



PERMANENT COUNTRY REPORT

Czech Republic



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

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1. INTRODUCTION TO THE PROJECT

1.1 Energy efficiency regulatory framework

Energy efficiency has been regulated by the Act No. 4006/2000 Coll., on Energy Management, (latest amendment in Act No. 393/2007/Coll.). Details are specified in several executive decrees to this Act. In the decrees standards and methodologies are being referred to, which have to be used of in case of calculations.

This act introduces measures leading to rational use of energy in consumption, distribution and production of energy and states obligations of both public and private entities regarding energy management. The most important articles of the Act include:

- National Energy Policy – defines the policy document and the obligation to develop the Policy and make evaluation and updates (if necessary) every 4 years.
- Territorial Energy Plans – content has been defined of this document and authorities subjected to this law
- State Programme for economical use of energy and increased use of renewable and secondary energy sources – obligation for developing the programme
- Energy Efficiency – this paragraph states a number of obligations for legal and private persons related to energy efficiency (mainly in buildings)
- Heat and Power Generation – concerning the mandatory consideration of combined heat and power generation when modifying existing heat or power plants, minimum efficiency standards, etc.
- Energy Labels (for household appliances)
- Energy Audits
- Energy Auditor

In the Energy Management Act and its executive decrees – minimum efficiency standards have been set for:

- Heat and electricity production and distribution
- Boilers, heat pumps, solar panels and other technologies
- Buildings
- Appliances
- Cars

Energy Management Act has been updated often in order to integrate new EU Directives related to energy efficiency (EPBD – Energy Performance in Buildings Directive, ESD – Energy Service Directive – on end-use energy efficiency and energy services, Directive on Cogeneration, Labelling of Appliances, Ecodesign). The Directive on energy performance in buildings also includes mandatory inspections and measurements of energy efficiency of boilers and air conditioning systems. A specific executive decree was developed to the above Act to describe the way the inspections have to be performed and its results.

The main executive decrees to the Act on Energy Management include:

- Government regulation No. 195/2001 Coll. stating the details of Regional/ Municipal Energy Plan
- Executive Decree No. 425/2004 Coll. including detailed contents of energy audits
- Executive Decree No. 150/2001 Coll. stating minimal efficiency of heat and electricity generation
- Executive Decree No. 442/2004 Coll. on energy labelling of electric appliances and on minimal energy efficiency of appliances introduced to the market

- Executive Decree No. 148/2007 Coll. on energy performance of buildings. This Decree specifies in detail requirements for energy performance of buildings, contents of the energy performance certificate in buildings and states who may develop the certificate.
- Executive Decree No. 193/2007 Coll. on details of energy performance of heat supply
- Executive Decree No. 194/2007 Coll. stating rules for space heating and hot water preparation
- Executive Decree No. 276/2007 Coll. on regular inspections of boilers
- Executive Decree No. 277/2007 Coll. on regular inspections of air-conditioning systems

In the Czech Republic attempts were also made in the past to include compulsory use of EPC in case potential in technical measures with reasonable payback time exists and has been specified in the energy audit. No such attempts were successful, processes were unofficially standardised on how to organise tenders and select an ESCO (in line with the Czech Law on public procurement) and also EPC model contract has been developed with assistance of ESCOs grouped in a Working group for EPC at the Chamber of Commerce.

1.2 Investment Potential in Energy Efficiency

In 2001 a major detailed study was developed in the Czech Republic financed by the Czech Ministry of Industry and Trade in cooperation with the World Bank – National Energy Efficiency Study . In the Study following technical energy saving potential has been identified in individual sectors of the Czech Republic:

Table 1: Technical potential in energy saving measures by sector (only technical measures included)

Sector	Technical potential of energy savings by payback time							
	< 3		3 - 5		5 - 10		> 10	
	GJ	thous.€	GJ	thous.€	GJ	thous.€	GJ	thous.€
Industry ¹	62 609 048	1 705 177	8 226 839	373 349	54 675 800	1 452 616	36 723 554	3 763 827
Agriculture	1 079 440	18 253	1 820 136	128 764	2 047 632	207 848	1 468 184	524 330
District heating	1 354 645	16 936	114 140	5 098	289 196	27 082	12 090 607	2 556 227
Schools	2 855 007	45 038	36 828	669	3 943 507	204 325	7 115 328	2 669 786
Health - care sector	1 249 430	15 380	1 090 180	39 286	832 265	53 838	1 345 246	485 517
Administration	470 820	9 855	326 700	10 294	1 070 029	48 384	1 656 071	538 410
Housing	6 054 391	131 804	2 134 797	56 588	4 314 966	159 490	78 131 963	18 474 392
Total	75 672 781	1 942 443	13 749 620	614 047	67 173 395	2 153 584	138 530 953	29 012 489

Of this potential specified in the year 2000 about 40% has already been implemented (rough estimate) – mainly the potential in short and medium term measures (up to 5 years payback time).

The potential has not only been implemented by energy saving projects but due to vast modernisation efforts which have been undertaken in all sectors – industries (incl. energy industries)

Energy Efficiency potential has been calculated in detail in 2010 again for the needs of the National Energy Efficiency Action Plan, which requires achieve 9% reduction in energy consumption of each of the EU member states in selected end-use sectors by 2016. This reduction has to be achieved by a set of energy efficiency policies and measures (incl. legal and regulatory) to be implemented before 2016. The National Energy Efficiency Action Plans have been developed in all EU member states according to the European Directive No 2006/32/EC on energy end-use efficiency and energy services. The first Action Plans have been agreed with the European Commission and 2nd Action Plans will be submitted in April 2011.

