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Applying energy efficiency standards in Kosovo's residential buildings : {Presentation given November 2010]

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“Applying Energy Efficiency Standards in Kosovo’s Residential Buildings”

Capstone Project in partial fulfillment of a Master of Science Degree in Professional Studies at the RIT Center for Multidisciplinary Studies

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Kosovo targets for energy savings

Kosovo Energy Efficiency Plan 2010-2018

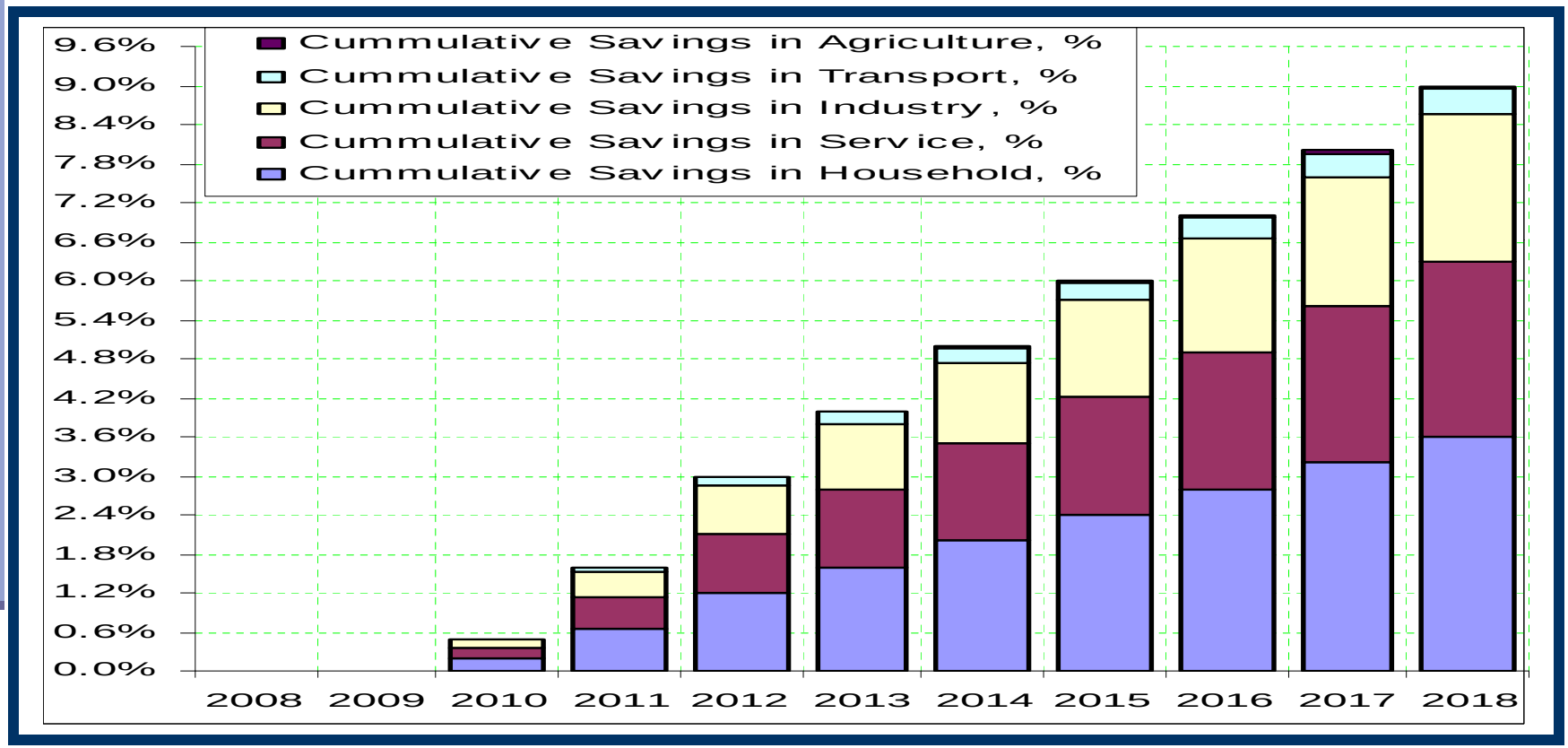


Figure 2.2 Saving Target for each sector (%), Source: KEEP 2010-2018

***Indicative target* is 9% of average energy consumption for 2003-2007**

9%* of *1 021.08 ktoe* *to be achieved by 2018, or* *91.89* *ktoe energy to be saved

