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PERMANENT

PERformance Risk MANagement for ENergy
efficiency projects through Training

Project IEE/08/657/SI2.528420

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1. INTRODUCTION

1.1 Why PERMANENT?

The success of Europe's energy and climate policy depends on a very large extent on the realisation of very large energy efficiency gains. While the potential for energy efficiency is there, a number of barriers still inhibit the realisation of this potential. **The PERMANENT project addressed the most common barrier to deployment of energy saving projects: perceived risk of achieving project results = disbelief that planned project results (project performance) will be achieved and can pay back the investment in a sustainable manner.**

This disbelief or lack of confidence in project savings impedes investment even where energy audits or other engineering analyses demonstrate sound investment opportunities. Third Party Financing (TPF) projects have, however, demonstrated key techniques for measuring project results, verifying achievement of guaranteed savings, and financing energy savings projects without the need for collateral beyond that of the project itself.

That was why the *primary* objective of the project was to address the common performance fears in emerging European economies, to significantly enhance the rate of investment in energy savings projects. This project addressed these fears by:

- (a) Developing and testing harmonized and integrated approaches for end users to measure and verify their energy savings in 5 Member States (approaches used in western Europe and internationally - International Performance Measurement and Verification Protocol, IPMVP, and International Energy Efficiency Financing Protocol, IEEFP, of Efficiency Valuation Organisation, EVO, were the basis for this development);
- (b) Educating energy end users, financiers and energy services suppliers on performance risk measurement and management techniques in energy saving projects;
- (c) Creating trained instructors who will be able to continue imparting PErformance Risk MANagement ENergy Training after the completion of this project.

Savings "measurement" is a key risk management tool.

Performance measurement, verification, management and reporting should become standard practice if the benefits of energy efficiency investments are to become sustainable, reliable and **PERMANENT**.

Secondary objectives of the project in Central/Eastern Europe were to:

- Increase the use of private sector financing for energy efficiency projects.
- Identify key elements which might be specific for public sector procurement of successful energy efficiency services.
- Demonstrate methods of performance documentation which would accelerate the uptake of market mechanisms such as white certificates.
- Establish a body of knowledge which may be used as a basis for accreditation or certification of energy services experts.
- Promote good practices in project risk management.
- Promote good practices in energy project planning and management.
- Foster development of energy services companies.
- Foster exchange of best practices on financing mechanisms which promote private investment in energy efficiency.

The strategic objectives of this project were:

- To expand the value of energy efficiency projects in Poland, the Czech Republic, Romania, Bulgaria and Croatia.
- To increase energy performance contract sales in Poland, the Czech Republic, Romania, Bulgaria and Croatia by reducing the stress that can arise over reports of the amount of actual savings. When an ESCO and its customer disagree over actual savings amounts, distrust of the performance contracting approach permeates a new market quickly, leading to general anxiety amongst potential future ESCO customers about the wisdom of using an ESCO approach.

The project aimed also at better understanding of principles of Third Party Financing and mainly Energy Performance Contracting concepts and of the value of energy service providers. It developed awareness about and better understanding of the Efficiency Valuation Organization's Protocols, making use of 15 years of experience represented by the Efficiency Valuation Organization (EVO) in performance risk management and end user energy efficiency project valuation.

One of the project activities was to adapt the savings measurement protocol to Central & Eastern Europe. It was then translated and printed in 5 national languages and in English and was made available to European energy users free of charge at: <http://www.evo-world.org/>

The following activities comprised educating financiers, project developers, industries, public administration, energy professional and energy users about how energy efficiency projects can demonstrate permanent results and how that permanence can break the distrust barrier. EVO training materials and the translated Protocols were the basis for the massive trainings.

1.2 PERMANENT countries and project partners

The countries involved in the project were: Poland, Bulgaria, Romania, Croatia and the Czech Republic. EVO experts (John Cowan, Thomass Dreesen and Anees Iqbal), having personal experience with the development of measurement and verification tools, were directly involved in the project through project partner Maicon Associates from the UK.

Project co-ordinator of PERMANENT was ENVIROS from the Czech Republic. It was assisted by Maicon Associates, who managed the knowledge and technology transfer aspects of the project. These and all other participants in the project have practical experience with energy auditing, verification of energy saving projects, Energy Performance Contracting or energy efficiency financing in their home countries.

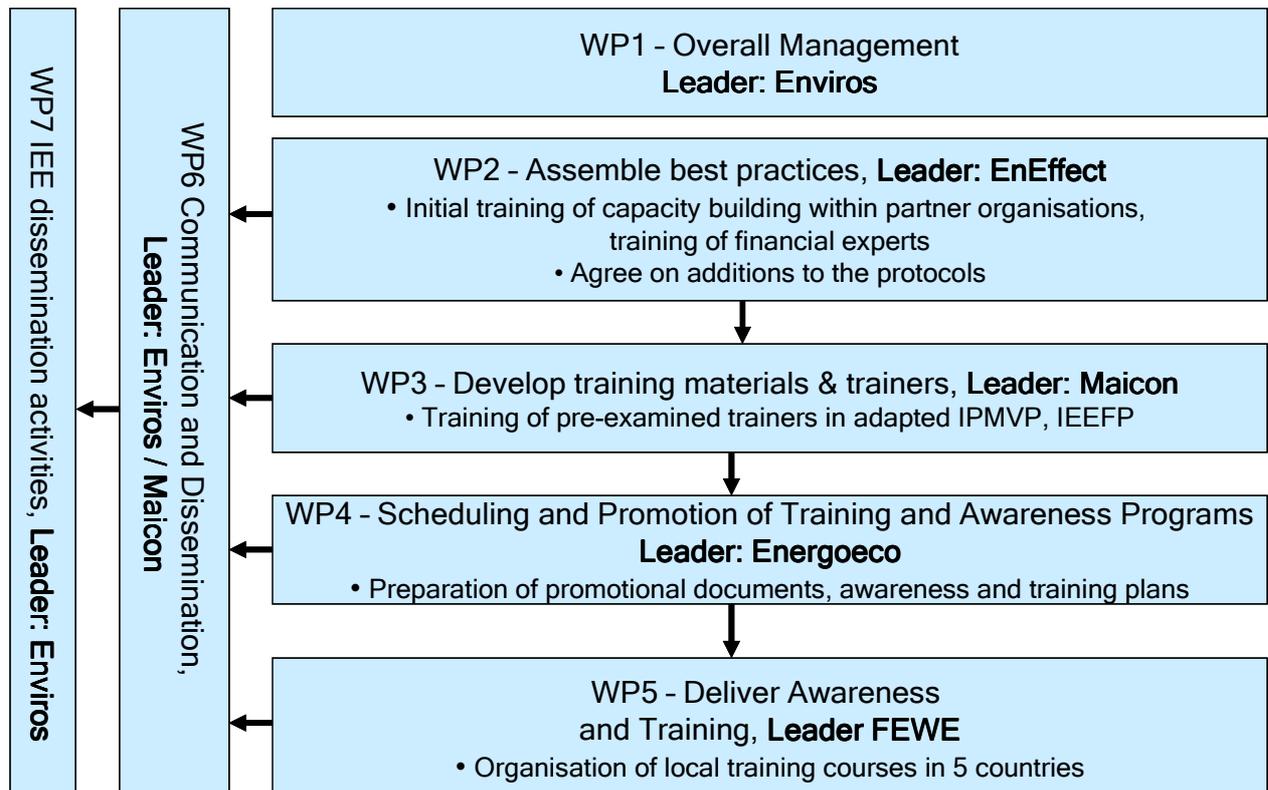
Partner name	Country
ENVIROS, s.r.o. , <i>project co-ordinator</i>	Czech Republic
Maicon Associates Ltd.	United Kingdom
Polish Foundation for Energy Efficiency (FEWE)	Poland
EnEffect-Consult Ltd.	Bulgaria
EnergEco	Romania
DZZD "Econoler, EnEffect and Elana" (EEE)	Bulgaria
HEP ESCO d.o.o.	Croatia

1.3 Target groups and major activities within the PERMANENT project

PERMANENT has trained energy end-users, technical energy efficiency professionals, and financiers and bankers in measurement and verification and performance risk management techniques. Trainings were scheduled for the following target groups:

Target Group	INVOLVEMENT / ENGAGEMENT	BENEFITS
Technical Energy Efficiency Professionals	Up to two days' training of professionals making use of the IPMVP and training materials specifically prepared for PERMANENT	Increased knowledge in detailed energy savings 'measurement' techniques. Provable savings projections will enable larger project investments. More business for consultants.
Financiers Bankers	Up to half-day trainings using the IEEFP as a basis	Increased confidence in projects with provable savings, and lower collateral requirements when well-documented savings streams are guaranteed by credible technical sources. More investments in energy efficiency. Increased understanding to ESCO services.
Energy End Users from public and private sector	Presentations at workshops / conferences (up to half an hour), articles in magazines.	Increased awareness of performance risk management techniques for energy efficiency projects (disseminated among a wider professional audience)

Figure 1: The PERMANENT work plan



The PERMANENT project was carried out according to the work plan shown above:

1. Project Management
2. Assembling Best Practises- After receiving initial training in EVO documents and materials (IPMVP and IEEFP), each partner prepared an example savings measurement and verification (M&V) plan and savings report for 2 energy efficiency projects in its home country. The Protocols were adapted to both existing European legislation (e.g. IPPC, EPBD, ESD), national legislations & standards and after that translated. Partners agreed on ways to customize the IPMVP to the national and EU context.
3. Develop training materials and training the trainers - From this assembly and harmonization of materials for Europe, training materials were developed. Training of trainers' was provided by a team of EVO experts fully immersed in EVO's tools.
4. Promotion of training and awareness programs - Partners widely promoted awareness of the techniques of performance risk management through development of promotion materials and arranged speaking engagements at: energy user conferences, ESCO conferences, banker conferences and engineering conferences.
5. Delivering awareness - Partners in the five countries organized local training sessions for different market segments and in different levels of depth.
6. Dissemination and communication – project results were disseminated among an EU-wide professional public

.Figure 2: Kick-off meeting in Prague



2. PERMANENT COUNTRIES BACKGROUND

2.1 Potential for energy savings

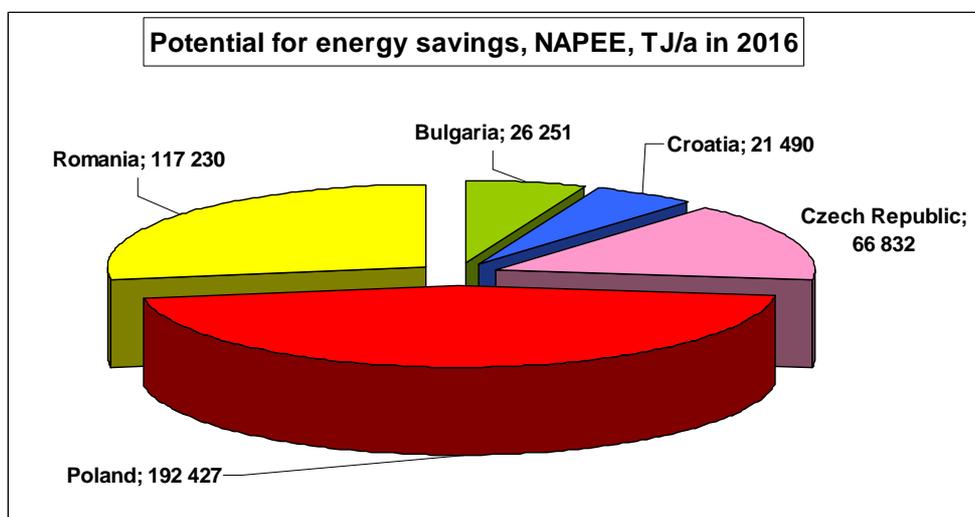
The energy savings potential in the EU is large and exists in all sectors of the economies. Estimates of the potential for increased energy efficiency allocate 19% to industry; 20% to transport; 30% to households and services. These data are country specific. Reducing energy consumption and eliminating energy wastage are among the main goals of the European Union (EU), one of their main goals being to cut its annual primary energy consumption by 20% by 2020. To achieve this goal, the EU has been working on mobilising public opinion, decision-makers and market operators and on setting minimum energy efficiency standards and rules in energy efficiency (labelling of products, services and infrastructure, energy certificates of buildings) and on improved energy management and extension of energy services.