¹ Energy savings administrative buildings at industrial sites not included

Table 2: Setting the target in energy efficiency improvement

	Indicator	TJ/year
Average annual consumption (corrected for the Plan) over five-year period 2002 to 2006		793 663
Target 9% energy savings at the end of 2016		71 431
Average annual indicative target		7 938
Adopted target of transitional period at the end of 2010		14 854
Average annual forecasted consumption 2008 - 2016 (without measures)		1 041 001
Average annual forecasted consumption 2008 - 2016 (with measures)		969 570

Zdroj: ENVIROS, ČSÚ

Achievement of the Action Plans in terms of energy savings is verified at the annual consumption development of the specific country from the national statistics – the Directive specifies the way in which the corrected balance has to be calculated.

1.3 Key Barriers to Investing in Energy Efficiency

Energy efficiency (EE) investments are not made at a fast rate in the past for many reasons. They are summarized below:

Table 3: Barriers to energy efficiency improvement

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		
Inadequate legal/regulatory framework					
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
Small investments and benefits, and high transaction costs		X	X	X	
Complex transactions with energy service companies (ESCOs)	X		X		X
Low priority and rates of return	X	X	X		
Limited technical capabilities	X	X	X		X
Low (subsidized) energy prices					
Complex technologies					
Too much reliance on subsidies	X		X	X	X

Fragmented and diverse industry of energy users and product/service suppliers

This barrier relate mainly to SMEs. SMEs have more difficulties in developing sufficient information on energy efficiency, for SMEs energy audits are not compulsory. They rarely have specialised personnel and do not often hire external consultants for energy efficiency improvements proposal. This has been changing recently due to available subsidies which are oriented on small industries and entrepreneurs (SMEs by EU definition). The number of companies also is a barrier for ESCOs in their marketing policy.

Also suppliers are numerous – in addition to local production lots of products are imported and it can be difficult for end-users to select products and services of required quality, reliability and lifetime.

Inadequate legal/regulatory framework

The regulatory and legal framework in energy efficiency was adopted to large extent already before the Czech Republic joined the European Union. Minimum energy efficiency standards were set up in the Energy Management Act, compulsory energy audits, energy certificates, compulsory assessment of cogeneration in plants over 5 MW of installed heat capacity, labels for domestic appliances and assessment of energy requirements of buildings. During the accession process and after 2005 additional energy efficiency requirements have been included in the Act as they follow from the approved EU Directives in Energy Efficiency and its requirements.

Difficulties arise in the implementation of other laws; e.g. assistance would be needed in public procurement guidelines for acquisition of energy-efficient equipment, in procurement for low and zero energy buildings, in preparing request for provision of energy services to public entities.

Lack of knowledge of EE benefits and techniques for managing risks

This barrier is typical for industrial SMEs, small entrepreneurs, households, and public administration. During past 20 years the situation has improved – due to price increases, lots of awareness and information campaigns, energy efficiency information centres, technical assistance provided through state energy efficiency programmes, etc. Most resistance, though, can be seen at the state administration, in which efforts to implement cost effective energy efficiency measures, improve energy efficiency, monitor costs in facilities paid from the budget of ministries do not seem to have relevant support.

Complex transactions with energy service companies (ESCOs)

This barrier was extremely significant before a procedure how to make use of existing procurement law in tendering energy services was developed. Contract for energy services has been developed several years ago and is being improved and refined. Also consultancies exist which are able to assist the local governments and other procuring entities in preparing qualification of tenderers, tender documentation, tender procedure, evaluation of bids, contract completion. The number of contracts has been increasing mainly in past several years, because EPC complement thermal insulation and other construction measures financed by the EU subsidy.

Low priority and rates of return, low capabilities

This barrier is typical for households and private building owners or tenants. Measures to be implemented in the houses usually have low rate of return and high investment costs. Thermal insulation of panel houses became popular several years ago with the introduction of a support programme for retrofitting of these houses. Currently also insulation of family houses has been supported from sold CO₂ allowances, under so called Green Investment Scheme. Both groups and also farmers and small entrepreneurs in services belong to the groups less informed and less interested in energy efficiency improvements.

1.4 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 follow up half day, one day or two day training in relevant topics for target audiences.

1.5 Target Audiences for Training in the Czech Republic

Target market sectors are, in general:

- Users of large amounts of energy: industrial, commercial, multiple residential, institutional (e.g. education, health care), Governmental buildings owners (e.g. universities, defence, prisons, etc.), municipal authorities as owners of municipal buildings and facilities, regions as owners of regional buildings (schools, social and health care facilities)
- Financiers: local financial institutions (LFIs)
- Governments and representatives of ministries responsible for EU structural Funds 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:

- Chief Executive Officers will be addressed within LFIs, to encourage them to approve introduction of a new lending products or
- Senior lending officers within LFIs, to encourage them to establish a plan to develop a new lending product.
- Chief Financial Officers 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 promotion and proper validation of energy efficiency benefits and in regulating proper performance risk management.

In the Czech Republic these individuals will be found in internal contact database of ENVIROS, through separate set of activities consisting of telephone calls and electronic mail contacts. ENVIROS will seek approval of those receiving the information about PERMANENT, its products and its activities incl. training activities.

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.

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2. DETAILS OF COUNTRY ANALYSIS

2.1 Market Potential (from research by others):

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Table 4: Technical potential in energy saving measures by sectors

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The following list presents groupings of the most common energy saving measures included in calculation of the potential in manufacturing industry:

1. Good housekeeping and energy management;
2. Reduction of heat losses in buildings;
3. Heat recovery;
4. Reduction of losses in drives;
5. Improvement of efficiency of heat generation, distribution and heating;
6. Major modifications of existing plants; and
7. Recycling of materials.