Targets for energy savings in household sector

based on the article 4(1) of Directive 2006/32/EC on energy end-use efficiency

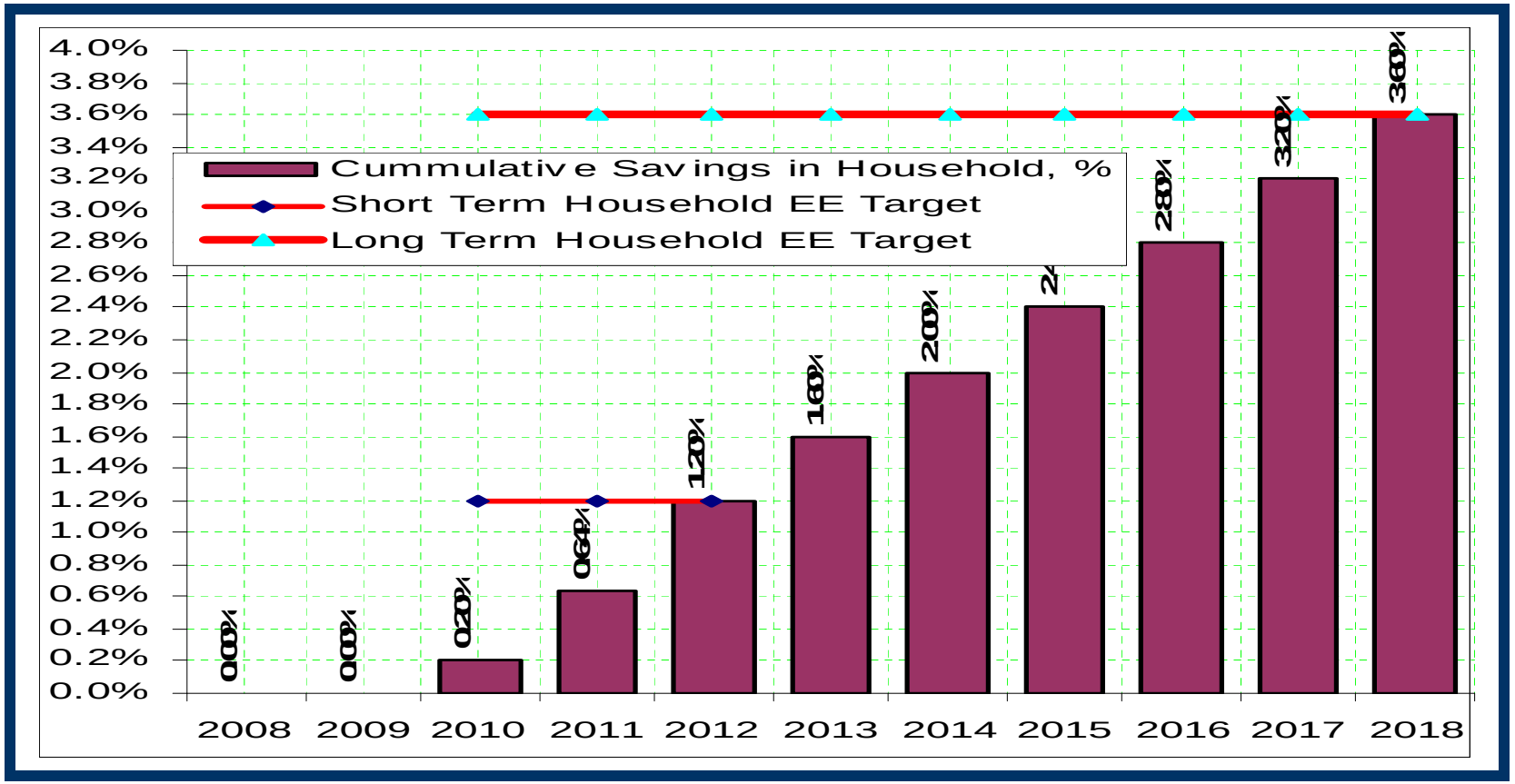


