner for the majority of apartment buildings, which is associated with disparity of incomes of the population;
   - people have low incomes and does it not allow them to carry out repairs of buildings using energy efficiency technologies;
   - large debts of the population for utility services (see table 3.6-2);
   - low level of tariffs for public utility services;
   - lack of sufficient budgetary funds at different levels for supporting this sector.

Table 3.6-2: Debts of the Population[106]

Region	Debts of the population	
	The total amount of debts, million UAH.	
	01.01.2013	01.11.2013
Donetsk	2111.1	1931.4
Dnepropetrovsk	1906.6	1751.2
Kharkiv	1254.5	1227.2
Lugansk	1007.0	989.5
Kyiv city	864.5	856.9
Zaporizhzhya	709.7	671.9
Kyiv	542.5	471.1
Odessa	502.3	470.6
AR Crimea	456.7	427.0
Lviv	517.8	411.7
Poltava	299.4	249.6
Mykolayiv	223.7	195.3
Sumy	220.7	189.8
Cherkasy	224.4	188.4
Transcarpathian	253.3	184.0
Vinnitsa	180.8	164.6
Rivne	176.1	155.8

[106]Міністерство регіонального розвитку, будівництва та житлово-комунального господарства України. Житлово-комунальне господарство. Available at: http://minregion.gov.ua/zhkh/. (Date of access: 19/11/2013).

Zhytomyr	160.9	155.5
Kherson	164.2	133.4
Kirovograd	139.3	112.8
Chernihiv	139.3	111.1
Volyn	104.1	101.6
Khmelnytsky	112.6	98.7
Ternopil	130.0	96.6
Ivano-Frankivsk	126.6	93.1
Chernivtsi	84.6	68.1
Sevastopol city	67.9	67.7
Total of:	12680	11575

2. In the sector of municipal centralized heat supply:
   - non-temperature schedule of heat supply to consumers especially at low outdoor temperatures;
   - lack of regulation of heat consumption both at the input of apartment houses and heat radiating appliances, largely due to the adopted system of quality regulation of supplied heat carriers and the design of internal heating systems;
   - low efficiency of heat production due to the use of technologically outdated boiler units and auxiliary equipment, which leads to environmental pollution (table 3.6-3);
   - high accident rate of damages of thermal networks and great loses of network water due to the wear of corroded pipelines;
   - high heat losses to the environment from thermal networks because of mass damage of thermal insulation and application of non-efficient thermal insulation materials and structures;
   - lack of comprehensive accounting of heat energy for its production and consumption, not all producers and consumers of thermal energy are equipped with metering devices (table 3.6-4);
   - low heat tariffs do not allow full repairs and modernizations of equipment;
   - great difference in tariffs on gas and electricity prices for households and heat supply organizations (table 3.6-5);
   - a significant decline in supply of heat energy due to the refusal of consumers to use heat supply;
   - large debts of the population for services of heat supply.

Table 3.6-3: Emissions of Pollutants and Carbon Dioxide in Atmospheric Air[107]

Year	The volume of emissions of polluting substances			In addition, emissions of carbon dioxide		
	total, thousand tonnes	including		total, million tonnes	including	
		stationary sources	mobile sources1		stationary sources	mobile sources1
1990	15549.4	9439.1	6110.3	--	--	--
1991	14315.4	8774.6	5540.8	--	--	--
1992	12269.7	8632.9	3636.8	--	--	--
1993	10015.0	7308.3	2706.7	--	--	--
1994	8347.4	6201.4	2146.0	--	--	--
1995	7483.5	5687.0	1796.5	--	--	--
1996	6342.3	4763.8	1578.5	--	--	--
1997	5966.2	4533.2	1433.0	--	--	--
1998	6040.8	4156.3	1884.5	--	--	--
1999	5853.4	4106.4	1747.0	--	--	--
2000	5908.6	3959.4	1949.2	--	--	--
2001	6049.5	4054.8	1994.7	--	--	--
2002	6101.9	4075.0	2026.9	--	--	--
2003	6191.3	4087.8	2103.5	--	--	--
2004	6325.9	4151.9	2174.0	126.9	126.9	--
2005	6615.6	4464.1	2151.5	152.0	152.0	--
2006	7027.6	4822.2	2205.4	178.8	178.8	--
2007	7380.0	4813.3	2566.7	218.1	184.0	34.1
2008	7210.3	4524.9	2685.4	209.4	174.2	35.2
2009	6442.9	3928.1	2514.8	185.2	152.8	32.4
2010	6678.0	4131.6	2546.4	198.2	165.0	33.2
2011	6877.3	4374.6	2502.7	236.0	202.2	33.8

[1] For 1990-2002 – the recorded data on road transport; since 2003 – by road, rail, aviation, water transport; since 2007 – by road, rail, aviation, water transport and production equipment.

3. The sector of municipal water supply:
   - high rate of and damages great water losses because of corrosion, aging and damage of pipelines;
   - insufficient number of consumers with metering devices;
   - high degree of deterioration of the technological and pumping equipment of water utilities;
   - lack of quality of water according to the required sanitary standards in a number of cities and settlements;
   - low tariffs for water do not allow full repairs and modernizations of equipment;

[107]Міністерство регіонального розвитку, будівництва та житлово-комунального господарства України. Житлово-комунальне господарство. Available at: http://minregion.gov.ua/zhkh/. (Date of access: 19/11/2013).

- large debts of the population for water supply services;
- lack of sufficient budgetary funds at different levels for supporting this sector of economy.

Table 3.6-4: The total number of control devices of heat energy[108]

No.	Region	Enterprises of communal heat power engineering					The total number of control devices of heat energy in buildings	
		The number of sources of thermal energy	The total number of control devices of heat energy			Number of residential buildings with district heating		
			Installed	Must be installed	Will be installed in 2012		Installed	Must be installed
1	AR Crimea	349	223	120	120	5305	2272	3033
2	Vinnitsa	96	96	0	0	1459	1030	413
3	Volyn	125	125	0	0	1641	351	1220
4	Dnepropetrovsk	651	651	0	0	9957	4950	5007
5	Donetsk	1040	933	115	115	21067	6725	10496
6	Zhytomyr	151	139	9	9	1922	405	1652
8	Zaporizhzhya	133	133	-	-	5534	2275	3014
9	Ivano-Frankivsk	82	87	4	-	1124	606	427
10	Kyiv	476	186	285	157	2701	826	1480
11	Kirovograd	59	62	0	0	1669	661	385
12	Lugansk	287	203	61	245	4831	738	4078
13	Lviv	302	235	46	21	4468	2641	1845
14	Mykolayiv	141	113	-	-	2425	934	1491
15	Odessa	47	52	-	-	4942	1629	3313
16	Poltava	160	149	11	11	3501	670	2831
17	Rivne	132	134	0	0	1340	249	950
18	Sumy	131	105	26	-	2494	968	1545
19	Ternopil	74	74	5	5	867	71	912
20	Kharkiv	650	650	0	0	8227	2812	14517
21	Kherson	71	72	3	3	1478	468	940
22	Khmelnytsky	158	156	3	3	2148	845	1411
23	Cherkasy	104	84	20	20	2180	460	1059
24	Chernivtsi	97	45	52	52	645	173	472
25	Chernihiv	167	131	36	36	1548	512	1036
26	Kyiv city	189	62	180	0	10360	6300	13351
27	Sevastopol city	114	21	105	77	2332	363	2395
Total of:		5986	4921	1081	874	106165	39934	79273

[108]Міністерство регіонального розвитку, будівництва та житлово-комунального господарства України. Житлово-комунальне господарство. Available at: http://minregion.gov.ua/zhkh/. (Date of access: 19/11/2013).

4. The sector of the municipal power supply:
   - ageing of the distribution networks, protective armature and, as a consequence, low reliability of power supply and low quality of electricity;
   - exceeding the electrical loads due to the increased number and capacity of electrical equipment and, as a consequence, network congestion and disconnection of consumers.

Table 3.6-5: Heat Tariffs for Different Cities of Ukraine[109]

City	Heat tariffs, UAH/Gkal (1.05.2013)	
	for the population	for commercial organizations
Simferopol	309.84	910.37
Vinnitsa	190.07	964.26
Dnepropetrovsk	268.7	1008.34
Donetsk	265.55	916.43
Zhytomyr	199.42	837.5
Zaporizhzhya	281.16	925.32
Ivano-Frankivsk	281.66	895.44
Kyiv	253.15	991.58
Kirovograd	303.94	1128.2
Lugansk	307.45	965.77
Lviv	295.63	973.00
Mykolayiv	269.95	951.62
Odessa	365.58	1015.56
Poltava	290.08	962.62
Rivne	282.05	904.20
Sumy	253.58	717.78
Ternopil	282.94	887.6
Kharkiv	304.03	899.94
Kherson	314.36	908.77
Khmelnytsky	206.38	806.05
Cherkasy	284.94	884.24
Chernivtsi	271.07	932.52
Chernihiv	262.5	985.75
Sevastopol city	260.96	942.84

The major constraints hindering modernization of the given sphere of the economy are as follows:
   - critical financial and economic state of enterprises of housing and communal services;

[109]Міністерство регіонального розвитку, будівництва та житлово-комунального господарства України. Інформація про тарифи на послуги теплопостачання. Станом на 1 травня 2013 року. Available at: http://minregion.gov.ua/attachments/content-attachments/774/teplo_2013_05_01.pdf. (Date of access: 19/11/2013).