In commercial and public buildings and in the domestic sector following five broad categories of energy saving measures were taken into account when calculating the potential:

1. Good housekeeping, measuring and accounting
2. Thermal insulation of buildings;
 - Thermal insulation of ceilings above non-heated space;
 - Thermal insulation of surrounding walls;
 - Replacement of windows;
 - Thermal insulation of flat roofs;
 - Thermal insulation of ceilings above non-heated space;
 - Thermal insulation of ceilings above non-heated basement;
 - Thermal insulation of ceilings under non-heated loft; and
 - Thermal insulation of slant roofs above heated attic.
3. Heat recovery;
4. Efficiency improvements of equipment, and
5. Improvement of efficiency of heat generation, distribution and heating:

² Potential for energy savings in administrative buildings at industrial sites is not included

- More efficient boilers and fuel switching - this measure includes replacement of old boilers by new more efficient ones with switch from coal to natural gas.
- Control systems in space and tap water heating systems - this measure includes installation of central control systems
- Reduction of losses in heat distribution through thermal insulation of steam and hot water piping

Barriers to the implementation of the potential identified in 2000 comprised lack of:

- financial abilities of the end-use sectors
- Czech government and other (non-) government institutions sources
- availability and price of capital for energy savings from various financing sources
- energy pricing and taxation policy - present situation and possible development
- institutional and organisational structure of the energy market
- energy and environmental legislation related to the aspect of energy conservation and the use of renewables
- other barriers - lack of information, lack of incentives, administrative obstacles, institutional barriers.

Most of the barriers were removed during past ten years. Due to economic stabilisation, harmonisation of laws, modernisation, huge reconstructions and economic growth of the country about 40% of this potential specified in the year 2000 has already been implemented (rough estimate). Obviously these were mainly the short and medium term measures with up to 5 years payback time).

Energy Efficiency potential has been calculated in detail in 2010 for the needs of the National Energy Efficiency Action Plan. In the Plan 9% reduction in energy consumption has to be reached by 2016 by implementation of existing regulation, policies and legislation, and by newly adopted measures in end-use sectors (all plants subjected to emissions trading excluded and net energy consumption in defence sector). The National Energy Efficiency Action Plans have been developed in all EU member states according to the European Directive No 2006/32/EC on energy end-use efficiency and energy services. The first Action Plans have been agreed with the European Commission and 2nd Action Plans will be submitted in April 2011.

Table 5: Setting the target in energy efficiency improvement

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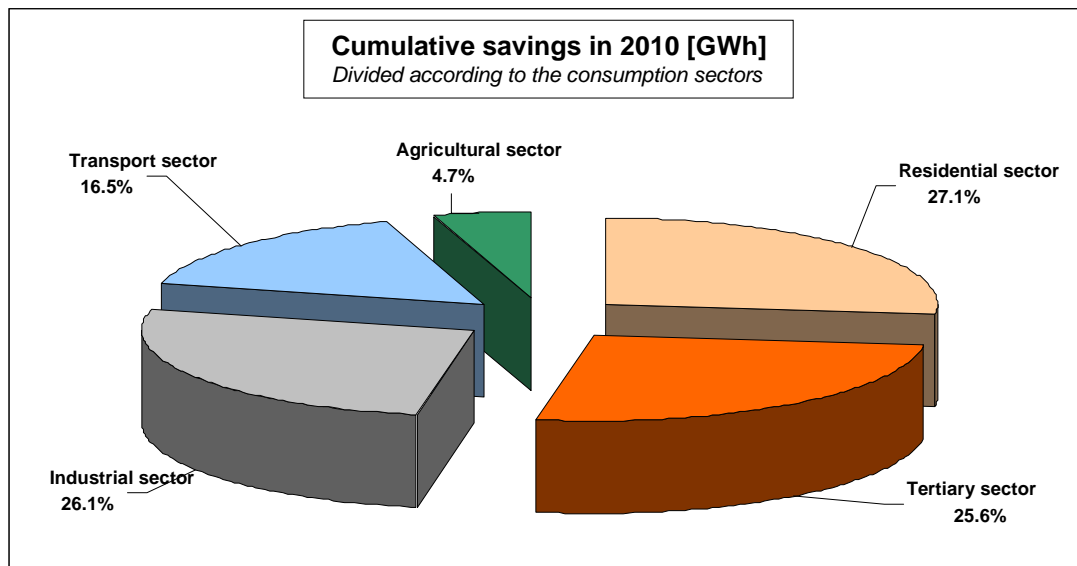
The measures proposed for the Czech Republic also include, as one specific measure, extension and promotion of energy services – Energy Performance Contracting. The estimated savings to be achieved in 2016 by extended use of energy performance contracts amount to 330 TJ/a. This estimate seems to be conservative and we can hope that the savings will be at least twice as much.