Figure 2.1 Targets of EE for household sector in % , Source: KEEP 2010-2018

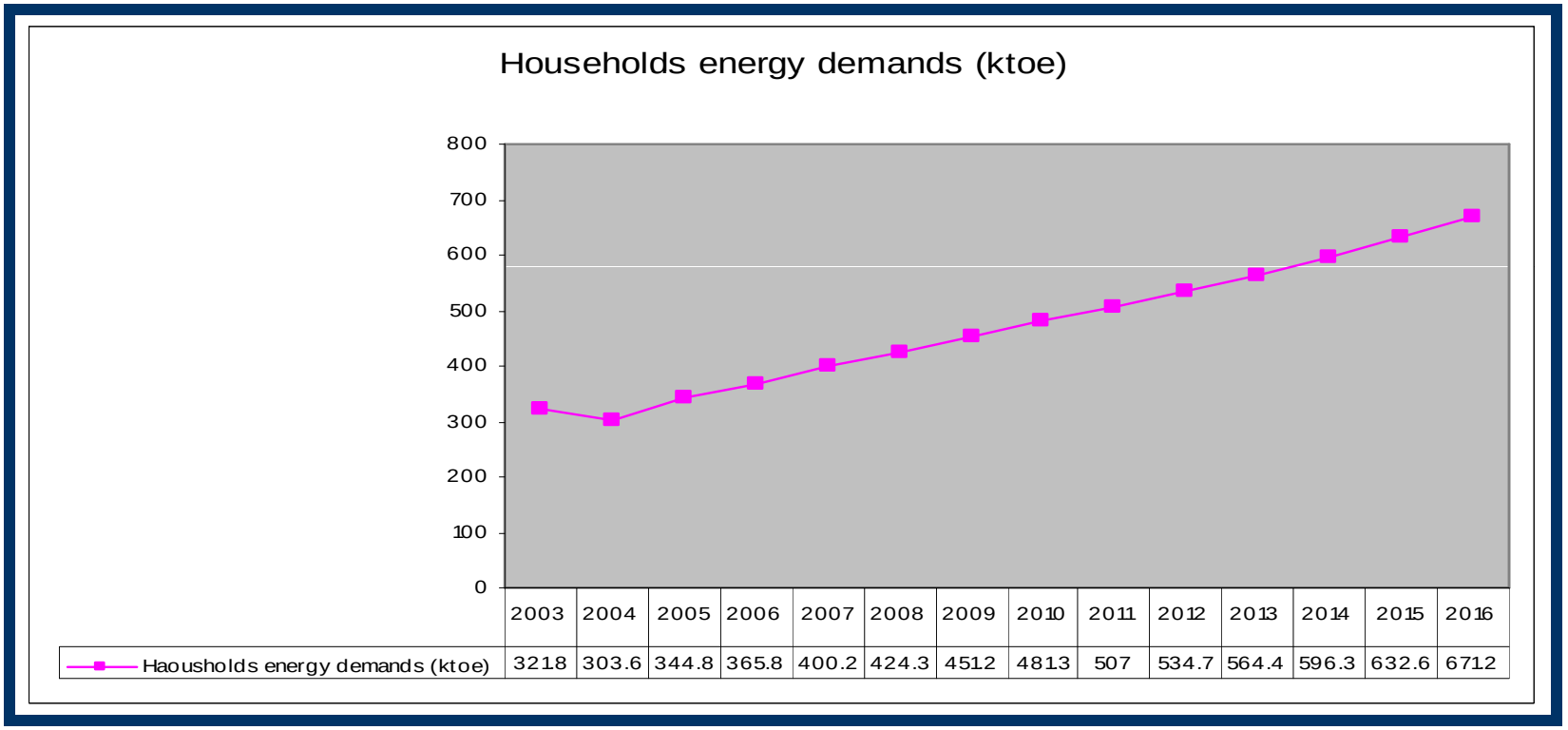
3.6% represents approximately 40% of the energy that will be saved from all sectors

