



PERMANENT COUNTRY REPORT

Bulgaria

Developed within the project Performance Risk Management for Energy Efficiency through
Training – PERMANENT – IEE/08/657/SI2.528420

August 2010

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1. INTRODUCTION TO THE PROJECT

1.1. Investment Potential in Energy Efficiency

Energy Efficiency Market Potential

The actual analysis on energy efficiency market is based on researches and energy audits made by Energy Efficiency Agency and Ministry of Regional Development and Public Works from the last 5 years (entities subject to compulsory energy efficiency audit according to the Energy Efficiency Act. There is considerable potential undigested in:

- Building sector, especially in multifamily buildings, which potential is difficult to be absorbed entirely by means of commercial financing. The state intervention programs will be required in this case in order to promote and subsidize the measures.
- Public transport
- Industrial enterprises
- Technical potential of cogeneration in the DH sector penetrating in the residential sector
- National program for accelerated gasification, for the period 2010-2020, draft

Table 1. Energy efficiency investments volume up to 2020

Item	Investment Mln. EUR/y	Savings MWh/y	Avoided emissions t CO ₂ /period
Industrial enterprises	300	450 000	N/A
National Strategy for financing building insulation 2006-2020. From them:	1 653	2 075 821	828 664
Buildings state & municipality owned	380	611 114	305 617
Renovation of residential buildings	1 273	1 464 707	523 047
Public Transport Enterprises	26.0	72 700	N/A
Technical potential of cogeneration in the DH sector penetrating in the residential sector	509.1	4 670 000	3 504
National program for accelerated gasification, for the period 2010-2020, draft	2 454	1 900	1 400 000
Total	4 942	5 194 600	N/A

On a national scale the priority sectors for energy efficiency improvement have been outlined in the First National Energy Efficiency Action Plan 2008-2010¹. The document was worked out on the basis of Directive 2006/32/EO on energy efficiency at end-use and energy services. In implementation of the Directive Bulgaria approved a national target for energy conservation by 2016 to the amount of not less than 9% of the end energy consumption for 9

¹ First National Energy Efficiency Action Plan 2008-2010, Bulgaria,
http://ec.europa.eu/energy/efficiency/doc/neeap_a_d.zip

years (by 1% per year on the average), which means that the country should ensure saving of fuels and energy to the total value of 627 ktoe or 7291 GWh.

In a short term prospect the first Three Years Action Plan 2008 – 2010 formulates an intermediate target for that period, namely saving of fuels and energy to the amount of 3% of the averaged value of final energy consumption within the scope of the Directive for the period 2001-2005.

On the basis of the real possibilities for application of energy efficiency measures in the sectors the target is distributed in the framework of the first 3-year Action Plan (Table 2). It is important to note that this distribution has not been made proportionally on the basis of the share of the sectors in the final energy consumption. It has been made taking into account the additional impact produced by the implementation of measures and programmes financed under the operational programmes and the State Budget.

Table 2. Sectors of final energy consumption within the scope of the National Energy Efficiency Action Plan - distribution of the energy savings target by 2010

	Structure of energy consumption for 2005 (%)	Distribution of the total target by 2010 (ktoe)	Distribution of the total target by 2010 (%)
Industry	23	61	29
Transport	33	29	14
Agriculture	4	48	23
Services	11	63	30
Households	29	8	4
Total	100	209	100

More details are in Section 1.

1.2. Key Barriers To Investing in Energy Efficiency

1. Institutional barriers. Limited capacity of the Governments in designing and implementing EE policies and program
2. Legal barriers. Insufficient coordination between the Acts and Ordinances dealing with energy efficiency issues.
3. Tariff related barriers. The energy prices in the country are relatively low compared to the other MS in the EU.
4. Macro-economic barriers: macro-economic instability (high interest rates, limited credit history of the legal entities; lack of housing associations of owners in the Condominiums as legal entities, lack of clear ownership and use rights particularly during the period of refurbishment.
5. Financial barriers. Installation of Energy efficiency (EE) equipment, buildings, and appliances requires additional funding, especially at the initial stages. Difficult access to finance. Lending depends mainly on the collateral and less on the proven cash inflows.

6. Perception of high risk for EE projects. The banks in Bulgaria do not have the capacity to assess the financial benefits of the EE projects. The benefits of these projects are often seen only as “social” and “environmental”
7. Weak capacity to develop bankable EE projects. The combination of technical and financial skills needed to develop a viable EE business plan is largely missing in the Bulgarian project owners.
8. Information barriers. Information on: EE technologies, the financial effectiveness of EE measures and EE financing techniques is missing (or at least is insufficient in BG) EE investments are not being made at a fast rate for many reasons, as summarized below.

Energy efficiency (EE) investments are not being made at a fast rate for many reasons, as summarized below.

BARRIER (“X” = MAJOR DEFICIENCY)	“EE” STAKEHOLDERS AFFECTED				
	Energy Users	Lenders (Debt)	Investors (Equity)	EE Product & Service Suppliers	Public Interest NGOs & Gov’t Agencies
Fragmented and diverse industry of energy users and product/service suppliers	X	X	X	X	X
Inadequate legal/regulatory framework	X	X	X	X	X
Lack of knowledge of EE benefits and techniques for managing risks	X	X	X		X
Lack of commercially viable financing (unattractive terms & tenor)	X		X	X	X
Small investments and benefits, and high transaction costs	X	X	X	X	
Complex transactions with energy service companies (ESCOs)	X	X	X	X	
Some complex technologies	X	X	X	X	
Low priority and rates of return	X	X	X		
Limited technical capabilities	X		X	X	
Low (subsidized) energy prices				X	X

One of the most significant barriers is a lack of commercially viable financing for EE activities. The shortage is *not* caused by a lack of funds per se, but rather by the inability of energy users to access existing funds at local financing institutions (LFIs) on commercially attractive terms. This lack of access is caused by a “disconnect” between the traditional lending practices of LFIs and the financing needs of EE projects. LFIs typically apply traditional “asset-based” corporate lending approaches for EE projects, lending a maximum

of 70%-80% of the value of assets financed (or collateral provided). Unfortunately there is often little or no collateral value in EE equipment once installed in a facility. Rather, the value is in the certainty of future cash flow generated by project installation and transparent documentation of actual savings. To date, most LFIs (due to lack of knowledge) have not recognized, nor appear to believe that meaningful cash flow can be generated from EE projects, or that such cash flow can be relied upon to repay the related loans. Consequently, LFIs generally assign no collateral value to the future cash flow generated and require energy users to encumber their other credit capacity for the full value of the EE installation. This requirement for additional credit capacity is usually reason enough for energy users to not use commercial financing.

Common to many of the barriers is *disbelief* that planned project results will be achieved and can pay back the investment in a sustainable manner. Lack of confidence in project savings impedes investment even where energy audits or other engineering analyses demonstrate sound investment opportunities. However successful energy efficiency projects, mainly Third Party Financing (TPF or ESCO) projects, have demonstrated some key techniques for managing risks through: measuring project results, verifying achievement of guaranteed savings, and financing energy savings projects *without* the need for collateral beyond that of the savings cash flow from the project itself.

1.3. The Role of PERMANENT

The PERMANENT project aims to significantly enhance the rate of investment in EE projects in new European Member States by educating key stakeholders about how perceived risks in the EE projects can be managed. This education process addresses the common concern for performance risk by:

- adapting the widely used International Performance Measurement and Verification Protocol (IPMVP) and the International Energy Efficiency Financing Protocol (IEEFP) to local conditions and language. With these protocols, EE can be seen as a significant investment opportunity, and thereby encourage the establishment of commercial EE lending products that are attractive to end users.
- training instructors to impart knowledge on performance risk management, during and after the life of the PERMANENT project.
- educating energy end users, financiers and energy services suppliers on ways to manage the risks in EE project design, implementation and measurement. Education will be at varying levels of detail, first creating awareness of the opportunity and needs. Further details will be provided in followup half day, one day or two day training in relevant topics for target audiences.

1.4. Target Audiences For Training In Bulgaria

Target market sectors are, in general:

- Users of large amounts of energy: industrial, commercial, multiple residential, institutional (e.g. education, health care), and Public Sector establishments (e.g. defense, prisons, etc.).
- Financiers: local financial institutions (LFIs)

- Governments as both consumers of the knowledge for their own facilities and enablers of markets.

Financing messages will be delivered in half hour and half day sessions to:

- CEOs within LFIs, to encourage them to approve introduction of a new lending products
- Senior lending officers within LFIs, to encourage them to establish a plan to develop a new lending product
- CFOs within large energy users, to help them appreciate the opportunities, risk management methods and new financing strategies for energy efficiency projects.
- Senior managers within governments and regulatory bodies, to help them understand their roles in removing barriers to energy efficiency through encouraging or regulating proper performance risk management.

In Bulgaria these individuals will be found in some of the leading commercial banks such as: Raiffeisenbank (Bulgaria), UniCredit Bulbank, Allianz Bulgaria, United Bulgarian Bank etc.

Technical messages about transparent reporting of actual energy and money savings will be delivered in half hour, half day, one day or two day sessions to:

- Senior managers, middle managers and project/plant managers and engineers within
 - large energy users, and
 - suppliers of energy efficiency services and products to help them understand best practice in ‘measuring’ savings and transparent reporting of results.
- Senior policy advisors and program designers within governments and regulatory bodies to alert them to best practices, and to help them properly specify use of best practices in ‘measuring’ savings and transparent reporting of results.

In *Bulgaria* these individuals will be found in large energy consumers like:

The district hearing companies in the city of Sofia, Plovdiv, Pleven, Pernik, Sliven, Bourgas, Varna, Razgrad, Kazanlak, Gabrovo, etc.

The energy efficiency services suppliers like Enemona JSCo, Company for Energy Saving AD (CES AD), Erato Holding AD, Elmib Bulgaria AD, Emporia Ltd., etc.

Senior policy advisors and program designers within governments and regulatory bodies from the Energy Efficiency Agency and the regional energy efficiency agency of the city of Sofia - Energy Agency Sofia; Energy Agency of Plovdiv; Regional Energy Agency of Pazardjik; Energy Management Agency, city of Dobrich, Black Sea Regional Agency for Energy Management (BSRAEM), Varna; Bourgas Regional Agency for Energy Management.

More details are in Section 5.

2. DETAILS OF COUNTRY ANALYSIS

2.1. Market Potential (from research by others)

- A) Potential annual cost savings (in euro), at 5 and 10 year payback (if available) in small residential, large residential, commercial buildings, and industrial sectors.

Look at the Table 3, Section 1.2. Potential EE investments (in euro), by sector, for 5 and 10 year payback

National Program for Renovation of Residential Buildings in the Republic of Bulgaria – 2006 to 2020²

On January 20th, 2005, the Government adopted the National Programme for renovation of the residential buildings in Republic of Bulgaria. The Program priority is the multi-families residential buildings. The Programme foresees within the 2006 – 2020 period 684 683 dwellings to be renovated, of which 362 792 are Panel, 152 686 – Ferroconcrete and 169 205 – Massive. The total value of the Programme implementation needed financial resources is amounting to EUR 1273 Mln. The State will support the panel dwelling proprietors by means of direct subsidy of 20% from the renovation total value. The direct State subsidy increases smoothly from 13 000 thousand BGN in 2006, to 130 000 thousand BGN in 2020. The Programme implementation is assigned to the Minister of Regional Development and Public Works who coordinates the relevant activity among all Administrations and other interested parties. Every year the Minister proposes, within the framework of the budget procedure, planning of the needed Programme implementation direct State subsidies.

The preliminary impact evaluation is based on technical calculations and assessment of the expected average annual energy savings of 1 sq. m building floor area. This expected savings for residential buildings are 30 kWh/m².year. Expected savings 1 464 707 MWh/year.

National Strategy for financing the building insulation for energy efficiency – 2006 to 2020³

According to this strategy, for the period 2006 – 2020 existing public buildings have to be thermo-insulated as follows:

- 508 State owned building;
- 3 454 Municipal owned building;

² National Strategy for financing the building insulation for energy efficiency 2006-2020, http://www.mee.government.bg/ind/doc_inov/STRATEGIA-IZOLACIA.doc

³ National Strategy for financing the building insulation for energy efficiency 2006-2020, http://www.mee.government.bg/ind/doc_inov/STRATEGIA-IZOLACIA.doc

- 651 000 Private flats in panel blocks.

The Strategy's priority buildings are audited & certified, based on adopted annual Target EE Programs (TEEPs), following adopted pre-determined common criteria for selection.

The lawful method, applied for all Strategy priority groups of buildings consists of implementation of initial energy audits under the EPBD & EE Act and their respective reports, containing the recommended measures for improvement with all necessary time, financial, energy and ecological parameters. The impact evaluation is based on these Reports and on the respective consecutively implemented measures assessment. The preliminary impact evaluation is based on technical calculations and assessment of the expected average annual energy savings of 1 sq. m building floor area. This expected savings for State and Municipal buildings are 48 kWh/m².year. The assessment for the buildings involved is 3454 Municipal and 508 State owned. Expected savings 490 413 MWh/year for Municipal and 120 701 MWh/year for State owned buildings.

Building Tax Exemption⁴

The provision for buildings tax exemption is included in the Local Taxes and Fees Act (last amendment from 6 July 2007).

The owners of buildings, having obtained a certificate category A, issued in the terms under Energy Efficiency Act, are exempt from building tax:

- for the duration of 7 years, after the year of certificate issuing;
- for the duration of 10 years, after the year of certificate issuing if RES are used in the energy consumption of the building.

The owners of buildings, having obtained a certificate category B, issued in the terms under Energy Efficiency Act, are exempt from building tax:

- for the duration of 3 years, after the year of certificate issuing;
- for the duration of 5 years, after the year of certificate issuing if RES are used in the energy consumption of the building.

Recommended further actions and measures in buildings

Financial support from the state budget for the implementation of the National Strategy for financing the building insulation for energy efficiency.

New energy performance requirements for new buildings (and for renovation of existing buildings).

Special measures for low-income households.

Energy efficient public procurement practices. Incentives for the employed in service sector for energy saving.

Provision of relevant information to the final customers for the:

- actual energy consumption and energy prices;

⁴ Todorova, S., Bulgarian policy for improving EE in buildings– facts by October 2009, Berlin, 21.10.2009, http://www.seea.government.bg/documents/Berlin_21_10_09.ppt

- available energy efficiency improvement measures and practices;
- energy performance (labels) of buildings, electrical appliances, boilers, air conditioners.

National program for accelerated gasification, 800000 households for the period 2010-2020, draft⁵

Indicative targets

- Gas supply penetration to 11 % of the population for the period 2010 – 2014 and 30 % till 2020;
- Gas supply to all industrial or public consumers in all of the settlements connected to the gas supply network within the 3-rd year from the supply and distribution network completed;
- Gas supply to all industrial new built facilities and new built residential buildings.

Parameters:

- Households using NG in 2014 г. – 300 000 and in 2020 – 900 000;
- Newly constructed gas supply networks till 2020 – 3000 km, investment needed ~EUR 400 Mln., i.e. 275 km/year in average;
- Investments in distribution network till 2020 ~EUR1000 Mln.;
- Investments in in-house gas installations and appliances till 2020 ~EUR1500 Mln.;
- Investments needed 1500-3000 EUR/household;
- Natural gas consumption increase about 6000 Mln. m³, i.e. ~750 m³/capita.

Expected savings:

- Primary energy intensity decrease with ~6% in 2020;
- CO₂ decreased by ~7.3%;
- About 2000 MW electricity generation capacities dismissed.