Table 6: Overview table of all proposed measures of the Action Plan NAPEE II

No.	Sector	Title of the measure
1.1	Residential	Support to housing fund modernization using the building saving
1.2	Residential	Renewal of panel houses – PANEL Programme
1.3	Residential	Grant from the State Housing Development Fund for repairs of multi-family houses
1.4	Residential	Loans for cities, towns and villages for housing fund modernization by the state
1.5	Residential	Awareness - State support to activities leading to reduction in heat energy consumption
1.6	Residential	Energy labelling of household electrical appliances
1.7	Residential	Electric energy savings in the area of household lighting
1.8	Residential	Green to Savings Programme
2.1	Tertiary	Provision of energy services via the EPC method in the tertiary sector and its support
2.2	Tertiary	Extension of the role of public sector in demonstrating new technologies
2.3	Tertiary	Electric energy savings in the area of lighting in the tertiary sector and public lighting
2.4	Tertiary	Application of the Energy Star agreement on office equipment
3.1	Industry	Promotion of energy efficiency in the Operational Programme Industry and Enterprise
3.2	Industry	Promotion of energy efficiency in the Operational Programme Enterprise and Innovation
3.3	Industry	Support of voluntary commitments to energy savings
4.1	Transport	Reduction in emissions and energy demand of new passenger cars put on the market
4.2	Transport	Public transport measures (modernization of electrical equipment for trams)
4.3	Transport	Measures of support to combined transport
4.4	Transport	Measures to improve energy efficiency in railway transport
5.1	Agriculture	Summary of measures to improve energy efficiency in agricultural services
7.1	Cross-cutting	Energy services offered by energy producers, distributors and suppliers
7.2	Cross-cutting	Putting the "white certificates" into practice and relation to energy services
7.3	Cross-cutting	Benefits of implementation of the recommendations of the mandatory energy audits
7.4	Cross-cutting	Duty to prepare energy certificates of buildings (building certification)
7.5	Cross-cutting	Requirements for minimum efficiency in generation of electricity, heat and cold
7.6	Cross-cutting	Requirements for minimum efficiency in transmission and distribution of electricity, heat energy and cold
7.7	Cross-cutting	Rotation fund energy-saving projects (Ministry of Industry and Trade, ČSOB bank)
7.8	Cross-cutting	Energy efficiency promotion in other operational programmes (especially the Operational Programme Environment)
7.9	Cross-cutting	State Programmes in Support of Energy Savings and the Use of Renewable Energy Sources
7.10	Cross-cutting	Support to information dissemination and energy savings promotion by the state
7.11	Cross-cutting	Application of the Eco-design Directive
7.12	Cross-cutting	Effect of the application of the ecological tax reform on energy savings
7.15	Cross-cutting	Use of environmental energy for heat and hot water supply using heat pumps
7.16	Cross-cutting	Use of solar thermal energy for heat and hot water supply
7.17	Cross-cutting	Use of solar photovoltaic energy for electric power supply
7.18	Cross-cutting	Effect of making the standards in thermal protection of buildings more restrictive with regard to their energy performance
7.19	Cross-cutting	New requirements for energy performance of buildings
7.20	Cross-cutting	Effect of the distributed co-generation production
7.21	Cross-cutting	Support to combined electricity and heat production
7.22	Cross-cutting	Targeted emission reduction activities with state subsidy (gas network extension)

Following is the overview of energy savings in all sectors.

Picture 1: Total energy saving potential as at 2010 by sectors



Source: Ministry of Industry and Trade, first Energy Efficiency Action Plan submitted to the European Commission, corrected by ENVIROS, s.r.o.

2.2 EE Stakeholder Identification

Following is a 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 Industry and Trade – the ministry is responsible for developing energy policy, harmonisation of laws in energy industries, in renewable energy and energy efficiency. Under the responsibility of this ministry is also energy efficiency in buildings, energy services directive implementation, etc. It is also responsible for definition of priorities of the EU Structural Funds, and manages the programme through the implementing agency CzechInvest. The ministry abolished Czech Energy Agency and took over responsibilities on energy efficiency activities in the Czech Republic. It develops annually the State Programme for support of energy efficiency and extended use of renewable energy and allocates funds from this programme.
- b) Ministry of Environment – this Ministry is responsible for Climate change strategies, emissions trading, air quality, sustainable energy, other environment protection (water, wastes, land, etc.). This Ministry has proposed significant programme for reduction of emissions and for increased energy efficiency in public buildings – Operational programme Environment and its priority axes Sustainable Use of Energy Sources. The programme is implemented by the State Environmental Fund. Ministry of Environment has also signed an agreement with Japan and sold Japan CO2 emission allowances. The yields from this sale are invested into a programme called Green investment scheme, which finances energy efficiency investments in family and residential houses and only recently also in public buildings.
- c) Ministry of Regional Development – is generally responsible for programming and financing from EU funds. In addition to it runs programme PANEL for rehabilitation of panel houses and other national funds for development of housing. The ministry is also responsible for Law on public procurement.
- d) Ministry of Finance is responsible for e.g. laws dealing with financial rules, property of the state, budgetary issues, co-financing EU funds, and also for investments in the state property incl. investments into energy efficiency. These investments have to be proposed by the Ministries, running

the relevant offices, and rules for investments application have been set up by the Ministry of Finance. This ministry already was and will be again consulted as to the eligible procedures to be used for Energy Performance Contracting implementation in state owned facilities and buildings.

- e) Local and Regional authorities - these authorities are also owners of property – administration buildings, sport and recreation facilities, hospitals and health care facilities, social housing, pensioners’ houses, schools, etc. Local and regional governments are very active recently – trying to submit applications for energy efficiency improvements from EU Operational programmes and recently also from Green Investment Scheme. These improvements are mainly concentrated on thermal insulation improvements and can be often combined with EPC.
- f) Energy Agencies (local and regional) – these agencies are involved in awareness activities and dissemination of information, they assist general public and local and regional authorities in developing applications to various supporting programmes – subsidies and grants, sometimes develop energy audits.
- g) Commercial Banks – CSOB bank was involved from 1997 in management of energy efficiency revolving fund in the Czech Republic. Most recently the fund finances energy modernisation of housing estates – during 2008 and 2009 they concluded 800 credit agreements with housing associations or associations of owners. Commercial Bank (KB) has been very active in renewable energy investments and has established a department for renewable and energy efficiency investments. Reiffeisen bank has been active in renewable investments and Ceska Sporitelna which run programme FINESA several years ago, cooperating with IFC/GEF and providing guarantees on energy efficiency investments.
- h) ESCOs in the Czech Republic which are involved in end use energy savings include several active companies in addition to those who follow the development in the market but are more interested in supply side activities. ESCOs are active in the Working group for Energy Performance Contracting under the Chamber of Commerce and most recently are establishing Association of EPC companies. Most active ESCOs are:
 - ENESA (former EPS)
 - Siemens
 - MVV Energie
 - ENERGA (AB Facility)
 - SUE (Centre for Energy Savings)
 - EVČ
 ESCOs partially involved include Dalkia, Komterm, MARTIA, Honeywell.
- i) Other important bodies include Association of Energy Auditors, consulting companies (SEVEN), Association of Energy Managers, Association of large energy consumers, electricity suppliers, gas distribution companies, heat producers and suppliers, Energy Information and Consulting Centres (EKIS).