- large debts of the population to municipal utilities;
- lack of investment attractiveness of the industry due to low tariffs and the crisis of solvency;
- high interest rates on loans;
- structural, price and tariff disproportions in housing and communal services;
- the presence of non-market and non-transparent relations, high monopolization of the market of housing and communal services;
- ineffective system of controlling the operation of housing utility companies and regulation of natural monopolies;
- lack of effective owners for the majority of apartment houses;
- low level of tariffs which does not cover the costs of housing and utilities enterprises;
- lack of the mechanisms for collecting of debts for consumed housing and communal services that leads to the growth of non-payments by the population.
- The state and the society are aware of these problems and constraints.

3.6.5 Mykolayiv (local level)

3.6.5.1 Legal framework

The acceptance of the majority of regulations in the field of housing and communal services, construction, energy, environment and transport is the responsibility of the executive authorities. The City Council and the Executive Committee of the City Council within its powers took regulatory acts, which specify the relationship in these areas. Currently, the following regulatory acts adopted by City Council are used:

- Approval of the regulations on the use and development of the territory of Mykolayiv, No. 15/41 17.10.2003[110];
- Engineering and Geodetic Support of Mykolayiv, No. 5/11 21.04.2011[111];
- Approval of the share participation of customers in the development of engineering – transport and social infrastructure in Mykolayiv, No. 8/22 25.08.2011[112];
- Approval of lease of property belonging to the municipal property territorial community of Mykolayiv, No. 10/15 20.10.2011[113];

[110] Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Правил використання та забудови території м. Миколаєва No. 15/41 17.10.2003. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=5599. (Date of access: 19/11/2013).
[111] Нормативні акти Миколаївської міської ради та виконкому. Про інженерно-геодезичне забезпечення території м. Миколаєва No. 5/11 21.04.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=16992. (Date of access: 19/11/2013).
[112] Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Порядку пайової участі замовників у розвитку інженерно-транспортної та соціальної інфраструктури м. Миколаєва No. 8/22 25.08.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=17610. (Date of access: 19/11/2013).
[113] Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Положення про оренду майна, що належить до комунальної власності територіальної громади міста Миколаєва No. 10/15 20.10.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=17871. (Date of access: 19/11/2013).

- Approval of the normative monetary evaluation of land in the city of Mykolayiv, No. 3/40 27.01.2011[114];
- Approval of the transfer to non-residential premises for the placement of trade, consumer services, catering, offices in Mykolayiv, No. 5/14 21.04.2011[115];
- Approval of the rules of improvement, sanitary maintenance areas cleanliness and order in the city of Mykolayiv, No. 12/21 19.04.2007[116].

"The regulations on the use and development of the territory of Mykolayiv" is intended to ensure a consistent and sustainable development through the management, the most effective use in all urban areas, in the interests of its citizens, society and the state, for all subjects of legal regulation, in accordance with the laws of Ukraine "On the planning and development", "On the fundamentals of urban development", "Land code of Ukraine", "Approval of the state architectural construction control" and other legislatives acts.

The Regulations establishes zoning in the urban area, the use of the land within the boundaries of individual zones, the implementation of all kinds of urban construction, regulations of the implementation of procedural matters. Its aim is methodological and regulatory support of policy of the city authorities to regulate land management and building regulations in the city on the basis of new systems of economic relations and various forms of ownership of land and real estate[117].

It also establishes the mechanisms for the implementation of decisions of “The concept of territorial development of Mykolayiv”, which laid the basis for a new master plan of the city by controlling the process in accordance with the functional zoning of areas. In the rules there were postulated the institutional conditions for the expansion of private capital investment for the urban construction and development of entrepreneurial activity, the formation of the land market and real estate, providing the processes of privatization. The rules are mandatory for all entities ownership of land and buildings in Mykolayiv, as well as for design, survey, construction companies, all engineering services involved in the work regardless of their deployment and departmental affiliation, for all departments and divisions of the City Council during the survey work, construction, reconstruction, repair and

[114]Нормативні акти Миколаївської міської ради та виконкому. Про затвердження нормативної грошової оцінки земель міста Миколаєва No. 3/40 27.01.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=16543. (Date of access: 19/11/2013).
[115] Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Порядку переведення житлових приміщень у нежитлові для розміщення об’єктів торгівлі, побутового обслуговування, громадського харчування, офісів у м. Миколаєві No. 5/14 21.04.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=16883. (Date of access: 19/11/2013).
[116] Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Правил благоустрою, санітарного утримання територій, забезпечення чистоти і порядку в м. Миколаєві No. 12/21 19.04.2007. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=5594. (Date of access: 19/11/2013).
[117] Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Правил використання та забудови території м. Миколаєва No. 15/41 17.10.2003. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=5599. (Date of access: 19/11/2013).

maintenance of city facilities, controlling the use of urban land, buildings and structures, as well as performing other procedures in the area covered by the Rules.
The resolution on "Engineering and geodetic support of Mykolayiv" made in order to comply with the state building codes and the phased renovation plan of the city. It requires mandatory corrections of geodetic surveys, a new survey of lands (drawings of maps in scale 1:500). The resolution on "Engineering and geodetic support of Mykolayiv" provided[118]:

- performing inventory of the existing and new challenges;
- design of works;
- the coordination of projects and facilities of urban development at all stages of design;
- the signed acts of readiness for servicing the existing objects;
- obtaining the acts of construction.

In the act «On approval of the share participation of customers in the development of engineering – transport and social infrastructure in Mykolayiv» were determined[119]:

- subjects who are involved in the development of engineering and transport and social infrastructure in the city of Mykolayiv;
- objects of construction for which the developers are obliged to take equity participation in the development of engineering and transport and social infrastructure in the city;
- the size of the equity participation.

The Act operates throughout the city of Mykolayiv and is mandatory for all customers regardless of their form of ownership, local governments, their officials and other organizations regardless of ownership and departmental affiliation.

The act «Approval of the normative monetary evaluation of land the city of Mykolayiv» establishes regulatory monetary value of land Mykolayiv, which includes[120]:

- The scheme of the economic and planning zones;
- The scheme of local factors of the geotechnical and civil engineering infrastructure;
- The scheme of local factors of functional planning, historical, cultural and natural landscapes;
- The scheme of the main agro-industrial groups of soils.
- The resolution sets the base price of 1 m^2 land and the value of the zonal coefficients within the economic-planning zones in Mykolayiv.

[118]Нормативні акти Миколаївської міської ради та виконкому. Про інженерно-геодезичне забезпечення території м. Миколаєва No. 5/11 21.04.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=16992. (Date of access: 19/11/2013).
[119]Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Порядку пайової участі замовників у розвитку інженерно-транспортної та соціальної інфраструктури м. Миколаєва No. 8/22 25.08.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=17610. (Date of access: 19/11/2013).
[120]Нормативні акти Миколаївської міської ради та виконкому. Про затвердження нормативної грошової оцінки земель міста Миколаєва No. 3/40 27.01.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=16543. (Date of access: 19/11/2013).

The act «On the approval of lease of property belonging to the municipal property of territorial community of Mykolayiv» regulates[121]:

- the institutional relations associated with the transfer of the leased property belonging to the municipal community;
- the property relations between an owner and a tenant for the economic use of the property belonging to the municipal community.
- The authorities for the transfer of the communal property are as follows:
- The Department of the Use and Development of Communal Property of the City Council (integral property complexes of enterprises and their subdivisions which are in communal property);
- the enterprises (real property for production purposes), the total area does not exceed 200 m^2 per enterprise).

The act «On the approval of the transfer to non-residential premises for the placement of trade, consumer services, catering, offices in Mykolayiv» regulates[122]:

- the procedure for the transfer of residential premises in non-residential buildings to accommodate objects of trade, consumer services, catering, offices;
- a list of the necessary documents and approval procedure.

Catering facilities (restaurants, bars, cafes and others) are allowed to be built in separate buildings or in houses with the consent of citizens living around the perimeter.

The act «Approval of the rules of improvement, sanitary maintenance areas cleanliness and order in the city of Mykolayiv» regulates the rights and obligations of the parties involved in making the city more attractive determines a set of measures necessary to ensure cleanliness and order in the city[123]. Managers and other officials of enterprises, organizations, institutions, regardless of ownership and departmental subordination, individuals, community organizations, bodies and official bodies are the participants of the activities. The City Council controls all the activities. Enterprises, institutions and organizations regardless of their departmental affiliation, citizens who have private property dwellings, legal and physical persons are obliged to make timely cleaning, removing snow, ice, on the adjacent land (territory) to preserve the purity and maintain order throughout the city, to keep apartment houses and other social facilities clean and tidy. The list of authorities,

[121]Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Положення про оренду майна, що належить до комунальної власності територіальної громади міста Миколаєва No. 10/15 20.10.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=17871. (Date of access: 19/11/2013).
[122]Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Порядку переведення житлових приміщень у нежитлові для розміщення об'єктів торгівлі, побутового обслуговування, громадського харчування, офісів у м. Миколаєві No. 5/14 21.04.2011. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=16883. (Date of access: 19/11/2013).
[123]Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Правил благоустрою, санітарного утримання територій, забезпечення чистоти і порядку в м. Миколаєві No. 12/21 19.04.2007. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=5594. (Date of access: 19/11/2013).

which are entitled to draw up the reports confirming the violations of the Rules of improvement, sanitary maintenance areas to ensure cleanliness and order in Mykolayiv:

- The Administration of City Council Districts;
- The Landscape Inspection of City Council;
- Gossanepidemsluzhby (State Anti-epidemic Administration) in Mykolaiv region;
- The Directorate of Urban Planning and Architecture in the City Council;
- Department of Trade City Council;
- The Directorate of the Transport Complex, Communications and Telecommunications in the City Council;
- The Directorate of Internal Affairs of Ukraine in Mykolaiv region, etc.