The EU agenda on energy efficiency policy is developed around so called ‘five pillars’:

1. the general policy framework and the actions taken under the **Action Plan for Energy Efficiency (EEAP)**;
2. the National Energy Efficiency Action Plans (NEEAP) based on the framework Directive on end-use efficiency and energy services;
3. the legal framework for the most important consumption sector buildings – and energy consuming products;
4. policy instruments such as targeted financing, provision of information and networks like the Covenant of Mayors and Sustainable Energy Europe; and
5. international collaboration on energy efficiency.

The energy efficiency potential in the five PERMANENT countries is even higher than the EU average. Detailed analysis of possibilities in reducing energy consumption in existing and new buildings, in industries and transport were made for the National Energy Efficiency Action Plans (NEEAP), worked out according to the Energy Service Directive (2006/32/EC). The NEEAPs identified potential reductions in energy consumption after implementation of energy saving measures by 2016. Figure 2 shows the potential energy savings targeted in the NEEAPs of the partners’ countries.

Figure 3: Potentials for energy savings as per NEEAPs developed in 2007



NEEAPs contained a comprehensive list of actions to be taken: technical, legal, institutional, administrative, organisational, economic and financial, and also promotion of energy services and ESCO business development. In this specific sector estimates were made of the total potential for investments by ESCOs at the level of about 648 million EURO by 2016 at least. Therefore, ESCOs can potentially play a major role in energy savings in all 5 countries.

Table 1: Estimated ESCO sales Potential by country

Partner country	Estimated investment in mil. EURO	
	MIN	MAX
Bulgaria	150	380
Croatia	248	571
Czech Republic	80	125
Poland*	80	200
Romania	90	180
Total	648	1 456

Source: estimates of partners

2.2 Barriers to financing energy efficiency projects

In the five PERMANENT countries, following categories of barriers to financing energy efficiency projects have been identified:

- Legal, institutional and administrative barriers;
- Economic and financial barriers;
- Lack of awareness, human capacities and professional skills.

The perceived barriers to energy efficiency exist mainly in following areas:

- governments are either passive or slow in designing and implementing EE policies and programs, mainly in current situation of budgetary restrictions eliminating total investments not only investments into increased energy efficiency. State support for energy efficiency is low or non-existent.
- Legislation does not include clear requirements of activities which should be performed by the state and other public financed facilities. Also, there is insufficient guidance for public procurement officials on the special requirements for purchasing energy efficiency services and equipment;
- The current financial crisis has led banks to impose stricter requirements on creditworthiness of their clients, while client indebtedness and operating problems have made them less attractive hosts for financiers.
- Lack of skills at both public and private organisations, creating disinterest or disbelief in financial benefits of energy efficiency projects. The situation between private and public organisations, does, however differ substantially:
 - Industrial companies generally recognise the benefits of energy efficiency measures but have competing investment needs limiting the capital they make available for energy efficiency investments.
 - In public organisation, disinterest for energy efficiency still exists, as often no one has been made responsible for reducing the energy bill.

- Lack of understanding to energy performance contracting (EPC) still persist and lack of trust in energy service companies, little knowledge in enforcing contracted guarantees. Lack of trust in private businesses by public building officers, even if they are aware of the advantages of energy efficiency, is a problem recognised in all PERMANENT countries.
- A gap between the traditional lending practices and the financing needs of EE projects exists. Financiers typically apply “asset-based” corporate lending approaches to 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. Instead, the value of EE projects is in the certainty of future cash flow generated by project installation and transparently documented actual savings that are guaranteed.

Following a comprehensive list of barriers to energy efficiency has been compiled which the PERMANENT partners found most important to energy services development in their countries and to increased financing of energy efficiency project in general.

Table 2: List of major general barriers in investing into energy efficiency

BARRIER (“X” = Major Deficiency)	Czech Republic	Bulgaria	Romania	Poland	Croatia
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	X
Lack of commercially viable financing (unattractive terms & tenor)	-	-	X	X	X
Complex transactions with energy service companies (ESCOs)	X	X	X	X	X
Low priority and rates of return	X	X	X	X	X
Low (subsidized) energy prices	-	X	X	X	X
Complex technologies	-	X	X	-	X
Too much reliance on subsidies	X	X	X	X	X
Lack of energy management skills and practical experience	X	X	X	X	X

2.3 The ESCO market in the PERMANENT countries

Third party financing (TPF), or Energy Performance Contracting (EPC) projects have demonstrated already a key technique for managing savings risks: measuring and documenting project results. They also demonstrate how well-documented guaranteed savings enables the financing of energy savings projects without the need for collateral beyond that of the savings cash flow created by the project itself. ESCOs operate in all partner countries, though in different ways as discussed below. The status in each of the countries in the course of the PERMANENT project is described below.

In the **Czech Republic**, the number of EPC projects has been steadily increasing with first projects implemented already in 1993. The method has been widely promoted since early 90ies by ESCOs themselves and by Consultants, most recently with support of Ministry of Industry and Trade and Ministry of Environment as an alternative to diminishing investments budget. The method starts to be recognised by public authorities. Thanks to risk management by ESCOs and their full guarantee of cost savings in the contract, ESCOs can sell the debts and future cash flow

generated to banks. This is also feasible due to the fact that most EPC contracts are in the municipal and/or regional sectors, in which repayment conditions are from the banker's point of view safe. Public buildings (hospitals, pensioner's houses and schools) make most of the EPC projects during last years and advisory companies exist which help the public sectors in procurement of the EPC services. The Czech Association of Energy Service Companies (APES) was established in 2011 (www.apes.cz). ENVIROS has become a member of the association as EPC advisor / consultant.

In **Bulgaria** energy services are specified by law on energy efficiency. Contracts and tender documentation have been standardised. The range of service required is stipulated by the legislation and relates to final mandatory result of buildings modernisation (requiring A or B level energy certificates). Such a requirement does not enable to finance projects just from achieved savings and mostly co-financing is necessary from local budgets. Though, numerous ESCO projects exist in public buildings, and in these ESCO's receivables are sold to a security fund after the project is implemented.

In **Romania** ESCO services have not yet developed to a standardised form. Private companies and the national agency are working hard to improve understanding and acceptance of ESCO services in energy user efficiency. Most recently EBRD has been supporting EPC projects in Romania.

In **Croatia** a very high potential for ESCO services has been identified in all sectors: district heating, public lighting, buildings, CHP installations, etc. The legislative framework is not particularly supportive of the ESCO concept. The ESCO model is not recognized by the authorities as an individual business model. The result of this situation is that ESCOs cannot invoice their services as a package, and VAT must be paid for the equipment installed for the client, which make ESCO provided projects expensive. Similar to many other countries, public procurement is complicated.

In **Poland** the ESCO potential is mainly identified in the heating of municipal buildings, usually with long payback periods. A major issue is to achieve agreement between the Mayor, its Board and Council that will first have to accept long contracts and then successfully live with them. The investment potential is very high since few municipal buildings in Poland have been retrofitted to date. It is easier for large municipalities to undertake EE actions and ESCO projects since they have EE engineering and procurement experience and legal capabilities on staff. In theory, there is also a large potential for ESCOs in industrial facilities.

The **UK** has been seen as one of the most important ESCO leaders in Europe (for instance EC DG JRC 2005). However, between 2000 and 2004 a serious stagnation of investment was experienced partially due to the demise of CHP. Growth of the ESCO market is the highest in the commercial sector, then in the public sector, and slowest in industry; the residential sector still accounts for a negligible part of ESCO activity. The general contracting scheme is called Contract Energy Management (CEM). The main element of CEM is that a significant percentage of the financial risk is transferred from the client to the ESCO that takes over responsibility for the management of energy¹.

¹ Latest development of Energy Service Companies across Europe, a European ESCO update, Benigna Boza-Kiss, Paolo Bertoldi, Silvia Rezessy, DG JRC

2.4 Measurement and verification (M&V) practices in PERMANENT countries

M&V related practices within the PERMANENT countries were rare at the beginning of the project.

- ESCOs have some practical experience and developed their own methods of M&V for project control;
- In Bulgaria ESCO activities are supported by special regulation;
- In all countries ESCO activities are better accepted when M&V is part of the contract, and subsequent energy results are determined in accordance with the plans.
- So far, the greatest experience with M&V is in Bulgaria, Croatia and the Czech Republic.

Bulgaria - Bulgaria is the closest of all countries in having legal requirements that relate to M&V. No mandatory requirements for special measurements to support data used in standardized software calculations for energy audits or energy savings assessments are stipulated by the Bulgarian legislation, but a regulation exists named: 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. This Ordinance defines the way in which energy savings are calculated, measured, etc. and in its Annex No. 6 also Methods are defined for collection and processing of data for evaluation of energy savings.

Also Ordinance concerning the Terms and Procedures for Determination of the Amount and Payment of the Planned Funds under Performance Contracts Leading to Energy Savings in Buildings, which are State and/or Municipal Property, exists and a unified training programme for energy auditors, endorsed by the Executive Director of the Energy Efficiency Agency. Energy efficiency company certification includes training in measurement procedures. ESCOs have a special interest in providing site measurements and verifications, to ensure their predicted energy savings are realistic and a reliable basis for an energy performance contract. IPMVP might become mandatory in Bulgaria, IPMVP could be added to the training requirements for EE companies, thereby improving service supplier quality.

Discussions were held during the PERMANENT project on whether IPMVP energy saving verification methods and procedures can be compatible with the Ordinance requirements. The conclusion was yes - IPMVP is a cookbook, a guide.

Croatia - There is no particular M&V practice or specific legislation in Croatia relevant to IPMVP. HEP-ESCO is producing M&V plans for its own purposes and not for performance contracting.

Czech Republic - Standardised tender procedures and pilot contracts may be among the reasons why energy performance contracting is growing in use as a method of achieving “safe” energy savings. Energy performance contractors routinely use M&V procedures, since they guarantee savings.

Many energy management systems implemented at industrial companies are using M&V related methods of energy measurement called Monitoring & Targeting (M&T). M&T is a management technique in which the energy sources used in each plant cost centre are closely monitored and compared with production volumes. Routine analysis enables the setting of appropriate target profiles so that variances from target can be spotted and addressed. M&T techniques support the development of baselines for M&V plans and produce the data needed to verify achieved savings.

As to legislation, no legislation requires measurement and verification of energy savings. M&V plans are not part of energy audits. Calculations of energy savings in energy audits concentrate on thermal insulation qualities of the building. Calculations are very detailed using standardised procedures of the Czech standard ČSN 73 0540-2, harmonised with the EU standards updated for certification of energy performance in buildings.

Standards are 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, since savings achieved by better operations (compared to physical retrofits) are not considered to be “reliable.”

Poland - In Polish legislation there are no mandatory requirements related to measurements and calculations for energy audits or energy savings assessments for ESCO contracts and EPC. On national level there are legislative provisions on: buildings energy certification, thermomodernisation grants and for “white certificates: i.e. improving energy efficiency. But to date, these acts do not regulate the questions of savings measurements in EE projects.

The laws, ordinances and other documents (standards etc.) related to the evaluation and verification of the savings achieved are:

- Energy Efficiency Act
- Ordinance concerning energy audit in “white certificate” procedure (not published yet)
- Ordinance concerning methodology of working out building energy certification

But as it has been said above there are no mandatory requirements for special savings measurements. Large stakeholders like Siemens, Dalkia, Philips, Honeywell, providing ESCO services know IPMVP and to a certain extend use its provisions in their contract rules.