2.3 Best Practices and Barriers

2.3.1 Financing energy efficiency projects

Available grants and subsidies

The situation in financing energy efficiency in the Czech Republic has changed dramatically after subsidies were made available from EU Structural Funds. In the first programming period for the Czech Republic (2004-2006) the Operational programmes according to which subsidies could come to the

country were not that much oriented on energy efficiency (some industrial projects were subsidized within the Operational programme of industry and entrepreneurship), but in the second programming period (2007-2013) several programmes included energy efficiency into their priorities and supported measures. Some of the programmes asked for significant allocations in energy efficiency – mainly Operational Programme Environment, Operational programme entrepreneurship and innovation and Regional Operational Programmes. Within these programmes subsidies are provided mainly for:

- Industries
- SMEs
- Public buildings

The applications into the Operational programmes make use of energy auditing obligation which started in the Czech Republic in 2002 as compulsory activity for public organisations and for large private consumers. The audits are developed according to the Law 406/2000 Coll., as updated. The audits have to be updated and attached in the application for EU subsidy.

The allocated funds and the two requirements (1- legal requirement for compulsory energy audits, 2- requirement for submission of the energy audit for application for the subsidy) made owners of the buildings or its managers change significantly their interest in energy efficiency investments and improved awareness about energy efficiency measures, mainly those improving thermal insulation characteristics of buildings.

Projects financed from EU Structural Funds and the Cohesion Fund include in SMEs (both industry and services) in the programme called **Eko-Energie**:

- projects leading to energy efficiency
- installation of renewable energy sources

Criteria that the applicants for subsidies must meet:

- Financial health of the company (short-term liquidity, long-term solvency, profitability)
- Non-financial evaluation of the company
- Financial Plan of the Investment Project (cash-flow of the project)
- Financial plan of the whole company
- Feasibility study of the project
- Energy Audit (according to the Czech legislation)
- Others

Fulfilment of binding indicator - savings of energy – must be proved by Monitoring Report. No details were found on how the monitoring report should look like and what is the procedure of monitoring energy savings in the Eko-Energie Programme.

Projects are financed in public buildings within the largest programme for energy efficiency the Czech Republic has ever had for improvements in thermal insulation qualities of buildings (Priority axis 3 of the **Operational Programme Environment**, The Sustainable Use of Energy Sources). Measures with long lifetime and long-term payback time are financed, savings achieved are not eligible costs. Financed measures include:

- Reducing energy consumption by improving the thermal insulation characteristics of building envelopes
- Applying waste heat use technologies.

In case of the Operational Programme Environment, binding parameter is parameter of the building thermal quality - value of average coefficient of heat transfer through envelope of the building [$W/(m^2.K)$], which after the building reconstruction has to achieve at least the legally required value of this parameter [$U_{em,N,rq}$] set by the Czech standard ČSN 73 0540-2.

Achievement of energy savings and also reduction of emissions of air pollutants and CO₂ has to be confirmed by authorised energy auditor, who compares the savings planned (in energy audit annexed to the application) and achieved after implementation. The confirmation has to contain also that energy savings are based on real data (invoices of gas and electricity suppliers, corrected by climatic conditions) or that they are calculated by the auditor.

Energy audits which have to be submitted with the application have to comply with the Czech legislation. The measures and values achieved must e also confirmed by design documentation, which is also submitted with the application and must be used for the reconstruction.

Financing through LFIs

Current lending procedures for EE projects - Local financial institutions have become active in helping their clients with financing subsidized projects. The subsidies are only repaid to the applicant after the measures and investments are implemented. LFIs provide short term loans for the installation period, which starts mostly only after the application was accepted, evaluated and approved. Once the subsidy was approved, the share of subsidy is known and also the share of repayment by the borrower and all repayment terms. The credit conditions very much depend on the share of the subsidy (subsidy is considered as guarantee) for both industrial and public sector projects.

LFIs in case of a project without any subsidy 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). Thanks to many products in the financial market that existed for energy efficiency promotion and for alleviation of barriers the market has accepted energy efficiency projects and do not rank these projects into risky business, but still, the certainty of future cash flow generated by project has not been considered. Documentation of actual savings has not been required. This is not the case for renewable projects, in which the revenues due to guaranteed sales of energy produced have already become understood and accepted.

To date, many LFIs (due to lack of knowledge) have already recognized that meaningful cash flow can be generated from EE projects. Yet there exist *disbelief* that planned project results will be really achieved and can pay back the investment in a sustainable manner. Lack of confidence in project savings persists even in case energy audits or other engineering analyses demonstrate sound investment opportunities. This may be very much due to the fact that there are no M&V plans submitted in the feasibility studies or in energy audits and there is no description of the way in which energy savings will be measured, verified and demonstrated.

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. Because of the risk management by ESCOs and full guarantee for cost savings in the contract ESCOs in the Czech Republic sell the debts and future cash flow generated. This can be also due to the fact that nearly all EPC contracts were concluded with municipal and/or regional sector in which repayment conditions are very safe. The banks, though, assess the ESCO client (energy users) and the value of the EE installation and often may require additional collateral behind the one of energy savings.