Currently, the development of the city of Mykolayiv regulates "General plan Mykolayiv" approved by the City Council number 35/18 on 2009-06-18 with an estimated period until 2031[124]. The Executive Committee of the City Council of June 27, 2008 No. 1320 approved the procedures of the environmental management in the executive branch of the City Council[125].

Environmental management procedures for the Directorate of Environmental Protection of the Department of Municipal Housing and Communal Services consist in the following:

Activity: Organization and Implementation of the programs by the City Council and its executive committee, monitoring their implementation.

- Procedure 1. Annually to develop the project proposals, estimate urban trust fund for environmental protection, analyze the effectiveness of spending funds.
- Procedure 2. Every 2 years to inform the staff of the Executive Committee of the City Council on environmental policy.
- Procedure 3. To form the environmental policy in Mykolayiv:
    - 3.1. Annually review the progress of implementation of environmental policy indicators.
    - 3.2. To inform about results of the calculation of indicators.
    - 3.3. To correct documents on environmental policy.
    - 3.4. To publish information on the implementation of the environmental policy and indicator adjustments (new editions).

Activities: Construction permits objects on the territory city, which affect the environment.

[124]Нормативні акти Миколаївської міської ради та виконкому. Про затвердження Генерального плану міста Миколаєва. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=13114. (Date of access: 19/11/2013).
[125]Нормативні акти Миколаївської міської ради та виконкому. Про затвердження процедур екологічного менеджменту у виконавчих органах міської ради. Available at: http://ngik.gorsovet.mk.ua/ru/showdoc/?doc=9503. (Date of access: 19/11/2013).

- Procedure 4. To participate in the work of the City Council.

Activities: the organization of environmental assessments and examinations.

- Procedure 5. To perform environmental assessments of projects, plans and programs of socio- economic development of the city, sectoral programs, planning, documentation, etc. (involving, if necessary, experts and specialized organizations) and to direct the proposals to the Department of Economy and Investment.

Activities: organization and participation in environmental education.

- Procedure 6. To interact with the Department of Education in support of the City Naturalists Station.
- Procedure 7. To organize and carry out environmental education activities, carrying out round tables, exhibitions, seminars, conferences, etc.

Activities: international cooperation in the field of ecology.

- Procedure 8. To interact with the Department of Foreign Trade and International Cooperation: to transmit information to the member of the Executive Committee of Mykolayiv City Council in the international environmental organizations, participation in international projects and campaigns.
- Procedure 9. To oversee the payments for participation in ICLEI activities.
- Procedure 10. To exchange the experience with the Department of Environmental Protection of Moscow City Council.
- Procedure 11. To implement of the International obligations of the Executive Committee of the City Council for the protection of the environment and sustainable development.

Activity: public relations.

- Procedure 12. To interact with environmental non-governmental organizations on the issues of environmental protection.
- Activities: improving environmental management in Mykolayiv.
- Procedure 13. To implement and maintain a scheme of environmental management and audit:
    - 13.1. To constantly expand EMAS rules in all areas which affect the environment.
    - 13.2. To coordinate EMAS in the executive bodies of the City Council; to make preparations for EMAS Internal Audit in the Executive Committee of the city council.
    - 13.3. To participate in the internal audit.
    - 13.4. To conduct workshops on environmental management system and EMAS audit for other cities of Ukraine.

Activity: to interact with the executive bodies of the City Council

- Procedure 14. To interact with the executive bodies of the City Council:
  - 14.1. To analyze the budget in terms of its environmental performance defining the share of funds aimed at improving the environment jointly with financial management.
  - 14.2. To coordinate the consumption of natural and energy resources, and the implementation of urban environmental policy with the Directorate of Energy.

Activity: analysis of status and trends of the ecological situation in the city, the organization of the study of the environment, awareness of population about the environment.

- Procedure: 15. To monitors the environment:
  - 15.1. To annually collect information from the State Administration of Environmental Protection in Mykolayiv region, SES of Mykolayiv, Regional Centre for Hydrometeorology and other institutions on the state of the environment and the data for the calculation of indicators in accordance with the resolution of the City Council from 14.12.01 No. 26/29.
  - 15.2. To calculate indicators for sustainable development.
  - 15.3. To analyze trends of the environment.
  - 15.4. To annually publish the results of monitoring in the media.

Environmental management procedures for the Directorate of Energy of the Department of Municipal Housing and Communal Services consist in the following:

Activities: ensuring the implementation of state policy on energy and energy efficiency.

- Procedure 1. To implement programs aimed at installing heat meters, hot and cold water meters:
  - To inform the Directorate of Environmental Protection and the Department of Municipal Housing and Communal Services about the calculation of the indicator No. 9 of the environmental policy of Mykolayiv.
  - To implement state and local programs aimed at installing heat meters and determine the results of saving resources.

Activity: forecasts and programs on social and economic development of the city.

- Procedure 1. To submit proposals for reducing energy consumption in the annual program of socio-economic development of the city to the Department the Economy and Investment.

Activity: Participation in the preparation of proposals for the city budget.

- Procedure 1. To prepare proposals and timely apply for funding

Activities: informing the public about the work of power engineering enterprises.

- Procedure1. To continuously collect, prepare and transmit to the management of public relations the information on the work of power engineering enterprises, displaying consumption of natural resources.

3.6.5.2 Administrative framework

Administrative management in Mykolayiv is performed by local governments. The City Council is the local government of the territorial community of Mykolayiv. The Executive Committee of the City Council is the executive organ of the City Council. The City Council has the following permanent commissions[126]:

- Local government, Parliamentary Activities, Transparency and Rule of Law;
- Economic Policy, Planning, Budget and Finance;
- Management of Communal Property of the City;
- Architecture, Construction and Land Relations;
- Housing and Communal Services and the Improvement of the City;
- Industry, Transport and Communications;
- Entrepreneurship, Investment, Trade, Consumer Services and Consumer Protection;
- Education, Culture, Family, Youth and Sports;
- Health Affairs, Motherhood and Childhood;
- Labor and Social Welfare;
- Environmental Policy, Environmental Protection and Resources Conservation.

The competence of The City Council includes:

- approval of local budget, its changes, approval of budget execution;
- creation of trust funds;
- adoption of the socio - economic targeted programs of the local government;
- approval of local urban programs;
- approval of decisions in accordance with the law regulating land relations;
- assignment of communal property that cannot be privatized;
- management of the housing and communal services, consumer and commercial services, transport and communications, which are in municipal ownership, others.

The main authorities of The Executive Committee of Mykolayiv City Council which carry out the operational management and control in housing, communal services and construction is The Department of Housing and Communal Services and The Directorate of Urban Planning and Architecture. Department is responsible for:

- managing objects of housing and communal services, water, heat, electricity, communal property of the city and its subordinate departments;

[126] Миколаївська міська рада. Структура органів місцевого самоврядування. Available at: http://www.gorsovet.mk.ua/structure/main.ua. (Date of access: 19/11/2013).

- developing and submitting proposals for the implementation of state and municipal programs, implementation of radical economic reforms in the industry, new management methods, progressive forms of organization and incentives in accordance with applicable law;
- making decisions on expanding and improving the network of enterprises operating in the sphere of housing and communal services;
- summarizing offers for reconstruction and overhaul, beautification and sanitation;
- overseeing reconstructions, repairs and maintenance of housing and communal services, budgets and their effective use for its intended purpose;
- introducing tariffs for housing and communal services, others.

The structure of The Department of Housing and Communal Services includes three spheres of control[127]:

- Housing Authority;
- Management of Public Utilities;
- Environmental Protection and Improvement.

The Directorate of Housing Authority, within its powers, is in charge of the following:

- organizing tenders to identify contractors to servicing and maintaining houses, buildings and adjacent territories;
- overseeing the budget and use efficiency for its intended purposes;
- developing long-term plans on capital repair and reconstruction of housing and communal services of the city due to local, state budgets and investments;
- developing investment projects and citywide programs in housing and communal services, monitoring their implementation;
- overseeing the organization of works of housing and operational enterprises city;
- taking the necessary measures to eliminate the consequences of environmental disasters, natural disasters, epidemics and other emergencies;
- studying the best practices of housing and communal services and taking measures to implement them in Mykolayiv;
- providing cooperation with condominium associations and community organizations, providing information support, others.

The Directorate of Public Utilities is responsible for:

- providing operational management of city objects;
- providing the analyzes of the economic and financial performance activities of enterprises and making suggestions for improving their work;
- taking necessary measures on liquidation of consequences of environmental and natural disasters, and other emergency situations in utilities;
- realizing planning, controlling repair, reconstruction, construction of facilities for domestic purposes, budgets and effective use.