Romania - The National Energy Balance Elaboration Guide describes how to perform an energy balance, an energy audit, and how to make measurements. However verification (or M&V) is not regulated. The Romanian Energy Regulatory Authority (ARNE) defines how energy measurements are made in the Electric Energy Measurements Rules and the Thermal Energy Measurements Rules.

2.5 EU standardisation efforts related to Energy Savings and M&V (2010)

In addition to the duties imposed upon Member States, the Directive 2006/32/EC addresses some of the duties to other entities. Pursuant to the Directive, documents facilitating or directly conditioning the fulfilment of the duties by Member States should be created.

Article 8 called "Availability of Qualification, Accreditation and Certification Schemes" can serve as an example. Another example is Article 14 called "Reports", pursuant to which the Commission "shall publish a cost/benefit impact assessment examining the linkages between EU standards, regulations, policies and measures on end-use energy efficiency". A number of duties are addressed to the Commission in Article 15 called "Review and Adaptation of the Framework". This article addresses the following:

- Adaptation of the evaluation of savings and their calculations to technical progress,
- Measurability of savings, their estimates, determination of the accuracy of these estimates, harmonised lifetime of saving measures and verification of savings by a third party,
- Increase the proportion of savings evaluated using the "bottom-up" method,
- Creation of a set of harmonised energy efficiency indicators and benchmarks based upon them.

The harmonised energy efficiency indicators are prepared in cooperation with the CEN – Comité Européen de Normalisation in scope of the QACS (Quality Assurance & Control System) Programme. A fundamental pillar, on which the QACS is based, involves standards, and therefore, a requirement for new standards was created in linkage to the above mentioned directive in the CEN group engaged in the "Energy Management". The highest priority was given to the following:

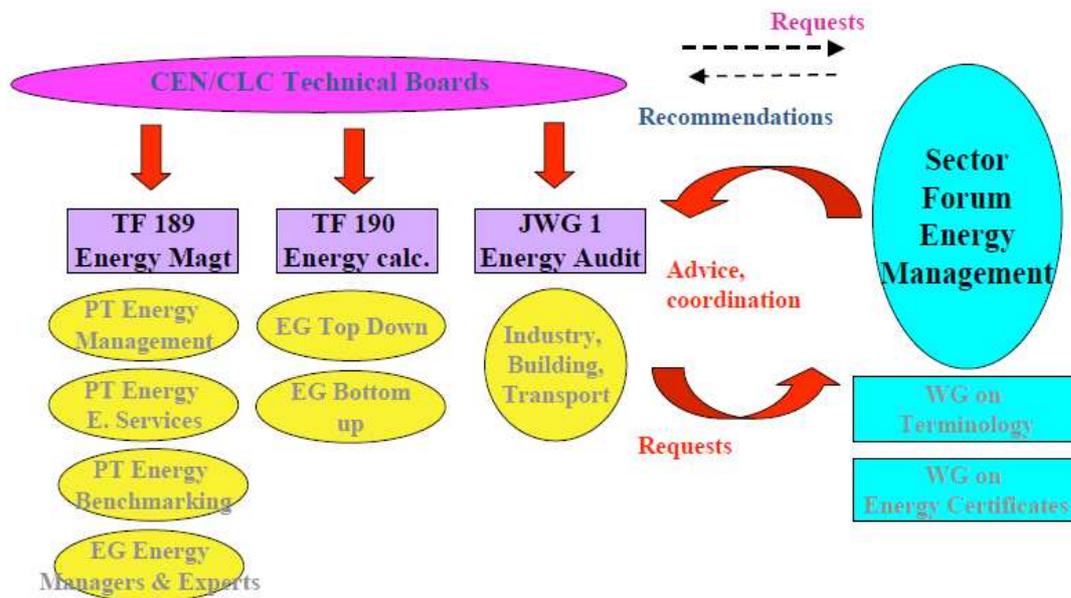
- Energy Service Companies
- Energy Managers and Experts
- Energy Management System
- Energy Efficiency and Savings calculations.

The following standards were added later:

- Energy Efficiency Services
- Energy Labelling (Benchmarking)
- Energy Terminology
- Energy Audits
- Green and White Certificates, Certificates of Origin

Task Forces 189 and 190 were established to prepare the relevant documents. Their responsibility is shown in the figure hereinafter.

Picture 1: Scheme of CEN-coordinated works on standards related to the Directive 2006/32/EC:



Source: CEN/CENELEC Conference Brussels March 2010, Mr. Inge Pierre - presentation Energy Management System

Standards already developed include:

- EN 16 001 on Energy management Systems, publication 1st of July 2009 (TF 189 PT EMS, SIS). Standard for Energy Management Systems has been in effect since June 2009.

According to this document, an organization should receive an overview of its energy situation and of the possibilities to improve this situation systematically and gradually.

- EN 15900 on Energy Efficiency Services, CEN/CLC Enquiry until June 2009, publication November 2010 (TF189 PT EES, UNI). This document contains the minimum requirements for providing energy services by providers and enables the customers to choose such a provider based on the quality assessment of the service offered. **The standards says: the improvement of energy efficiency shall be measured and verified over a contractually defined period of time through contractually agreed methods. Verification requires development and implementation of the measurement and verification plan for the assessment of the actual energy efficiency improvements.**

Standards under way in June 2010

- Working drafts on Top down and Bottom up energy efficiency and savings calculations, June 2009, (TF190, NEN)
- CEN/CLC Enquiry on CEN/ CLC Technical report on Terminology in July/August 2009 (SFEM WG, AFNOR)

New standardisation work

- CEN/TC320/WG10 on Energy consumption and GHG emissions in relation to transport services : started December 2008, AFNOR
- CEN/CLC/TF189/PT Benchmarking methodologies for energy uses : started March 2009, NEN
- CEN/CLC/TF189/WG on Energy Managers and Energy experts: feasibility study to be sent to CEN/CLC BTs by end of 2009, UNI

What is next

- CEN/CLC/WG on Energy Audits, BSI (to start September 2009)
- CEN/CLC/ WG on Guarantees of Origin, SIS.
- Other works on the standards for energy audits are not at an advanced level of elaboration, they are limited to the standards for energy audits of buildings and industrial sectors and calculations of overall national energy savings as required by Article 4 of the Directive.

The joint working group (JWG) registered initially under the number TF190 became after the JWG4. It is chaired by France (J-L PLAZY, ADEME and AFNOR, as convenor) and administrated by the Netherlands (Bert DIJSKTRA, NEN, as secretary). Terms of reference for JWG4 included to take in account the following topics :

- methodology and general rules of calculation,
- terminology and definitions,
- choice of parameters and data, to be used including data quality and data sources.

Ten European countries bring regularly their contribution to this JWG work.

All this information was received at a meeting with J-L Plazy in Zagreb, 2010. It was appreciated by the PERMANENT team. It was agreed that possibilities should be sought on how to incorporate IPMVP reference and in some of the standards under development – where appropriate, relevant and useful.

3. INTERNATIONAL PROTOCOLS OF EVO - IPMVP AND IEEFP

3.1 History of the Protocols

For efficiency to be considered a reliable resource, its energy savings, including the persistence of savings, must be verifiable and project transactions costs must be kept to reasonable levels. If energy efficiency is to realize its full potential, facility owners and operators, service companies, consultants, contractors and financiers should adopt common technical, financial and legal standards that guide the measurement and verification (M&V) of savings and other aspects of energy efficiency business transactions.

Starting in the 1990s, standardized approaches to energy efficiency M&V were developed to assist developers, owners and financiers of projects. Today, the EVO-owned International Performance Measurement and Verification Protocol (IPMVP) is the leading international standard in M&V protocols. IPMVP has been translated into 10 languages and is used in more than 40 countries. Five thousand copies are ordered or downloaded annually.

Two types of protocols deal with:

International Performance Measurement and Verification Protocol - IPMVP – provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. IPMVP was originally applied for EPC projects in North America but has gradually gained ground throughout Europe.

International Energy Efficiency Financing Protocol - IEEFP - provides guidelines for local financing institutions around the world to evaluate and finance energy efficiency and savings-based renewable projects.



www.evo-world.org

IPMVP and IEEFP are published by the **Efficiency Valuation Organization (EVO)**. EVO is a non-profit corporation with a Mission to “develop and promote the use of standardized protocols, methods and tools (EVO Protocols) to quantify and manage the performance risks and benefits associated with end-use energy efficiency, renewable energy, and water efficiency business transactions.” EVO is a community of volunteers which came together in 1996 under a US Department of Energy initiative to develop an international M&V protocol that would help determine energy savings from ESCO projects in a consistent and reliable manner. EVO has been an independent volunteer run non-profit corporation since 2001.

EVO's role in the project is in supplying the basic course material to be adapted by PERMANENT. Experts with intimate knowledge of IPMVP and IEEFP were part of the Maicon team and channelled support from EVO in the form of course materials (and assisted in customizations of IPMVP and IEEFP as needed for PERMANENT). Co-operation with EVO ensured long term availability of project materials and a focal point for ongoing updates.

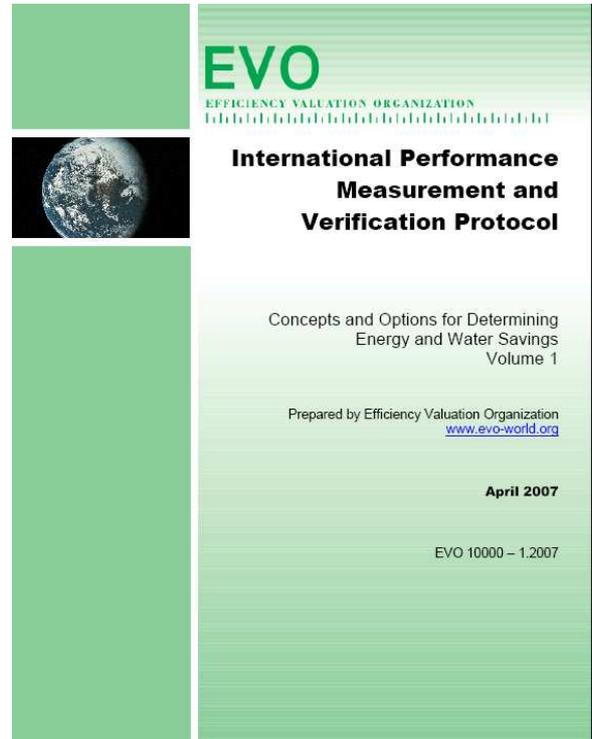
3.2 Introduction to IPMVP

The IPMVP provides an overview of current best practice techniques available for verifying results of energy efficiency, water efficiency, and renewable energy projects in commercial and industrial facilities. It may also be used by facility operators to assess and improve facility performance. It is especially used in energy performance contracts where savings must be reported to a client and may form the basis of a payment to an ESCO.

IPMVP presents common terminology and defines full disclosure, to support rational discussion of often contentious M&V issues. A primary purpose of IPMVP is to publish current good M&V practise, as reassurance for the public about savings reports. Its global use has helped the EPC industry in the USA and worldwide.

Energy conservation measures (ECMs) covered in the protocol includes fuel saving measures, water efficiency measures, load shifting and energy reductions through installation or retrofit of equipment, and/or modification of operating procedures. The IPMVP has three current volumes:

- Volume I Concepts and Options for Determining Energy and Water Savings;
- Volume III contains specific application guidance manuals for Volume I (current manuals address new building construction (Part I) and renewable energy additions to existing facilities (Part II)).



Content of IPMVP

IPMVP is written to progressively provide greater levels of definition of M&V practice through the Chapters as summarized below.

