

Energy Agency of the Republic of Macedonia

**UNECE-Financing Energy Efficiency Investments for Climate Change
Mitigation**

**Case Studies on Overcoming Barriers to Investments into Energy
Efficiency and Renewable Energy Projects through Policy Reforms**

**ENERGY EFFICIENCY IN THE BUILDING SECTOR IN THE REPUBLIC OF
MACEDONIA**

Kiev from 10-11 November 2009

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SECTOR CHARACTERISTICS AND REGULATORY FRAMEWORK BEFORE THE POLICY REFORMS

- The existing building stock in Macedonia is not energy efficient,
- Level of thermal insulation of the buildings is poor,
- Energy efficiency problem with the old, but also with the newly constructed buildings,
- A regulation for thermal insulation of buildings is in force since the '80s,
- Building permits are received without any energy efficiency criteria,
- There is no enforced energy performance standard,
- There is no supervision of the energy systems in buildings during their construction.

Generally, the considerable potential for improving energy efficiency in buildings, together with the high level of electricity use by households, makes the residential sector a key target for energy efficiency improvement programs.

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REGULATORY FRAMEWORK BEFORE THE POLICY REFORMS:

- ***National Development Strategy*** (adopted in 1997);
- ***Energy Law*** (“Official Gazette of the Republic of Macedonia No. 47/97 and 50/97), referring to energy efficiency, *development* of an Energy Efficiency Strategy and the establishment of the Energy Efficiency Fund;
- ***National Environmental Action Plan*** (NEAP), developed in 1997
- ***Program on All Types of Energy Savings, Substitution and Rational Use By 2000***,
adopted by the Government of the Republic of Macedonia in 1988. More than 100 projects have so far been realized within this Program, which has contributed to the reduction of total energy consumption by approximately 8% on annual level.

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DESCRIPTION OF THE PROJECTS, INVESTMENT NEEDS AND ECONOMIC RETURN BEFORE THE POLICY REFORMS

- **Residential Buildings Program**

Assuming that the implementation of this Program starts at the beginning of the period considered i.e., 2004 to 2020, it will result in an estimated level of saving of 61,079 MWh/year in year 2020. The Net Present Value of the Program is estimated to be approximately \$5,621,699.

- **Commercial Buildings Program**

Assuming that the implementation of this Program starts at the beginning of the period considered i.e., 2004 to 2020, it will result in a total savings of 28,411 MWh by year 2020. The Net Present Value of the Program is estimated to be approximately \$1,373,304.

- **Institutional Buildings Program**

Assuming that the implementation of this Program starts at the beginning of the period considered in this Energy Policy (i.e., 2004 to 2020), it will result in a total estimated savings of 27,662 MWh by year 2020. The Net Present Value of the Program is estimated to be approximately \$1,136,190.

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DESCRIPTION OF THE COMPLETED PROJECTS, INVESTMENT NEEDS AND ECONOMIC RETURN BEFORE THE POLICY REFORMS

- 120 projects realized; 80 for preparation of technical investment documentation, other for realization of concrete projects for efficient use of the available energy and use of renewable energy sources.
- Realized projects in: wood industry, food industry, leather industry, chemical industry, building industry, metal industry, textile industry, industry for production of electrical machines and appliances, medical centres, balneology, municipal sectors, black metallurgy and ceramic industry
- 7% reduction of the total energy consumption of the Republic has been obtained.

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DESCRIPTION OF THE COMPLETED PROJECTS, INVESTMENT NEEDS AND ECONOMIC RETURN BEFORE THE POLICY REFORMS

- In 1994 from EBRD a credit line of 4.500.000 € has been provided for realization of projects for rational energy consumption.
- 27 enterprises were co-financed for interventions in energy efficiency, 15 for pre-adaptation of the boiler plants to use natural gas and 12 for efficient energy use. PSO Program (Dutch) 1998-2003, grant of 3.500.000 €
- 4 projects for efficient energy use and use of RES were realized: “Energy saving in the factory Evropa AD Skopje”, “Utilization of biomass for the energy needs of the factory Lozar AD-Veles”, “Substitution of coal with heavy fuel and natural gas”- TETEKS- Tetovo and “Market oriented improvement of the program for valves and joints in MZT, Makedonija”.
- In 1988 a grant of 400.000 € for realization of the project “Geothermal System – Kocani” and 420.000 € for realization of the project “Geothermal System – Vinica”.