[127] Миколаївська міська рада. Департамент житлово-комунального господарства Миколаївської міської ради. Available at: http://www.gorsovet.mk.ua/structure/department/01.ua. (Date of access: 19/11/2013).

The Directorate of Environmental Protection and Improvement is responsible for:

- coordinating the activities of local governments on environmental protection;
- taking part in foreign economic cooperation in the field of environmental protection and improvement of the city;
- participating in the organization of environmental education and raising awareness concerning the state of the environment;
- participating in the implementation of environmental management in the structural units of the executive bodies of the City Council.

The Directorate of Urban Planning and Architecture is responsible for[128]:

- providing the analysis of urban planning and projects;
- coordinating the implementation of research, design, survey and construction works carried out in the city;
- issuing permits about the start of construction of works, implementation of projects, carrying out expertises;
- introducing advanced planning and technical solutions for design and construction;
- organizing the development and maintenance of urban cadastre;
- organizing the design, construction and repair of the main networks and installations for municipal purposes;
- contributing to the creation of urban planning documentation archive, etc.

The Public Council on Environmental Safety was also been established. The activities in housing and communal services and construction in Mykolayiv are also controlled by: The Inspection of State Architectural Control in the Mykolayiv region, The Department of State Agency for Energy Efficiency and Conservation in the Mykolayiv region, The Sanitary and Epidemiological Station of Mykolayiv, The State Ecological Inspectorate in Mykolayiv region, The Main Department of State Emergency Service Ukraine in the Mykolayiv region[129].

3.6.5.3 Challenges and opportunities

Permanent population in Mykolayiv on 01.01.2013 amounted to 491700 persons. Characteristics of housing in Mykolayiv and energy consumption are showed in the tables 3.6-6, 3.6-7 and 3.6-8[130].

[128]Миколаївська міська рада. Управління містобудування та архітектури. Available at: http://www.gorsovet.mk.ua/structure/direction/13.ua. (Date of access: 19/11/2013).
[129]Миколаївська міська рада. Государственный надзор. Available at: http://www.gorsovet.mk.ua/potential/state_supervisions.ru. (Date of access: 19/11/2013).
[130] Статистичний щорічник м. Миколаєва за 2012 рік / За редакцією П.Ф. Зацаринського – Миколаїв, Головне управління статистики у Миколаївській області, 2013. – 234 р.

Table 3.6-6: Characteristics of the housing stock in Mykolayiv.

	2000	2005	2008	2009	2010	2011	2012
Number of houses	34274	34272	34564	34735	34750	34777	34818
Including:							
buildings of hostels	141	133	145	143	143	142	141
having five or more of floors	1255	1340	1416	1459	1485	1510	1503
which are equipped:							
with refuse chutes	684	716	752	757	740	720	727
lifts	649	711	736	755	783	786	792
Number of flats	210409	201810	198109	197997	197089	198773	197358

Table 3.6-7: Equipment of the housing stock.

The share of the total area of premises, equipped with:	2000	2005	2008	2009	2010	2011	2012
plumbing	88,5	89,4	89,2	89,4	89,4	89,5	89,4
sewerage	88,4	89,3	89,1	89,3	89,3	89,4	89,4
heating	87,3	86,9	88,8	89,0	89,0	89,2	89,1
gasification	92,3	88,3	91,7	92,0	92,1	92,0	92,0
lacking hot water	78,1	83,6	84,6	84,7	84,3	84,6	84,9
bathes (showers)	83,5	83,1	84,4	84,6	84,8	85,1	85,0
electrical stoves	2,1	1,8	1,8	1,5	1,5	1,5	1,5

Table 3.6-8: Characteristics of the housing stock.

Number of gasified apartments, including those:	2000	2005	2008	2009	2010	2011	2012
	184455	188972	193165	193596	194146	194379	194794
with natural gas	171999	178536	183940	184526	185205	185564	186087
with liquid gas	12456	10436	9225	9070	8941	8815	8707
Use of natural gas, thousand m^3, including:	444049	447810	393808	355398	379298	389172	375236
population	179199	198199	180132	166510	173600	171791	162498
Use of liquid gas, t, including:	1524	842	2050	623	1005	278	318
population	113	50	34	62	107	49	57
Use of water, thousand m^3, including:	51556	36803	35233	32961	32247	32674	32085
population	43666	24318	22022	20811	20381	19929	20519
Use of heat, thousand Gkal, including:	1205,7	1098,7	958,6	803,3	966,2	1031,8	1166,9
population	871,9	764,5	685,4	564,6	690,4	736,0	764,4

In residential buildings there are 1656 elevators, 1755 houses have central heating system. Only 34 of the houses have antifire systems. 25% of homes need major repairs, overhauled housing constitute 10-15% of the required volumes [2]. Today 583 homes require urgent repair including: roof 494.27 m^2 - 65 mln. UAH; sealing joints - 312 homes (245 km) to the amount of 13.7 mln. UAH; repair of internal networks of water and heat systems - 575 houses, worth 20 mln. UAH; facades - 863 houses amounting to 24 mln. UAH.

For overhauling the housing stock, from the city budget there has been allocated:
- in 2006 – 5.685 million UAH;
- in 2007 – 23.2 mln. UAH, of which 7.4 mln. UAH – borrowed funds;
- in 2008 – 22.8 mln. UAH, of which 0.6 mln. UAH – borrowed funds;
- in 2009 – 15.7 mln. UAH;
- in 2010 – 16.1 mln. UAH.

In Ukraine, on the basis of the law of Ukraine "On local self-government in Ukraine» (No. 280/97-VR of 21.05.1997) the management in the housing sector and in communal services is entirely within the competence of local authorities. The costs of implementing local programs are funded solely by local budgets. The problems in the housing and communal services and their possible solutions depend significantly on the regional economy and the capacity of local budgets. One of the main activities of Mykolayiv City Council is to introduce energy-saving technologies and the development of "energy-efficient city". The long-term plans of the enterprises of the Housing Department include both the development and introduction of energy saving technologies. The main short-term objectives and priorities in the municipal economy are defined as:

- the introduction of energy-saving technologies;
- the improvement of the management system in the city housing sector;
- the creation of associations of condominiums and attracting people to the maintenance of the housing stock;
- more efficient use of all energy resources, drastic reduction of energy consumption, increase in energy efficiency in buildings;
- the creation of incentives and conditions for the transition of the economy to the rational use of energy resources;
- encouraging innovation, investment, energy conservation in business;
- the mobilization of financial resources for the development of the industry.

Most of the high-rise residential and public houses in the city of Mykolayiv were built according to the standard projects and regulatory requirements to the thermal resistance of enclosed structures, they being outdated at present.

Heating of the city is mainly carried out by the two largest producers: JSC "CHP of Mykolayiv city" and OKP "Mykolayivoblteploenergo". OKP "Mykolayivoblteploenergo" provides heat to about 70% of consumers in Mykolayiv. The enterprise has an installed capacity of 609.533 Gcal / h., 119 boiler plants, 70 heating-water converter plants, 363 boilers, of which 360 units use natural gas, 3 units use coal. This company operates 143.534 km of heat networks (two-pipe)[131].

JSC "Mykolaiv CHP" produces heat and electricity. The structure of its main equipment includes steam boilers -4 pcs, hot water boilers - 3pcs, and turbogenerators-3 pcs.

[131] Миколаївська міська рада. Програма економічного і соціального розвитку м. Миколаєва на 2011-2014 роки. Available at: http://www.gorsovet.mk.ua/potential/development_plan.ua. (Date of access: 19/11/2013).

The objectives and priorities of the heating system in the near future are defined in the following way:

- reducing costs and losses of fuel and energy resources;
- introducing energy-saving measures;
- introducing modern types of highly efficient energy equipment;
- dismounting inefficient boilers;
- installing meters;
- constructing cogeneration plants;
- attracting investors for the implementation of energy-saving technologies;
- optimizing the district heating system;
- increasing the share of alternative fuels and energy;
- implementations pilot projects on energy saving by means of investment, the state budget and the budget of the city.

Opportunities: favorable geographical position; extensive transport network, powerful waterways; powerful recreation potential, under-utilized at present; good climatic conditions, the presence of unique natural places, availability of skilled labor; presence of a large number of scientific, educational institutions, and retraining opportunity; existing tradition of hosting international events, festivals, competitions, exhibitions and fairs; the presence of a developed financial infrastructure; advanced Internet and communication.

3.6.5.4 Problems and constraints

The main problems that hinder the implementation of energy efficient technologies in the residential complex in Mykolayiv are as follows:

- the city budget does not provide sufficient funds for capital repairs of buildings and introduction of energy efficient technologies;
- persistent underfunding overhaul of residential and public buildings, energy systems led to a significant deterioration of their technical condition that reduces the efficiency of operation;
- high degree of deterioration of buildings and engineering systems;
- low operational efficiency and high energy consumption due to the use of old technologies, the lack of implementation of new energy saving technologies;
- low level of tariffs for the population;
- low level of profitability of utilities that does not allow to update the fixed assets and implement reconstruction of objects to improve operational efficiency;
- the presence of significant differences in the cost of energy for households and utility companies, which leads to negative consequences;
- the lack of working capital and inability to attract loans due to high interest rates;
- untimely and incomplete compensation of funds for the communal services;
- low level of equipping consumers with metering devices and controlling of thermal energy, water and natural gas;
- the lack of control systems of thermal energy consumption in buildings and on radiators;

- the lack of competition in the market for goods and services in the field of housing and communal services;
- the low income of citizens does not allow to carry out repairs and modernization of premises, buildings, to use energy-efficient technologies;
- the low level of self-organization of the population living in apartment buildings;
- the big difference in income among the population living in apartment buildings does impossible to organize condominiums, this does not allow to obtain financing for repair and modernization of apartment buildings;
- the large debts of population for the consumed housing services;
- the inability of officials collect debts from the population for consumption of housing and utilities;
- the high cost of credit resources in Ukraine.