1.1 Potential EE investments (in euro), by sector, for 5 and 10 year payback.

⁵ Ivanov, S., Gas supply – a basic instrument for low-carbon energy supply and sustainable development. International congress 2010 “Sustainable development environmental and energy foundations”, Overgas, Sofia, 27.05.2010.

Bazadjiev, G. Integrated energy efficient solutions. A pilot project in the city of Yambol. International congress 2010 “Sustainable development environmental and energy foundations”, Overgas, Sofia, 27.05.2010

Table 3. Potential annual cost savings and EE investments (in euro), by sector

Item	Investment	Savings	Savings	Simple payback	Avoided emissions
	Mln. EUR/y	MWh/y	EUR/y	years	t CO ₂ /period
Industrial enterprises	300	450 000	N/A	3-3.4	N/A
National Strategy for financing building insulation 2006-2020. From them:	1 653	2 075 821	N/A	N/A	828 664
Buildings state & municipality owned	380	611 114	N/A	N/A	305 617
Renovation of residential buildings	1 273	1 464 707	N/A	N/A	523 047
Public Transport Enterprises	26.0	72 700	N/A	N/A	N/A
Technical potential of cogeneration in the DH sector penetrating in the residential sector ⁶	509.1	4 670 000	N/A	N/A	3 504
National program for accelerated gasification, for the period 2010-2020, draft	2 454	1 900	N/A	N/A	1 400 000
Total	4 942	5 194 600	N/A	N/A	N/A

⁶ Analysis of the national potential for high-efficiency cogeneration of heat and electricity in the Republic of Bulgaria and evaluation of the progress towards implementation of Art. 6 and Art. 10 of Directive 2004/8/EC of the European Parliament and of the Council of 11 February 2004 on the promotion of cogeneration based on a useful heat demand in the internal energy market. Technical University - Sofia for the Ministry of Economy and Energy, May 2008, Sofia, http://ec.europa.eu/energy/efficiency/cogeneration/doc/ms_reports/bg.zip

2.2. EE Stakeholder Identification

List all of the major governmental, non-profit and private sector entities in the local market that have influence over energy efficiency, environmental, finance, legal or banking policy and commercial market activities, with a focus on those entities that have an interest in M&V or EE project financing:

A. Ministry of Energy

The Ministry of Economy, Energy and Tourism⁷ (MEET) is the public authority that conducts the energy efficiency policy of the country. The department is known under that name after the merger of Ministry of economy and energy and The State Agency of Tourism in 2009. The energy policy is defined by the Council of Ministers in Bulgaria, and MEET develops and presents to the Council of Ministers, through the Minister, strategic guidelines and programs for the sector elaboration.

The Ministry of Economy, Energy and Tourism is the major institution in charge of policy making in the energy sector in Bulgaria. Within its wide scope of responsibilities, the Directorate “Energy Efficiency and Environmental Protection” is the unit which specifically deals with energy efficiency and renewable energy. The ministry has the legislative initiative in the energy efficiency area. It also develops, and submits for adoption by the Council of Ministers, national indicative targets for energy savings, including an intermediate indicative target, and energy efficiency action plans. The Ministry interacts with other government authorities regarding the implementation of the state policy on energy efficiency and implements international cooperation of Bulgaria in the area of energy efficiency.

B. Government and EE Development Agencies (local and regional)

The Energy Efficiency Agency⁸ (EEA)

The Energy Efficiency Agency is an executive agency of the Ministry of Economy, Energy and Tourism. The Agency was established in 2002 under the Energy Efficiency Act and is a successor of the National Energy Efficiency Agency at the Council of Ministers (1997) and the State Energy Efficiency Agency (1999). AEE is a legal person of budget with headquarters in Sofia. EEA cooperates actively with ministries and departments, industry bodies, regional administrations and local authorities and the operators, allowing them to provide expertise:

- Develop programmes and projects to improve energy efficiency;
- Technology transfer, knowledge and experience in the field of EE;
- Providing funds for financing the programmes and projects under section 1 of the EU programmes and funds for economic and social cohesion as well as other national and

⁷ The Ministry of Economy, Energy and Tourism, <http://www.mi.government.bg/>

⁸ Energy Efficiency Agency, <http://seea.government.bg/index.php?lang=en>

international programmes, sponsors and institutions;
Implementation of projects to improve EE;

- Participation in project development for regulations, harmonized with European legislation, methods of assessment and marks related to rational use of energy;
- Propose the development and improvement of standards in the field of EE in order to harmonize them with EU norms and promote energy efficiency improvement in energy consumers;
- Contribute to the development of training in EE;
- Organizing seminars, conferences and workshops.

EEA is also responsible for:

- the confirmation of the amount of energy savings;
- the preparation of model contracts for the provision of energy services;
- the project preparation and conclusion of voluntary agreements and subsequent monitoring of their;
- creating and maintaining a national information system on the state of EE, incl. by territorial units.

Executive Director of the EEA monitoring and coordinating programmes for EE, developed by the EEA. Their results and analysis are used for statistical purposes and the Ministry of Economy, Energy and Tourism in conjunction with the establishment of the national energy balance.

EEA performs control the implementation of legislative provisions. EEA cooperates actively with ministries and departments, industry bodies, regional administrations and local authorities and the operators as they have expertise in energy efficiency, technology transfer, knowledge and experience, providing funds for financing of programs and projects. EEA participates in the harmonization of the Bulgarian with the European legislation on energy efficiency, organize and coordinate the implementation of National Long-term Program on Energy Efficiency by 2015 and the First National Energy Efficiency Action Plan 2008-2010.

C. The State Energy and Water Regulatory Commission (SEWRC)⁹

The State Energy and Water Regulatory Commission is an independent state body responsible for the state regulation of the activities in the energy and the water supply and sewerage services. The Commission was established in 1999 under the name State Energy Regulatory Commission. In the energy sector, SEWRC carries out monitoring of the energy markets, prices and license regulatory control in regard of the activities for generation, transmission and distribution of electric power, transmission and distribution of natural gas, electric power and natural gas trading, generation and transmission of heating energy.

D. Ministry of regional development and public works (MRDPW)¹⁰

⁹ The State Energy and Water Regulatory Commission, <http://www.dker.bg>.

¹⁰ The Ministry of Regional Development and Public Works, <http://www.mrrb.government.bg/>

Ministry of Regional Development and Public Works is the state body that conducts the regional policy of the country and is in close interaction with other Ministries, local government bodies, business sector, civil organizations and the scientific and technical community. The Ministry conducts the state policy in the following 5 areas, relevant to the environment and quality of human life in Bulgaria.

- Balanced and sustainable regional development, decentralization and consolidation of local government;
- City planning and related information systems of the cadastre and land registry, public-private partnerships, control and application of European standards in construction;
- Effective and efficient usage of European Union fund resources and consolidation of reliability in European partners;
- Construction and maintenance of technical infrastructure, related with the improvement of transport accessibility and integrated management of water resources;
- Rehabilitation of settled locations and establishing environment for management and maintenance of housing fund.

The Ministry participates in the development of principal legislative acts in the energy efficiency field and establishment of strategies and programs for increasing the energy efficiency in the country.

E. Ministry of Finance¹¹

Ministry of Finance is established in 1879 in accordance with the Tarnovo Constitution. The Ministry is responsible for the financial management and policy of the country. The Ministry plans, compounds and monitors the incomes and outcomes of state bodies, ministries and municipalities. Ministry of finance participates in developing legislative acts in the energy efficiency field and has leading role in the budget and tax policy determination, on a national as well as on a local level. The Ministry performs functions as principle coordinator and paying authority for the support of the Structural Funds and Cohesion Fund.

F. The Agency for Economic Analysis and Forecasting (AEAF)¹²

The Agency for Economic Analysis and Forecasting is established in 1991 as Agency for economic programming and development (AEPD) at Council of Ministers in Republic of Bulgaria. In 1997 AEPD is transformed in Agency for Economic Analysis and Forecasting (AEAF) at Ministry of finance, and from November 1999 the Agency is an administration with the Minister of Finance of the Republic of Bulgaria for applied and theoretical macroeconomic research, as well as for elaboration of independent and objective macroeconomic analyses, forecasts and simulations of alternative economic policies.

The Agency is a budget support legal entity having its headquarters in Sofia, Bulgaria. It has the statute of an Executive agency.

¹¹ Ministry of Finance, <http://www.minfin.bg/en>

¹² The Agency for Economic Analysis and Forecasting (AEAF), <http://www.aeaf.minfin.bg/en/aboutus.php>

G. The Bulgarian Small and Medium Enterprises Promotion Agency (BSMEPA)¹³

The Bulgarian Small and Medium Enterprises Promotion Agency is a government body under the Minister of Economy. It was established with the amendments of the Law for SMEs in 2004 as a successor of the Bulgarian Trade Promotion Agency (BTPA) and the Agency for Small and Medium-sized Enterprises (ASME). BSMEPA has four specialized operational Departments:

- Information Services and Regional Coordination General Department ;
- Technological Development and Innovations Department ;
- Pre-accession Projects and Programmes Implementation Department ;
- Competitiveness and Entrepreneurial Skills Department.

Each of these departments has its own area of expertise and set of activities and together they elaborate and implement the major functions of the Agency, namely:

- information and consulting services;
- support to innovative projects and new technologies;
- assistance of Bulgarian companies in growing and entering into the foreign markets;
- managers training and transfer of experience through the implementation of international projects.

There are several regional agencies for energy management on local and regional level, constituted with the financial and methodological assistance of the European Commission. Some of them are following: Energy Agency Sofia¹⁴; Energy Agency of Plovdiv¹⁵; Regional Energy Agency of Pazardjik¹⁶; The Dobrich Local Agency for Energy Management¹⁷, Black Sea Regional Agency for Energy Management (BSRAEM), Varna¹⁸; Bourgas Regional Agency for Energy Management¹⁹.

Non-governmental organization (NGO) sector plays significant role in the energy efficiency policy and implementation in the country.

Center for Energy Efficiency Eneffect²⁰ is a non-profit non-governmental organization, established in 1992 in Sofia, Bulgaria. Its mission is to support the efforts at all governance levels in the country towards sustainable development through more efficient use of energy.

The Municipal Energy Efficiency Network EcoEnergy²¹ is a non-profit organization of Bulgarian municipalities for mutual support and activities related to the local policies for effective use of traditional and alternative energy resources and for ensuring energy safety and opportunities for sustainable development of the municipalities.

¹³ The Bulgarian Small and Medium Enterprises Promotion Agency, http://www.sme.government.bg/IANMSP/Default_en.aspx

¹⁴ Sofia Energy Agency, http://www.sofena.com/IndexEn_1.htm

¹⁵ Energy Agency of Plovdiv, <http://www.eap-save.eu/indexeng.php>

¹⁶ Regional Energy Agency of Pazardjik, <http://www.reap-save.org/index.html>

¹⁷ The Dobrich Local Agency for Energy Management, <http://www.dlaem.org/en/>

¹⁸ The Black Sea Regional Agency for Energy Management (BSRAEM), <http://www.bsraem.org/en/index.html>

¹⁹ Bourgas Regional Agency for Energy Management, <http://www.boraem.org/en/index.html>

²⁰ Center for Energy Efficiency Eneffect, www.eneffect.bg

²¹ The Municipal Energy Efficiency Network EcoEnergy, <http://www.ecoenergy-bg.net/en/menu1/about>

a. Development Banks (local and regional)

H. **Bulgarian Development Bank**²² was established after the adoption of a special law by the Parliament of the Republic of Bulgaria in April 2008. The financial institution is a successor of Encouragement Bank. The mission of the Bulgarian Development Bank is to support the development of the Bulgarian economy by promoting export and supporting the implementation of the economic policy of the government in terms of micro, small and medium-sized enterprises.

For the performance of its tasks and objectives, Bulgarian Development Bank will establish a bank group of its own, which will comprise:

- Bulgarian Development Bank (BDB)
- National Guarantee Fund (NGF)
- Capital Investment Fund (CIF)

The activity of the Bulgarian Development Bank and its group is regulated by the Act on the Bulgarian Development Bank.

The objectives of the Bulgarian Development Bank are as follows:

- development of the common economic, export and technological potential of micro, small and medium-sized enterprises registered on the territory of the Republic of Bulgaria
- attracting and management of medium-term and long-term local and foreign resources and/or subsidies
- implementation of schemes for financing of public investments and projects for development of the national economy
- attracting of funds and management of projects of international financial and other institutions

The main activities of the Bulgarian Development Bank and its related structures are as follows:

- Pre-export direct and indirect financing of Bulgarian micro, small and medium-sized enterprises geared toward their export transactions;
- Guarantees through establishment of a National Guarantee Fund and support for launching and development of the activity of micro, small and medium-sized enterprises in the country;
- Long term investment financing which the bank will perform directly or through the commercial banks in Bulgaria;
- Risk capital financing, which will be geared towards small and medium-sized enterprises registered in Bulgaria with a proved potential for development, good financial condition and stable, but not dominant presence on the market;
- Attracting and management of medium and long-term local and foreign resources and grants intended for economic development.

Sources of funding of the Bulgarian Development Bank are:

²² Bulgarian Development Bank, <http://www.bbr.bg/en/bulgarian-development-bank.html>

- Loans and credit lines from international and domestic institutions
- Development funds from international and domestic organizations, i.e. EU (structural funds)
- Bond issues
- Attracting corporate deposits
- Special purpose funds for development of economic sectors and geographic regions

Principles of operation of the Bulgarian Development Bank:

- Transparency
- Efficiency
- Profitability
- Effectiveness
- Good practice

The Bulgarian Development Bank will also apply the principle of market compatibility and non-competitiveness with the other participants. This principle should be observed by implementing the requirement for “complementing” by performing activities and offering products that other market participants do not offer or offer within a very limited range.

a. Government Structural Funds

The resources of The Structural funds are allocated, in the frames of EU policy for economic and social approximation, in three funds:

- European fund for regional development (EFRD)
- European social fund (ESF)
- Cohesion fund, that finances mainly large infrastructural projects in the environment protection and transportation sector²³

Each country-member of EU prepares National plan for development (NPD), which is used by the Commission as basis for composing National strategic reference frame (NSRF) that actually represents the agreement between the Commission and particular country-member.

The agreement defines all marked objectives and financial contribution of EU. The summarized priorities for country development and the general vision of acquiring the funds are included in the National strategic reference frame (NSRF), developed by The Agency for Economic Analysis and Forecasting and The headquarter coordination department-directorate “EU Funds Management” in Ministry of finance. For the period 2007-2013, National strategic reference frame (NSRF) determines two strategic middle-term objectives that have to be achieved in Bulgaria:

- Intensification of economic competitiveness for high and sustainable growth achievement

²³ Source: The Ministry of Economy, Energy and Tourism,
http://www.opcompetitiveness.bg/uploadfiles/documents/brochure_2_v9.pdf

- Development of human capital for higher employment assurance, higher incomes and social integration.

The general areas of intervention for achieving the strategic objectives of NSRF, for the period 2007-2013, are focused in the following strategic priorities:

- Improvement of physical infrastructure;
- Increasing the quality of human capital, with a focus on employment;
- Encouraging the entrepreneurship, favorable business environment and good management;
- Maintenance of balanced territorial development.

The priorities form the basis for The Ministries to plan and coordinate the preparation for applying Structural Funds and Cohesion Fund for the period 2007-2013, through developing operational programs that describe in details the problems in particular field and ways of solving them by EU financing. Each operational program contains strategy for development of particular region or field, including priorities and objectives to be achieved by The Structural Funds and Cohesion Fund.