- Chapter 2 defines M&V and describes eight different applications for M&V techniques.
- Chapter 3 presents the six foundational principles of good M&V practice and the IPMVP. They are useful for guiding M&V design details where IPMVP is silent.
- Chapter 4 presents the general framework and savings computation equations needed to properly express savings. Table 1 summarizes four M&V design Options and Chapters 4.8 - 4.10 describe each of them. Chapter 4.11 offers guidance and a logic diagram for selecting the right Option for any application. Appendix A provides example applications of IPMVP's methods to 12 typical projects.
- Chapter 5 lists the topics and data which should be included in an M&V Plan and offers some suggestions on key issues which might be discussed under each topic. Readers can use this as a checklist for describing the M&V design for a particular project.
- Chapter 6 lists the topics and data that should be included in savings reports.
- Chapter 7 shows the requirements for claiming adherence with IPMVP and suggests terms for specifying the use of IPMVP in contracts.

- Chapter 8 reviews a variety of common M&V issues that need to be considered in any M&V program. A key issue governing the design and operation of an M&V system is the competing needs for reasonable accuracy and reasonable cost. Each user must find its own balance between the accuracy and cost of reporting. Chapter 8.5 particularly focuses on the factors involved in this tradeoff. Appendix B provides an overview of some uncertainty and statistical methods, but this overview is not a definitive text on the topic. Users are advised to seek appropriate statistical design help for any M&V program data normalization, sampling or uncertainty evaluation techniques they may use. Chapter 8 also presents design issues surrounding metering for M&V programs, though it is not a definitive text on metering.
- Chapter 9 contains the definitions of key terms used in this document. The terms are italicized throughout the document to indicate that they have the special meanings given in Chapter 9.
- Chapter 10 lists useful readings, references, and other sources of useful material.

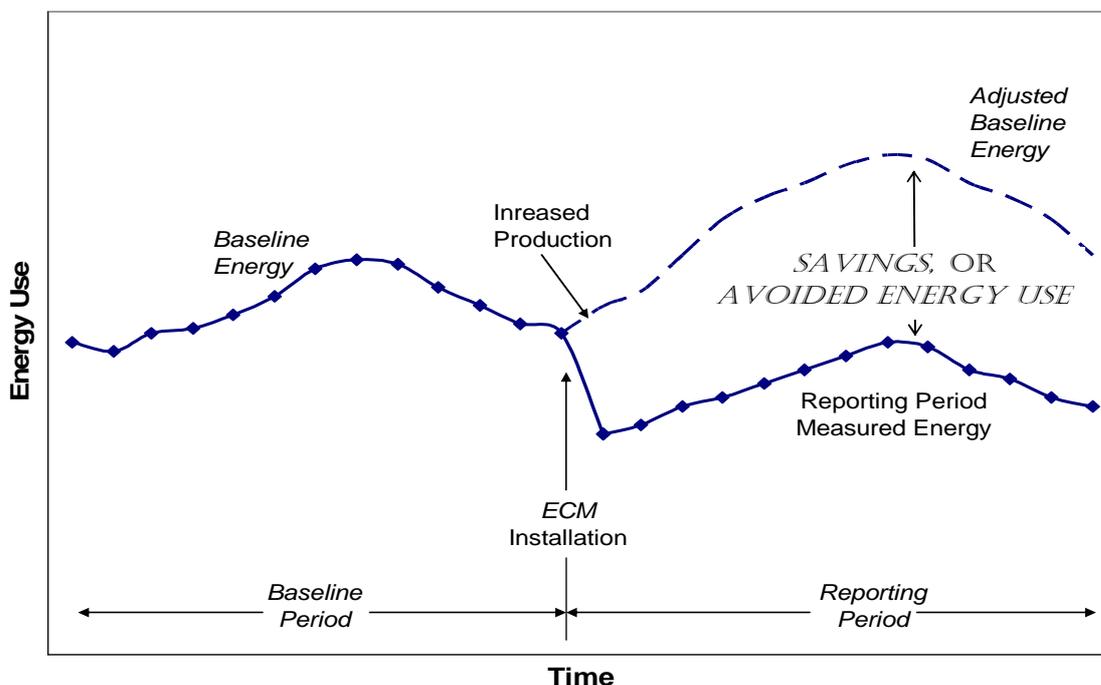
The IPMVP Methodology

The methodology is based on the fact that energy savings cannot be directly measured. They can only be determined by comparing measured use before and after implementation of a project, and making appropriate adjustments for changes in conditions. In a simplified way, it can be said that:

$$\text{Energy (cost) savings} = (\text{Baseline Energy} - \text{Reporting-Period Energy}) \pm \text{Routine Adjustments} \pm \text{Non-Routine Adjustments}$$

Simple comparisons of measured energy amounts without the Adjustments term reports only energy change and fail to report the true performance of a project. To properly report “savings,” adjustments must account for the differences in conditions between the baseline and reporting periods.

Figure 4: Determining True Energy Savings

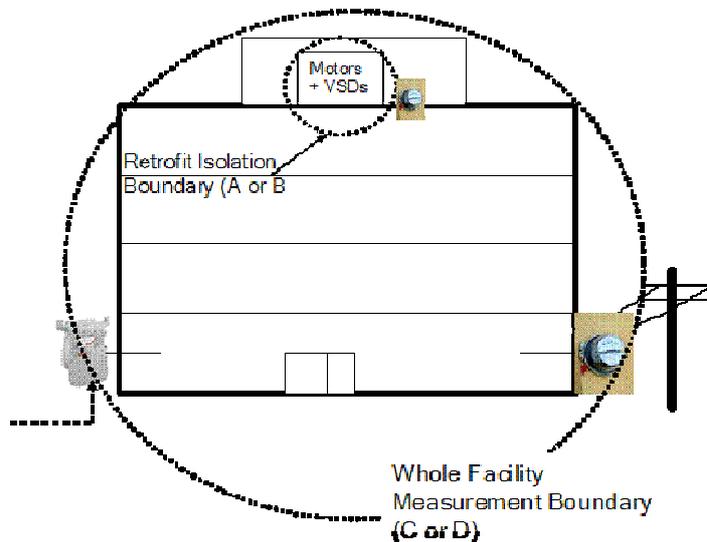


Source: EVO

IPMVP defines four Options for determining savings: A, B, C, and D. These four Options enable evaluation of all types of energy efficiency techniques deployed at a building or industrial plant. They provide flexibility in balancing the accuracy and costs of M&V.

- **OPTION A** – Retrofit Isolation: Key Parameter Measurement. A typical application is a lighting retrofit where power draw is the key performance parameter that is measured before and after retrofit. Operating hours of the lights are estimated based on building schedules and occupant behaviour.
- **OPTION B** – Retrofit Isolation: All Parameter Measurement. A typical application is a variable-speed drive (VSD) and controls added to a motor to adjust pump flow. Electric power can be measured with a kWh meter installed on the electrical supply to the motor. In the baseline period, this meter is in place for a week to verify constant loading. The meter is in place throughout the reporting period to record the energy reduction relative to the baseline level. Adjustments are made as needed for changes in the pump flow circuit.
- **OPTION C** – Whole Facility. A typical application is a multifaceted energy management program affecting many systems in a building. It involves measuring energy use with the gas and electric utility meters for a twelve-month baseline period and throughout the reporting period. Adjustments are made for weather variations and any other changes in the equipment or occupancy of the building.
- **OPTION D** – Calibrated Simulation. A typical application is a multifaceted energy management program affecting many systems in a facility but where no meter existed in the baseline period. Energy use measurements, after installation of whole building gas and electric meters, are used to calibrate a detailed computer simulation. Baseline energy use, determined using the calibrated simulation, is compared to a simulation of reporting period energy use.

Figure 5: Determining The Measurement Boundary



The choice among the four Options involves many considerations, one of which is the **definition of the measurement boundary** (e.g. a whole building or one energy using system within a plant.) To manage savings at the whole facility level, Option C or D are needed. However, for more detail on the performance of an individual retrofit, a retrofit isolation would be used (Option A or B).

The PERMANENT project informed energy users, energy efficiency professionals, ESCOs and financiers about the benefits and techniques of IPMVP.

3.3 IPMVP and M&V Plans

IPMVP is a guidance document developed for proper measuring, computing and reporting savings achieved by energy or water efficiency projects at end user facilities. IPMVP intends to be used as a basis for establishing of specific M&V plan (measurement and verification) relating to the project characteristics. IPMVP is designed to allow maximal flexibility in M & V plans processing together with the compliance with the principles of accuracy, completeness, conservatism, consistency, relevance and transparency.

Appropriate M&V Plan Users:

- Energy performance contractors and their building customers
- Energy performance contractors and their industrial process customers
- Energy users doing their own retrofits and wanting to account for savings
- Facility managers properly accounting for energy budget variances
- New building designers
- New building designers seeking 'LEED' rating
- Existing building managers seeking 'LEED-Existing Building' rating
- Utility demand side management program designers and managers
- Emission reduction trading program designers

Users claiming adherence with IPMVP must:

1. Identify the person responsible for approving the site-specific M&V Plan, and for making sure that the M&V Plan is followed for the duration of the reporting period.
2. Develop a complete M&V Plan which:
 - clearly states the date of publication or the version number of the IPMVP edition and Volume being followed, uses terminology consistent with the definitions in the version of IPMVP cited,
 - includes all information required in IPMVP,
 - is approved by all parties interested in adherence with IPMVP, and
 - is consistent with the Principles of M&V, IPMVP Volume 1.
3. Follow the approved IPMVP adherent M&V Plan

13 Basic Topics of Complete M&V Plan

1. ECM Intent

Describe the ECM, its intended result, and the commissioning procedures that will be used to verify successful implementation of each ECM. Identify any planned changes to conditions of the baseline, such as unoccupied building temperature settings.

2. Selected IPMVP Option and Measurement Boundary

Specify which IPMVP Option, defined in Chapters 4.8 – 4.10, will be used to determine savings. Identify the measurement boundary of the savings determination. The boundary may be as narrow as the flow of energy through a pipe or wire, or as broad as the total energy use of one or many buildings. Describe the nature of any interactive effects beyond the measurement boundary together with their possible effects.

3. Baseline: Period, Energy and Conditions

Document the facility's baseline conditions and energy data, within the measurement boundary. (In energy performance contracts, baseline energy and baseline conditions may be defined by either the owner or the ESCO, providing the other party is given adequate opportunity to verify them.)

The baseline documentation typically requires well-documented audits, surveys, inspections and/or short-term metering activities. The extent of this information is determined by the measurement boundary chosen or the scope of the savings determination.

An energy audit used for establishing the objectives of a savings program or terms of an energy performance contract usually provides most if not all of the baseline documentation needed in the M&V Plan.

4. Reporting Period

Identify the reporting period. This period may be as short as an instantaneous measurement during commissioning of an ECM, or as long as the time required to recover the investment cost of the ECM program

5. Basis for Adjustment

Declare the set of conditions to which all energy measurements will be adjusted. The conditions may be those of the reporting period or some other set of fixed conditions. As discussed in Chapter 4.6, this choice determines whether savings are reported as avoided energy or as normalized savings.

6. Analysis Procedure

Specify the exact data analysis procedures, algorithms and assumptions to be used in each savings report. For each mathematical model used, report all of its terms and the range of independent variables over which it is valid.

7. Energy Prices

Specify the energy prices that will be used to value the savings, and whether and how savings will be adjusted if prices change in future.

8. Meter Specifications

Specify the metering points and period(s) if metering is not continuous. For non-utility meters, specify: meter characteristics, meter reading and witnessing protocol, meter commissioning procedure, routine calibration process, and method of dealing with lost data

9. Monitoring Responsibilities

Assign responsibilities for reporting and recording the energy data, independent variables and static factors within the measurement boundary during the reporting period.

10. Expected Accuracy

Evaluate the expected accuracy associated with the measurement, data capture, sampling and data analysis. This assessment should include qualitative and any feasible quantitative measures of the level of uncertainty in the measurements and adjustments to be used in the planned savings report.