It is evident that all these problems constrain modernization of housing and communal services.

4. Comparison and conclusions

This chapter compares analytical studies on legislatives frameworks in energy efficiency field on national and local levels in Greece, Romania, Armenia, Moldova, Ukraine and Turkey. The studies on legislative frameworks on energy efficiency issues focused on buildings construction sector on local and national level were prepared in the framework of Black Sea Buildings Energy Efficiency Plan project.

The studies are prepared by the following project partners:

- American University of Armenia
- Municipality of Cahul, Moldova
- Municipality of Galati, Romania
- Municipality of Kavala, Greece
- Municipality of Mykolayiv, Ukraine
- Municipality of Samsun, Turkey
- Municipality of Tekirdağ, Turkey

The goal of the chapter is to compare legislative frameworks of the above-mentioned countries and municipalities, to identify their common sides, problems and challenges, to define their common opportunities and outline differences.

National authorities charged with energy efficiency, particularly for the building sector

In this section the information about bodies responsible for energy efficiency issues in building sector in each of the partner countries and municipalities in particular is summarized, based on contributions from project partners.

American University of Armenia
Key national authorities for energy efficiency for the building sector are the Ministry of Urban Development (MUD) and the Ministry of Energy and Natural Resources (MENR). A third entity, the Public Services Regulatory Commission (PSRC) has indirect influence on energy efficiency by setting utility prices in the country. In case of conflict between MUD and MENR, the Prime Minister's office is the main arbiter.

Municipality of Cahul, Moldova
According to the Law on Energy Efficiency, National Agency for Energy Conservation was created and acted as the specialized state institution responsible for promotion and implementation of energy efficiency in Republic of Moldova. In 2007 this Agency was liquidated and all responsibilities were transferred to the Ministry of Energy.

The Ministry of Economy has the overall responsibility for the energy efficiency development in Republic of Moldova. According to the provision of the Law on Energy

Efficiency, two new institutions were created: Energy Efficiency Agency (AEE) and Energy Efficiency Fund (FEE). FEE is an independent, self-governed institution that provides different financing tools for energy efficiency projects. The budget of FEE is created from the state budget resources. AEE is a separate state institution specialized on promotion and development of energy efficiency and use of renewable energy sources. It is subordinated to the Ministry of Economy and has its own staff and budget.

Municipality of Galati, Romania

At the central level, the Ministry of Economy plays a key role in energy policy in Romania, while the Ministry of Regional Development and Public Administration is responsible for carrying out government policy in areas related to housing, residential buildings, thermal rehabilitation, management and development housing and urban infrastructure. National Regulatory Authority for Energy (ANRE) and the National Regulatory Authority for Local Public Services (ANRSC) are independent regulatory bodies sectors of electricity and gas and the public service of heat supply system centralized. Local authorities have a key role in the implementation of energy efficiency interventions in Romania.

Municipality of Kavala, Greece

The Ministry of Environment, Energy and Climate Change (YPEKA) has the overall responsibility for energy efficiency policy in Greece. Inside YPEKA, the Renewable Energy Sources and Energy Saving Directorate and the Special Service of Energy Inspection are actively involved in energy efficiency policy development and implementation. The Centre for Renewable Energy Sources and Saving (CRES), under the supervision of YPEKA, promotes renewable energy and energy efficiency at a national level, assists national energy planning, assists in the formulation of energy policies and is involved in the development of R&D activities. The Ministry of Infrastructure, Transportation and Networks and the Ministry of Economy also have energy efficiency responsibilities.

Municipality of Mykolayiv, Ukraine

The management in urban development activities is carried out by the VerkhovnaRada of Ukraine, the Cabinet of Ministers of Ukraine, by the VerkhovnaRada of the Autonomous Republic of Crimea, by the Council of Ministers of the Autonomous Republic of Crimea, by the central executive authority which ensures the formation of public policy in the field of urban development, by the central executive body which implements the state policy in architecture, by local administrations, local authorities.

Municipality of Samsun, Turkey

The Ministry of Energy and Natural Resources (ETKB) is responsible for sector strategy and policy formulation. The Ministry is supported by the main regulatory institution for the energy sector - the Energy Market Regulatory Agency (EPDK) – and the General Directorate of Electrical Power Resources Survey and Development Administration (EIE). They work closely with the Treasury, State Planning

Organization, and the Ministry of Environment and Forestry, the lead agency for climate policy.

Municipality of Tekirdag, Turkey

The main entity assigned responsibility for the implementation of the Energy Efficiency Law is General Directorate of Renewable Energy of Energy and Natural Resources Ministry (former General Directorate of Electrical Power Resources Survey and Development Association EIE).

Challenges

In this section the information about challenges that legislative frameworks for the energy efficiency issues in building sector face in each of the partner countries and municipalities is summarized, based on contributions from project partners.

Municipality of Cahul, Moldova

The existing legal framework already puts a lot of pressure on the central and local governments to cope with the requirement to achieve the set goals on energy consumption reduction by 2020. Approval of new Law on Building Energy Performance is a task for the Ministry of Construction and Regional Development that has to be accomplished as soon as possible, since this Law sets clear technical requirements for the energy consumption of buildings.

At the same time, the increased energy prices during the last few years had put pressure on the consumers as well thus increasing the interest for reduction of energy consumption.

Building sector in Moldova is the largest energy consumer covering about 47% of the total energy balance, which is almost double in comparison with EU average. Given the construction standards used during soviet period, the efficiency of building stock is very low, having a lot of energy consumption reduction potential.

Enabling the existing and coming up legal framework on energy efficiency and energy performance of buildings requires certain level of expertise, capacities and abilities of local and central government that would allow elaboration and implementation of EE projects in public buildings.

Residential sector is the largest and at the same time the most difficult sector to be addressed since there is no adequate legal and institutional framework that would allow for implementation of EE projects. Unfortunately, there are no real projects implemented so far that would prove a feasible approach from the legal, technical and financial point of view.

Central and local authorities have challenges and at the same time possibilities to develop good quality EE projects, to develop feasible financing mechanisms that would lead to achievement of the set goals and to the improved environment through the reduced carbon emissions in each municipality.

Municipality of Galati, Romania

- Economically exploitable reserves of oil, natural gas and uranium are limited, given that there will not be discovered important new deposits;
- The volatility of oil prices in international markets;
- The trend of changing climatic characteristics and hydrological instability;
- The possibility of adverse effects on competition in the European energy sector, due to the concentration of energy industry trends;
- Uncertainties in increasing energy and economic recovery;
- The existence of arrears of companies in the sector;
- Significant share of the population that has a high degree of vulnerability in terms of practicing energy prices akin to the European average;
- Lack of effective fiscal instruments to support investment in energy efficiency programs and development of energy services;
- Reduction of coal mining activity, due to the accumulation of historical liabilities and EU policy on subsidizing this activity;
- Difficulties in operating activities of lignite due to the lack of specific rules to ensure the best interest of public lignite reserves, with a straight and fair compensation to landowners.
- Selection, retention and motivation in free market conditions of human capital necessary for the safe operation of facilities owned by the state in the energy sector;
- High costs of uranium mining due to variation in mineralization parameters and its discontinuity;
- Opposition of local government and authorities to the opening of new production capacities in the exploration of uranium;
- Possible sharp rise in the world price of uranium;
- Possible change in public attitudes towards the construction of new nuclear power plants and radioactive waste landfills;
- Difficulties in providing ancillary services during dry periods.

Municipality of Kavala, Greece

The adoption of Directive 2010/31/EU in Greek legislation and the relative functional progress will lead to almost zero energy demand buildings. Challenges also include the supply of the rest required energy applying renewable energy sources, such as photovoltaic, solar thermal collectors, heat pumps, small wind turbines, etc.

The intense and long-lasting financial crisis and rising energy costs in Greece put emphasis on the necessity to search new technologies and opportunities arising from renewable and energy conservation measures.

Municipality of Mykolayiv, Ukraine

The emergency homes category consists of 46.9 thousand units (0.6% of the total residential units of the country), with a total area of 3.9 million m^2, which are home to 95.5 thousand people.

The dilapidated homes category consists of 13.2 thousand units (0.16% of homes of the country), with a total area of 1.2 million square meters, which are homes to 23.1 thousand people.

Residential and public buildings, built mostly between 1950 and 1990, have unsatisfactory thermal characteristics that leads to the excessive loss of heat during their operation. The heat loss in homes of the mass construction accounts to through walls – 42%, through windows – 16%, through roofs – 7%, through basements – 5%, ventilation – 30%. Annually, housing and utilities consume electricity – about 10.0 billion kW • h, natural gas – about 14.0 billion m^3, coal – about 1.5 million tons. The housing and utilities consume alternative and renewable sources of energy of about of 0.87 million tce. Energy costs per unit of production are more than 1.5 times higher than in EU. Excess fuel consumption leads to an increase in greenhouse gases in the atmosphere.