Two operational programs – OP “Development of Bulgarian economy competitiveness” and OP “Regional development” – obtain financing from European Fund for regional development (EFRD).

Three operational programs – OP “Development of human resources”, OP “Administrative capacity” and OP “Technical assistance” – obtain financing from European Social Fund (ESF).

Two operational programs – OP “Transport” and OP “Environment” – obtain financing from The Cohesion Fund as well as from EFRD.

The governing bodies of the seven operational programs are as follows:

- Ministry of Economy, Energy and Tourism for OP “Development of Bulgarian economy competitiveness”. The Bulgarian Small and Medium Enterprises Promotion Agency (BSMEPA) is intermediate unit for Priority axis 1 and 2 of the Operational program;
- Ministry of Regional Development and Public Works for OP “Regional development”;
- Ministry of Labour and Social Policy for OP “Development of human resources”
- Ministry of state administration and administrative reform for OP “Administrative capacity”
- Ministry of Finance for OP “Technical assistance”
- Ministry of Transportation and Communications for OP “Transport”
- Ministry of Environment and Waters for OP “Environment”

b. Commercial Banks

Commercial banks active in the functioning credit lines for EE and/or RES in Bulgaria:

Commercial bank name	Partner in REECL ²⁴	Partner in BEERECL ²⁵	Partner in KIDSF EIB facility ²⁶
UniCredit Bulbank	yes	yes	yes
DSK Bank	yes	no	yes
United Bulgarian Bank	yes	yes	no
Raiffeisenbank Bulgaria	yes	yes	yes
Eurobank EFG (Postbank)	yes	yes	no
Piraeus Bulgaria bank	no	yes	no
MKB Unionbank	yes	no	no
Allianzbank Bulgaria	no	yes	no
Procredit bank	yes	no	no

c. ESCOs and other EE Developers

The most active company operating under ESCOs model is Enemona JSCo²⁷. Enemona is a leading company in the implementation of a full package of energy conservation activities. It has been active in the energy efficiency field since 2004 and is the leader in the successful application of the ESCO model in buildings state and municipal property – administrative buildings, kindergartens, schools, rehabilitation hospitals, centers for children deprived of parental care, etc. For the past five years the ESCO contracts implemented by the Enemona amount to more than BGN 30 million and the volume of the total of implemented energy efficiency projects amounts to more than BGN 55.5 million. Through its activities in the energy efficiency field Enemona contributes for reduction of energy consumption in the building stock and mitigation of CO₂ emissions. It contributes also to improvement of the aesthetic appearance of the buildings and hence of the urban environment. The comfort of habitation is guaranteed. In 2006 a joint-stock special investment company was founded – Bulgaria’s Fund for Energy and Energy Savings²⁸ (FEES), whose primary field of activity is securing payments due under ESCO contracts.

Another ESCOs, which is operating successfully on the Bulgarian market, is CES AD²⁹, founded in May 2001 and active in the field of energy and energy efficiency. Since recently CES is 100% owned by Dalkia Bulgaria EAD³⁰. The company’s activities comprise procurement of the required funding for investments and operative expenditures for overall implementation of energy management activities under the formula “performance guarantee with shared savings”.

Other active ESCOs, which operate successfully on the Bulgarian market, are as follows:

²⁴ Residential Energy Efficiency Credit Line (REECL), <http://www.reecl.org/about.php>. The credit line expired on 20.01.2010.

²⁵ Bulgaria Energy Efficiency and Renewable Energy Credit Line, <http://www.beerecl.com/cms/?q=en/about>

²⁶ Kozloduy International Support Fund (KIDSF) and European Investment Bank (EIB) facility, <http://www.eib.org/products/loans/kids/providers/index.htm?lang=en>

²⁷ Enemona JSCo, <http://enemona.bg/english/index.php?98>

²⁸ Bulgaria’s Fund for Energy and Energy Savings, <http://www.eesf.biz/>, <http://www.ebrd.com/projects/psd/psd2007/38100.htm>

²⁹ Company for Energy Saving AD (CES AD), <http://www.kes-sofia.com/index.php?lang=eng&res=main>

³⁰ Dalkia Bulgaria EAD, <http://www.dalkia.bg/en/home>

- Elmib Bulgaria AD³¹;
- Erato Holding AD³²;
- Energy Effect EAD³³, etc.

d. Large EE Vendors and Contractors

The list is just an example and could not pretend to be exhaustive!

Boilers, burners, heaters, steam generators, solar collectors, complete solar systems, etc.

BNNS OOD³⁴ is a company specialized in the solar technologies

Bulgaria Therm OOD³⁵ sales of boilers, burners, automation, armature, gas systems, etc.

Bultherm Bulgaria OOD³⁶, sales of boilers, burners, automation, steam generators, solar systems, etc.

ELDOMINVEST Ltd.³⁷, a local producer of electric water heaters, instant water heaters, electric storage water heaters, storage water heaters combined with heat exchangers, etc.

Erato AD³⁸, production and sales of boilers, burners, automation, armature, radiators, solar systems, thermal insulation, HVAC equipment, engineering, etc.

KOTLOSTROENE JSCo.³⁹, a producer of wide range of boilers

LILIA HIV Ltd.⁴⁰ includes design, supply, installation and maintenance of highly efficient installations

New Energy Systems Ltd.⁴¹ is a manufacturer of water heaters with one and two coils, solar collectors, accessories for solar installations, complete solar systems and heat only boilers

TESI OOD⁴², boilers, burners, heaters, steam generators, solar collectors

Viessman EOOD⁴³, sales of boilers, solar systems, air-conditioning equipment, etc.

Heating, Ventilation, Air-Conditioning (HVAC) equipment

Air Trade Center AC⁴⁴, sales of Air-Conditioning (AC) systems and components

³¹ Elmib Bulgaria AD, <http://www.elmibbg.com/>

³² Erato Holding AD, http://erato.bg/otoplenie/index_en.php

³³ Energy Effect EAD, <http://www.energyeffect-bg.eu/>

³⁴ BNNS OOD, <http://www.bnns.bg/index.php/Nachalo/Za-nas.html>

³⁵ <http://www.bulgariatherm.com/index.php>

³⁶ Bultherm Bulgaria OOD, <http://www.buderus-bg.com/>

³⁷ ELDOMINVEST Ltd., <http://eldominvest.com/en/aboutus/main.html>

³⁸ Erato AD, http://erato.bg/otoplenie/index_en.php

³⁹ "KOTLOSTROENE JSCo., <http://www.kotlostroene.net/eng/history.htm>

⁴⁰ LILIA HIV Ltd., <http://www.lhprotrade.com/en/aboutus.php>

⁴¹ New Energy Systems Ltd., <http://www.sunsystem.bg/>

⁴² TESI OOD, http://www.tesy.com/index_eng.php

⁴³ Viessman EOOD, <http://www.viessmann.bg/>

⁴⁴ Air Trade Center, <http://www.airtradecentre.com/index.php?country=BG&language=BG>

Ataro Clima EOOD⁴⁵, production, sales, engineering of AC systems and components
 ClimaCom Ltd.⁴⁶, design, delivery, sales, installation, maintenance of air-conditioning, heating and ventilation equipment
 Condex Ltd.⁴⁷, AC systems sales and engineering
 COVES EOOD⁴⁸, AC systems sales and engineering
 G and A OOD⁴⁹, AC systems sales and engineering
 Hidria Bulgaria EOOD⁵⁰, sales of AC systems and components
 MMC Inc. EOOD⁵¹, AC systems sales and engineering

Automation, control systems, pumps

Belimo Bulgaria OOD⁵², automation, control systems
 Climatherm OOD⁵³, sales of pumps and pumping systems
 Danfoss EOOD⁵⁴, automation, control systems
 Grundfos Bulgaria EOOD⁵⁵, sales of pumps and pumping systems
 Honeywell EOOD⁵⁶, automation, control systems
 Wilo Bulgaria EOOD⁵⁷, sales of pumps and pumping systems

Heat insulation

Austrotherm EOOD⁵⁸, manufacturer of EPS and XPS thermal insulating boards
 Baumit Bulgaria EOOD⁵⁹, thermal insulation products and systems
 Fibran Bulgaria AD⁶⁰, manufacturer of thermal insulating boards from XPS – extruded foam polystyrene.
 ISOGOMATHERM Inc.⁶¹, producer of thermal insulation and insulating material from expanded rubber

⁴⁵ Ataro clima EOOD, <http://www.ataro.bg/en/>

⁴⁶ ClimaCom Ltd., <http://climacom.com/pages/read/13>

⁴⁷ Condex Ltd.p <http://www.condex.bg/en/services>

⁴⁸ COVES EOOD, <http://www.coves-bg.com/>

⁴⁹ G and A OOD, <http://www.ga-clima.com/>

⁵⁰ Hidria Bulgaria EOOD, <http://www.hidria.com/>

⁵¹ MMC Inc. EOOD, <http://www.mmc.bg/>

⁵² Belimo Bulgaria OOD, <http://www.belimo.ch>

⁵³ Climatherm OOD, <http://www.biral.ch>

⁵⁴ Danfoss EOOD, www.danfoss.bg

⁵⁵ Grundfos Bulgaria EOOD, <http://www.grundfos.bg/>

⁵⁶ Honeywell EOOD, www51.honeywell.com/bulgaria/index.html

⁵⁷ Wilo Bulgaria EOOD, <http://www.wilo.bg>

⁵⁸ Astrotherm EOOD, <http://www.austrotherm.com/bg/main2/>

⁵⁹ Baumit Bulgaria EOOD, http://www.baumit.bg/front_content.php?idcat=2384

⁶⁰ Fibran Bulgaria AD, <http://www.fibran.bg/eng/company.htm>

LILIA HIV Ltd., pipe insulation

Windows and window systems

ALUKÖNIGSTAHL⁶² EOOD, representing the producers SCHÜCO, JANSEN и RHS

Kristian Neiko 90 EOOD⁶³ has strength positions in glass selling and processing, in high quality PVC and Al joinery producing, in facade constructions and facing, manufacturing of doors, glass partition walls, shop-windows, construction and details from glass and stainless steel

REHAU EOOD, design, production, installation of PVC and Al window and façade systems and accessories, HVAC and RES equipment, sofia@rehau.com, www.rehau.bg

Profine Austria GmbH, Repräsentanz Bulgarien⁶⁴, representing window PVC profiles under the trademarks KBE, KÖMMERLING и TROCAL

Salamander-Koichevi OOD⁶⁵, design, production, installation of PVC and Al window systems and accessories

Weiss Profil OOD⁶⁶, a Bulgarian manufacturer of PVC and Al systems for windows and doors

e. Other Government Agencies and bodies

The Bulgarian Energy Efficiency Fund (BEEF)⁶⁷

The Bulgarian Energy Efficiency Fund was established through the Energy Efficiency Act, adopted by the Parliament in February 2004 and its entity was confirmed with the newly adopted Energy Efficiency Act in October 2008. BEEF is a legal entity with residence in the town of Sofia and is managing financial funds, granted for the purpose of investment projects for increasing the energy efficiency, according to the national strategy. It's major donors are the Global Environment Facility through the International Bank for Reconstruction and Development (the World Bank), the Government of Austria and the Bulgarian Government.

BEEF operates under the regulations of the Energy Efficiency Act and agreements with the donors and is not a part of the consolidated government budget.

The main sources of BEEF's funding are donations from international financial institutions and funds, Bulgarian and foreign legal entities and private individuals, current account rates and bank deposits, loans and other credit instruments; from international organizations, banks, individuals and legal entities. The initial capitalization of BEEF is entirely with grant funds.

⁶¹ ISOGOMATHERM Inc., http://www.gomoplast-bg.com/Goma_about_us_ENG.html

⁶² ALUKÖNIGSTAHL, http://www.alukoenigstahl.com/AKS/portal/alias_Stahl/lang_en-GB/domain_bg/tabID_3399/DesktopDefault.aspx

⁶³ Kristian Neiko 90 EOOD, <http://www.kristian-neiko.com/en/?go=about>

⁶⁴ Profine Austria GmbH, Repräsentanz Bulgarien, www.profine.bg

⁶⁵ Salamander-Koichevi OOD, <http://pvc-salamander.com/>

⁶⁶ Weiss Profil OOD, www.weissprofil.bg

⁶⁷ The Bulgarian Energy Efficiency Fund, <http://www.bgeef.com/display.aspx?page=about>

There have been 79 credit contracts signed and 29 contracts for credit guarantees since BEEF was established. The total value of investment in energy efficiency, supported (through credit or guarantee) by BEEF runs over BGN 53 million.

BEEF was awarded for best qualified institution in energy efficiency financing, during “The Fifth National Conference for energy efficiency and renewable energy sources”. For two consecutive years BEEF was announced as “best practice project” after internal audits of the World Bank - an unique distinction, adjudged by The World Bank.

The underlying principle of BEEF’s operations is public-private partnership. BEEF follows and complies rules and procedures, developed or approved by the World Bank, completely adopted by Bulgarian government. The fund is managed by Management Board, composed of 7 members. The entire day-to-day operation of BEEF is managed by Fund Manager, selected through the World bank competitive selection procedure regulations. For a fund manager was chosen a Consortium that consists of:

- "Elana Holding" Plc⁶⁸. – leading non-banking financial institution in Bulgaria with over 18 years of experience on Bulgarian financial market;
- The Foundation "Center for Energy Efficiency EnEffect⁶⁹" – a Bulgarian non-governmental organization that was founded in 1992 with initial financial support from Battelle/Pacific Northwest National Laboratory (USA) and
- The Canadian energy efficiency consultancy company "Econoler International⁷⁰" – one of the first companies for energy services in the world. Till that moment "Econoler International" has over 3 000 accomplished projects in more than 80 countries worldwide.

The fund combines functions of a bank institution as it offers to its clients credits for energy efficiency projects, credit guarantees and consultations during the project preparation. BEEF supports technically Bulgarian companies, municipalities and private individuals in the preparation of energy efficiency investment projects and thereafter supports their financing.

The value of a single package or a package of projects varies between BGN 30 000 and BGN 3 000 000 at market-oriented lower interest levels than the current market rates. The maximum payback period is up to 5 years. A flexible scheme for repayment of the credits is applied. The project financing from the Fund amounts to 75% of the investment costs when the credit is lent solely by BEEF. In the event of shared financing with involvement of a co-financing institution the total share of the credit may reach up to 90% of the project investment costs. No fees or commission are charged, nor interest for pre-term repayment. BEEF grants also credit guarantees. The credit guarantees are a tool for risk sharing with other financing institutions lending credits for energy efficiency projects. Partial guarantees may cover up to 50% of the credit exposure (and up to 80% of the exposure in the event of equal rights with the bank in the possible realization of the collateral). The portfolio guarantees cover up to 5% of the portfolio of credits lent for energy efficiency projects in buildings and industrial facilities, i.e. in the event of first loss under the guaranteed portfolio BEEF would pay as much as 5% of the due amount.

⁶⁸ "Elana Holding" Plc, <http://www.elana.net/en/holding/aboutus/history.shtm>

⁶⁹ Center for Energy Efficiency EnEffect, http://www.eneffect.bg/button/?category_id=75

⁷⁰ Econoler International, Canada, <http://www.econoler.com/home.aspx>

BEEF is structured as a self-financing commercial mechanism and concentrates its efforts on support for energy efficiency investments and promotion of the development of a functioning market for energy efficiency services in Bulgaria. The major environmental objective of BEEF is to support identification, development and financing of bankable projects for energy efficiency improvement leading to mitigation of GHG emissions in the atmosphere.

Since 2009 BEEF lends also bridge financing of energy efficiency projects under EU Operational Programmes.