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POLICY BARRIERS TO SUCCESSFUL INVESTMENTS INTO THE PROJECTS BEFORE THE POLICY REFORMS

- Ministry of Economy & Energy Agency- has not sufficient skill employees
- There is no Fund for Energy Efficiency
- The field is covered partially by NGOs activities, without Governmental financial support.
- Existing laws and secondary legislation are still not harmonies with EE legislation or are not implemented
- Low level of awareness for EE
- Complex and long process of public procurement and tendering,
- Not yet finished process of fiscal decentralization

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POLICY REFORMS APPLIED TO OVERCOME BARRIER TO INVESTMENT

- Energy Strategy prepared by MANU remains to be adopted by Parliament,
- Energy Action Plan remains to be prepared,
- Energy Efficiency Strategy adopted 2004 in process of up dating,
- Action Plan for implementation of Energy Efficiency Strategy is in process of preparation,
- Energy Law, adopted by the Parliament in 2006 changes and current harmonization requested by Energy Community,
- The Energy Law obliges municipalities and the City of Skopje to develop and implement five-years Local Energy Efficiency Programs and action plans for their implementation.

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SECONDARY LEGISLATION

- Rulebook for EE labeling of household appliance, adopted 2007, to be applied from January 1, 2010,
- Rulebook for EE of new buildings and reconstruction of new ones, to be applied from January 1, 2010,
- Rulebook for RES for production of electricity,
- Rulebook for acquiring the status of preferential producer of electricity from RES,
- Rulebook for issuing the GoO from RES,
- Rulebook for acquiring the status of preferential producer of electricity from CHPP,
- Rulebook for issuing the GoO from CHPP,
- Study for using of biogas in the city of Skopje.

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IMPLEMENTATION OF THE PROJECTS

- Pilot project design under USAID Project – Types of Measures
 - Building selection
 - Energy auditing to determine appropriate and cost-effective measures for each building
 - Replacement and installation of low-energy windows (double glazing)
 - Improvement of insulation of the existing windows
 - Installing thermal insulation on exterior building walls by renovating building's facade
 - Thermal floor and roof insulation
 - Reconstruction and repair of existing systems for area heating
 - Replacement of heating system
 - Implementation of measures for lighting systems savings

- Development of Youth Employment Program
- Preparation of Applications to MGGF
- Pilot project implementation
 - Installation of weatherization and insulation by youth employment program
 - Installation of measures by licensed contractors

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ENERGY AUDITS USING ENSI SOFTWARE

- Thermal scanning of buildings belonging to the municipalities of Saraj, Veles and Kicevo was performed to identify buildings from pilot projects
- More than 30 buildings were scanned and analyzed
- 5 buildings in 3 municipalities were selected for the pilot projects