Ukrainian housing and public utility sector is characterized by a high level of wear of fixed assets (more than 60%), a low level of equipment of metering devices.The housing and public utility sector accounts for almost 30% of the total energy consumption in Ukraine. In 2011, boiler houses consumed 15924.426 thousand tce to generate heat energy.

In 2011, the specific consumption of energy resources to generate 1 Gcal of heat energy was 174.7 kgce/Gcal, while in the world the specific consumption of energy resources to generate 1 Gcal of heat energy – from 140 to 150 kgce.

The major part of the housing stock (up to 70%) was developed in the 1960-1990s. It means that most families live in buildings with low energy characteristics. Therefore, implementation of energy efficient measures in buildings has the highest potential for reducing the heating energy consumption.

The technical condition of most buildings and energy systems makes it impossible to ensure an adequate level of energy characteristics of buildings by means of organizational measures and needs replacement of equipment and overhaul of buildings. Residents of blocks of flats equipped with central heating systems are usually technically unable to regulate consumption of heat supplied via the centralized heating system and/or are technically incapable of paying for heat energy they actually consume. As a result, end consumers are not encouraged to save energy.

In Ukraine, practically the entire housing stock, which was built before 1995, needs thermal modernization. First and foremost, 18140 buildings that were built in the period from 1971 to 1980 with the total area surface of 105.1 mln. m^2, need to be thermally modernized. They include large panel buildings with the surface area of 43 mln. m^2, brick buildings with the surface area of 62.1 mln. m^2. The specific weight of those buildings in the housing stock of Ukraine totals 22%.

Thermal modernization works also need to be carried out in 22270 buildings built from 1981 to 1990s accounting for 27% of the total housing stock. Their total surface area amounts to 134.5 mln. m^2, including 76 mln. m^2 of large panel buildings and 58.5 mln. m^2 of brick ones.

The buildings built from 1991 to 2010 with the total surface area of 96.8 mln. m^2 (their specific weight amounts to 20%) are the next ones that should be subject to thermal modernization. They include large panel buildings with the surface area of 33.2 mln. m^2, brick buildings with the surface area of 55.3 mln. m^2, and carcass-monolithic buildings with the surface area of 8.4 mln. m^2.

The buildings built before 1970 accounting for 31% with a total surface area of 148.2 mln. m^2 (including: large panel buildings – 35.7 mln. m^2, brick buildings – 35.7 mln. m^2) need to be thermally modernized by overhauling or reconstructing.

Municipality of Samsun, Turkey

- Lack of Awareness: Energy efficiency investments usually involve well established technologies and provide high rate of return with short payback periods, with Government providing various incentive schemes. However, the awareness of the benefits of energy efficiency investments or incentives provided for the promotion of energy efficiency investments among Small and Medium Enterprises (SMEs) are not very high.
- High transaction cost: Higher cost associated with assessing and preparing energy efficiency investments, compared with the small size of the loans, have deterred sponsors and financiers alike. This is especially so for SME sector, where the technical capacity required is usually not available within companies,

- Underdevelopment of Energy Service sector: The energy management services sector, including Energy Service Companies (ESCOs), is still at an infant stage in Turkey. They face challenges not only in getting deal flows, but also in obtaining financing. Many of them do not have access to finance as they lack the collateral or capital required in obtaining financing.

Energy Efficiency is needed in order to reduce the energy intensity and improve Turkey's economy. Despite a few projects done by the Government and private sector, there are strong market barriers to scaling up energy efficiency investments, especially in SME sector which accounts for 99 percent of all enterprises, 27 percent of total output, and 80 percent of employment in the economy.

Municipality of Tekirdag, Turkey

As urban migration continues, it further increases pressure on local governments for urban service provision which far exceed their budgetary and human resource capabilities. The economic realities also give result to higher income disparition and in equalities which increase social exclusion. These circumstances create additional demands on local governments that are much closer to the local population.

Such pressures are already upon Tekirdag and this will also be accompanied by increases in the consumption of energy in Tekirdag. This situation presents a large opportunity for the Municipality also. The opportunity is to be able to guide this growth towards an energy efficient path and decrease the energy intensity of the city.

Tekirdağ city electric subscribers increased by almost 20% and electricity consumption increased by 10% between 2008 and 2012. Increase in urbanization and increased income lead to increases of energy consumption. Since the penetration of natural gas is relatively low, the consumption of natural gas is expected to increase exponentially. In 2013 the natural gas consumption was above 125 million m^3 and is expected to increase to by 30% and reach 163 million m^3 in 2014.

The challenges facing Tekirdağ are listed below:

- Lack of experts and collaboration between local administration and existing institutions.
- Insufficient investigation regarding public buildings with poor energy efficiency and energy management.

Opportunities

In this section the information about opportunities for legislative frameworks for the energy efficiency issues in building sector in each of the partner countries and municipalities is summarized, based on contributions from project partners.

American University of Armenia

- The Ministry of Urban Development charter has been added with new tasks/functions related to energy efficiency;
- Loans being provided for energy efficiency renovation of apartments/houses by several banks;
- On-going donor funded projects (e.g. UNDP/GEF, WB, IFC, EBRD, etc.) working towards creating appropriate environment for energy efficiency in buildings;
- Already built/thermal modernized energy efficiency buildings (e.g. Goris building for socially vulnerable households, Avan panel building, AMAAA LEED school (still on-going), etc.);
- Seminars conducted for architects, engineers, designers;
- Educational modules for energy efficient design of buildings have been developed and being incorporated into curricula of Yerevan State Architectural-Construction University;
- Activity of several designers/architects already involved in energy efficient design of buildings;
- Two laboratories for testing energy efficient construction materials are operational;
- New energy efficient construction materials are being produced (tested/certified) and imported;
- Several energy audits have been conducted for multi-apartment buildings;

- Energy efficient buildings voluntary rating system being developed;
- Technical documentations related to buildings' energy efficiency were developed recently, e.g. technical solutions on insulation;
- New legislative initiatives (laws "On energy efficiency and renewable energy", "On urban development", "On Yerevan smaller center development") are underway for improving the legal framework.

Municipality of Cahul, Moldova

Opportunities for the central and local authorities in improving the EE in building sector are the following:

- Elaboration and approval of the Law on Energy Performance of buildings;
- Enabling of the existing legal framework on energy efficiency;
- Monitoring of EE projects results and elaboration of recommendations for improved measures;
- Set up a database of the EE projects implemented by local and central authorities;
- Elaboration of feasible financing mechanisms for public, businesses and residential buildings;
- Conducting good quality energy audits and analysis;
- Elaboration of local EE Programs and Action Plans;
- Integration of EE programs into the municipalities development documents;
- Develop and implement the mechanism for elaboration of energy performance certificates;
- Elaborate a database on materials and equipment that would provide support to local authorities with information on the technical and efficiency characteristics, as well as price references;
- Develop mechanism for improved market reaction on the energy efficient buildings/apartments;
- Improve the certification process for materials and equipment as well as the control of the fulfillment of the quality standards upon the use of such materials and equipment;
- Organize trainings for local and central authorities representatives on EE projects, financing mechanisms and materials used;
- Develop and implement awareness raising campaign and information dissemination for interested stakeholders.

Municipality of Galati, Romania

- Favorable geographic position to actively participate in the development of pan-European projects, mainly regarding oil and natural gas;
- The existence of physical energy markets and opportunities for access to regional markets for electricity and natural gas;
- Available capacity in the national gas transport can ensure taking requests users;

  Attractive investment climate for both foreign and domestic investors, including the privatization of various companies currently owned by the state;
- Increased confidence in the functioning of the capital market in Romania, which allows successful listing on the Stock Exchange of energy companies;

- Increased opportunities for investment in energy efficiency and renewable energy resources;
  EU structural funds for energy projects;
- A major hydropower sector capable of supplying the required amount of ancillary services;
- The existence of long experience in mining and extraction and processing of hydrocarbons and important infrastructure for the exploitation of coal and uranium;
- The existence of considerable coal reserves.

Municipality of Kavala, Greece

- Enabling legal framework.
- Put efforts to lead to nearly zero energy demand buildings.
- Setting performance requirements when a major renovation is to be carried out.
- Support the energy performance certificates, inspections of heating and air-conditioning systems, and energy performance requirements, without increasing bureaucracy.
- Provide local authorities and interested parties with a calculation instrument to show the cost benefit of energy efficiency.
- Better understand the factors that affect energy performance of buildings decisions in order to design and implement policies that will more effectively push energy efficiency investments and actions.
- Develop frameworks for higher market uptake of low or zero energy and low carbon buildings.
- Apply at administrative level one-stop shop model that manages administrative barriers by having one agency to provide simple and full services for the beneficiaries.
- Initiate skills and training programs covering the key professions and disciplines.
- Develop packaged solutions that can be readily replicated in similar building types.
- Introduce quality standards/certification systems for installers & products (including packaged solutions).
- Apply and search new technologies on renewable energy sources and energy conservation measures.
- Support research, development and demonstration projects using new & improved technologies for energy efficiency and renovation of buildings including how to extent demonstration projects.
- Encourage development of local supply chain industry for maximizing macro-economic benefits and to minimize embedded CO_2 emissions
- Deploy knowledge and experience-sharing networks across regions.
- Develop promotional and dissemination activities that sensitize building owners to opportunities for deep renovation.