The Fund for local authorities and governments (FLAG)⁷¹

The Fund for local authorities and governments was established in March 2007 by the Council of Ministers with funding provided through the Bulgarian National Budget. FLAG is an instrument of the central government policy for regional development. Its aim is to provide financial assistance to municipalities for the absorption of as much funds as possible from the Structural Funds and the Cohesion Fund of the EU. The contribution of FLAG to the regional development involves coverage of as many municipalities as possible, located at the whole territory of the country, by creating conditions for maximum absorption of the funds from all operational programs under which the municipalities are beneficiaries.

The Fund is an independent legal entity having the status of a commercial company (joint stock company). It is structured as a revolving mechanism for financing the development and implementation of economically and financially viable projects in the area of municipal infrastructure and for supporting capacity building of municipalities with a view to absorbing funds from the structural and cohesion funds. The Fund is designed as a financial mechanism to overcome the problem of ensuring cash funds to municipalities when they develop project proposals or finance approved projects in the framework of the Operational Programmes, co-financed by the EU funds.

FLAG provides loans only to Beneficiaries eligible for funding from the EU Funds and which are either:

- municipalities or a group of municipalities in Bulgaria (for development of project proposals or for implementation of investment projects, approved by the Managing authority of the Operational programme), or
- public utilities operating in Bulgaria, owned or controlled by municipalities, local governments or local government agencies in the Republic of Bulgaria (only for implementation of investment projects, approved by the Managing authority of the Operational programme).

FLAG established a partnership with one of the most respectable commercial banks operating in the country – Unicredit Bulbank (Managing Bank). The bank's role is to assist the Fund in assessing applicants' creditworthiness and to administer the loan repayment. FLAG finances only projects, which the Managing Bank regards as financially and economically admissible, and which have been approved by the respective Operational Programme, except for the financing of the preparation of projects (project development). The risk of the projects is minimized by the evaluation carried out by the Managing Bank; afterwards, the Fund has

⁷¹ Fund for local authorities and governments (FLAG), <http://www.flag-bg.com/?l=2>

adopted additional criteria that aim to reduce risks for the Fund itself and ensure the prudent management of its portfolio.

On 22 December 2008 FLAG signed the contract with the Managing bank for its services and a long-term loan agreement with the European Bank for Reconstruction and Development (EBRD). Thus FLAG became fully operational on 15 January 2009 and ready to receive and appraise the first credit applications.

The Kozloduy International Decommissioning Support Fund (KIDSF)⁷²

The KIDSF was set up with the aim to help Bulgaria to overcome the consequences from the decommissioning of turbines at the Kozloduy Nuclear Power Plant. The Funds finances and co-finances the preparation for and implementation of projects for prevention of the negative impacts from the decommissioning of the turbines. Administrator of the Fund is the European Bank for Reconstruction and Development (EBRD) in compliance with the Framework Agreement signed between EBRD and Bulgaria⁷³. The co-ordinating body of the Fund's assets is the Ministry of Economy, Energy and Tourism⁷⁴.

In compliance with the rules of the KIDSF and the Framework Agreement, EBRD grants funds for financing and co-financing of individual projects after their approval by the Assembly of the Contributors, in which the European Commission has the decisive vote in its capacity of primary donor to the Kozloduy International Fund. In 2007, as a result of Bulgaria's accession to the EU, the country became a full member of the Assembly of the Contributors. In the framework of the KIDSF the agreed grant amounts to EUR 550 million to be disbursed in four portions. According to the signed Agreements and the Memorandum about the grant the agreed funds amount to EUR 351.43 million, of which EUR 217.155 million for the Nuclear Energy Sector and EUR 199.42 million for the Non-nuclear Energy Sector.

⁷² Kozloduy International Decommissioning Support Fund,
<http://www.ebrd.com/country/sector/nuclear/overview/funds/kidsf.htm>

⁷³ Framework Agreement, signed on 15 August 2001 and ratified by Law, promulgated in SG Vol. 38/12 April 2002.

⁷⁴ Ministry of Economy, Energy and Tourism, www.mee.government.bg

The Invest Bulgaria Agency (IBA)⁷⁵

IBA is a government investment promotion agency under the Ministry of Economy, Energy and Tourism. It is established to assist the Minister in the implementation of the state policy in the field of investment promotion. The mission of IBA is to attract investment to Bulgaria, assist project set-up and ensure successful project development resulting in new jobs, exports and know-how transfer for the Bulgarian economy. The services provided by InvestBulgaria Agency are:

- Full information assistance;
- Business properties identification;
- Handling of investment incentives;
- Comprehensive services for investors;
- Supplier identification;
- Liaison with central and local governments;
- Branch chambers and NGOs.

Note the people who can guide the project (Local Advisory Group) in Appendix A.

Note the specific financing persons to review financing materials (IEEFP Working Group) in Appendix C.

2.3. Best Practices and Barriers:

EE Finance: (Summary of results obtained from Questionnaire provided by T. Dreessen to financial candidate trainers)

- Highlight the current lending procedures for EE projects

The **Bulgarian Energy Efficiency Fund** operates actively on the credit market since the beginning of 2006. The primary task of the Fund during the initial period was to identify a specific own market niche for the energy efficiency credits. Such niche was found in the credit demand of municipalities, small and medium-sized enterprises, hospitals and universities.

EBRD credit lines for EE and RES (BEERECL⁷⁶) and a **credit line for energy efficiency in households (REECL⁷⁷)** operate since 2005. Besides technical assistance in project preparation these credit lines offered also a grant component for the customer in the event of successful implementation of the project: 7.5% on the principal of credits for energy efficiency, 20% for renewable energy sources and 20% for households. The grant is provided

⁷⁵ The Invest Bulgaria Agency (IBA), <http://www.investbg.government.bg/index.php?idx=1>

⁷⁶ Bulgaria Energy Efficiency and Renewable Energy Credit Line, <http://www.beerecl.com/cms/?q=en/about>

⁷⁷ Residential Energy Efficiency Credit Line (REECL), <http://www.reecl.org/about.php>. The credit line expired on 20.01.2010.

by the KIDSF⁷⁸. In 2008 the BEERECL credit line was extended for the second time, whereat the grant component was increased up to 15% for energy efficiency and 30% for RES.

2.4. EIB EE and RES credit line⁷⁹

Appeared on the market since the beginning of 2008. The objective of the Energy Efficiency Programme of EIB and the KIDSF is to promote the development of energy efficiency and renewable energy sources in Bulgarian municipalities and other public and private entities. EIB disburses part of its financing through the intermediary of local partner banks participating in the programme.

The KIDSF in parallel provides grants to the EIB intermediaries, to approved candidates, as well as funding for consultancy services. Funding is lent to projects such as: energy efficiency in the building stock; mini power plants for combined generation of heat and electricity; renewable energy sources; district heating, etc. The credit line provides a grant to the amount of 10% of the loan lent by EIB for

EE projects in the public sector; 7.5% of the loan in the private sector; 20% of the loan lent by EIB for energy from RES in all sectors. Upon validation of the project the grant is remitted by the KIDSF to the partner-bank and the partner-bank perform partial pay-off of the loan principal.

The EBRD credit lines could be refunded again. Their lending activities will depend on the grant component, coming from KIDSF and provided to the clients.

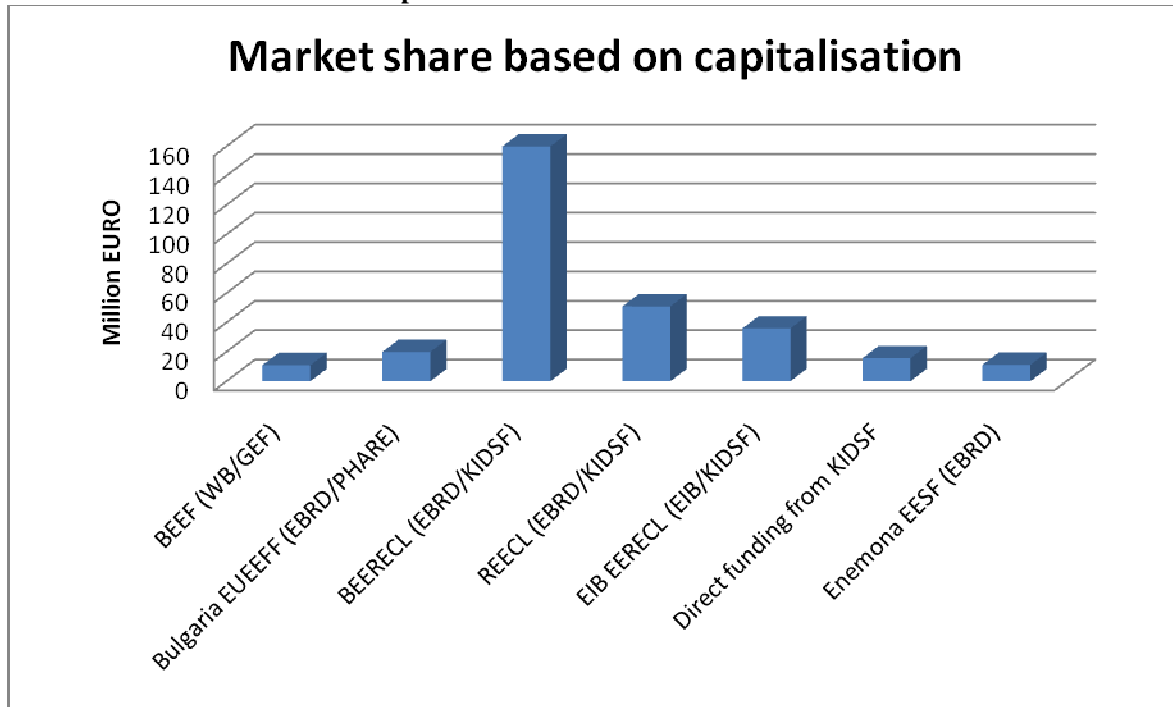
Table 4. Capitalization of the Energy Efficiency Credit Lines 2005-2009

Credit line	Financing	Beneficiaries	Million EURO
BEEF	WB/GEF	Public sector Municipalities Industry Individuals	11.2
Bulgaria EUUEFF	EBRD/PHARE	Industry	20.0
BEERECL	EBRD/KIDSF	Industry	160.0
REECL	EBRD/KIDSF	Individuals	51.1
EIB EERECL	EIB/KIDSF	Public sector Municipalities Industry	36.0
Direct funding KIDSF	KIDSF	Public sector	15.7
Enemona's FEES	EBRD/Enemona	Municipalities Industry	11.2
Total			305.2

⁷⁸ Kozloduy International Decommissioning Support Fund,
<http://www.ebrd.com/country/sector/nuclear/overview/funds/kidsf.htm>

⁷⁹ Kozloduy International Support Fund (KIDSF) and European Investment Bank (EIB) facility,
<http://www.eib.org/products/loans/kids/providers/index.htm?lang=-en>

Chart 2. Market share based on capitalization



The energy efficiency potential analysis shows that at available potential for projects up to 2015 at about EUR 2.5 billion, the energy efficiency credit lines in Bulgaria have capitalization amounting to about EUR 300 million in total, which could provide funding to about 15% of the sites (the real undisbursed capital of the credit lines is much less currently and it could cover about 5-7% of the needs).

- Review the current level of understanding of EE projects in local financial institutes

Commercial banks, participants in credit lines of EBRD and EIB have consistent capacity for assessment and financing of energy efficiency projects and RES. With the exception of International Asset Bank, most of the other banks have superficial or no knowledge about assessment and financing of energy efficiency projects.

Table 5. A list of Bulgaria`s top 20 Commercial banks, ranked with regard to the volume of assets owned.

	Commercial bank -name	Partner in REECL	Partner in BEERECL	Partner in KIDSF EIB facility
1	UniCredit Bulbank	yes	yes	yes
2	DSK Bank	yes	no	yes
3	United Bulgarian Bank	yes	yes	no
4	Raiffeisenbank Bulgaria	yes	yes	yes
5	Eurobank EFG (Postbank)	yes	yes	no
6	First Investment bank	no	no	no
7	Piraeus Bulgaria bank	no	yes	no
8	Societe Generale Expressbank	no	no	no
9	Corporate commercial bank	no	no	no
10	CiBank	no	no	no
11	Central Cooperative Bank	no	no	no
12	MKB Unionbank	yes	no	no
13	Allianzbank Bulgaria	no	yes	no
14	Investbank	no	no	no
15	Procredit bank	yes	no	no
16	Municipal bank	no	no	no
17	Bulgarian - American credit bank	no	no	no
18	International Asset Bank	no	no	no
19	Emporiki Bank Bulgaria	no	no	no
20	Commercial bank D	no	no	no

The table above depicts that the majority of Bulgaria`s top financial institutions has no or very limited experience with EE financing. Even those that participate in EIB and EBRD EE credit lines have no internal capacity to evaluate the technical and financial risks of EE projects, but rather rely on External expert firms.

- Highlight current barriers to financing of EE projects.

The experience up to now shows that the implementation of the energy efficiency projects meets **certain barriers in the country**. The main barriers outlined were as follows:

- **Institutional barriers.** Government often has limited capacity in designing and implementing EE policies and program. Designing and implementing effective policies and regulatory environments requires resources and that have generally been undersupplied. Even when there is a favorable regulatory environment, local governments - on whom the enforcement burden often falls - have a limited workforce and little expertise to undertake all the tasks stipulated by law. Obligatory tasks include local enforcement, supervision, and inspection; all of which require large numbers of

professionals with sufficient knowledge of EE and experience in various engineering fields. There is inefficient coordination between the stakeholders and policymakers: Ministry of Regional Development and Public Works; Ministry of Economy, Energy and Tourism; Energy Efficiency Agency; Municipalities, Universities; Professional associations (builders, construction supervision, installation unions, energy auditing), Industrial enterprises, NGOs, etc.

- **Legal barriers.** Insufficient coordination between Energy Efficiency Act, Regional Development Act, Energy Act, Renewable and Alternative Energy Sources and Biofuels Act, Condominium Ownership Management Act and corresponding Ordinances;
- **Tariff related barriers.** The energy prices in the country are relatively low compared to the other MS in the EU. At the same time they are high for significant portion of the population in comparison with the level of income. The preferential tariffs for the renewable energy are high and at the same time “green electricity” component is about to rise since 01.07.2010 with 48%. The investors in the RES electricity face certain difficulties in integration with the National Electricity Grid.
- **Other macro-economic barriers** in investment projects’ realization such as: macro-economic instability (high interest rates, limited credit history of the legal entities; lack of housing associations of owners in the Condominiums as legal entities, lack of clear ownership and use rights particularly during the period of refurbishment.
- **The barrier of inertia** at both the managerial and individual levels. One of the most daunting barriers is that EE is not a central concern for most businesses or individuals. This barrier creates a strong inertia that is difficult for any EE effort to overcome and can be the result of a combination of the barriers described above. This inert attitude is often the first hurdle that EE professionals confront in project implementation. In practice most business owners (SMEs for example) do not prioritize future savings as much as they do expenditure reduction and assurance of short-term income. This means that EE professionals have faced difficulties selling the concept of initial investment for delayed savings. They often find that business owners prefer to keep day-to-day liquidity instead of embarking on an investment leading to net savings in the future. Another major cause of the inertia is that EE often interferes - sometimes even conflicts - with companies' and individuals' daily routines and tried-and-true common practices. It is often disconnected with short-term and long-term managerial goals, such as increasing production or expanding market share. Policies and incentives often are not sufficient to get individuals to change their daily routines and conventional way of doing business. It takes tremendous effort for companies and individuals (because they are many in number) to change their mind-sets and practices.
- **Dispersed end-use barriers.** A large part of financial, technical, informational, etc. barriers for EE improvement comes from its dispersed nature. The widespread geographical locations, multiplicity of small end-users, and differing technological and knowledge levels of end-users make any attempt for control and management difficult and costly. “Command-and-control” type government policies work the best in large and aggregated energy consumers, but rarely reach the outlying society/community effectively. Immense effort required to achieve a small efficiency gain often hampers the willingness of owners and financial institutions to start EE projects. Individual differences between end-users and dispersed locations also make it difficult to form any voluntary collective actions.