Energy consumption of all sectors (average for the period 2003-2007),

Energy consumption sectors	Kosovo Energy consumption shares contribution (%)	EU Energy consumption shares contribution (%)
Households	33.34	26.28
Services	13.34	12.47
Transport	26.52	30.91
Industry	22.35	27.77
Agriculture	5.06	2.54

Source: KEEP 2008-2016

Energy demand forecast
based on the Kosovo Energy Strategy



	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016
Haousholds energy demands (ktoe)	3218	303.6	344.8	365.8	400.2	424.3	4512	4813	507	534.7	564.4	596.3	632.6	6712

Figure 1.1 Forecast of energy demand based on population growth

Household's energy consumption will increase from 321.8 ktoe in the year 2003 to 671.17 ktoe in the year 2016

Problem statement

- **This Capstone Project aims to address the important problem of low energy efficiency in residential building in Kosovo as one of the biggest energy user and (CO2) emitter.**

- **Clearly defined institutional and legal framework, and improved energy efficiency in housing sector in Kosovo can contribute to the global objective of increasing level of energy efficiency and environmental protection also can help to avoid social exclusion.**

- **This project may serve as a road map for the responsible governmental structures on there future policy decisions regarding energy efficiency in residential buildings.**

Kosovo's residential buildings data

- **370,000 households in Kosovo (36,400) apartments.**
- **90% are privatized.**
- **More than 50% of the apartments are 40 years old, 10% of houses build before 1999 are insulated, after 1999 increased to 60%.**
- **Management and maintenance system is not established.**

Kosovo's residential buildings data *cont.*

- **District heating systems for only about 5% of the heat demand in Kosovo.**
- **Buildings and apartments are not registered in the Immovable Property Right Register.**
- **The building typology in Kosovo is not standardized.**

Kosovo EE policies, Laws and Regulations

- **Law on Energy No 2004/8, (MEM)**

  Defines the basic principles for energy strategy. It sets indicative targets for consumption of electricity and heat generated from RES.

- **Kosovo Energy Strategy 2009 – 2018, (MEM)**

- **Administrative Instruction No. 09/2008 on Energy Auditing (MEM).**

- **Kosovo Energy Efficiency Plan 2010-2018 (MEM)**

Kosovo EE policies Laws and Regulations

- **Law on Construction No. 2004.15 (MESP)**
- **Law No.03/L-091 on Use Management Maintenance of Building Joint Ownership (MESP)**
- **Technical Regulation No 03/2009 on thermal Energy Savings and thermal protection in buildings (MESP).**

Mandatory energy efficiency standards in Kosovo

Technical Regulation No 03/2009 refers to the :

- **standards for calculation methods,**
- **standards for building component testing**
- **standards for construction products.**

It consists of technical demands for :

- **heat energy savings and thermal protection,**
- **building products,**
- **project content**
- **building maintaining**

Requirements of this regulation are valid for all new buildings and existing buildings undergoing reconstruction which are heated on space temperature higher than 12°C.

Energy efficiency strategies in other countries

The comparative analysis of county EE policies, instruments and measures

Country	Legislative	Normative Technical Regulation	Financial	Building Auditing Projects	Building Certification	Awareness Information
Albania	X	X		**X**		
Macedonia		X		**X**		
Bulgaria	X	X	X	**X**	X	X
Austria	X	X	X	**X**	X	X
Kosovo		X		**X**		

EU Regulations Concerning Energy Efficiency

- **Green Paper on Energy Efficiency [COM (2005) 265]** introduces the target of 20% efficiency improvement in the use of energy by 2020 towards meeting the targets for implementing Kyoto Protocol.
- **EC Directives on Energy Labeling** require marking of energy performance levels for domestic equipment.
- **EC Directive 2006/32/EC on energy end-use efficiency and energy services**
- **EC Directive on the energy performance of buildings (2002/91/EC)**

EC Directive on the energy performance of buildings (2002/91/EC)

It sets requirements for:

- **Calculation methodology of the energy performance of buildings**
- **Application of minimum energy requirements on the energy performance for new buildings and for renovation of existing buildings**
- **Energy certification of buildings under construction, rent out or sold**
- **Inspection of boilers**

Energy Auditing Model

Preschool institution "Ardhmeria 2", Gjilan

Energy Audit is used to define potential of energy-saving and later to produce the Energy Efficiency Certificate of the building.