Municipality of Samsun, Turkey

The new electricity strategy and related legislative and regulatory measures provide strong support for RE and EE initiatives. Turkey's electricity market provides a functioning market place for trading renewable electricity.

Local capacity to build and operate hydro and wind power facilities and implement industrial projects including building retrofits and construction has been demonstrated as have the skills of the domestic financial sector to assess and supervise RE projects although financial assessment of EE activities is emerging. EUAS and private developers have demonstrated capacity in the generation sector and TEIAS in transmission system control management. The decentralized nature and smaller size of RE and EE interventions mitigate impacts on power sector performance due to possible delays or failures of individual projects (except for the inevitable variation of wind, for which a Smart Grid approach is proposed). Technical assistance and external expertise will be sourced for Smart Grid development and to support assessment of EE opportunities- donor interest has been established.

Government will utilize hydro, wind, and some EE technologies that have already been proven in country. Government will also utilize technologies with a proven track record outside Turkey in the case other EE technologies; Smart Grid; and biomass, solar and geothermal technologies.

WB/IFC/EBRD safeguards policies will apply to all interventions. TSK Bank, TK Bank and Halk Bank and TEIAS are already applying them under ongoing projects.

Municipality of Tekirdag, Turkey

Increasing energy prices with the effect of additional taxes on fuels make it easier to convince citizens to take EE measures. The main fuel consumed in housing sector, is coal and most of the houses have low energy characteristics. There are still government incentives on coal and it is affordable for most of the families. Energy efficiency measures for those using natural gas have become particularly important because of the additional taxes on gas.

The opportunities facing Tekirdağ are listed below;

- Establishing local management scheme to improve and monitor the energy performance of existing public buildings
- Analysis of the potential of buildings heating systems to provide efficient and low carbon energy.
- Ensuring the implementation of regulations and laws, proper monitoring.
- Financial incentives for EE in buildings
- Establishing publicly accessible information databases demonstrating energy performance of buildings.
- Demonstrate good practice examples and the benefits of EE.
- Enhance the capacity of key professionals with educational programs, training
- Demonstrating that the efficiency measures in the buildings are affordable.
- Providing inform about the synergetic benefits of energy efficiency measures such as environmental and social benefits.

Problems and constraints

In this section the information about problems and constraintsin legislative frameworks for the energy efficiency issues in building sector face in each of the partner countries and municipalities is summarized, based on contributions from project partners.

American University of Armenia

- *Absence of clearly defined requirements for building's energy efficiency in legal acts*
  Energy saving and energy efficiency requirements for buildings and urban development objects are missing in the law "On urban development" and other legal acts of urban development sector, while the Law "On legal acts" requires that any requirement to be imposed to legal and physical persons should be adopted by legal acts. On another hand, the building code on thermal physics, which defines requirements for building's thermal resistance, is not properly registered with the Ministry of Justice. The list of building codes adopted by the Minister of Urban Development was registered with the Ministry of Justice while each building code should have been submitted separately and registered properly.

- *Existence of outdated building codes*
  Existing building codes do not comply with integrated building design approach and are not flexible as modern building codes. Current building code on thermal physics only specifies thermal resistance values for building envelope while modern building codes in the meantime specify overall building performance, e.g. kWh/m^2.year.

- *Low enforcement capacity*

  Supervision over construction works related to thermal protection by construction quality control organizations and state urban development inspectorate is week. Many organization and state inspectors are not aware of building norms, technologies, etc. related to building's energy efficiency.

  Energy audit of buildings is not practiced which would determine their actual performance with building codes. Energy audits are reliable tools to assess building code compliance and demonstrate the economic benefits of energy savings.

  Recently the Ministry of Urban Development applied to INOGATE programme for supporting development of roadmap for introducing energy performance certification system in the country.

  Construction materials and prefabricates are not certified for energy performance which makes impossible to ensure that the buildings made of those construction materials comply with building codes requirements and

measure energy performance. It is worth mentioning that currently there is a non-solvable problem related to testing and certification of windows and doors in the country. This is due to a lack of appropriate testing equipment (climate camera) which is costly and is not demanded by market at large.

- *Low level of awareness among population, private and public sectors*
  There is a low level awareness of energy efficiency benefits and opportunities in buildings, moreover appropriate public awareness campaigns related to buildings energy saving and energy efficiency are absent. Customers, especially for apartments mostly do not have any idea about energy performance of their apartments and buildings where they are located.

- *Low capacity of construction sector actors*
  Most of the designers/architects, design evaluation specialists, builders have low capacity in designing and constructing energy efficiency buildings. Several trainings have been conducted for construction sector actors, however it is not sufficient.

- *Immature market for EE products and services*
  Many construction companies use do not use energy efficient materials, prefabricates and technologies. Although, recent demonstration projects have created demand for energy efficient products and services, it still needs further enhancement and development.

- *Inflexible investment decision-making practices (least cost versus operational expenses)*
  Public procurement rules which are based on least cost approach do not promote use of energy efficient materials, prefabricates and technologies. There are well-documented evidences for energy saving benefits for energy efficient public buildings taking into account their operational expenses. As mentioned above, the Ministry of Urban Development is drafting a government decree on approving energy performance targets for buildings built/reconstructed by public means. Once adopted, it will start addressing this barrier.

<u>Municipality of Cahul, Moldova</u>

Central and local authorities are facing several problems in regard with the energy efficiency development in the building sector.
The major problems faced are the following:

- Lack of vast experience of central and local authorities in elaboration and implementation of EE projects.
- Limited capacities and expertise in energy efficiency;
- Very limited financial resources available for energy efficiency projects;
- High prices of materials and equipment for EE;
- Low level of information on potential of energy efficiency benefits for different categories of buildings.

The above mentioned problems along with other create a number of impediments for energy efficiency development in building sector.

Two big problems should be underlined that deserve a primary attention of the authorities:

e) Financing of EE projects;
f) Incentives for local authorities to implement EE projects;
g) Quality of materials and works used for implementing EE measures in the building sector;
h) Public acquisition constraints.

Along with the country wide financing problems caused by deficient state budget, EE should have a higher importance to central government due to immediate positive effects as on local and state budget as on the energy security of the country.

Still, even there is a Fund on Energy Efficiency, the process of approval and disposing the financial means for EE projects is quite slow that leads to no use of available funds dedicated for energy efficiency projects.

Currently, local authorities do not have big incentives for energy efficiency projects because of the budgetary process, where state budget still sets limits for energy consumption/expenses depending on the level of consumption. A real financial decentralization is required in order to give free hands to local authorities to manage the expenses of energy consumption and to be interested in reducing such costs, while the saved money could be used for other needs that local authorities considers as appropriate.

The existing system of quality control of the materials and equipment used for EE projects has a number of deficiencies that lead to use of low quality materials and thus to lower efficiency of the measures implemented. Central authorities have to take measures, including legal framework improvement that would not allow for vendors delivering low quality materials. Also, central authorities have to improve the public acquisition rules in order to avoid procurement of low quality materials based on the lowest price principle only.

Municipality of Galati, Romania

The main measures envisaged to increase energy efficiency target are:

- Application of State aid scheme related to high efficiency cogeneration;
- Strengthen public information campaigns and business;
- Continuation of the “2006-2015 District buildings and comfort";
- Mandatory energy performance certificates since 2010 for apartments in existing homes that are sold or leased;
- Continuing the thermal rehabilitation of residential buildings;
- Continuing certification of energy auditors for both buildings and industrial activities;
- Modernization of passenger and freight rail and underground transport;

- Enforcement by public authorities and local art. 7 of Ordinance no. 22/2008 on energy efficiency and promoting the end users of renewable energy;
- Extending the National Energy Efficiency Program (heating system rehabilitation, rehabilitation of public buildings and public lighting efficiency) for the period 2011-2015.

Influence:
- During the current economic and financial crisis and the evolution of the GDP
- Energy consumption is influenced by economic developments and economic adjustments;
- Application of environmental legislation - applying the ETS Directive has the effect of improving the energy efficiency side.

Limitations that could lead to failure to target:
- Reluctance of banks to grant loans for energy efficiency projects;
- Low purchasing power and financial situation of the owners of buildings;
- Understaffed at institutional level;
- Failure due to current financial constraints, public authorities and local measures provided for in art. 7 of Ordinance no. 22/2008.

Nationally some local authorities have opted for the direct management and others for delegated management.

Ability of operators to invest in network rehabilitation SACET component is limited by the reduced capacity for payment of the population and the need to secure a lower price and supply of heat. Heat is subsidized from the budget and, in parallel, given as welfare for disadvantaged people. It was expected that the District 2006-2015" program" would be an important way to contribute to the achievement of such works, but economic and financial difficulties in recent years have made that reality to be below initial expectations.

Municipality of Kavala, Greece

Many barriers slow down energy efficiency in buildings, such as insufficient finance for efficiency improvement, not enough information, users' lifestyle choices, and increased initial cost of new buildings. Furthermore, administrative standard operating procedures and informal practices may hold back responsiveness.

Although there are some purposeful incentives, additional energy efficiency investments in buildings have been decelerated due to high initial investment costs, national financial problems, credit risk and rather extended redeem periods.