Introduction of M&V practice will improve understanding to reliability of energy savings and manners in which this reliability can be achieved.

2.3.2 M&V practices

Best practices which are close to M&V in the country exists in two cases:

- In case of Energy Performance Contracts
- In case companies have introduced system of energy management based on Monitoring&Targeting (M&T).

Energy Performance Contracts in the Czech Republic

Standardised tender procedures and pilot contracts may belong to the reasons why Performance Contracting has become more and more used by the clients as a method of achievement “safe” energy savings – in the contract ESCOs guarantee, that these savings will be sufficient for the lifetime of the contract for repayments of the investment, debt service and energy management.

In two Attachments to the Contract ESCOs have to describe:

- Energy savings –figures and methodology of setting the baseline (reference) level of energy consumption, way in metering and measurement of energy, way of baseline adjustments, way of calibration of achieved consumption and of calculation of energy savings in the accounting period.
- Cost savings - what is the value of existing / baseline values of operational costs and how these were set up, ways of adjustments these baseline costs during the accounting period, formulae and the procedures for energy savings calculation.

There exists big potential for improvement and in the discussions with ESCOs it was agreed that ESCOs will carefully read IPMVP and IEEFP (after the translation into Czech has been fully corrected) and will participate in a two day training course. After that it will be decided on how to integrate the methods in M&V and IPMVP into the existing model contracts for EPC in the Czech Republic.

Monitoring&Targeting (M&T)

Energy management systems using automatic monitoring and targeting (aM&T)

Monitoring and Targeting is a management technique in which all plant and building utilities such as fuel, steam, refrigeration, compressed air, water, effluent, and electricity are managed as controllable resources in the same way that raw materials, finished product inventory, building occupancy, personnel and capital are managed. It involves a systematic, disciplined division of the facility into Energy Cost Centers. The utilities used in each centre are closely monitored, and the energy used is compared with production volume or any other suitable measure of operation. Once this information is available on a regular basis, targets can be set, variances can be spotted and interpreted, and remedial actions can be taken and implemented

The essential elements of M&T system are:

- Recording -Measuring and recording energy consumption
- Analysing -Correlating energy consumption to a measured output, such as production quantity
- Comparing -Comparing energy consumption to an appropriate standard or benchmark
- Setting Targets -Setting targets to reduce or control energy consumption
- Monitoring -Comparing energy consumption to the set target on a regular basis
- Reporting -Reporting the results including any variances from the targets which have been set
- Controlling -Implementing management measures to correct any variances, which may have occurred.

Particularly M&T system will involve the following:

- Checking the accuracy of energy invoices
- Allocating energy costs to specific departments (Energy Accounting Centres)
- Determining energy performance/efficiency
- Recording energy use, so that projects intended to improve energy efficiency can be checked
- Highlighting performance problems in equipment or systems.

The practices used in M&T can be used in verification of savings, in developing M&V plans.

Local legislation related to M&V

There is no legislation which requires measurement and verification of energy savings. M&V plans are not part of energy audits and energy audits do not mention at all any improvements in measurement and metering energy consumption. Calculation of energy savings concentrate on thermal insulation qualities of the building and calculations is very detailed using standardised procedures by Czech standard ČSN 73 0540-2, harmonised with the EU standards updated for certification of energy performance in buildings.

Standards also set for calculation of energy needs for ventilation, lighting, heating and hot water preparation. Less attention is paid to the way the building has been operated, the savings achieved by better operation of the building and not by technology exchange or improvement are not supposed to be “reliable” and are subject to improved energy management of the building.

2.4 IPMVP and IEEFP Adaptation Activities

See Appendices F and G for recommended amendments/additions to IPMVP and IEEFP.

2.5 Training Target Audiences

In Appendices D & E target audience groups are listed and ways to access them on topics of:

- M&V
- Financing (current financiers and those not engaged already)

3. 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”)

Enviros has set up a Local Advisory Group of the following persons:

- Ing. Ivo Slavotínek (ENESA, a.s.)
- Ing. Jaroslav Maroušek (SEVEN Energy, s.r.o.)
- Ing. Vladimír Sochor (SEVEN, o.p.s.)
- Ing. Bohuslav Kyjánek (/ENERG, a.s. - AB Facility)
- Ing. Povýšil (MVV Energie CZ)
- Ing. Kohoutek (Siemens, s.r.o.)

Appendix B: M&V Plans and related Savings Reports

ENVIROS, s.r.o. has developed following two M&V Plans:

- An IPMVP Compliant M&V Plan for Office Building Project, Replacement of old circulation pumps with new efficient pumps. The agreed objective is a detailed review of space heating system and reduction of electricity consumption in office building operation. The plan was developed by Jan Pejter, authorised energy auditor by Czech legal requirements.
- ECM Intent, Introduction of the system for dust removal units automatic control. The project aim is to reduce electricity consumption by automatic control over starting and shutting down dust removal units based on the actual need. The report was developed by Pavel Sitný, authorised energy auditor by Czech legal requirements.

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)

Appendix D: M&V Trainees

- List of people to be targeted for training was developed in a team of ENVIROS and following organisations were agreed:
- Industrial managers – technical managers, energy managers
- State Energy Inspectorate
- ESCOs
- Implementing agencies (CzechInvest, State Environmental Fund)
- Association of Energy Managers
- Association of large consumers (of electricity)
- Energy auditors – association will be addressed
- Facility managers
- Ministry of Industry and Trade
- Ministry of Environment
- Energy Agencies

Appendix E: IEEFP Introduction Participants

- List of people to be targeted to attend the first “IEEFP Introduction Forum”
- ESCOs (extended list)
- Financial Managers of Industrial plants (mainly those cooperating already with ENVIROS)
- Ministry of Finance (budget department)
- Financial/ Investment departments of Regions through presidents /vice-presidents of the regions
- Energy managers of big Industrial plants
- Banks (most of local banks)
- Energy Agencies Managers

Appendix F: Recommended IPMVP Amendments

Specify recommended changes to current text of IPMVP. Show page reference, current text, proposed text and reasons for change.