11. Budget

Define the budget and the resources required for the savings determination, both initial setup costs and ongoing costs throughout the reporting period.

12. Report Format

Report should be processed to be intelligible for its readers.

Energy managers should review the M&V reports with the facility’s operating staff. Such reviews may uncover useful information about how the facility uses energy, or where operating staff could benefit from more knowledge of the energy-consumption characteristics of their facility.

13. Quality Assurance

Specify quality-assurance procedures that will be used for savings reports and any interim steps in preparing the reports.

3.4 Introduction to IEEFP

The IEEFP (International Energy Efficiency Financing Protocol) provides guidelines for Local Financing Institutions ("LFIs") around the world to evaluate and finance energy efficiency and savings-based renewable projects ("Energy Savings Projects").

The IEEFP's objective is to create a better understanding by LFIs on how energy users well-documented energy savings equate to new cash flow and increased credit capacity for end-use consumers to repay loans.

Among the main reasons for developing the IEEFP is overcoming one of the most significant barriers to energy efficiency projects, the lack of commercially viable financing. This lack of financing is not caused by a lack of available funds per se, but rather by an inability to access existing funding capacity at 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 energy efficiency projects.

LFIs typically apply their traditional “asset-based” corporate lending approach for energy efficiency projects that is limited to their 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 the energy efficiency equipment once installed in a facility; rather, the value is the cash flow generated from the equipment after installation. To date, most LFIs (due to lack of knowledge) have not recognized nor appear to believe that meaningful cash flow can be generated from energy efficiency projects, or that such cash flow can be relied upon to repay the related loans.

IEEFP is an international standardised methodology for evaluating the risks and benefits of financing energy efficiency projects. It focuses on the “Savings Value” of projects for loan repayment and credit capacity analysis. It provides, in non-technical terms, guidelines on:

- The overall investment opportunity presented by energy efficiency,
- Assessing risks of different types of projects,
- Assessing investment grade energy audits,
- Appropriate financing structures,
- Key elements of ESCO contracts,
- Key elements of the M&V process,
- Risk mitigation techniques, and
- Loan applications.

4. ADAPTATION OF THE PROTOCOLS TO PERMANENT COUNTRIES

4.1 Translation and adaptation of the protocols

The adaptation of IPMVP (International Performance Measurement and Verification Protocol) and IEEFP (International Energy Efficiency Financing Protocol) was a process in which the Protocols were first fully understood by 5 countries' experts (capacity building sessions were organised in Sofia), only then they were translated into 5 languages and published on EVOs website. The process in detail consisted of:

- Appointed persons from each of the 6 partners read IPMVP Volumes I and III, and the IEEFP. Associates of Maicon, experts on EVO's Protocols, conducted a three day training session using EVO training materials in English. This training ensured all Partners had good understanding of IPMVP and the other risk management tool of EVO (IEEFP).
- After the IPMVP training, Maicon administered a four hour EVO examination in English on savings measurement techniques.
- Two IPMVP training candidates per country developed M&V plans for concrete projects in their home country. These M&V plans became part of the "train the trainers session" (held in September 2010) and were finalised by the end of 2010.
- Five Country Reports were written on the status of energy services and M&V and proposed country-specific changes to IPMVP & IEEFP. These additions were discussed with EVO and included in the newest version of IPMVP Vol. I (version September 2010)
- The translated protocols were printed and distributed for free to attendees of the detailed training sessions..

EVO is the only body that makes the electronic versions of the translated national versions of the IPMVP and IEEFP available. They can be freely downloaded (after providing contact coordinates for internal purposes) at the following address:

http://www.evo-world.org/index.php?option=com_content&view=article&id=74&Itemid=84&lang=en

All persons interested are asked to fill in a short questionnaire. This questionnaire enables EVO to gain information about everyone interested in downloading IPMVP / IEEFP. One of the options refers to the IEE project PERMANENT.

4.2 Example Applications of IPMVP to European projects

An integral part of training the IPMVP trainers for the 2 day PERMANENT courses was each candidate's preparation of their own Measurement & Verification (M&V) plan and savings report. Such a report gives a detailed overview of the energy saving project, the baseline situation and how the savings will be measured and verified.

Two projects were selected for each Country. Partners prepared in English an example M&V Plans and a Savings Reports for each selected project. These M&V plans were reviewed intensively with the candidate trainers by Maicon. They were then placed on the PERMANENT and EVO websites. The list of M&V plan topics is shown below:

Table 3: List of M&V reports developed

Company	Candidate	Project type	Option
FEWE	Jerzy Piszczek	School building heat savings	C
FEWE	Szymon Liszka	CHP	B
Enviros	Jan Pejter	Office building	A
Enviros	Pavel Sitný	Industrial process fan control	B
Energoeco	Daniel Nistor	Biomass CHP	B
Energoeco	Andrei Ciuca	Industrial lighting	C
EnEffect	Dimitar Baev	Industrial flue gas economizer	B
EEE	Hristo Enchev	School building multiple ECM, with opening baseline adjustment	D
HEP-ESCO	Ivana Rogulj	Street Lighting	A
HEP-ESCO	Hrvoje Glamuzina	Office building – multiple ECM	C

The M&V Plans and Country Reports, including a Summary Report are presented at: www.permanent-project.eu

4.3 Developing Training Materials & Trainers

It was not the intention of the project that the Training of Trainers would produce “Certified Measurement & Verification Professional (CMVP)” accreditation (the CMVP program is jointly operated by EVO and AEE). CMVP involves a separate process of application and presentation of credentials, as well as passing an exam. The trainers trained received a certificate, applicable for trainings under PERMANENT. After the project ended, trainers could gain full certification as CMVP, enabling them to continue with IPMVP trainings after PERMANENT.

Capacity building in Sofia

Within the PERMANENT projects, though, Maicon and the associated EVO experts trained two to three trainers per country up to a level that they were able to give 2 day trainings in IPMVP and also 10 financial persons nominated by partners as financial trainers. This training consisted of three phases:



- Maicon conducted a three day IPMVP training course in Sofia for all partner staff having the basic qualifications suited for being a trainer at one level or another for PERMANENT (CVs were submitted and checked by EVO experts before the meetings took place). The class included the same four hour exam used by EVO for its CMVP program.



- 14 persons took the exam in Sofia. The course was nearly the same as the long course given by EVO around the world to prepare people for the CMVP exam. The course covered slightly more material than was intended for the PERMANENT project’s two day course.

- Based on exam results and qualifications, Maicon selected 10 candidates for advanced training.
- The 10 candidates for the advanced training prepared their own M&V plan and savings report which were reviewed by Maicon for adherence to IPMVP and revisions were made under Maicon's direction. The candidates prepared presentations of their case studies, in English, for use in the train-the-trainer course in Prague.

Train-the-trainers courses in Prague

Advanced training candidates attended one of 2 two day train-the-trainer courses conducted by Maicon in Prague within Work Package 3. The objective of this work package was to ensure that suitable trainers are qualified in both technical and financial issues and are able to provide training for the specified target groups. Suitably qualified experts, approved after the capacity building session in Sofia (WP2) were intensively trained in Prague by EVO experts. The range of issues included both technical and financial training and required a lot of expertise. The training was completed by one hour test.

Training materials were developed by Maicon, and originated in EVO's set of training materials and the additions to IPMVP and IEEFP established in WP2. The training material were sent to partners for translation into 5 project languages.

The IPMVP training from EVO is given in general on three different levels for IPMVP, (but only the first two for IEEFP training):

1. Awareness raising – 1 hour presentation
2. Short training – 1/2 day
3. 2-day training course, incl. exam

Target groups of PERMANENT will receive during the training programme level 1, 2 or 3 training.

Apart from that a train the trainers course exists, here called level 4 training,

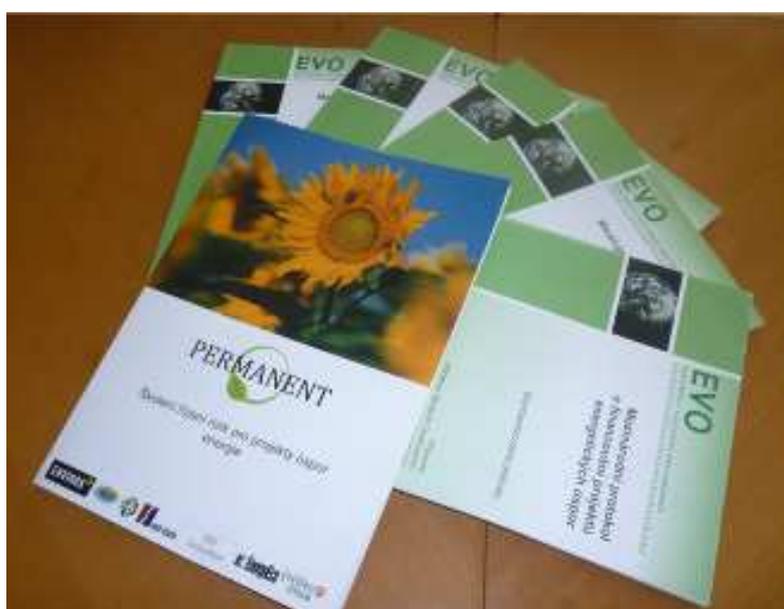
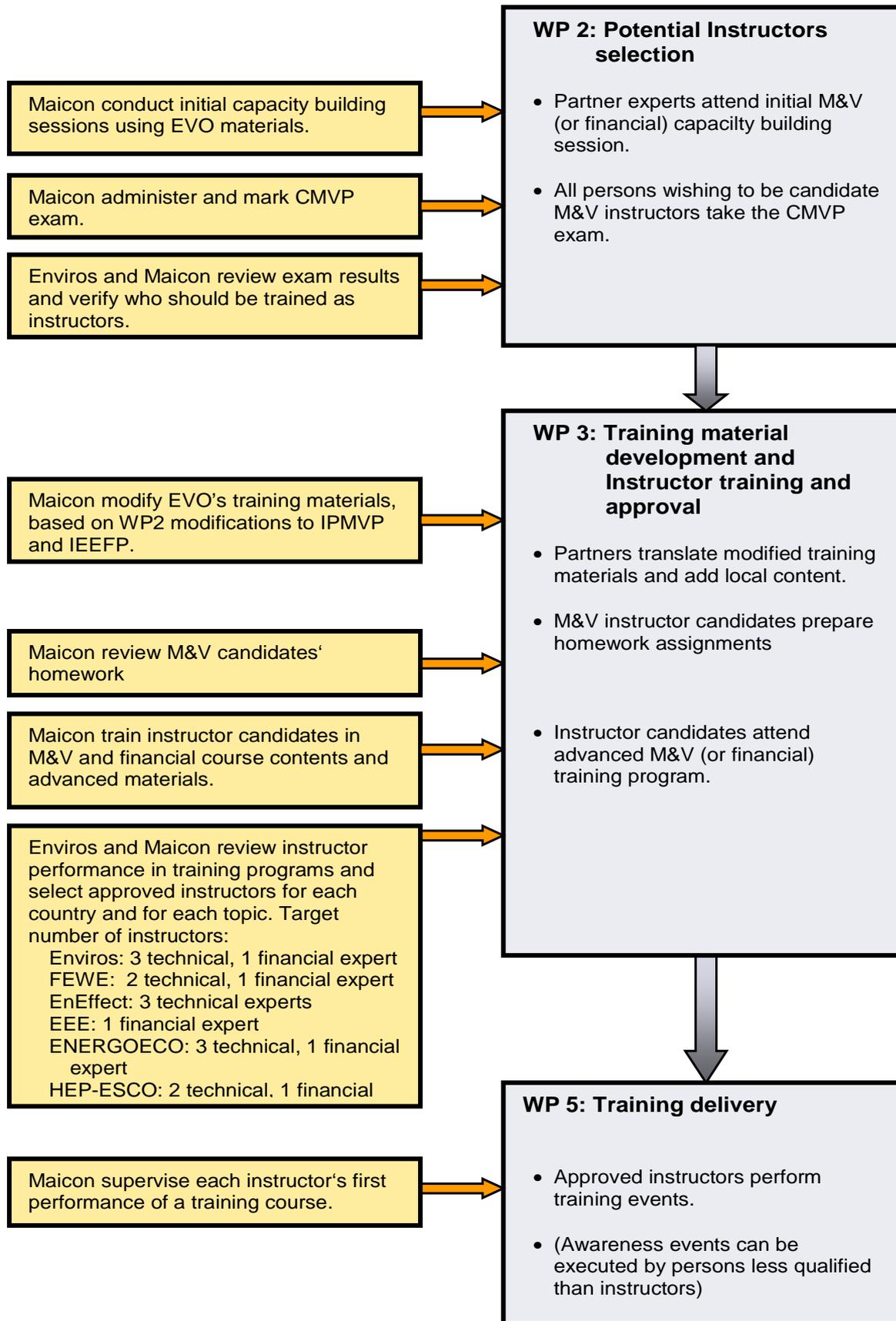


Figure 6: Details of the EVO expert assistance in the PERMANENT project



Training in Prague required each candidate to present his own M&V Plan for peer review. Maicon also provided training on advanced topics in statistics and metering. Based on peer evaluation, exam and test results, and Maicon’s evaluation, candidates were approved by Maicon as trainers or assistant trainers for two day PERMANENT IPMVP courses. Others not proceeding as far as the train-the-trainer program in Prague were qualified to give shorter training. The final list of IPMVP trainers and the type of training for which they were approved to run is shown below.