Project Identification

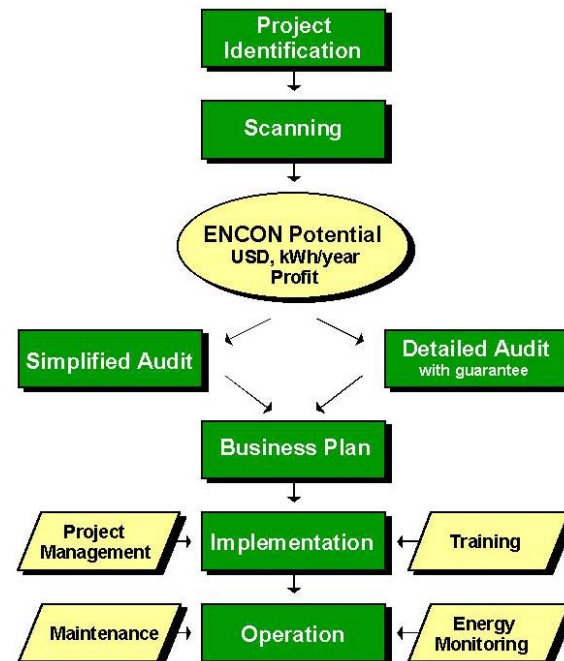
Scanning

Energy Audit

Business Plan

Implementation

Operation

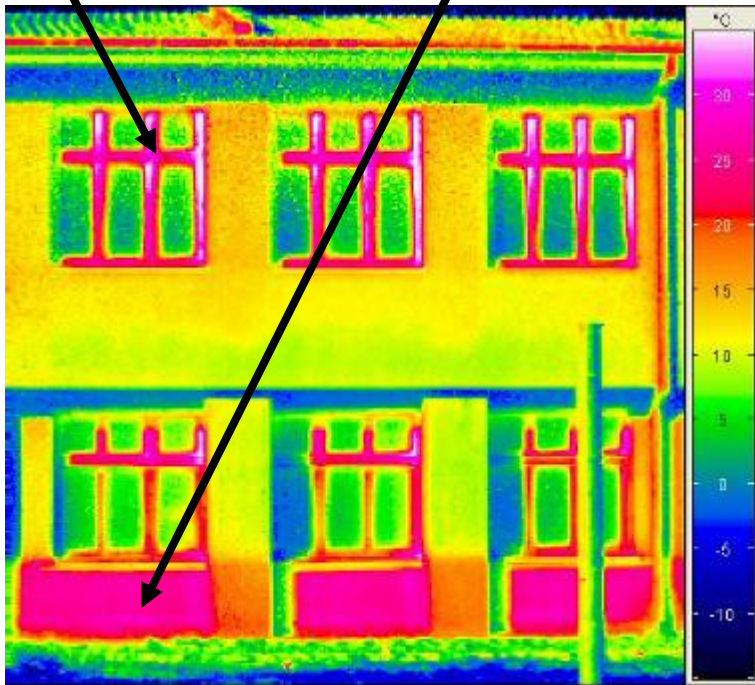


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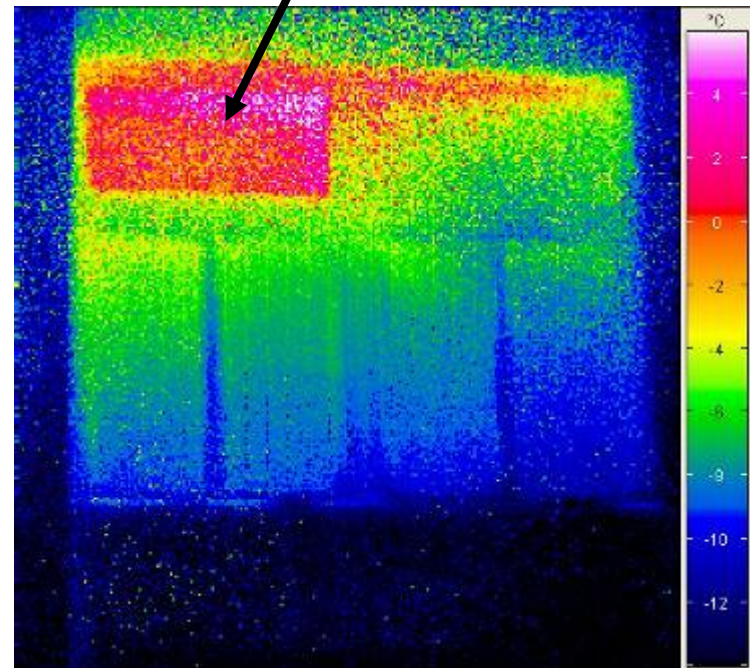
Why weatherization? It offers the best energy results with minimal investments

Big clearance between window glazing and frame

Weak wall insulation



Single glazing – big thermal losses



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Youth Employment Program – Saraj New skills development



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Selected Project Buildings in Municipality of Veles