- **Information barriers.** Information barriers are often seen as one of the major factors impeding the efficiency of the energy market, in terms of both financial and energy consumption. Usually the information gaps are present in all aspects of the market: consumers lack knowledge to purchase efficient end-use equipment; producers have little knowledge about technologies that would enable them to make efficient products; energy end-use providers are unacquainted with efficient technologies and thus unable to provide adequate information to customers; and a company's decision-makers lack effective management tools and procedures to account for the economic benefits of efficiency improvements.
- **Financial barriers.** Installation of EE equipment, buildings, and appliances requires additional funding, especially at the initial stages. Although the energy savings in the product use cycle would compensate for these additional investments and, generally, comfortably exceed the original extra costs, users often fail to choose energy-efficient options. This is usually due to (a) lack of information on the relative efficiency of products and services, (b) lack of information on the cost effectiveness of energy-efficient choices, (c) constraints in initial funding, and (d) split, or insufficient, incentives to make pertinent decisions. The financial sector can also be reluctant to finance EE projects due to their potentially high credit risks, the relatively small size of the investment, and lack of financing history and expertise on the part of project developers.
- **Capacity building needs.** The professionals, political experts working in the field of energy efficiency need permanent training and access to information and experience. This concerns every single member of the society in his capacity of end-user also.

Under the existing economic and financial circumstances in Bulgaria, the following factors could be specified as **main barriers for implementation** of energy efficiency measures:

- Limited funding for technological innovation and re-equipment consistent with "low energy consumption", "passive house", "zero net emission buildings" criteria. Innovations are laid aside under the circumstances of uncertainty.
- Absence of financial incentives that makes the investor to prefer lower capital cost even for the expense of higher operational costs.
- Preference of foreign investments to the options in power production and power supply sector which are more profitable and less risky than the energy demand side measures.
- Insufficient training, education and public awareness, consulting and engineering services. Lack of confidence, information and experience of consumer with energy efficient options and understanding of their contributions to GHG reduction and climate change mitigation.

f. M&V:

- Review current "in country" best M&V practices. Note differences from IPMVP form. See two example M&V Plans and Savings Reports in Appendix B.

Example: Energy Efficiency Project implemented in a High School - February 16, 2010

Situation

Municipality Ruse, located in northern Bulgaria, is required by the Energy Efficiency Act operating in Bulgaria to carry out energy audit and reduce the energy consumption of the High School by introducing energy efficiency measures. For this purpose they selected ESCO company to perform an energy analysis of building and to determine the best - appropriate energy efficiency measures.

M&V Plan

An M&V Plan was developed showing that IPMVP Volume I, EVO 10000 – 1:2009, Option D was to be used for savings determination because total facility energy cost was the focus. Option D was also chosen because many ECMs were involved, some of which could not be directly measured. Municipality wanted to know each measure how much energy will save and how long the payback period would be. Equation 1f) would be used, simulating pre - retrofit performance.

Results

The following steps were used to compute savings.

1. The 2005 baseline conditions were recorded, including a strategy for the engineering department to easily capture information about future changes. The Municipality insisted to use 2005 as a baseline period, because of the very good record of the needed data.
2. The baseline period’s energy data and weather data were recorded and analyzed by simple linear regression of monthly energy use against degree days. Degree day data was with the base temperature, which yielded the best R2 from a number of regression analyses performed over a range of plausible base temperatures.
3. Computer model was calibrated with long – term weather conditions. The building was under-heated so non – routine adjustments for the indoor temperature was needed.
4. After normalizing the computer model with fix set of conditions (occupancy, indoor temperature, lightening, etc.) and simulating the ECM’s, using Equation 1f) the results are shown in table 1:

Table 6. Energy Efficiency Project in a High School indices

a	ECM	Baseline Normal Conditions Model	Post - Retrofit Normal Conditions Model	Savings					Analysis		
				kWh/a	kWh/a	kWh/a	%	Investment cost	Profit	Pay back period	
											BGN
Ě1	Insulation of walls	1 153 916	931 399	222 517	19.28	141 369	42 278	3.34			
Ě2	New PVC windows	1 153 916	1 006 430	147 486	12.78	259 440	28 022	9.26			
Ě3	Isolation of the roof's slab	1 153 916	977 552	176 364	15.28	147 020	33 509	4.39			

€4	Automated system control for heating and insulation of pipes	1 153 916	1 082 695	71 221	6.17	11 500	13 532	0.85
Total		1 153 916	536 328	617 588	53.52	559 329	117 342	4.77

Baseline Normal Conditions Model shows how much energy the School consumes for a year with set fix of conditions.

Post - Retrofit Normal Conditions Model shows how much energy the School will consume after implementing ECM's with the same fix set of conditions.

So the expected savings (heating energy) after retrofit are 617 588 kWh/a, if all ECM's are implemented or the Building will consume 536 328 kWh/a.

5. Operating staff recorded monthly energy for 12 months throughout the first year after ECM commissioning. Site visits were taken during the reporting period to ensure all static factors were monitored and controlled.

6. After the data from reporting period was collected, the computer model was re - calibrated with long – term weather conditions. Non – routine adjustments were not needed. The results matched the predicted ones well.

- Outline local legislation governing M&V

In Bulgaria there are no standardized protocols, methods and tools to quantify and manage the performance risks and benefits associated with end - use energy efficiency, renewable energy, and water efficiency business transactions.

The amount of energy savings is determined as follows:

- Methodology based on deemed savings is applied in the cases when the energy conservation measures are planned and implemented without energy audit. The energy saved is determined on the basis of the recorded energy consumption in the building prior to the implementation of the energy conservation measures (after elimination of the factors influencing space heating, such as the weather, occupancy rate and operation mode of the building) and monitoring of energy consumption after application of the measures.
- In cases in which energy conservation measures are planned and implemented on the basis of energy auditing the energy saved is determined as the difference between the normalized energy consumption (energy consumption required for ensuring the indoor climate parameters in the building as required by the current regulatory framework under its current state) and the energy consumption of the building after application of the energy conservation measures. The value of each measure is determined and the savings resulting from its application are then calculated. The measures are combined in different packages. A technical and economic evaluation is prepared for every package. The most efficient ratio between investments and savings is sought.

The identification and design of energy saving measures in state-owned and municipal buildings is performed through;

- Analyses of the current status of energy consumption in the public building stock by the bodies of state power and local self-government;
- Energy efficiency audits, on the basis of which energy conservation measures are identified and implemented;
- On the basis of target programmes, predominantly with state funding.

2.5. IPMVP and IEEFP Adaptation Activities:

- See Appendices F and G for recommended amendments/additions to IPMVP and IEEFP. Include materials for IPMVP Vol. I, Appendix C

These amendments will be reviewed in the Zagreb meeting and finalized with EVO thereafter.

2.6. Training Target Audiences

- Target audience groups and ways to access each on topics of:
 - M&V

"Enemona" JSCo

"Risk Engineering" JSCo

"Energy effect" Ltd.

"Technical University - Sofia - Technologies" Ltd.

"Kimtex - LS" Ltd.

"Gas Flow Control" Ltd.

"Labimek" Ltd.

"Bulgarian Energetic Company" JSCo.

"TUV Reinland Bulgaria" Ltd.

"Buildcontrol" Ltd.

- Financing (current financiers and those not engaged already)

Marko Markov, Econoler, Elana, EnEffect Consortium (EEE)

Dimitar Doukov (EEE)

Vania Vassileva (Elana Finance Holding)

Ivan Peev (UniCredit Bulbank)

Daniel Entchev (UniCredit Bulbank)

Adrian Mitkov (UniCredit Bulbank)

Alexander Alexandrov (Tokuda Bank)

Emilia Stoyanova (Raiffeisenbank Bulgaria)

Vladimir Popov (Allianz Bank)

Refer to: List in Appendices D & E those people or organizations to reach/engage

2. APPENDICES

- A. **Local Advisory Group (“LAG”)** – list of targeted people from the EE Stakeholders’ list that will help promote the PERMANENT program and its events
- B. **M&V Plans and related Savings Reports** - two examples of each by candidate trainers
- C. **IEEFP Working Group** – list of people to be targeted to help develop and promote the local presentations and workshops (may include LAG members)
- D. **M&V Trainees** - list of people to be targeted for training
- E. **IEEFP Introduction Participants** - list of people to be targeted to attend the first “IEEFP Introduction Forum”
- F. **Recommended IPMVP Amendments** - specify recommended changes to current text of IPMVP. Show page reference, current text, proposed text and reasons for change.
- G. **Recommended IEEFP Amendments** - Specific changes recommended to current text of IEEFP. Show page reference, current text, proposed text and reasons for change.

APPENDIX A

Local Advisory Group (“LAG”) – list of targeted people from the EE Stakeholders’ list that will help promote the PERMANENT program and its events

Local Advisory Group - Bulgaria

1. United Bulgarian Bank

Stefan Vassilev
Manager SME and International Lending Programs
United Bulgarian Bank
tel: +359-2-8112594
fax: +359-2-8112402
e-mail: vassilev_st@ubb.bg

2. Ecotechproduct (energy/engineering consulting firm)

Kristian Spassov, director
Mob : 00359 887 238517
Fax : 00359 2 9525039
Email: eco.kriss@gmail.com

3. Energy Efficiency Agency

Boriana Koeva - Uzunova, dipl.eng.
Head of International Cooperation Department
Energy Efficiency Agency
Ministry of economy , energy and tourism
37, Ekzarh Jossif, Str.
1000- Sofia, Bulgaria
tel/fax - 00 359 2 915 40 38
BUzunova@seea.government.bg

4. Erato Holding Plc (EE manufacturer)

Krassimir Stanchev, executive director
K_stanchev@erato.bg
www.erato.bg
mobile: 0888 615 375

5. Center for energy efficiency EnEffect (NGO)

Pavel Manchev, deputy director
1 Hristo Smirnenski Blvd.
1164 Sofia, Bulgaria
Tel. (+359 2) 963 1714
Fax. (+359 2) 963 2574
Email: pmanchev@eneffect.bg

APPENDIX B

M&V Plans and related Savings Reports - two examples of each by candidate trainers

EXAMPLE (1):

AN IPMVP COMPLIANT M&V PLAN FOR
ENERGY EFFICIENCY PROJECT IMPLEMENTED
IN “ZEBRA” JSC RUBBER PLANT
MARCH, 2010

Consultant: Dimitar Baev, EnEffect

1. Initial Conditions:

An energy audit has been conducted in “Zebra” JSC rubber plant in 2008. The steam required for technology needs is produced by steam boiler - 20 tonnes/h of 10 bar 200°C. The steam load is changing no more than 10%. The boiler feed water from the deaerator is directly fed into the evaporator. One of the identified Energy Conservation Opportunities (ECO) was installation of economizer in the heating the boiler feed water.

2. M&V Plan**2.1 ECO boundary**

The following measurement devices were installed before installation of the economizer:

- gas flow meter;
- steam flow meter;

The boundary of the ECO is the boiler house with input the gas flow meter and output – the steam flow meter.

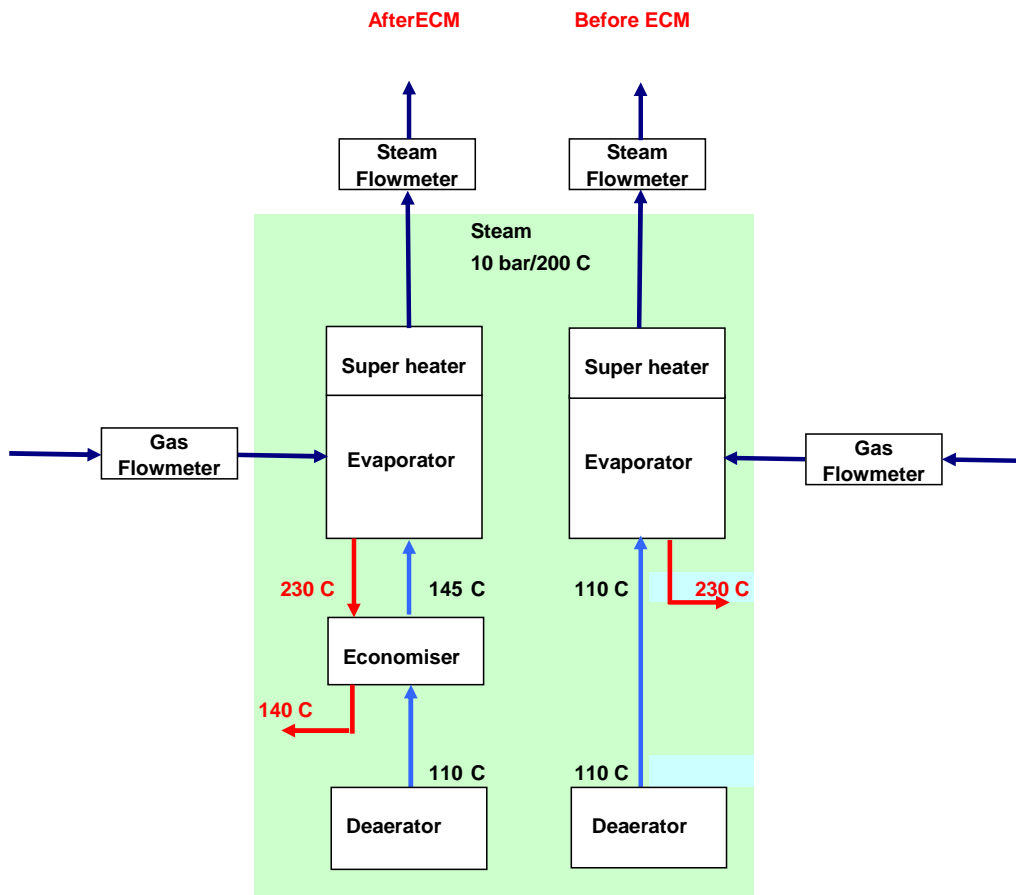
2.2 M&V Option selection

ECO is concentrated in isolated area – boiler house. All influenced parameters are measured. The most proper M&V Option is Option B – Retrofit isolation, all parameters measurement.

2.3 Baseline and post installation models

The economizer has been installed in December 2009. The next Figure shows the boiler before and after installation of the economizer. The measured stack temperature at the boiler without the economiser is 230°C and with the economiser - 140°C. The boiler feed water is heated up to 145°C. Boiler efficiency and fuel consumption per ton produced steam before and after installation are calculated on the base of the measured input fuel and output steam flows.

Figure – boiler before and after installation of the economizer



3. Marginal Price

The price of natural gas for Zebra plant delivered by Bulgargas JCS in January 2010 was 610 BGN per 1000 nm³ or 18,21 BGN per GJ.

4. Energy and Cost Savings determination

The next Table shows the results from savings determination.