IEEFP train-the-trainer development meetings were conducted by Tom Dreessen, an Associate of Maicon, who is an expert in knowledge of the IEEFP and its background, and EVO’s training materials, and also active in EVO (called the “IEEFP Expert”). The purpose of such train-the-trainer meetings from the IEEFP Expert was to provide sufficient know how to enable the trainers to organize and conduct the two IEEFP presentations below in their respective countries. The main objective to be achieved from the IEEFP presentations was to solicit enough interest from local bankers and EE stakeholders in one or more of the 5 PERMANENT countries for them to be willing to provide resources to create a ‘localized’ IEEFP and a sustainable EE finance training program.

Table 4: Approved trainers in IPMVP and IEEFP

Country	Company	Candidate	Technical / Financial	Level (1, 2, 3 for IPMVP or F (IEEFP))
CZ	ENVIROS	Jan Pejter	Technical	L3 – certificate
CZ	ENVIROS	Pavel Sitný	Technical	L3 – certificate
CZ	ENVIROS	Michael ten Donkelaar	Technical	L2
CZ	ENVIROS	Josef Pikalek	Technical	L1
CZ	ENVIROS	Michael ten Donkelaar	Financial	F
CZ	ENVIROS	Vladimira Henelova	Financial	F
PL	FEWE	Jerzy Piszczek	Technical	L3 – certificate
PL	FEWE	Szymon Liszka	Technical	L3 – certificate
PL	FEWE	Jerzy Kwiatkowski	Financial	F
PL	FEWE	Tomasz Weryk	Financial	F
PL	FEWE	Aleksandra Teodorowska	Financial	F
RO	Energoco	Daniel Nistor	Technical	L3 – certificate
RO	Energoco	Andrei Ciuca	Technical	L3 – certificate
RO	Energoco	Mirela Maniu	Technical	L2
RO	Energoco	Mihaela Coroiu	Financial	F
BG	EnEffect	Dimitar Baev	Technical	L3 – certificate
BG	EnEffect	Petar Kamburov	Technical	L1
BG	EnEffect	Pavel Manchev	Financial	F
BG	EEE	Hristo Enchev	Technical	L3 – certificate
BG	EEE	Marko Markov	Financial	F
HR	HEP-ESCO	Gordana Jeličić	Financial	F
HR	HEP-ESCO	Hrvoje Glamuzina	Technical	L3 – certificate
HR	HEP-ESCO	Ivana Rogulj	Technical	L2
HR	HEP-ESCO	Ljiljana Bucek	Technical	L1

Explanation:

L1: Qualified for awareness presentations (1/2 hour)

L2: Qualified for half day presentations

L3: Qualified for 1 and 2 day training events

Content of the Training Sessions - IEEFP

The training:

- explained the basic principles of Energy Performance Contracting (EPC) – the financing of energy efficiency projects through savings
- identified the associated types of risks for EPC
- proposed risk assessment of energy efficiency projects
- allocated responsibility for financial-operational- performance
- increased the confidence in savings projections and larger project investments
- raised interest for investments in energy efficiency in the role of a Third Party.
- increased understanding of services of ESCOs (Energy Service Companies)
- introduced key performance risk management techniques
- raised awareness of guidance documents on savings estimation and savings measurement and verification techniques
- presented financing strategies and structures for energy efficiency projects

Content of the Training Sessions - IPMVP

The training focused on energy savings measurement and management of savings estimates and included the following topics:

- Basic concepts of measurement and verification (what are energy savings and how to measure them)
- Examples of M&V of specific energy saving projects (and use of the four M&V options)
- Planning of M&V:
 - setting the measurement boundary, independent variables influencing the level of energy savings, setting the measurement baseline, measurement equipment
 - Data analysis and statistical analysis
 - Applying Utility (Energy) Prices to Value Savings, Uncertainty
 - The M&V plan
- Hot topics, including:
 - Missing Data
 - M&V Budget
 - Baseline Adjustments
 - Verification
- Details of Retrofit Isolation (option A and B)
- Details of Whole Facility Option C
- Details of Option D (Simulation of the Baseline)
- Summary - Adherence to IPMVP, Selecting an Option

Figure 7: PERMANENT Leaflet

The PERMANENT project is aimed at introducing to Europe, the International Protocols for measurement and verification of energy efficiency savings and financing of energy efficiency projects.

The protocol "IPMVP" on Measurement and Verification (M&V) of energy efficiency projects is an important tool for enhancing the confidence of investors in energy savings reported, and the protocol IEEFP provides the financial institutions to make investment decisions based on the value of energy savings.

The projects' main objective is to educate financiers, project developers and energy users about how energy efficiency projects can demonstrate permanent results and how that permanence can break the distrust barrier. The International Performance Measurement and Verification Protocol (IPMVP) and the International Energy Efficiency Financing Protocol (IEEFP) will be the basis for this development.

The project addresses the most common barrier in energy saving projects. This is the distrust in the savings achieved and whether they will in fact be achieved and pay back the investment in a sustainable manner.

This distrust or the lack of confidence in project savings impedes investment even where energy audits or other engineering analyses demonstrate sound investment opportunities. It eliminates the need for financiers to seek additional collateral to safeguard their investment.

Confidence in savings thus results in financing energy saving projects without the need for additional collateral beyond that of the project itself.

Consortium:

- ENVIROS
- CZECH REPUBLIC
- EnEffect
- BULGARIA
- CONSUL
- ROMANIA
- EnergyCo
- BULGARIA
- EEE Consortium
- POLAND
- HEP ESCO
- CROATIA
- UNITED KINGDOM
- EVO

www.permanent-project.eu

PERMANENT

Performance Risk Management for Energy Efficiency Projects Training Sessions

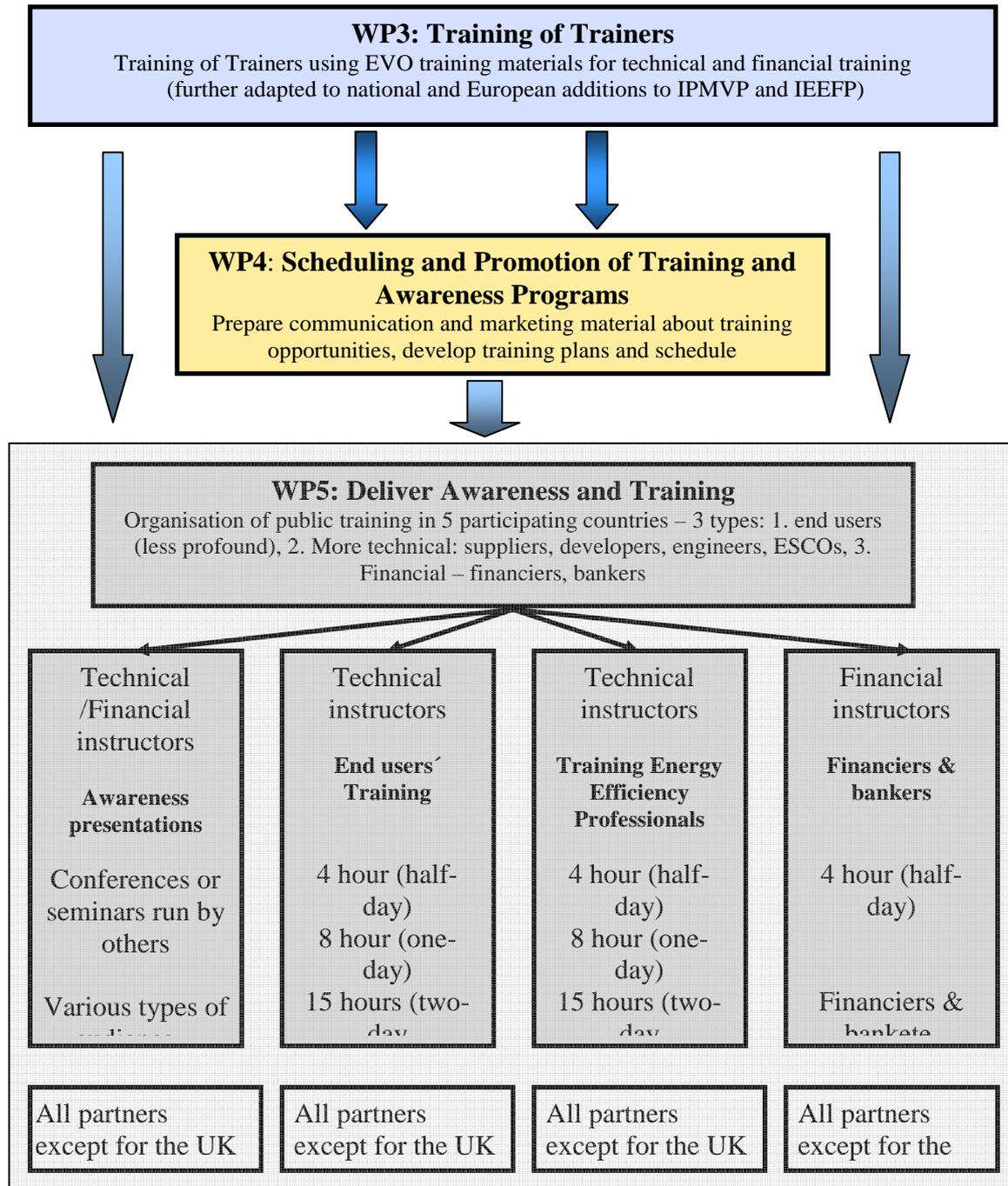
eaci Intelligent Energy Europe

5. TRAINING AND AWARENESS PROGRAMS OF PERMANENT

5.1 Scheduling and Promotion of Training and Awareness Programs

As part of this work package educational ‘events’ were planned and scheduled for a variety of audiences. Three main target groups were identified, energy end-users, technical professionals and bankers and financiers. Following the process of the training preparation and implementation has been presented in the graph.