J.H. Konstantinov Dzinot Primary School



Kole Nedelkovski High School

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Energy Audit Results

Location	Building	Measure	Cost Estimate ¹	Annual Savings Estimate ¹	Payback (years)
Saraj	Boris Kidric Primary School	Repair and replacement of windows	\$8,360	\$2,676	3.1
		Service and reconstruction of boiler plant and thermal heating installation	\$10,990	\$2,234	4.9
	Municipal Street Lighting	Replacement of street lighting in Municipality	\$77,500	\$15,800	4.9
Veles	Kole Nedelovski High School	Service and reconstruction of boiler plant and thermal heating installation	\$36,140	\$6,709	5.4
	J. H. Konstantinov Dzinot Primary School	Installation of thermal insulation on ceiling	\$1,812	\$664	2.7
Kicevo	Mirko Mileski High School	Install thermal insulation at certain parts of building	\$15,430	\$3,810	4.0
		Replacement of electric installation and lighting system	\$41,910	\$13,800	3.0
	Faik Konjica Primary School Village of Trapcin Dol	Replacement of electric installation and lighting system	\$1,980	\$662	3.0
	Senior Home	Install insulation tape on windows and external doors	\$800	\$276	2.9
		Insulate windows openings	\$1,240	\$877	1.4
		Install thermal insulation on roof ceiling	\$2,640	\$1,487	1.8

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Boris Kidric primary school (completed)

Heating Oil Savings:	5,988 liters / year
Cost Savings:	\$4,910 / year
Budget:	\$19,350
Investment:	\$18,429
Simple Payback:	3.75 years

Senior Home (completed)

Heating Oil Savings:	3,220 liters / year
Cost Savings:	\$2,640 / year
Budget:	\$4,680
Investment:	\$4,569
Simple Payback:	1.73 years

Mirko Mileski high school (completed)

Electricity Savings:	120,000 kWh / year
Cost Savings:	\$13,800 / year
Budget:	\$41,910
Investment:	\$40,876
Simple Payback:	2.96 years

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J.H. Konstantinov Dzinot primary school (completed)

Heating Oil Savings:	810 liters / year
Cost Savings:	\$664 / year
Budget:	\$1,812
Investment:	\$1,792
Simple Payback:	2.70 years

Kole Nedelkovski high school (completed)

Heating Oil Savings:	5,236 liters / year
Electricity Savings:	21,000 kWh / year
Cost Savings:	\$6,709 / year
Budget:	\$36,140
Simple Payback:	5.38 years

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POTENTIAL OF FURTHER EE PROJECTS IN BUILDING SECTOR

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STAKEHOLDERS INVOLVED

- Energy efficiency must be pursued through a partnership approach,
- private sector and PPP to lead implementation EE projects,
- government to promote policy, to develop the resources, both manpower and financial, to educate and train personnel and to stimulate replication,
- attention to be given to arrangements for municipal and residential energy efficiency activities, including targeted assistance for low income households.

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BENEFITS OF THE POLICY REFORMS

- Energy efficiency is a local problem and must be solved at the local level
- Financing options include grants, debt financing and leasing
- Feasible energy efficiency projects can
 - Service municipal project loans
 - Reduce budget for energy and narrow the gap between capital resources and social responsibilities – i.e., provide substantial social and health benefits
- Project implementation improves municipal infrastructure
- Financially viable street light lighting projects can
 - Decrease crime rates
 - Decrease traffic accidents at night
 - Increase quality of life in the city
- Bankable energy efficiency heating projects at schools, kindergartens and elderly facilities can
 - Increase building heating levels to western standards
 - Increase comfort and health of the elderly
 - Increase health of children at schools due to reduced fluctuations in heating and improved air flow

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CONTINUATION OF THE EE PROJECT

- USAID newly approved project for energy audit in 200 public building in Skopje,
- GEF Sustainable energy project for identification and financing EE projects,
- USAID credit and guarantee scheme for EE projects in municipalities,
- ADA Project for Energy Efficiency in the building sector.

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CONCLUSIONS AND RECOMMENDATIONS

- To adopt EU Recommendations concerning EE (especially for buildings performances)
- To strengthen administrative, institutional and human resources capacity at the main player in the energy sectors (MoE, EA, REC, NGO;s, municipalities)
- To upgrade and to put in compulsory force main laws and bylaws,
- To establish EE Fund, and good climate for investments
- To established new ESCO company or to strengthen existing one,
- To encourage national and regional networking in the field of EE,
- To support education in the field of EE – to raising awareness of public opinion