Table Energy savings determination

		No Eco	With Eco
Steam	tonnes	20	20
	pressure bar	10	10
	temperature C	200	200
Boiler feed water:	tonnes	21	21
	temperature C	110	110
Eco out temperature	C		145
Stack temperature	C	230	140
Boiler efficiency	%	86	90
Fuel per tonne steam	GJ/tonne	2.750	2.600
Perc. fuel saving	%		4%

- Energy savings: 2750Gj/ton – 2600 GJ/ton = 0,150 GJ/ton
- In January 2010 3540 tonnes steam were produced.
- Energy savings in January 2010: 0.150 GJ/ton x 3540 tonnes = 531 GJ
- Energy cost savings in January 2010: 531 GJ x 18,21 BGN/GJ = 9669 BGN/month or 4944 EURO/month
- Investment cost – 32000 BGN
- Payback period: 32000/9669 = 3,1 months

EXAMPLE (2):

**An IPMVP Compliant M&V Plan for
Energy Efficiency Project implemented in a High School
February 16, 2010**

Situation

Municipality Ruse, located in northern Bulgaria, is required by the Energy Efficiency Act operating in Bulgaria to carry out energy audit and reduce the energy consumption of the High School by introducing energy efficiency measures. For this purpose they selected ESCO company to perform an energy analysis of building and to determine the best - appropriate energy efficiency measures.

M&V Plan

An M&V Plan was developed showing that IPMVP Volume I, EVO 10000 – 1:2009, Option D was to be used for savings determination because total facility energy cost was the focus. Option D was also chosen because many ECMs were involved, some of which could not be directly measured. Municipality wanted to know each measure how much energy will save and how long the payback period would be. Equation 1f) would be used, simulating pre - retrofit performance.

Measurement Boundary

The measurement boundary of this project was defined as all energy-using systems in the School:

- The diesel fuel level in the underground tank is measured at the beginning and end of each month, taking into account the change in charge also.

- Electricity consumption is taken directly from the bills. It is needed because of the computer model that shows full energy analysis for the building.

Energy consumption data for the School has been recorded by the technical support each month for more than 5 years. The expected savings of the ECMs were predicted by computer simulation with the ENSI 7.12 software. A full survey of the building's systems and occupancy was needed to gather all the input data. The simulation used long - term normal weather conditions and the occupancy and other building characteristics that prevailed at the time of the prediction. It was decided to report actual savings under the same conditions.

Marginal price

The High school's diesel supply contract has a marginal unit price of 1.87 BGN/lt incl. VAT or 0.19 BGN/kWh. The marginal electricity price at the building meter is 0.19 BGN/kWh incl. VAT.

Following the first year, the first year's meter data will be used as a baseline for a new Option C approach for this building.

Results

The following steps were used to compute savings.

1. The 2005 baseline conditions were recorded, including a strategy for the engineering department to easily capture information about future changes. The Municipality insisted to use 2005 as a baseline period, because of the very good record of the needed data.
2. The baseline period's energy data and weather data were recorded and analyzed by simple linear regression of monthly energy use against degree days. Degree day data was with the base temperature, which yielded the best R2 from a number of regression analyses performed over a range of plausible base temperatures.
3. Computer model was calibrated with long – term weather conditions. The building was underheated so non – routine adjustments for the indoor temperature was needed.
5. After normalizing the computer model with fix set of conditions (occupancy, indoor temperature, lightening, etc.) and simulating the ECM's, using Equation 1f) the results are shown in table 1:

Table 1

q	ECM	Baseline	Post -	Savings	Analysis
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		Normal Conditions Model	Retrofit Normal Conditions Model			Investment cost	Profit	Pay back period
		kWh/a	kWh/a	kWh/a	%	BGN	BGN	years
Ě1	Insulation of walls	1 153 916	931 399	222 517	19.28	141 369	42 278	3.34
Ě2	New PVC windows	1 153 916	1 006 430	147 486	12.78	259 440	28 022	9.26
Ě3	Isolation of the roof's slab	1 153 916	977 552	176 364	15.28	147 020	33 509	4.39
Ě4	Automated system control for heating and insulation of pipes	1 153 916	1 082 695	71 221	6.17	11 500	13 532	0.85
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Baseline Normal Conditions Model shows how much energy the School consumes for a year with set fix of conditions.

Post - Retrofit Normal Conditions Model shows how much energy the School will consume after implementing ECM's with the same fix set of conditions.

So the expected savings (heating energy) after retrofit are 617 588 kWh/a, if all ECM's are implemented or the Building will consume 536 328 kWh/a.

5. Operating staff recorded monthly energy for 12 months throughout the first year after ECM commissioning. Site visits were taken during the reporting period to ensure all static factors were monitored and controled.

6. After the data from reporting period was collected, the computer model was re - calibrated with long – term weather conditions. Non – routine adjustments were not needed. The results matched the predicted ones well.

APPENDIX C

IEEFP Working Group – list of people to be targeted to help develop and promote the local presentations and workshops (may include LAG members)

1. Marko Markov (EEE)
2. Dimitar Doukov (EEE)
3. Vania Vassileva (Elana Finance Holding)
4. Ivan Peev (UniCredit Bulbank)
5. Daniel Entchev (UniCredit Bulbank)
6. Adrian Mitkov (UniCredit Bulbank)
7. Alexander Alexandrov (Tokuda Bank)
8. Emilia Stoyanova (Raiffeisenbank Bulgaria)
9. Vladimir Popov (Allianz Bank)

APPENDIX D

M&V Trainees - list of people to be targeted for training

Technical experts

"Enemona" JSCo

General manager: Dichko Prokopiev Prokopiev, Ludmil Ivanov Stoyanov,
Cvetan Kamenov Petrushkov and Bogdan Dichev Propokiev

Address: Kozlodyi, 1A "Panayot Hitov" Str.

Sofia, Ivan Vazov district, 1 "Balsha" Str., bl.9

Tel.:0973/85405; 02/8054848

Fax:0973/80874; 02/8054849

e-mail: office@enemona.com; enefectivnost@enemona.com

"Risk Engineering" JSCo

Executiva director: Bogomil Lubomirov Manchev

Sofia, Vitosha region, 10 "Vihren" Str.

Tel: 02/8089623

Fax: 02/9507751

e-mail: riskeng@riskeng.bg; jordan.bachovsky@riskeng.bg

web: <http://www.riskeng.bg>

"Energy effect" Ltd.

General manager: Vasil Kirilov ALeksiev

Address: Yambol, 1A "Rakovski" Str., office 418

Tel/Fax: 046/666502

GSM: 0897/802465; 0897/802468
Office: Pleven, Drujba district, bl. 428, entr. R, fl. 3, appt. 8
Tel: 064/871507
e-mail: erg_o@abv.bg
Sofia 1407, 2A "Emilian Stanev" Str., bl. 9, appt. 02
GSM: 0897/802467
GSM: 0897/802465
e-mail: ergoo@abv.bg
web: <http://www.nrgeffect.eu>

"Technical University - Sofia - Technologies" Ltd.
General manager: doc.prof.eng. Nikola Georgiev Kaloyanov
Address: Sofia, 8 "Kliment Ohridski" Blvd.
Tel: 02/9652572
Fax: 02/8686719
e-mail: bkirova@tu-sofia.bg

"Kimtex - LS" Ltd.
Managers: Ludmil Georgiev Duhlevski and Sonya Vylkova Ivanova
Address: Pleven, 71 "Doiran" Str., fl. 3
Tel/Fax: 064/80 55 34; 064/80 59 40
GSM: 0889/635 519; 0888/558 128
e-mail: kimtexls@abv.bg

"Gas Flow Control" Ltd.
Managers: Eleonora Velichkova Cvetanova and Nikola Grudev Dukov
Address: Varna 9000, 16 "Loza" Str., fl. 1
Tel.: 052/ 301 075
Fax: 052/ 301 175
GSM: 0878/444 594
e-mail: office@gasflowbg.com
web: <http://www.gasflowbg.com>

"Labimek" Ltd.
Managers: Lilia Nencheva Enicherova, Ivan Panayotov Ivanov and Radoslav Blajev Vasilev
Address: Pleven, 13 "Raina Knqginq" Str. , fl. 8
Tel: 064/800205
GSM: 0887/927399; 0889/866391
e-mail: office@labimec.com
web: <http://www.labimec.com>

"Bulgarian Energetic Company" JSCo.
Executive director: Bogdan Vasilev Ugyrchinski
Address: Sofia, 8 "Tzar Kaloyan" Str., fl. 5
Tel.: 02/9307309; 02/9307372; 02/9307549
Fax: 02/9884833
e-mail: bec_eneffect@yahoo.com ; bulgenergy.co@velgraf.biz
web: <http://www.velgraf.biz>

"Tuv Rheinland Bulgaria" Ltd.
Manager: Stanislav Metodiev Vladimirova
Address: Sofia, 41 "Stara planina" Str.
Tel: 02/9879087; 02/9879291
Fax: 02/9876605
e-mail: Onikolov@bg.tuv.com
web: <http://www.tuv-rheinland.bg>

"Buildcontrol" Ltd.
Manager: Emil Yordanov Taskov and Georgi Tihomirov Kapandjiev
Address: Dobrich, 5 "Svoboda" Square., fl. 10, room 1002
Tel: 058/603198
Fax: 058/604137
GSM: 0887/332405
Rousse, 40 "Nikolaevska" Str., room 21
Tel/Fax: 082/834273
e-mail: buildcontrol@yahoo.com
web: www.buildcontrolbg.com

Financial institutions/experts

See Appendix C!

APPENDIX E

IEEFP Introduction Participants – list of people to be targeted to attend the first IEEFP Introduction forum

- 1. UniCredit Bulbank**
 - 1.1. Mr. Levon Hampartzoumian – CEO
 - 1.2. Mr. Andrea Casini – Executive director
 - 1.3. Mr. Marko Esposito – Head Corporate division
- 2. DSK Bank**
 - 2.1. Mrs. Diana Miteva – Executive director
 - 2.2. Mr. Nikolay Borisov – Executive Director
- 3. United Bulgarian Bank**
 - 3.1 Mrs. Radka Toncheva – Executive Director
- 4. Raiffeisenbank Bulgaria**
 - 4.1. Mrs. Nadezhda Mihaylova – Procurator

5. Eurobank EFG (Postbank)

5.1. Mrs. Petya Dimitrova – Executive Director

6. Tokuda Bank

6.1. Mrs. Yonka Kinova – Executive director

7. Allianz Bank Bulgaria

7.1. Mr. Dorcho Ilchev – Executive director

8. MKB Unionbank

8.1. Mrs. Maria Ilieva - CEO

APPENDIX F

(Recommended IPMVP Amendments)

EVALUATION OF THE COMPLIANCE OF BULGARIAN LEGISLATION AND
REGULATORY FRAMEWORK IN THE FIELD OF ENERGY EFFICIENCY WITH THE
REQUIREMENTS OF IPMVP

**Position paper prepared by Dimitar Baev, Senior Fellow, Ph. D (Eng.)
(Without any claim for completeness of the analysis)**

CONCLUSIONS (1):

Some of the IPMVP principles and approaches are laid down in the Bulgarian regulatory documents. There are, however, open questions and differences, which might lead to incompatibility of certain procedures with the practices in other EU Member States, as well as to inaccuracies in the evaluation of the savings from measures implemented in Bulgarian sites, **therefore the methodology of IPMVP might be applied as a standardized, and quality procedure in case the IPMVP is recommended or imposed by EU and adopted by the Government.**

Supporting analysis (1):

Laws, ordinances and other documents related to the evaluation and verification of the savings achieved as a result of implemented energy efficiency projects

1. ENERGY EFFICIENCY ACT, *in force as of 14 November 2008*

2. ORDINANCE CONCERNING THE METHODOLOGIES FOR DETERMINATION OF THE NATIONAL TARGETS, THE ORDER OF DISTRIBUTION OF THESE TARGETS AS INDIVIDUAL ENERGY SAVING TARGETS AMONG THE ENTITIES AS SPECIFIED IN ARTICLE 10, PARAGRAPH 1 OF THE ENERGY EFFICIENCY ACT, THE ELIGIBLE ENERGY EFFICIENCY MEASURES, THE METHODOLOGIES FOR EVALUATION AND METHODS FOR VERIFICATION OF ENERGY SAVINGS, *in force as of 10 April 2009.*
3. Unified training programme for energy auditors, endorsed by the Executive Director of the Energy Efficiency Agency

Necessity of application of procedures for evaluation of savings ensuing from:

- The requirement for description of the methods and procedures for evaluation of the savings from the possible measures for energy efficiency improvement recommended by the energy audits
- The need to prove the achieved individual targets through certificates for realized energy savings for industrial consumers having annual consumption above 3000 MWh and for buildings (state or municipal property) with a floor area above 1000 m², as well as for energy suppliers..
- The requirement to report to the Energy Efficiency Agency the savings achieved during the preceding year by 31 March of the next year.
- The voluntary agreements between the state and energy end-users
- Implementation of energy performance contracts (ESCO schemes)
- The need to prove the achieved savings to financing institutions and organizations.

Provisions in the legislative and regulatory documents in accord with the requirements of IPMVP

ENERGY EFFICIENCY ACT:

Art. 9. (1) The national energy saving targets shall be set as a percentage of the final energy consumption by the energy end-users in compliance with the Ordinance specified in Paragraph 2 below..

(2) The methodologies for setting the national targets, the order of distribution of these targets as individual targets among the entities as specified in Article 10, Paragraph 1, the eligible energy efficiency measures, the methodologies for evaluation and methods of verification of the achieved savings shall be defined by an **Ordinance issued by the Council of Ministers at the proposal of the Minister of Economy and Energy.**

Art. 14. Measures for energy efficiency improvement are any actions, which lead to energy efficiency improvement that can be verified, measured and evaluated. .

Art. 36. (1) (Addendum – SG, Vol. 6/2009, in force as of 1 May 2009) Owners of buildings as specified in Art. 19, Paragraph 2 and of industrial systems as specified in Art. 33, Paragraph 2 are obliged to apply energy efficiency management.

(2) Energy efficiency management shall be performed through:

1. Working out of annual plans and programmes for energy efficiency improvement in compliance with the reports as specified in Art. 35;

2. Implementation of the measures envisaged in the plans and programmes as specified in Item 1 above;

3. Submission to the Agency of information concerning the effect of the implemented measures and the expected effect from the implementation of the measures envisaged in the plans and programmes as specified in Item 1 above.

4. Nomination of at least one employee, whose job description comprises implementation of the responsibilities as specified in Items 1-3 above;

(3) (Addendum – SG, Vol. 6/2009, in force as of 1 May 2009). Owners of buildings as specified in Art. 19, Paragraph 2, shall keep a logbook for the monthly consumption by types of energy, including delivery dates, prices and quantities, as well as the identification numbers of the documents evidencing the quantity of the delivered fuels.

(4) Owners of industrial systems as specified in Art. 33, Paragraph 2, shall prepare periodically, at least once a year, analyses of the total and specific energy consumption.

(5) The entities as specified in Paragraphs 3 and 4 shall submit to the Agency annual reports on the energy efficiency management.

(6) The reports under Paragraph 5 shall contain description of the activities and measures, indicate the amount of the achieved energy savings and shall be submitted together with a copy of the plans and programmes as specified in Paragraph 2, Item 1, not later than 31 March of the year following the year of implementation of the respective activities and measures.

Art. 46. (1) The voluntary agreements as specified in Art. 45 shall contain:

1. The specific responsibilities of the entities as specified in Art. 45 for achievement of the targets as specified in Art. 44;

2. The specific responsibilities of the Agency;

3. The mechanisms for supervision and control on implementation; ***the methodology for evaluation of the achieved energy savings;***

5. The procedures for amendment and/or supplementing of the envisaged measures in the event of failure to achieve the targets or of existence of barriers to their achievement;

6. Other clauses

(2) The drafts of voluntary agreements shall be published in an appropriate manner, ensuring their review by the stakeholders..