Figure 8: Diagram of training events organisation



1. Energy end users group – both local building and industrial sectors including financial, management and engineering staff were included in the large group of energy users:
 - Industries which use significant amounts of energy in their processes
 - Commercial buildings (office, retail, hospitality, warehouses)
 - Multiple residential buildings (flats, retirement facilities, etc)
 - Institutional buildings (schools, universities, military facilities, jails, hospitals, etc)
 - Property and facility management firms in the above sectors,
 - Government departments which operate large groups of buildings
2. Technical professionals group: local experts acquainted with energy efficiency issues:
 - Consulting companies, energy auditors
 - Local ESCO technical staff
 - Energy utilities, energy suppliers
 - Engineers within large energy users
 - Architects and developers
 - Energy Agencies
 - Independent energy savings verifiers
3. Bankers and financiers group included:
 - Local bankers
 - Financing associations
 - Legal advisors
 - Local ESCO financial and contract staff;
 - Financial managers within energy end users
 - Grant management organizations.

The main activity was the preparation of all promotional materials to create recognition, amongst target groups of:

- The content of training sessions;
- The schedule of awareness and training sessions available under the project; and
- The free electronic availability of the project documents in 6 languages (in 5 national languages and in English) .

Following promotional materials were developed:

- Leafsheets - customized for each target group
- Brochures (about PERMANENT and as folders for training materials)
- Power point presentation customized for each group, length and event topic.

Each Partner developed schedule of trainings in its country with the hosts of venues or conferences. The Partners also discussed the fees they believed could be charged for each Training session. Only two of the partners, ENVIROS and HEP-ESCO decided that it would be possible to collect fees and still keep the potential audience interested (the other partners were convinced that a registration fee would discourage people from coming). The schedules were regularly updated as events were completed and new opportunities arised/trainings were organised.

5.2 Implementation of the Training Programme

The PERMANENT team identified three basic target groups during the preparatory phase. During the recruitment of the trainees, the target groups have been refined in all countries.

Table 5: Target groups for training events

Target groups	Czech Republic	Poland	Croatia	Romania	Bulgaria
Technical Energy Efficiency Professionals	Employees of ESCO's, energy auditors, consultants	Energy auditors, consultants	Engineers, students	Engineers	Engineers
Energy End Users	Energy managers of commercial and public organisations	Energy managers of commercial and public organisations	Energy managers of commercial and public organisations	Energy managers of commercial and public organisations	Energy managers of commercial and public organisations
Financiers Bankers	Loan officers, policy makers involved in grant programmes	Loan officers, investment managers			

5.2.1 Czech Republic

The IPMVP trainings were organised in 6 locations in the Czech Republic between February and December 2011. The number of IPMVP events was 11 in total, in Prague, Ostrava, Brno, Uherské Hradiště, Zlín and Liberec.

Five IEEFP training events were carried out between February and November 2011 in Prague and Brno. The first training addressed first of all managers of ESCO firms, the following loan officers of banks and policy makers involved in grant programmes.

Awareness speeches, meetings (at which information on IPMVP and financing projects from achieved savings was discussed), and presentations at seminars and conferences organised by others were about 14, in addition to the dissemination events in which just a very brief information about the PERMANENT project was showed so that interest is raised at more detailed information.

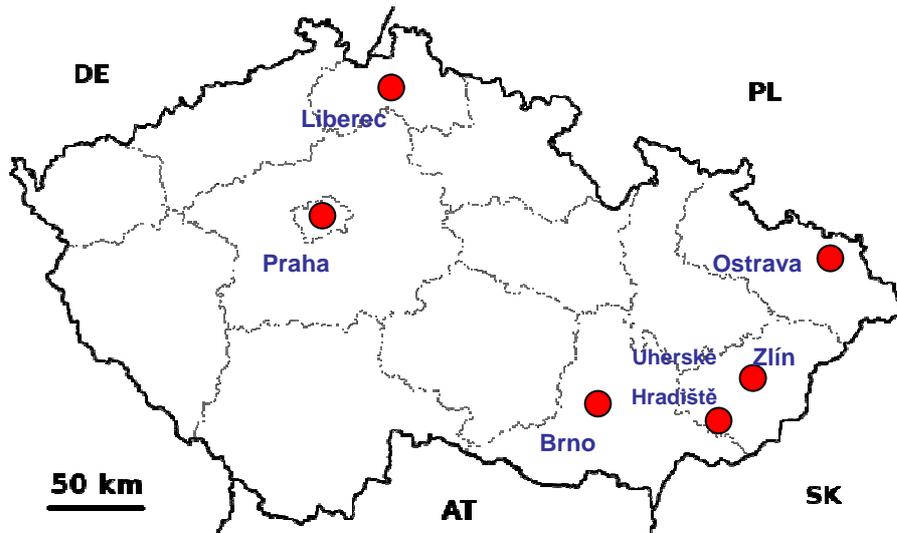
Table 6: Training events in the Czech Republic

Place	Date	Type	Target group
IPMVP			
Zlín	6.4.2011	1/2d	End users
Ostrava	13.4.2011	1/2d	End users
Prague	19.4.2011	1/2d	Professionals
Prague	10.5.2011	1d	End-users
Prague	19.5.-20.5.2011	2d	Professionals
Uherské Hradiště	7.6.- 8.6.2011	2d	End-users
Prague	14.6.-15.6.2011	2d	Professionals
Liberec	6.9.2011	1d	Professionals
Prague	15.11.2011	1/2d	End-users
Zlín	16.11.2011	1/2d	End-users
Prague	9.12.2011	1d	Professionals

Place	Date	Type	Target group
IEEFP			
Prague	23.2.2011	1/2d	Financiers - ESCO managers
Prague	18.4.2011	1/2d	Financiers
Prague	29.6.2011	1/2d	Financiers
Brno	13.10.2011	1/2d	Financiers
Prague	10.11.2011	1/2d	Financiers

The locations are marked on the map.

Figure 9: Training locations in the Czech Republic



In the Czech Republic ½ day, 1 day and 2 day trainings were given to stakeholders as different as energy managers of mid-size towns as energy efficiency experts from ESCOs. Each of the trainings aimed at different groups and had it's meaning:

- ½ day trainings gave an introduction to M&V, where people learned about the principles
- The 1 day trainings gave some more depth, explained the four options of IPMVP and the way how to do an M&V plan
- The 2 day training went into more depth and also gave room for interaction between trainers and trainees.

The trainings in the Czech Republic attracted the following number of participants (per target group) :

- Energy end users – 139
- Energy Efficiency Professionals – 82
- Financiers - 38

The IPMVP training in the Czech Republic was technical and mainly concentrated on Measurement and Verification of energy savings, related issues of setting the baseline, and measurement equipment, basically copying the original EVO training materials. The financial training had to be adapted more to the situation in the Czech Republic, due to certain specifics of the financial market and the well developed ESCO market.

The financial training mainly addressed risk management issues and then details of the ESCO contracts, forfeiting, public procurement procedure, way of implementation of energy services in the Czech Republic. The trainings also discussed the basics of IPMVP and discussions were held about the extent and feasibility of using IPMVP in evaluation of grant schemes.

A few conclusions from trainings

Almost 60 experts in energy efficiency have been trained in processing of M&V plan within the half day, 1day and 2day trainings. The professionals have considered for most important benefit especially the complexity, flexibility, arrangement and accuracy of M&V plan. They also often expressed that comparable methodology concerning the measuring, reporting and verification of energy savings does not exist in the Czech market. Some of them were concerned about the investments in acquisition costs – that investors would not be willing to invest such an amount to detailed development of M&V plan.

5.2.2 Poland

In Poland the IPMVP trainings (1/2 day, 1day and 2 days) were given between February and December 2011 on 8 locations: Katowice, Gliwice, Wroclaw, Poznań, Rzeszow, Łódź, Warszawa and Brenna. Most of them were delivered in Katowice and Gliwice. Five trainings were organised under the patronage of Marshall Offices – those in Katowice, Wroclaw, Kielce, Rzeszow, Poznan. Short events took place on 12 locations. The map below shows the locations of all training and disseminations events.

Figure 10: Training locations in Poland



Recruiting participants for the PERMANENT training events was more complicated as the Polish ESCO market remains underdeveloped – there are few strong ESCOs (4-5) and more small businesses (3 to 10 multinational and local actors according to EU reports). This is the reason of difficulties in attracting potential participants to trainings – especially in the end user

group. So it was necessary to modify training program for communities. We have to show more examples of ESCO contracts to attract participants.

A few conclusions from trainings

- *Trainings for End Users:* Polish experiences with trainings for end users show, that trainings for end users should be less technical. Attendees expected them to be more focused on ESCO mechanism, implementation of energy savings guarantee formula in contract with ESCO. Typical examples and patterns of ESCO contracts – with guarantee formula – should be presented. A good idea is to invite to the training a person who was responsible for ESCO project that was implemented in any community and who could present problems and solutions applied.
- Lot of participants would like to find more details on investments costs, monthly commitments to ESCOs.
- For end users of energy technical questions regarding to energy effect and savings are of less importance.

Users from communities show that in Poland public procurement procedures impede the selection of the best bids and are difficult to be implemented into long-term contracts. Participants of the trainings found ESCO contracts as complicated. The main conclusion was that it would be good to change laws for easier implementation of EPC by ESCOs.

Trainings for EEP (energy efficiency professionals): Examples/exercises shown in EVO materials are good for the first lessons. In long trainings (1-2 days) participants announced that they would like to have more complex examples. such case studies should show all aspects regarding savings measurement – baseline identification, regression analysis, static factor and interactive effects discussion – with quantitative assessment of effects (not only quality); static errors discussion. It would be good to show them at least one example including all components.

In Poland **the IEEFP** trainings (1//2d) were delivered from May to December 2011 on 4 locations: Katowice, Poznań, Gdańsk Warszawa. The participants came mainly from banks: Millenium Bank, Reifesse, BOŚ (Environment Protection Bank), WFOŚ (Fund of Environmental Protection Katowice).

One training was delivered to students of the last year of University of Economy. Short disseminations events were delivered on 9 locations.

Polish banks are sceptical about savings found as loan collateral. Only one bank sent their representatives to trainings in all locations. There was far more interest in IEEFP among local authority officials. They find in ESCO PPP, EPC the way to financing energy efficiency without falling in public debt.

5.2.3 Romania

The seminar presentations were adjusted from one training session to another based on the feedback received from the audience. A lot of examples were used based on ESCO's project experience. The general opinion about the trainings was a very good opinion, the trained people were very happy with the information and knowledge received. A few participants attended more training sessions, being really interested in the given information.

Figure 11: The map of training locations in Romania



Table 7: Training events in Romania

MEDIAS 27.06.2010	End users ½ Day Training 40 attendees
ORADEA 05.10.2011	End Users ½ day training 13 attendees
BRASOV 29.07.2011	Professionals ½ day training 20 attendees
CRAIOVA 01.09.2011	Professionals ½ day training 20 attendees
CONSTANTA 05.09.2011	Professionals ½ day training 20 attendees
BACAU 20.09.2011	Professionals ½ day training 10 attendees
ALBA-IULIA 03.08.2011	End Users 1 day training 20 attendees
ZALAU 18.10.2011	Professionals 1 day training 10 attendees
TARGU MURES 24.10.2011	Professionals 1 day training 10 attendees
GHEORGHENI 02.11.2011	Professionals 1 day training 10 attendees
CLUJ-NAPOCA 2-3.06.2011	Professionals 2day training 11 attendees

Training attendance IEEFP:

BUCURESTI 10.03.2011	Financiers ½ day training 51 attendees
CLUJ-NAPOCA 18.05.2011	Financiers ½ day training 22 attendees
BUCURESTI 30.06.2011	Financiers ½ day training 20 attendees

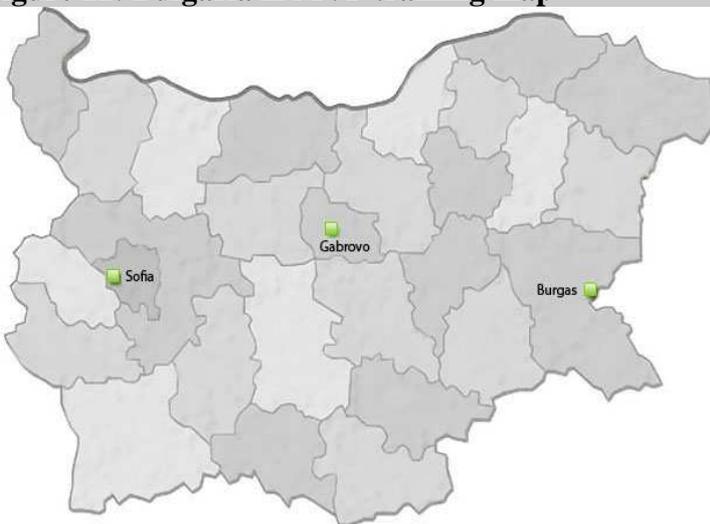
The IEEFP trainings were more difficult to organise, because the financiers were the least interested in the topic, they were always very busy, and maybe some times not that open minded. Some of them participated in the seminars, some important people from the financial domain acted as guest speakers and in that way it was possible to attract other bankers or financiers to the PERMANENT training sessions. Participants to the trainings had a very good level and gave high marks to the lecturers considering the information received very useful. They were willing to participate to similar trainings. Like in IPMVP trainings also here there were a few participants that attended several times to our training sessions.