In the Czech Republic following region specific characteristics are taken into account when reading and using IPMVP:

General: In the document proper reference to financing the translation from IEE programme has to be included as well as to training slides, etc.

Chapter 9: Definitions of Degree-day: Czech definition will be used.

All chapters: All references and recommendation of standards, procedures and guidelines will be in practical use of IPMVP be replaced by Czech and European standards wherever necessary, legally required or practical. This also partially relates to references to ASHRAE Guideline 14, in many of the calculations can be also replaced by several Czech standards. ASHRAE Guideline 14 is nevertheless recommended to learn and follow.

List of Czech standards follows:

Most important technical standards related to energy:

ČSN 01 1300	Legal units of measurement
ČSN 01 3613	Graphical symbols for energetic diagrams
ČSN 06 0210	Calculation of heat losses in buildings with central space heating
ČSN 06 0215	Heating with infrared radiators
ČSN 06 0310	Central space heating - projection and installation
ČSN 06 0312	Central radiant heating with concreted tubes
ČSN 06 0320	Heating of domestic hot water – designing and installation
ČSN 06 0830	Safety device for central space heating and for domestic hot water heating
ČSN 06 1101	Heaters for central space heating
ČSN 06 1102	Heaters for central space heating - calculation of dimension
ČSN 06 1201	Local solid fuel appliances
ČSN 07 0021	Hot water boilers
ČSN 07 0240	Hot water and low-pressure steam boilers
ČSN 07 0305	Evaluation of boiler losses
ČSN 07 0610	Heat exchangers water-water, steam-water
ČSN 07 0620	Steam boiler construction and accessories
ČSN 07 0621	Location of boiler equipments and design of boiler houses
ČSN 07 0623	Technical documentation and steam boiler testing
ČSN 07 0703	Gas boiler houses
ČSN 07 0710	Operation, attendance and maintenance of steam and hot water boilers
ČSN 07 5853	Liquid fuel burners
ČSN 07 7401	Water and steam for thermal power generating equipment (with pressure up to 8 MPa)
ČSN 07 7403	Water and steam for thermal power generating equipment (with pressure 8 MPa and higher)
ČSN 08 0010	Steam turbines for driving turbo-generators

ČSN 08 3500	Combustion turbines
ČSN 08 5000	Nomenclature of water turbines, storage pumps, pump turbines and water turbine governors
ČSN 09 0011	Combustion engines
ČSN 10 5004	Compressors
ČSN 11 0010	Pumps
ČSN 12 0000	HVAC systems
ČSN 33 2000	Electrical regulations
ČSN 33 3100	Classification of power plants and heating plants
ČSN 35 1100	Power transformers
ČSN 35 0220	Hydro-alternators
ČSN 35 0225	Synchronous compensators
ČSN 38 0526	Heat supply - principles
ČSN 38 5502	Gas fuels
ČSN 44 1315	Solid fuels storage
ČSN 44 1440	Solid fuels – brown coal of North-Bohemian coalfield
ČSN 44 1450	Brown coal of Sokolov coalfield
ČSN 44 1411	Bituminous coal of Ostrava-Karviná coalfield for energetic purposes
ČSN 44 1482	Coke for heating purposes
ČSN 65 7991	Oil products, fuel oils
ČSN 73 0540	Thermal protection of buildings - parts 1, 2, 3, 4
ČSN 73 0550	Thermal properties of building structures and buildings – calculation methods
ČSN 73 0560	Thermal properties of building structures and buildings – industrial buildings
ČSN 83 0616	Quality of domestic hot water
ČSN EN 835	Heat cost allocators for the determination of the consumption of room heating radiators - appliances without an electrical energy supply, based on the liquid evaporation principle
ČSN EN 834	Heat cost allocators for the determination of the consumption of room heating radiators. Appliances with electrical energy supply
ČSN EN 60034	Rotating electrical machines
ČSN EN 61400	Wind power plants
ČSN ISO 8528	Reciprocating internal combustion engine driven alternating current generating sets

MOST IMPORTANT TECHNICAL STANDARDS in the field of measuring and control tools and instruments

ČSN 2500	In general
ČSN 2501	Verification of measuring instruments and measuring devices in general
ČSN 2502	Verification of concrete measuring instruments and measuring devices
ČSN 2509	Measuring instrument accessories and record papers
ČSN 251010	Length gauges
ČSN 2512	Callipers, slide gauges etc.

ČSN 2514	Micrometers
ČSN 2516	Protractors, thickness gauges, feeler gauges and wire gauges
ČSN 2518	Dial gauges and accessories
ČSN 2519	Gauges for measuring the accuracy of machine tools
ČSN 2520	Coordinate measuring machines (CMM)
ČSN 2523	Instruments for measuring surface geometric properties
ČSN 2531	Limit gauges for diameters and length dimensions
ČSN 2532	Limit and standard gauges
ČSN 2533	Gauge blocks and accessories, taper gauges and check plugs
ČSN 2535	Splined shaft and hub gauges and shape gauges
ČSN 2537	Sine bars, knife edges, knife edge square
ČSN 2538	Radius gauges, profile gauges etc.
ČSN 2540	Thread gauges for ISO metric threads fit
ČSN 2541	Limit gauges for screw threads
ČSN 2546	Other screw thread gauges
ČSN 2547	Instruments and gauges for measuring gearing
ČSN 2551	Drawing and control sets
ČSN 2557	Levels, plumb lines, optical squares
ČSN 2561	Area and length measuring machines and gauges
ČSN 2570	Pressure gauges in general and accessories
ČSN 2572	Pressure gauges
ČSN 2574	Analyzing equipments
ČSN 2575	Volume measuring
ČSN 2576	Volumetric weight and density measuring
ČSN 2577	Liquid and gas flows in hollow sections measuring
ČSN 2578	Instruments for liquid and gas flows and quantities measuring
ČSN 2579	Viscosimeters
ČSN 2580	Thermometers in general, components
ČSN 2581	Glass liquid thermometers
ČSN 2582	Pressure-type thermometers, with contacts and for transformers
ČSN 2583	Thermocouple and resistance thermometers
ČSN 2585	Calorimeter and indicators for heating cost distribution
ČSN 2591	Flaw detectors
ČSN 2593	Liquid flow measuring in open channels
ČSN 2596	Control sieves etc.