Art. 49. (1) The services under performance contracts shall be provided at guaranteed energy savings for the building or industrial system, for which the service is provided. .

(2) The services under performance contracts shall be provided on the basis of written contracts, which shall contain:

1. Normalized energy consumption;

2. The amount of guaranteed energy savings and the order of their verification;

3. The method of financing;

4. The manner of payment of the fee;

5. Other clauses

Art. 50. The energy savings certificates are aimed to prove their owner's contribution to the implementation of measures for energy efficiency improvement.

Art. 51. (1) The certificates for achieved energy savings as per Art. 50 shall be issued by the Executive Director of the Agency to the entities specified in Art. 39, Paragraph 2, to owners of buildings as specified in Art. 19 and owners of industrial systems as specified in Art. 33, Paragraph 2, against payment of a charge defined according to a tariff approved by the Council of Ministers.

Art. 52. (1) Provision of evidence about the achieved energy savings shall be the responsibility of the entities as specified in Art. 23, Paragraph 1 and Art. 34, Paragraph 1.

(2) Inspection of the methodologies used for evaluation of the different types of implemented measures for energy efficiency improvement shall be performed by the Agency..

(3) The actions under Paragraph 1 and 2 above, as well as the format, conditions and procedure for issue of the certificates as specified in Art. 50 shall be defined by the Ordinance specified in Art. 9, Paragraph 2.

ORDINANCE CONCERNING THE METHODOLOGIES FOR DETERMINATION OF THE NATIONAL TARGETS, THE ORDER OF DISTRIBUTION OF THESE TARGETS AS INDIVIDUAL ENERGY SAVING TARGETS AMONG THE ENTITIES AS SPECIFIED IN ARTICLE 10, PARAGRAPH 1 OF THE ENERGY EFFICIENCY ACT, THE ELIGIBLE ENERGY EFFICIENCY MEASURES, THE METHODOLOGIES FOR EVALUATION AND METHODS FOR VERIFICATION OF ENERGY SAVINGS

Art. 19. As evidence for the implementation of the individual energy saving targets shall be recognized all the measures for energy efficiency improvement, whose energy saving effect can be verified, measured or evaluated. .

Art. 20. The eligible measures for energy efficiency improvement should meet the following requirements:

1. To have payback periods not longer than the service life of the respective measures;
2. To lead to saving of primary energy resources;
3. To lead to reduction of GHG emissions;
4. Not to lead to deterioration of the quality of the environment;
5. Not to lead to deterioration of the sanitary and hygienic norms.

Art. 22. (1) Energy savings shall be determined through estimation and/or measurement of the energy consumption of the respective sites.

(2) The estimation and/or measurement of energy consumption shall be performed after the implementation of the energy efficiency measures

(3) The energy savings shall be presented as saved quantities of primary energy consumption, final energy consumption and CO₂ emissions in compliance with the requirements of:

Art. 23. The specialized methodologies shall be worked out by the Energy Efficiency Agency on the basis of:

1. **Standardized methodologies recommended by EU acts**
2. Methodologies worked out and proposed by the persons specified in Art. 23 and 34 of the Energy Efficiency Act

Art. 24. The following principles shall be followed in the design of the specialized methodologies:

1. The principle of universality, which permits development of a unified basis for comparison of the expected energy saving by different energy efficiency measures
2. The principle of compatibility, which permits application of the worked out methodology to all the sites of the same type
3. The principle of functionality, which permits the worked out methodology to cover all the required information for proving the resultant energy savings through measurement, evaluation and verification

Art. 25. (1) The specialized methodologies shall be used for evaluation of the quantity of energy saved as a result of the implementation of individual eligible measures for energy efficiency improvement

(2) The specialized methodologies should contain a mechanism for distribution of the energy savings by years for the entire service life of the respective implemented energy efficiency measure

Art. 26. The specialized methodologies shall comprise the following indicators:

1. Energy performance indicators:
 - a) Total and specific energy consumption prior to and after implementation of the measure
 - b) *Achieved energy savings by types of energy as compared to the normalized level of energy consumption for the entire service life of the measures;***
 - c) Deviations for the values defined under items (a) and (b) above;
2. Environmental indicators:
 - a) Achieved saving of CO₂ emissions by types of energy;
 - b) Deviation from the values defined under Item (a) above;
3. Financial indicators:
 - a) Monetary equivalent of the achieved energy savings by types of energy for the entire service life of the measure;
 - b) Payback period;
4. Functional indicators:
 - a) *Technology conditions, under which the measure was implemented;***
 - b) *Climatic conditions, under which the measure was implemented;***
 - c) *Organizational conditions, under which the measure was implemented;***

Art. 27. The specialized methodologies are based on:

1. Measurements, which involve determination of the:
 - a) measurement points and periods, the types of metering devices, protocols/records of the performed measurements;
 - b) measurement methods, the techniques used and any additional equipment;
 - c) accuracy and measurement procedures, ensuring the required quality of the measurements;
 - d) forms of reporting and documentation of the results;

2. Engineering calculations and estimates, which involve determination of the:
- a) preliminary conditions and assumption;
 - b) characteristics of the site and the type of energy efficiency measures, which will be evaluated;
 - c) climatic data, other internal or external factors, which will be used in the engineering analyses;**

Art. 28. In the evaluation of the implementation of the national energy saving targets the potential energy savings that may be achieved after the deadline for meeting the targets shall not be taken into account..

Art. 29. (1) Collection and processing of the data for implementation of the energy saving targets shall be performed in Compliance with Annex No. 6.

(2) For the purposes of comparison of the energy savings and their transformation into comparable units the transformation coefficients according to Annex No. 7 shall be applied.

Annex No. 6

Methods for collection and processing of data for evaluation of energy savings

A. Methods for collection and processing of data based on available documents and/or observations

1. On the basis of invoices issued by energy suppliers:

1.1. The invoices for measured and paid for energy for a representative period shall be used as a basis for evaluation of the energy consumption prior to the implementation of the energy efficiency measure.

1.2. The invoices under Item 1.1 shall be compared with invoices for measured and paid for energy for a specified representative period after the implementation of the energy efficiency measure.

1.3. The results from the comparison under Item 1.2 above shall be compared with a reference group of energy end-users, which has not participated in the implementation of the energy efficiency measure..

1.4. If the comparison under Item 1.3 cannot be ensured, the results under Item 1.2 should be normalized according to the rules set forth in Annex No. 3.

2. On the basis of data about energy sales:

2.1. Energy savings for the different types of energy (for instance electricity, natural gas, fuel for space heating) shall be measured through comparison of the data about the energy sold by the energy suppliers prior to the implementation of the energy efficiency measure with the data about the sales after implementation of the measure.

2.2. With a view to normalizing of the results from Item 2.1 and elimination of any external factors affecting energy consumption they should be compared with a reference group of energy end-users.

3. On the basis of data about the sales of equipment and devices:

3.1. The efficiency of the equipment and devices is calculated on the basis of information provided by the manufacturer.

3.2. The data about the sold equipment and devices shall be obtained from the respective tradesmen, who offer them on the market. This data may be adjusted through additional specialized studies and/or measurements.

3.3. The total amount of the energy savings is determined on the basis of the information from Item 3.2 about the realized sales

3.4. Under this method adjustments are made according to the changes in the regime and/or manner of use of the respective equipment or device.

4. On the basis of data about the loads at energy end-use:

4.1. The energy consumption of a building or an individual piece of equipment is tracked for the purpose of establishing its values prior to and after the implementation of the energy efficiency measure;

4.2. Detailed measurements are conducted of the factors, which have significant impact on energy consumption (production process, specialized equipment, space heating systems).

Stipulations in the legislative and regulatory documents in disaccord with the requirements of IPMVP

ORDINANCE CONCERNING THE METHODOLOGIES FOR DETERMINATION OF THE NATIONAL TARGETS, THE ORDER OF DISTRIBUTION OF THESE TARGETS AS INDIVIDUAL ENERGY SAVING TARGETS AMONG THE ENTITIES AS SPECIFIED IN ARTICLE 10, PARAGRAPH 1 OF THE ENERGY EFFICIENCY ACT, THE ELIGIBLE ENERGY EFFICIENCY MEASURES, THE METHODOLOGIES FOR EVALUATION AND METHODS FOR VERIFICATION OF ENERGY SAVINGS

Art. 21. The eligible measures for energy efficiency improvement and their service life shall be in accordance with Annex No. 5. For measures, whose service life is not specified in the list, the service life shall be subject to proving under the terms and conditions of Chapter Five.

Sample list of eligible measures and their service life

Sector “Industry”

Technical measures

59. Co-generation (combined heat and power generation)

60. Heat recovery

61. Energy efficient compressed air systems: use of new energy efficient compressors or improvement of the efficiency of existing ones

62. Energy efficient motor and variable speed drives

63. Energy efficient pumping systems for the industrial processes

Organizational measures

64. Energy management and monitoring

The sample list of eligible measures is incomplete and unsystematic. A large portion of the traditionally implemented measures is not included in the list.

Art. 23. The specialized methodologies are designed by the Energy Efficiency Agency on the basis of:

1. Standardized methodologies recommended by EU acts;
2. Methodologies designed and proposed by the persons specified in Art. 23 and 34 of the Energy Efficiency Act – **these are the accredited auditors, which to date are not adequately trained to the job – they have undergone training on the general principles of IPMVP in the framework of 1 lecture hour. These methodologies, established in Bulgaria, might deviate from the IPMVP**

Art. 31. (1) The quantitative and qualitative characteristics of the energy savings achieved as a result of the implementation of energy efficiency measures shall be corroborated through certificates for energy savings.

(2) Every implemented energy efficiency measure shall be valued separately and reflected in the energy savings certificate – **valuation of a group of interrelated measures (Option C, for instance) is not allowed**

B. Methods for collection and processing of data based on engineering estimate – violation of the IPMVP requirements concerning mandatory measurement

1. Under this type of evaluation no site visit is realized.
2. It is used as a method for evaluation of presumed energy savings
3. The calculations are based on engineering principles without direct measurement of the characteristics of the site..
4. The method uses assumptions based on the specifications of the equipment, the operation characteristics, the schedule of change of the state in the process of operation with implemented measures, statistical data etc.
5. Additional information for performance of engineering evaluation may be obtained also from an external expert through study of the respective site. On the basis of this approach more complicated simulation algorithms/models may be worked out, which might be applied to a larger number of sites (for instance buildings, equipment, vehicles). In this way the data, obtained only through engineering estimate, might be supplemented or adjusted.

ESCO and M&V in Bulgaria

by Hristo Enchev, EEE

CONCLUSIONS (2):

The implementation of an M&V Plans in Bulgaria would improve the quality of ESCO contracts. The Customer and ESCO company will ensure that there is a real effect of the implemented energy efficiency measures, that there is a control over the energy systems and constant monitoring of the energy consumption in order to achieve the desired savings – one part customer is satisfied and confident he will achieve energy saving levels set by the project, on the other part ESCO company will be assured that monthly payments of actual energy savings achieved after the implementation of energy efficiency measures will be received. **Simply M&V provides PROOF of the effectiveness of energy management.**

Supporting analysis (2):

In Bulgarian public sector buildings such as schools, hospitals and kindergartens - the National Programme for Energy Savings until 2015 estimates potential energy savings of up to 50%. There are approximately 6,000 municipal or state owned buildings in Bulgaria with floor area exceeding 1,000 square metres with total investment needs for improved insulation, window frames and heating controls of approximately €250 million (not including any necessary boiler refurbishments). Given the relatively high levels of energy savings which can be realised these investments are said to be highly profitable, however local authorities are constrained by the availability of budget funds to finance these investments.

One approach which enables to finance energy saving projects in Bulgarian public sector is making use of energy performance contracts (EPC). EPCs are a form of public private partnership whereby the public authority selects a private firm to undertake specified energy saving investments which can be ideally repaid from achieved energy savings. The advantage of this approach is that the repayments are calculated so that the total payments for the EPC and energy needs after the investments are completed do not exceed what the client (i.e. the municipality or budget entity controlled by the municipality) was paying for energy before the investments. Once the EPC project is completed and the investments repaid (typically after 10 or 12 years) the client gets the full benefit of the energy savings thereafter.

Although often undertaken by specialist companies known as Energy Service Companies (ESCOs) in fact EPC contracts can be entered into by any engineering firm which is capable of undertaking the required work provided it is able to finance the investments and guarantee that the energy savings are achieved at the predicted level. It is therefore a highly effective approach to mobilise local skills and resources as well as save energy on a sustainable basis without the client having to find the additional funds itself.

In Bulgaria the EPC market has begun to develop, but even though recent projects demonstrate that the EPC concept can be successfully applied in the Bulgarian public sector, development of the market is constrained for a number of reasons:

- Local authorities have not had the experience or resources to develop or enter into EPC type contracts, which are effectively a form of public-private-partnership;
- local authorities lack the resources and skills to undertake the technical preparation of EPC programmes and conduct the tenders for awarding contracts to private sector companies;
- Similarly local engineering firms have not had the necessary experience of EPC contracts, or access to long term funds to finance investments;
- The need for tendering of public sector contracts has deterred many firms from trying to develop the market as they have no guarantee of business at the end of the process;
- Budget laws have constrained the possibilities for local authorities to retain the benefit of energy savings; and
- Local banks have not been prepared to finance engineering firms on the basis of receivables from EPC contracts, meaning only firms with substantial balance sheets would have the capability to raise finance.

Provision and financing energy supply and maintenance costs

The maintenance costs of the buildings are a significant item to the state budget and municipal budgets. As a result of inadequate investments for energy efficiency improvement in these buildings and the inefficient management this segment is heavily depreciated and manifests exclusively poor energy performance.

In the high school educational system is adopted the financial scheme of the “allocated budgets”. The activities of the schools are financed by the state based on national expenditures standards which includes labour and maintenance expenditures. The total amount of the allocated budget is transferred to the municipality and from the municipality 80% is conceded directly to the schools. The rest of 20% is distributed among the local schools upon system of criteria taking into account the specific differences of the municipal schools.

The schools pay for their energy consumption from the transferred by the municipalities “allocated budget”. They receive the invoices and report the expenditures to the municipalities on the base of bank documents. The expenditures of the smaller schools are included in the municipal budget and are paid from it. For this reason in the municipal book-keeping are opened special sub accounts.

In case energy savings are realized due to applied energy efficiency measures, the savings remains in the schools’ budget, and the maintenance cost is covered by the municipal budget.

In the recent years there is a trend the municipalities to assign provision of external services for such kind of social institutions. In these cases similar to the schools after the investments specifically for energy efficiency the savings could be use included in ESCO/EPC scheme.

Current status of public buildings

The energy intensity of the Bulgarian economy, or the energy consumption compared to the GDP, is 40% above the average figures in the EU and over 60% above the highest figures. This defines a significant energy saving potential.

Buildings are responsible for the total energy consumption and therefore require renovation.

Although some measures have been taken in terms of renovation of public buildings by means of using low interest loans of international organizations, there are still missing firm and comprehensive actions.

Experts assume that one of the causes for this is the lack of coordination of some laws as there is no uniform administrative body which would coordinate and implement the policies regarding the improvement of energy efficient features of building.

The public building stock in Bulgaria is characterized by:

- High energy intensity: poor or missing heat insulation of the building envelope – walls, floor, roof, physically worn out door and window frames, inefficient space heating, DHW and lighting in-house systems
- Poor management and maintenance;
- The use of inefficient, expensive and emitting large quantities of harmful emissions fuels and energy sources, such as liquid fuels, coal etc
- No use of renewable energy sources;
- Poor indoor climate and low comfort of habitation.