Energy Auditing Model

Annual energy savings and costs savings

Recommended Measure	Estimated annual energy savings, kWh/year	Estimated annual cost savings, Euro/year	Estimated implementation cost, Euro	Payback period, Year
Building facades	23,465	2,346	9,400	4.41
Roof/Floor	38,041	3,804	19,977	5.78
Windows	36,225	3,623	29,665	9.01
Heating system	27,679	2,768	18,827	7.48
Hot tap water system	17,682	1,768	8,100	5.04
Lighting	2,440	219.60	732.00	3.67
TOTAL	**145,532**	**14,529**	**86,701**	**6.56**

Table 5.8 Annual energy savings and cost savings for Preschool Institution "Ardhmeria", Source: EA Training Material, MEM

Costs and financing instruments 1

estimated based on several audits of the public buildings in Kosovo.

No	Recommended Measure	Description of application	Estimated implementation cost	Approximate Energy Savings %
1.	External wall insulation	Extruded polystyrene 8 cm	25.00 Euro/m2	25
2.	External roof/floor insulation	Extruded Polystyrene 4cm	15.00 Euro/m2	20
3.	Windows replacement	PVC Windows with double glass	120.00 Euro/m2	15-25
4.	Heating system HS	New EE boiler, thermal insulation of the pipes of the HS in the boiler room	18.827 Euro	10-20
5.	Renewable energy sources	Solar hot water system	450 Euro/m2	10
6.	Substituting of existing incandescent lamps, systematic maintenance	Efficient lamps	12 Euro	10

Costs and financial instruments 2

Total expenditures in the energy sector in Kosovo, in Million Euros

Description	2002	2003	2004	2005	2006	2007	2008
Donations	66.4	138.5	48.2	10.4	28.2	-	-
Subsidies	4.1	-	-	-	-	-	-
Technical assistance	9.8	90.3	10.9	10.4	-	-	-
Capital investments	52.5	48.2	37.3	-	-	-	-
KCB	108.1	56.3	41.4	67.2	47.1	65.6	84.1
Total	174.5	194.8	89.6	77.6	75.3	65.6	84.1

Table 17; Expenditures in energy sector in Kosovo, Source: MEF 2009-2011

Costs and financial instruments 3

Current Financing of EE Programs in Bulgaria

Source of financing	Total value of projects, million Euro
With state budget participation	
Programs for certification of public buildings, 2006/2007	~ 2.0
Programs for auditing of enterprises, 2006/2007	~ 1.7
Bulgarian Energy Efficiency Fund (Renovation Subsidies)	~ 7.5
Fund (KIDSF)	~ 5.4
Credit line in industry (EBRD)	~ 33.3
Credit line in households (EBRD)	~ 22.5
GRAND TOTAL	~ 72.4

Table 3.2 Current financing in Bulgaria regarding EE, Source: NEEP Bulgaria, 2008-2010

Project Methods

- The work plan of this capstone project was to critically analyze the energy efficiency policy and practice in Kosovo and identify priority areas for strengthening energy efficiency in the building sector with the focus on residential buildings. The identification of areas was done based on the comparison of Kosovo and selected regional and European countries EE situation.

- This comparison involved three steps:

    1) Critical analysis of current state EE policy
    2) Comparative analysis of polices
    3) Identification of the recommendation for future energy efficiency policy and project for Kosovo.