MOST IMPORTANT TECHNICAL STANDARDS in the field of metrology

ČSN 9900	General provisions, nomenclature, symbols and units of measurement of geometric magnitudes
ČSN 9901	General provisions, nomenclature, symbols and units of measurement of geometric magnitudes
ČSN 9903	Length gauges for yard goods measuring
ČSN 9905	Accuracy of coordinate measuring machines (CMM)

ČSN 9906	Length gauges, micrometers and slide gauges, deviation meters and precision dial gauges
ČSN 9910	Length measuring instruments – rolling and folding gauges
ČSN 9921	Testing of ammeters, voltmeters, wattmeters
ČSN 9931	Glass thermometers
ČSN 9941	Weighing instruments
ČSN 9944	Measuring instruments of mechanical tests of material – hardness meters
ČSN 9947	Mean absolute pressure measuring instruments
ČSN 9954	Electronic filter testing
ČSN 9963	Metal volume measures
ČSN 9964	Large volume measures
ČSN 9968	Gas flow-meters and gas volume-meters
ČSN 9971	Photometric measuring instruments
ČSN 9973	Optical properties of materials measuring instruments
ČSN 9980	General provisions, nomenclature, symbols and units of measurement of physico-chemical properties of materials

Appendix G: Recommended IEEFP Amendments

Specific changes recommended to current text of IEEFP. Show page reference, current text, proposed text and reasons for change.

1) Page 10 (Word document), Chapter 15: ... *In assessing the proposed technologies for a given project, LFI's need to be able to assess the quality of an investment grade audit (IGA)...*

Comment

There are not many „just“ ESPs financed by LFI's credits in our countries. Most often these are projects financed with state (EU) subsidy. That is why the banks say they do not feel much need to develop their own capacities for evaluation of such projects. Instead they use consultants – authorised energy auditors – or recommended companies - to have them evaluate the technical qualities of the ESP audit and project documentation – and its economic results. We cooperate with some banks just because if this. They can include the cost of consultant´s work into the credit... and efficiency of the banking sector must be high here – owners (foreign) are very strict with efficient work of the bank and its officials.

Which does not mean banks are not interested in any training.

2. IFC/GEF guarantee – we had this programme in the Czech Republic several years ago, I wonder if it is still available here...

3. Chapter 1, Page 1 (Word document): Even energy efficiency projects with very high 25 to 50 percent IRR's are unable to compete with one-year internal hurdle rate of returns “projected” for core business investments of many large industrial Hosts.

Comment

Energy Efficiency projects with IRR from 25-50% do not need to look after external financing.

4) Page 10 (Word document), Chapter 15: ... *In assessing the proposed technologies for a given project, LFI's need to be able to assess the quality of an investment grade audit (IGA)...*

Comment:

There are not many „just“ ESPs financed by LFI's credits in our countries. Most often these are projects financed with state (EU) subsidy.

That is why the banks say they do not feel much need to develop their own capacities for evaluation of such projects. Instead they use consultants – authorised energy auditors – or recommended companies - to have them evaluate the technical qualities of the ESP audit and project documentation – and its economic results. We cooperate with some banks just because if this. They can include the cost of consultant´s work into the credit... and efficiency of the banking sector must be high here – owners (foreign) are very strict with efficient work of the bank and its officials.

Which does not mean banks are not interested in any training.

2. IFC/GEF guarantee – is it still available in the Czech Republic?

4. APPENDIX A: TABLE M&V SUMMARY: SUGGESTION TO ADD ONE COLUMN:

Original M&V table

Savings Measure	Item Measured	Level Measured	Item(s) Stipulated (based on post actual)
Water	Gallons	Sample	Toilets – # Flushes Showers – # & Time
Lighting	kW	Sample	Hours of Use (based on actual logged use)
Steam Traps	Steam Loss	Sample	Extrapolated Actual
Power Factor	Utility Bill	100%	Annual Savings
Sterilizer	Steam Loss	100%	Annual Savings
Chiller Plant	kW/Ton	100%	Ton Hours

Proposed M&V table (distinguishing medium and units)

Savings Measure	Item measured	Units of measurement	Level measured	Item stipulated (based on post actual)
Water	Hot and cold water	Litres	Sample	Toilets = # Flusches Showers = # & Time
Lighting	Electricity	kW	Sample	Hours of Use (based on actual logged use)
Steam Praps	Steam loss		Sample	Extrapolated actual
Power factor	Utility bill		100%	Annual savings
Sterilizer	Steam loss		100%	Annual savings
Chiller Plant	Elektricity savings	kW/t	100%	Tonhours

4. Tables: All US\$ will have to be translated into EURO, units will be translated into those used in Czech Republic.

5. The last page or any other place should state that the Czech version (and also Romanian, Bulgarian...) was developed within the Intelligent Energy Europe Programme and Logo of IEE should be placed there.