All these factors determine the high potential for energy conservation in these buildings.

Potential for energy efficiency improvements

The amount of energy savings is determined as follows:

- Methodology based on deemed savings is applied in the cases when the energy conservation measures are planned and implemented without energy audit. The energy saved is determined on the basis of the recorded energy consumption in the building prior to the implementation of the energy conservation measures (after elimination of the factors influencing space heating, such as the weather, occupancy rate and operation mode of the building) and monitoring of energy consumption after application of the measures.
- In cases in which energy conservation measures are planned and implemented on the basis of energy auditing the energy saved is determined as the difference between the normalized energy consumption (energy consumption required for ensuring the indoor climate parameters in the building as required by the current regulatory framework under its current state) and the energy consumption of the building after application of the energy conservation measures. The value of each measure is determined and the savings resulting from its application are then calculated. The measures are combined in different packages. A technical and economic evaluation is prepared for every package. The most efficient ratio between investments and savings is sought.

The identification and design of energy saving measures in state-owned and municipal buildings is performed through;

- Analyses of the current status of energy consumption in the public building stock by the bodies of state power and local self-government;
- Energy efficiency audits, on the basis of which energy conservation measures are identified and implemented;
- On the basis of target programmes, predominantly with state funding.

Following identification of possible measures for energy efficiency improvement they are incorporated in Energy Efficiency Programmes, compiled annually by the bodies of state power and of local self-government.

Monitoring on energy used before investment and after

In order to identify the current state of the buildings with respect to their energy consumption, prior to the implementation of the energy conservation measures up-to-date information is collected about the recorded energy consumption for a 3-year period preceding the year of the analysis. The main purpose of the analysis is to determine the specific energy consumption while the climate factor is eliminated by means of the integrated indicator “heating degree-days”.

Information is collected about the monthly energy consumption by types of energy carriers, tariff rates and supply costs.

The information is collected from:

- Available documentation (accounting or technical logbooks about recorded energy consumption in the building, determined through calculation or measurements);
- Interviews with the personnel of the site;
- Visits to the site;
- Measurements.

How do local authorities typically organise and manage their energy saving activities

The bodies of state power and the bodies of local self-government prepare energy efficiency plans and programmes for their implementation over a specific timeframe. These plans and programmes are worked out in compliance with the national strategy, the laid down objectives for achievement of energy savings with due consideration of the specifics of the regional development plans of the respective planning regions and the sustainable development prospects. The required funds for implementation of the plans are envisaged in the budgets of the bodies of state authority and the local self-government bodies. The bodies of state authority and the bodies of local self-government submit annually to the Executive Director of the Energy Efficiency Agency reports on the implementation of the plans. The reports contain description of the activities and measures and the amount of achieved savings. The energy efficiency audits of state-owned and municipal buildings serve as a basis for working out of plans and programmes for energy efficiency improvement (as requested under Art. 36, Paragraph 2 of the Energy Efficiency Act). The owners of public buildings – state-owned and municipal property - plan and manage the implementation of the measures recommended in the audit report. The timeframe for implementation of the measures is three years as of the date of approval of the results from the audit (Art. 19, Paragraph 3 of the Energy Efficiency Act).

What engineering firms have been most active

On the Bulgarian market operate engineering companies, which implement engineering services under Energy Performance Contracts. The most active company operating under this model is Enemona plc. Enemona is a leading company in the implementation of a full package of energy conservation activities. It has been active in the energy efficiency field since 2004 and is the leader in the successful application of the ESCO model in buildings state and municipal property – administrative buildings, kindergartens, schools, rehabilitation hospitals, centres for children deprived of parental care, etc. For the past five years the ESCO contracts implemented by the Enemona amount to more than BGN 30 million and the volume of the total of implemented energy efficiency projects amounts to more than BGN 55.5 million. Through its activities in the energy efficiency field Enemona plc contributes for reduction of energy consumption in the building stock and mitigation of CO₂ emissions. It contributes also to improvement of the aesthetic appearance of the buildings and hence of the urban environment. The comfort of habitation is guaranteed. In 2006 a shareholding company with a specific investment objective was founded the Energy and Energy Conservation Fund (EECF), whose primary field of activity is securing payments due under ESCO contracts.

Another engineering company, which is operating successfully on the Bulgarian market, is KES plc, founded in May 2001 and active in the field of energy and energy efficiency. Since recently KES plc is 100% owned by Dalkia Bulgaria. The company's activities comprise procurement of the required funding for investments and operative expenditures for overall implementation of energy management activities under the formula “performance guarantee with shared savings”.

Other active engineering companies, which operate successfully on the Bulgarian market, are as follows:

- Elmib Bulgaria plc
- Erato Holding plc
- Energy Effect SP plc
- Etc.

Common facility management practices

Energy efficiency management in public buildings above 1000 sq. m. is performed by specially charged with that responsibility officials from the owners of these buildings, whose functions comprise to keep track of:

- The annual compilation of plans and programmes for energy efficiency improvement in compliance with the reports from the energy audits;
- Implementation of the worked out plans and programmes for energy efficiency improvement;
- Submission to the Energy Efficiency Agency information about the effect from the implemented measures and the estimated effect from the implementation of the measures envisaged in the plans and programmes as well as annual reports on the management of energy efficiency;
- Keeping a logbook about the monthly consumption by types of energy, including dates, price and quantities of the respective deliveries, as well as the identification numbers of the documents evidencing the quality of the delivered fuel.

Metering and billing procedures.

Accounting of and payment for energy consumption in buildings state and municipal property is performed in accordance with the enforced legislation.

Energy is metered and paid for on the basis of the reading of commercial metering devices. These devices may be designed for distance or direct reading. Depending on the specific energy carrier the metering and payment is performed as follows:

- In the event of district heating supply to end-users:

In the case of district heating the metering of heat energy is performed at the boundary of the property by means of commercial devices – heat meters. Individual allocators are used for regulation and distribution of the heat energy inside the building.

The calculation of the value of the supplied heat energy is carried out by the district heating companies at end-user energy prices for the reporting period. Payment is effected directly to the supplier's account.

- Supply of natural gas to the end-users:

Metering of the consumed quantity of natural gas is carried out at the boundary of the property using commercial metering devices – gas meters.

The calculation of the value of the supplied quantity of natural gas is carried out by the gas distribution company at the end-user prices for the respective reporting period. Payment is effected directly to the supplier's account.

- Supply of electricity to the end-users:

Metering of the consumed quantity of electricity is carried out at the boundary of the property using commercial metering devices – electricity meters.

The calculation of the value of the supplied electricity is carried out by the electricity distribution companies at end-user energy prices for the reporting period. Payment is effected directly to the supplier's account.

Engineering scope related to energy efficiency measures with guaranteed result of public buildings

The engineering includes:

Scope and activities of energy efficiency investigation:

- measuring means and control of the energy fluxes in building;
- systems of burning the fuels and transforming the energy fluxes coming into the building;
- heat-transfer systems – water, steam condensate, air;
- electric supply systems;
- lighting systems;
- microclimate providing systems;
- domestic hot water systems;
- building fencing constructions and elements;
- analysis of the existing status and energy consumption;
- elaboration of energy balances, specifying the base line of energy consumption;

- visual examination and measuring to collect detailed information for energy – transforming processes and systems;
- data processing and data detailed analysis;
- analysis of existing scheme to manage the energy consumption;
- specifying energy characteristics of the building and their improvement potential;
- preparation of measures list in order to raise the energy efficiency;
- assessment of value of the measures, assessment of the annual rate of energy saving, arrangement of measures by “buy-back term” indicator;
- formation of measures packages, specifying the annual rate of energy saving taking into account the mutual impact of some individual measures and feasibility evaluation to the measures packages;
- analysis and evaluation of CO2 emissions reduction resulting from proposed measures to increase energy efficiency;
- preparation of report and summary to outline the investigation results;
- their submittal to the building proprietor;

The measures related to energy efficiency increase have to be in compliance with the building usage.

Elaboration of work documentation at Technical design stage on:

- Architectural and civil part;
- Electrical and I & C part;
- HVAC part;
- Water supply and sewerage part;
- Safety and health plan part;
- Coordination of work documentation with the contracting authority and competent control institutions.

Building take-over for upkeep and marking input data of the energy consumption measuring devices (electrometers, water meters, heat meter, fuel flow meter). Start of investment repayment by the contracting authority.

Control and monitoring of the energy consumption and the microclimate in the building during the corresponding monitoring year, marking output data of the energy consumption measuring devices at the end of the period. Assessment of energy used for the building, calculation of achieved saving and performing a balance payment under the contract. The activities under this item are repeated for each year of the investment repayment.

Contracting the engineering services are performed in compliance with the legislation in Bulgaria. The agreement to implement the engineering services is declared in a written Contract for implementation of energy services, parties to which are the (Contractor) and the energy end-user (Assignor). According to the enforced legislation in Bulgaria (The Law on Commerce, the Law on Obligations and Contracts, the Energy Efficiency Act and other regulatory acts) the contracts for energy services may be either contracts dealing solely with the implementation of energy efficiency service or Energy Performance Contracts:

- The contracts for energy efficiency service shall seek to implement energy efficiency improvement activities and measures leading to end-use energy savings. Energy services may be rendered by natural or legal persons who or which are merchants within the meaning given by the Commerce Act or within the meaning

given by the legislation of a Member State of the European Union or of another Contracting Party to the Agreement on the European Economic Area (Art. 39, para. 1 of the Energy Efficiency Act).

- The Energy Performance Contracts shall seek to implement energy efficiency improvement activities and measures leading to end-use energy savings, with the investments made and the payment of the remuneration owed to the contractor being recouped by the energy savings achieved. The contractors shall be natural or legal persons who or which are merchants within the meaning given by the Commerce Act or within the meaning given by the legislation of a Member State of the European Union, or of another Contracting Party to the Agreement on the European Economic Area, with objects including performance of services under guarantee of energy savings contracts(Art. 48, para. 2 of the Energy Efficiency Act). The contractors shall ensure the rendering of the service in whole or in part on their own financial resources and/or shall undertake to procure the financing thereof from a third party.

The selection of the energy services company is made by the Assignor in compliance with the legislation of the Republic of Bulgaria – the Public Procurement Act, respectively the Ordinance concerning assignment of small public procurement orders.

The contract contains description and valuation of the specific engineering activities, selected by the Assignor on the basis of the energy conservation measures recommended as a result from the conducted energy efficiency audit, Beside engineering activities the contracts comprise also activities, which may be implemented individually or as part of joint investment projects for energy conservation. Such activities are as follows:

- Technical design;
- Replacement of building envelope structures and components, including windows, entrance doors, etc.
- Heat insulation of building envelope structures and components, including external walls, roofs and floors;
- Repair, upgrading or replacement of substations/boiler plants, including heat carrier shift, fuel shift, including the use of renewable energy sources, heat pumps, co-generation systems, etc.;
- Repair or replacement of the heat distribution network;
- Repair or replacement of in-house space heating systems, including in the event of shift of the heat carrier of the in-house space heating system;
- Installation of radiator thermostatic valves and individual heat allocators;
- Replacement of incandescent bulbs by energy saving ones;
- Installation of automatic control systems for heat energy and electricity consumption and other activities leading to reduction of energy consumption and improvement of energy efficiency.
- Miscellaneous building and installation works
- Miscellaneous activities and measures assigned by the Assignor;
- etc.

In general, the provided contracts meet in full all principles of Energy Performance Contracting, but it is very strict and less flexible. In practice there is one solution how participants can renegotiate the contract. In case that no participant is disposed to accept all

defined details in draft contract, open procedure is cancelled and negotiation procedure can be used. In negotiation procedure, all details can be renegotiated.

Contracts with guaranteed results are not specially regulated in Public Procurement Law; it regulates only contracts for services, deliveries and construction/engineering. In each category of the contract, duration and payment condition must be defined and it is limited for services contracts. Guarantees for economic result and payments conditions dependent on achieved savings are provisions that are not strictly amended in Public Procurement Law, these provisions we can find in Energy Efficiency Laws. As regards funds for repayments of investment, this is regulated via Laws for the Structure of the State Budget and for Municipal Budgets. In most cases, the Contractual Authority cannot simply take saved operating resources and use them for investment repayments, it has to use approved in advance budgetary targeted subsidies for the capital costs.

According to PPL, the maximum duration for ESCO contracts awarded as service is 4 (resp.5) years, but these types of contract cannot be met in practice at all. In case of ESCO contracts awarded as engineering or construction, there was no written maximum duration before, but due to combination of different technical and economy factors, contracting authorities usually set the maximum duration for 7 years.

At present, maximum contract duration is 10 years according to ORDINANCE No RD-16-347 dated from 2.04.2009.

M&V

“Measurement & Verification (M&V) is the process of using measurements to reliably determine actual saving created within an individual facility by an energy management program.” The purpose is to develop and promote the use of standardized protocols, methods and tools to quantify and manage the performance risks and benefits associated with end-use energy efficiency, renewable energy, and water efficiency business transactions.

Benefits

- Defines standard approaches to “measuring” “savings,” to reassure facility owners.
- Legitimizes ESCO projects through international recognition of the “cash register” for savings.
- Provides guidance on the trade-off between measurement “accuracy” and measurement cost.
- Helps parties to create transparent, repeatable performance contract terms and emission trades regarding savings settlement.
- Updates the definition of the state of the M&V art through constant evolution on the EVO website.

Purposes of M&V

- Increase Energy Savings
- Document financial transactions
- Enhance financing for efficiency projects
- Improve design, operations and maintenance
- Account for variances from the utility budget

- Enhance the value of emission credits
- Support evaluation of regional efficiency programs
- Educate facility users about their energy impacts
- Improve score in Sustainability rating systems such as “LEED.”

Energy users usually want to know how much their bills would have been if they had not taken energy efficiency action. They want to know how much energy or cost they avoided. To report avoided cost, M&V engineers adjust baseline period energy use to the conditions of the reporting period. They sometimes simply call cost avoidance ‘savings,’ at risk of confusion with accountant reports. Accountants often use the word ‘savings’ to describe ‘cost reductions.’ They make no adjustments. So, when talking about ‘savings’ we have to be very careful to explain our meaning.

We must report the common set of conditions (apples) we are using for stating “savings.”

The M&V Plan

Summary of Contents

- Purpose of each ECM and its impact on operating conditions
- Measurement boundaries for each ECM
- Interactive effects (beyond the boundary)
- Baseline energy/demand
- Selection of independent variables and their values during the baseline
- Static conditions (within the boundary) during baseline
- Reporting responsibilities for Static Factors in the reporting period
- Define the reporting period
- Standard conditions for adjustments
- Option A, B, C or D with exact computation method
- Energy price schedule to be used
- Metering points, specs & procedures
- Quality assurance procedures
- Expected costs and accuracy
- Report formats and frequency

For Option A:

- Justification of the estimate(s) used
- Periodic equipment inspections that will be made after retrofit

For Option D:

- Name and version of software used for simulation
- Input data and method of measuring any parameters used to support input values
- Output from software
- Calibration data, and accuracy achieved by simulation

Performance Contracts:

- M&V plays a critical role in performance contracts:
 - maximizes the savings and the persistence of savings over the contract term
 - documents what savings were achieved and acts as the cash register for the exchange of value
- Performance contracts allocate the costs and benefits of M&V accuracy between the ESCO and Owner.
- Carefully consider contract motivations of all parties before designing the M&V. Append the M&V Plan to the contract.

APPENDIX G

There are NO additions recommended to current text of IEEFP.