Analytical process for Kosovo EE policy

Energy Efficiency Policies	Yes	No	Partly
Developed EE Policy?		X	
EE Law?			X
EE fund?		X	
National Targets?	X		
International Cooperation?	X		
Technical regulations?	X		
EE Directives transposed?		X	
Building Auditing?			X
Building Certification?		X	

Table No. 7.1 Analytical process for Kosovo EE policy

Conclusions
Legislation & Programs

- **Energy Efficiency Law &Fund on Energy Efficiency – MEM**
- **Instruction on Energy Certification of Buildings – MESP**
- **Instruction on requirements and criteria for certification of energy auditors – MESP**
- **Mandatory energy efficiency standards in buildings regarding heating and cooling systems, windows and doors, building ventilation and air conditioning – MESP**
- **National Programs with the objective for Renovation of the Residential Buildings** (Residential Building Subsidies)

Conclusions
Law enforcement 1

- **Creation of Owner Associations and Licensing of the companies for Management Maintenance of Building Joint ownership**
- **Certification System for Energy Auditors**
- **Revision of Construction Law and licensing for architects engineers**
- **Revision of minimum requirements for thermal transmission coefficient in building in the course of transposition of the Buildings Directive in Construction Law**

Conclusions
Law enforcement 2

- **Consideration of energy efficiency in spatial planning, urban planning and residential development (Revision of spatial planning law taking into account of energy-related criteria - Austrian model)**
- **Creation of the national database system housing and construction**
- **Clear responsibilities of the institutional structure regarding EE is crucial for law enforcement.**

Conclusions

Financial and Fiscal instruments

- **Conditional public subsidies to residential buildings which could cover renovations, energy auditing costs**
- **Access to loans for renovation and technical assistance to voluntary homeowners associations**
- **The energy efficiency mortgages model released based on energy audit tools.**
- **Public subsidies which could cover promotional activity costs.**
- **Fiscal policy application of customs relief connected with efficient technologies**
- **Building tax exemption to owners of buildings who have obtained energy performance certificates of one of the higher classes.**

Impact evaluation and results

Table No. 7.1 Expected energy savings and emissions reduction for the number of residential buildings

Year	Number of buildings	Floor area	Costs Wall insulation and double glassed windows	Expected Energy Savings	Expected CO2 reductions
		m2	Euro	MWh/year	ton/year
2012	10	13 200	383 500	396	430. 84
2013	20	26 400	767 000	792	861. 69
2014	50	66 000	1 917 500	1 980	2154. 24
2015	50	66 000	1 917 500	1 980	2154. 24
2016	50	66 000	1 917 500	1 980	2154. 24
2017	50	66 000	1 917 500	1 980	2154. 24
2018	20	26 400	767 000	792	861. 696
total	250	369 600	9 587 500	9 900	10 771. 2

Based on the assumptions for energy savings of approximately 30 kWh/sq.m/year, and greenhouse gas emissions 1088(kg/MWh).