The development of most buildings focuses on construction costs with very little concern for running costs. The weight of energy efficiency in buildings is traditionally low due to the warmer climate in Greece, although, there are many building with relatively poor insulation and fuel prices are high.

In general there is lack of experience, skills and expertise regarding subsidized EU programs in public and building sector. Thus, the implementation of complicated and large scale programs is difficult.

The existing financial crisis has stricken Greece much harder than the rest of the EU. The lack of liquidity in the banks causes them to demand high collateral and interest rates for loans. This particular difficult situation has as a result to put everything on a hold, and no money is lent. On top of that, the economic crisis forces drastically cut government expenses. Currently in Greece, the housing market, building sector and construction sector is near to collapse, which makes investment in buildings less attractive. However, for the Greek government it seems that EE investments in the building sector could be an attractive option to create employment and stimulate economic improvement.

Lastly, a problematic situation at national level refers to informal settlements. Usually, these settlements have significant importance in energy efficiency legislation. In Greece, such buildings are relatively well built and number nearly one million across the country. Building efficiency legislation and regulations should take account this social and economic issue, which requires a combined approach at technical and administrative level.

Municipality of Mykolayiv, Ukraine

The long-term crisis in the housing and communal services of Ukraine is caused by the following factors:

1. In the sector of residential buildings:

- Expiring the term of exploitation of some apartment houses and the lack of funds for the resettlement of their tenants;
- Absence of planned capital repairs of residential buildings for a long time because of lack of funds;
- Low volumes of financing the renovation of residential buildings;
- High heat loss through the enclosures of the majority of the buildings because of their construction according to construction norms with low thermal resistance;
- High heat losses due to high infiltration of outside air through the damaged and deformed window and door constructions;
- The absence of a single owner for the majority of apartment buildings, which is associated with disparity of incomes of the population;
- People have low incomes and does it not allow them to carry out repairs of buildings using energy efficiency technologies;
- Large debts of the population for utility services (see table 1);
- Low level of tariffs for public utility services;
- Lack of sufficient budgetary funds at different levels for supporting this sector.

2. In the sector of municipal centralized heat supply:

- Non-temperature schedule of heat supply to consumers especially at low outdoor temperatures;
- Lack of regulation of heat consumption both at the input of apartment houses and heat radiating appliances, largely due to the adopted system of quality regulation of supplied heat carriers and the design of internal heating systems;
- Low efficiency of heat production due to the use of technologically outdated boiler units and auxiliary equipment, which leads to environmental pollution (table 2);
- High accident rate of damages of thermal networks and great loses of network water due to the wear of corroded pipelines;
- High heat losses to the environment from thermal networks because of mass damage of thermal insulation and application of non-efficient thermal insulation materials and structures;
- Lack of comprehensive accounting of heat energy for its production and consumption, not all producers and consumers of thermal energy are equipped with metering devices (table 3);
- Low heat tariffs do not allow full repairs and modernizations of equipment;
- Great difference in tariffs on gas and electricity prices for households and heat supply organizations (table 4);
- A significant decline in supply of heat energy due to the refusal of consumers to use heat supply;
- Large debts of the population for services of heat supply.

3. The sector of municipal water supply:

- High rate of and damages great water losses because of corrosion, aging and damage of pipelines;
- Insufficient number of consumers with metering devices;
- High degree of deterioration of the technological and pumping equipment of water utilities;
- Lack of quality of water according to the required sanitary standards in a number of cities and settlements;
- Low tariffs for water do not allow full repairs and modernizations of equipment;
- Large debts of the population for water supply services;
- Lack of sufficient budgetary funds at different levels for supporting this sector of economy.

4. The sector of the municipal power supply:

- Ageing of the distribution networks, protective armature and, as a consequence, low reliability of power supply and low quality of electricity;
- Exceeding the electrical loads due to the increased number and capacity of electrical equipment and, as a consequence, network congestion and disconnection of consumers.

The major constraints hindering modernization of the given sphere of the economy are as follows:

- Critical financial and economic state of enterprises of housing and communal services;
- Large debts of the population to municipal utilities;
- Lack of investment attractiveness of the industry due to low tariffs and the crisis of solvency;
- High interest rates on loans;
- Structural, price and tariff disproportions in housing and communal services;
- The presence of non-market and non-transparent relations, high monopolization of the market of housing and communal services;
- Ineffective system of controlling the operation of housing utility companies and regulation of natural monopolies;
- Lack of effective owners for the majority of apartment houses;
- Low level of tariffs which does not cover the costs of housing and utilities enterprises;
- Lack of the mechanisms for collecting of debts for consumed housing and communal services that leads to the growth of non-payments by the population.

Municipality of Samsun, Turkey

The main barriers that the Government of Turkey proposes to tackle in promoting energy efficiency investments in SME, residential, buildings and municipal sectors are high transaction cost, underdevelopment of Energy Service Companies (ESCOs), and lack of awareness.

There are higher cost associated with assessing and preparing EE investments relative to the small size of the loans, and these have deterred sponsors and financiers alike. This is especially so for the SME sector, where the technical capacity required is usually not available within companies;

The energy management services sector, including ESCOs, is still at an infant stage in Turkey. They face challenges not only in getting energy efficiency projects, but also in obtaining financing. Many of them do not have access to finance as they lack collateral or capital required to obtain financing. There is a lack of regulatory, as well as legislative improvements to drive their development.

EE investments usually involve well established technologies and provide high rate of return with short payback periods, with Government providing various incentive schemes. However, the awareness of the benefits of EE investments or incentives provided for the promotion of energy efficiency investments is not very high.

Risks are substantial due to vulnerability to international liquidity problems and an abrupt capital outflow and a significant economic downturn is possible due to high financing needs and current account deficits. Turkey's economic outlook for 2008-09 is thus highly affected by global credit conditions. One of the main measures on the fiscal side is to link spending to revenues in view of the downside risk to growth and

revenue projections. The Government is committed to implement a multi-year MTFF and reforms and economic program continue to be anchored by EU accession process.

Turkey is expected to return to a high-growth path in the medium to long term. Energy demand, particularly electricity and gas demand has grown and is expected to continue to grow rapidly. The Electricity Strategy sets targets to contain the use of gas in power generation and energy demand may be constrained by available supply in the short to medium term.

Political risks include: domestic political differences, upcoming municipal elections, border tensions and geopolitical events in neighboring regions. Turkey's single-party Government with a 2/3 majority has leverage to push through difficult reforms while the governance structure is anchored by the leadership's commitment to EU accession as a priority. Turkey's election to the UN Security Council as a nonpermanent member reinforces its role as regional peace broker and strategic foreign policy actor.

Other Relevant Problems and Constraints:

- There is a need for collaborative studies of related governmental institutions and for better and widespread implementation national agencies formation is crucial.
- What is targeted in terms of energy efficiency buildings should be defined clearly in order to see the differences with what is realized in the application.
- Secondary legislation should be strengthened i.e. recasting of Energy Performance Certification considering the existing buildings, as well.
- Mandatory surveying and energy efficiency auditing together with bonus for the data base formation and good monitoring i.e. known saving potentials, reference values are very important.
  - Governmental incentives should be defined and applied for the building sector i.e. starting from the commercial ones. In the Medium Term Plan for the first time the need for energy efficiency is announced as an inevitable action by the Government in October 2012 and now related planning should be made.
  - Public-private partnership, energy performance contracting, third party financing applications should be considered for demonstration and formation of best practices.
  - Energy efficiency and renewable energy technology database for more implementation practices should be developed.
  - Low interest rate loans and credits, tax exemptions for energy efficiency materials, equipment and systems should be provided.
  - Overcoming information gap has great importance to be more involved private sector the government side through energy efficiency in buildings.

Municipality of Tekirdag, Turkey

Tekirdag Municipality was responsible for the center of Tekirdag serving a population of almost 180 thousand people. With the issuance of the Law 6360 regarding the establishment of 13 new Metropolitan Cities, Tekirdağ will be a Metropolitan Administration covering all the provincial borders of the city with a total population

of 873 thousand people. The merger process will create additional work for the human resource which will be trying to adapt to the new situation.

- Among others, the budget is the biggest constraint, regarding capital expenditures aiming for energy efficient technologies and procedures.
- There are local, national and international funding opportunities present but the capacity of public authorities should be raised in order to apply and manage projects with different partners.
- Main energy source of the residential buildings is still coal. There are local producers and incentives on coal prices. Population under the average welfare level will continue to use coal for a while.
- High initial costs to change low operational efficiency of older technologies is a big constraint over new technologies with higher energy efficiency.
- The low income of citizens does not allow them to carry out repairs and modernization of premises, buildings, to use energy-efficient technologies. There are not enough funding or incentives to motivate citizens.
- There are not enough awareness campaigns, incentives to inform citizens regarding the financial benefits of EE.
- The control mechanisms for the implementation of existing regulations are not strict and properly monitored
- Final user awareness pertaining to the control of energy self-consumption is non-existent. Especially own energy use with metering (cooling/heating, electrical devices, natural gas, lighting, etc.)
- A significant percentage of the building stock is regarded as unlicensed and/or illegal making it very difficult to implement any energy efficiency measure.

It is evident that all these problems constrain the modernization of the building stock vis-à-visenergy efficiency.

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