Impact evaluation and results

Program model for residential building renovation

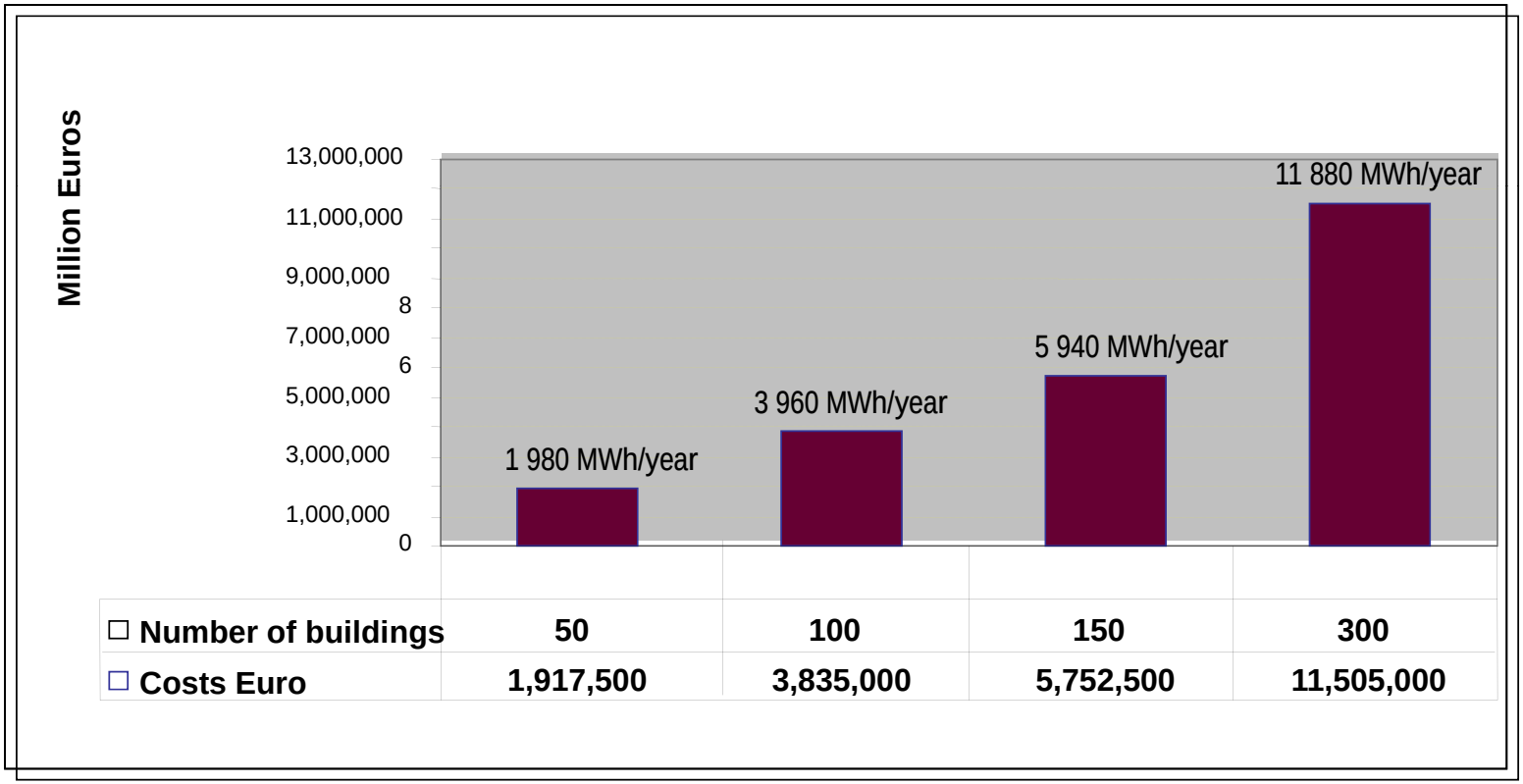
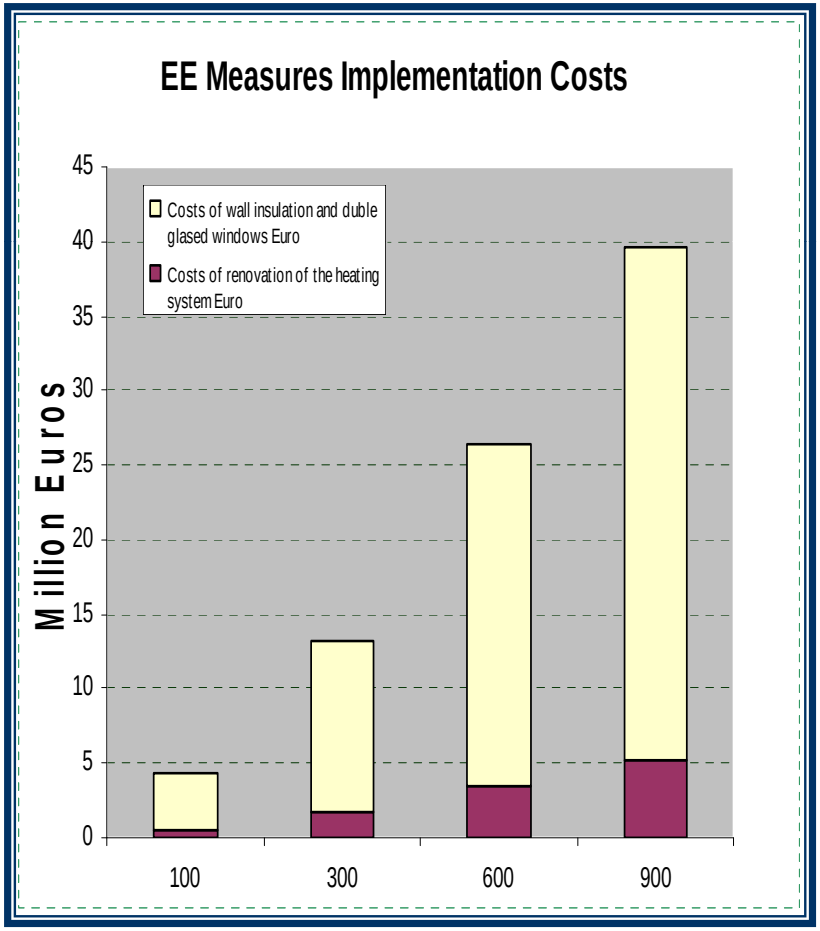
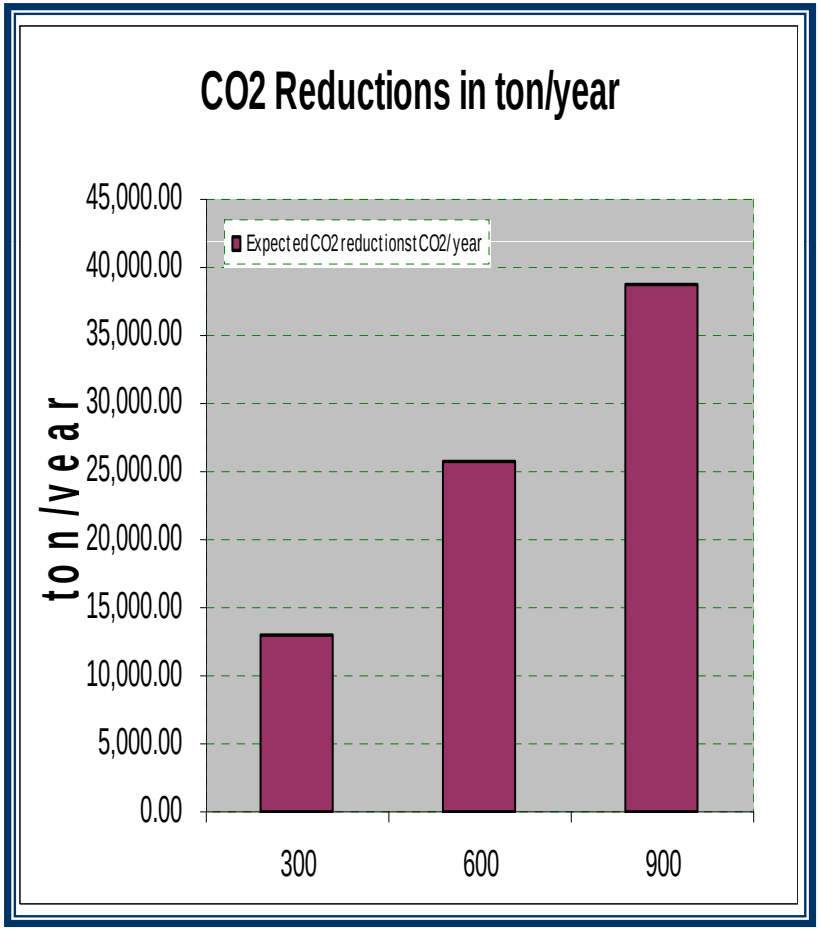


Figure No. 7.1 Investments for application if specific EE measures and Expected Energy Savings

Impact evaluation and results





Recommendations

- **To complete legal framework** for energy efficiency in residential buildings, by settling of correlations in legislative framework within the area of energy, housing, spatial planning and building construction.
- **To enforce the existing legal framework** for energy efficiency by undertaking necessary action for implementation of enacted technical regulations, introduction of the appropriate standards and strengthen human capacity at central and local level and coordination between organizations is crucial.

Recommendations

- **To develop energy efficiency programs** for energy efficiency improvement and management in residential buildings followed by the appropriate raising awareness campaigns, to help change the understanding of the wider professional public and draw attention to the importance of the necessary thermal energy savings in building sector in general.

- **To develop innovative financing** for energy efficiency investments in residential buildings through introduction of fiscal policy needed for the application of customs relief connected with efficient technologies, and subsidies which could cover the energy auditing costs, energy conservation investment costs and promotional activity costs.

Thank you for your attention.

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