5.2.4 Bulgaria

The IPMVP trainings in Bulgaria were given on three locations (see map) in sessions of ½ day and 1 day trainings between May and July 2011.

TRAINING on IPMVP		Target	Attended
Sofia	Energy Users	30	29
(1 day)	Energy Experts	20	24
Burgas	Energy Users	30	28
(1/2 day)	Energy Experts	20	21
Gabrovo	Energy Users	20	23
(1/2 day)	Energy Experts	10	14

Figure 12: Bulgaria IPMVP training map



The Bulgarian Energy Efficiency and Renewable Sources Fund together with “En Effect Consult” had two trainings regarding the International Energy Efficiency Financing Protocol (IEEFP) in May and June 2011. Its main goal was to proclaim the guidelines for Local Financing Institutions to evaluate and finance energy efficiency and savings-based renewable projects.

Experts in financing, energy efficiency and risk management in energy efficiency projects and application of tools, developed under the PERMANENT project, presented their lectures during two half-day seminars. The trainings were attended by 53 representatives of banks, consultation companies and the Agency for sustainable energy development in Bulgaria.

According to the seminars and trainings program for 2011 there were two events that took place regarding risk management in energy efficiency projects and application of tools developed under the PERMANENT project – on the 17th of May and on the 1st of July 2011.

First TRAINING PROGRAMME included the following topics:

- Introductory presentation of PERMANENT project, Mr. Petar Kamburov, Project Coordinator for Bulgaria
- Presentation of EVO (Efficiency Valuation Organization), Mr. Thomas Dreessen, EVO Canada
- Presentation of the International Energy Efficiency Financing Protocol, Mr. Marko Markov, Head of Corporate Banking Dept., Tokuda Bank AD, Bulgaria
- Implementation of the IEEFP – International Experience, Mr. Thomas K. Dreessen, EVO Canada
- Bulgarian Energy Efficiency Fund partner in energy efficiency projects financing, Mr. Dimitar Dukov - Executive Director of BEEREF.

Invitations were sent to all executive directors of the 30 banks in Bulgaria. 41 representatives stated participation, 33 representatives actually participated in the seminar.

The second training was given on 1 July 2011, also in the Radisson SAS Grand Hotel, Sofia with basically the same topics for a different audience. There were sent 50 invitations altogether to

representatives of banks from the first edition of the seminar, consultation companies and the Agency for sustainable energy development in Bulgaria, 27 of all invited stated participation. The seminar was attended by 20 participants.

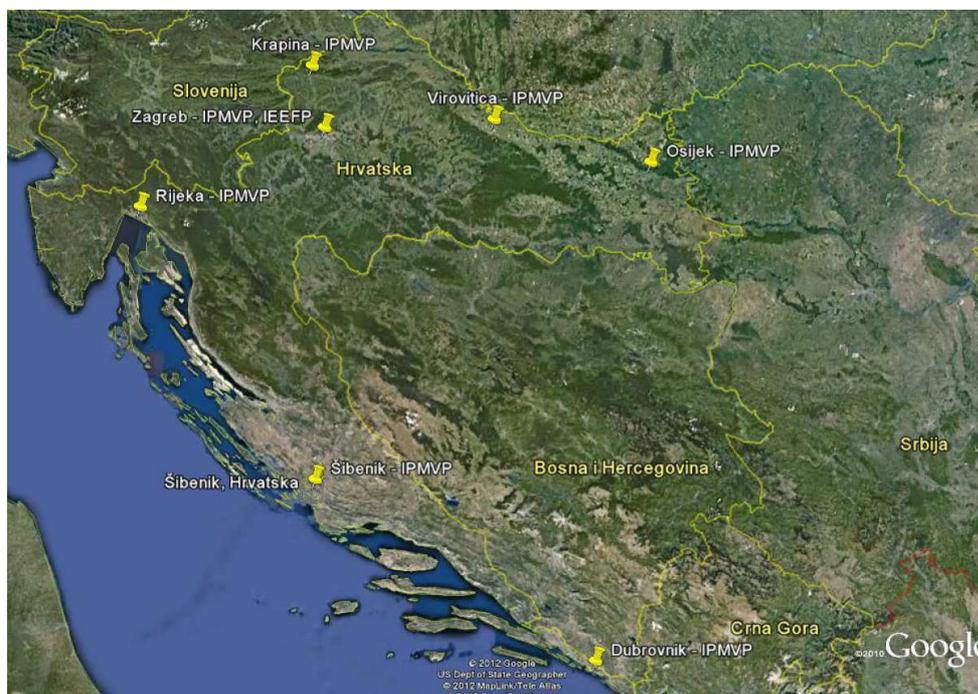
5.2.5 Croatia

Trainings in Croatia went very well. Attendees marked the trainings as successful and useful. They required more examples related to Croatia and more examples in general. Average mark for trainings is 1,48.

Table 8: Training events in Croatia

	Location	Date	Type	attendance
1	ZAGREB	June 2010	awareness	100
2	DUBROVNIK	October 2010	awareness	207
3	VIROVITICA	18.04.2011	technical ½ day	15
4	OSIJEK	19.04.2011	technical ½ day	10
5	ZAGREB	20.04.2011	financial ½ day	14
6	RIJEKA	05.05.2011	technical ½ day	8
7	KRAPINA	06.05.2011	technical ½ day	10
8	ZAGREB	11.05.2011	technical 1 day	104
9	ŠIBENIK	18.05.2011	technical 1 day	9
10	DUBROVNIK	25.05.2011	technical ½ day	5
11	ZAGREB	30.-31.5.2011	technical 2 day	13
12	ZAGREB	04.07.2011	financial ½ day	11

Figure 13: Training events locations in Croatia



5.3 Evaluation of the training programme

Feedback from participants

During the trainings all partners distributed an evaluation form among participants which was developed for the ex-post evaluation of the quality of the training, sufficiency of the information and interest raised in the topic. The developed questionnaire templates were distributed among all in-country local project coordinators, were translated into national versions and used in the training events.

As assumed in the program, the subject to questionnaire research were the trainings that lasted 4 hours or longer, i.e. half-day, 1-day and 2-days training events were based upon the two protocols: the International Performance Measurement and Verification Protocol (IPMVP) and the International Energy Efficiency Financing Protocol (IEEFP).

A detailed report describing the evaluation results in all 5 PERMANENT countries can be found at a website:

www.permanent-project.eu

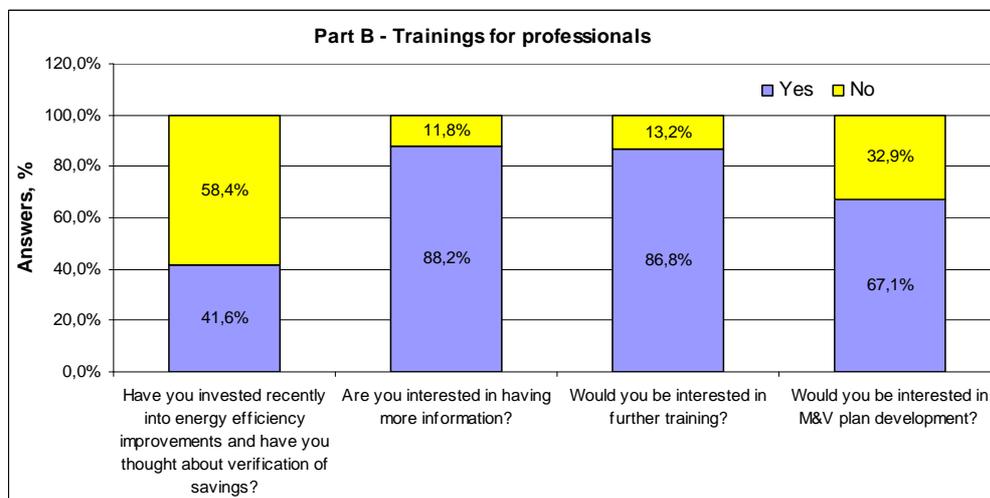
Evaluation results from Poland

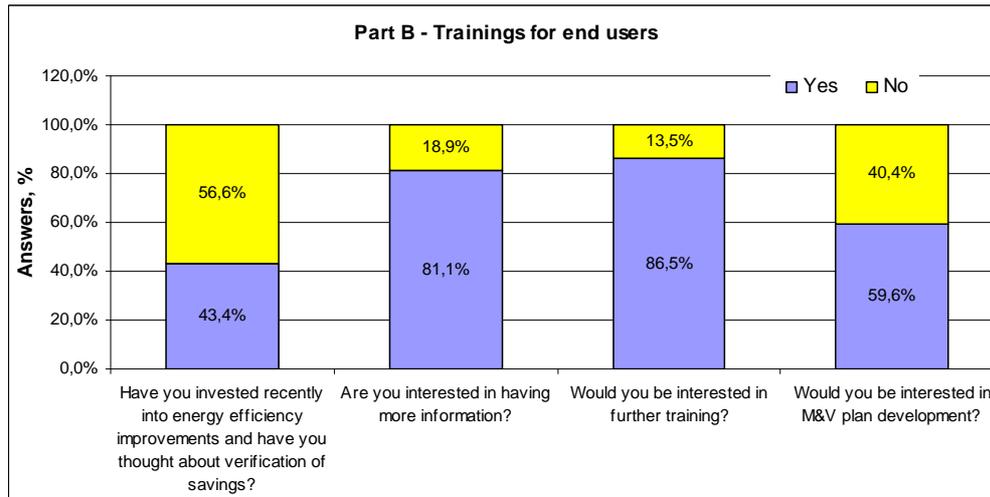
In Poland, the questionnaire action addressed separate trainings for participants belonging to the target group “Professionals”, “End Users” and “Investment Managers (Financial)”.

Within the group of professionals who day-by-day work on the energy efficiency issues 116 filled-in questionnaires were collected. Energy end users questionnaire action was performed for 6 trainings, addressing 44 persons. The questionnaire action for the trainings for investments managers attended 38 persons.

In the Tables that refer to the Part “A” a summarized number of score for individual questions is presented for particular groups of attendees. An average value was calculated from all answers (score) for the given question. Average score values for each question, depending on the group of attendees ranged between 1,36 – 2,0 (very good – good). The average score for all questions and all attendees was 1,62. The analysis results regarding questionnaires from the Part „B” are presented below.

Figure 14: Score values for training in Poland





The Table presents the number of persons who participated in the training and represent a certain group of professional activity.

Table 9: Participants to the training in Poland

Area of responsibility (number of participants for each area)						
	Professionals		End users		Investment managers	
Engineering	78	57%	38	64%	14	23,7%
Management	13	9%	11	19%	2	3,4%
Investments managements	28	20%	4	7%	25	42,4%
Marketing	4	3%	0	0%	1	1,7%
Rother	14	10%	6	10%	4	6,8%

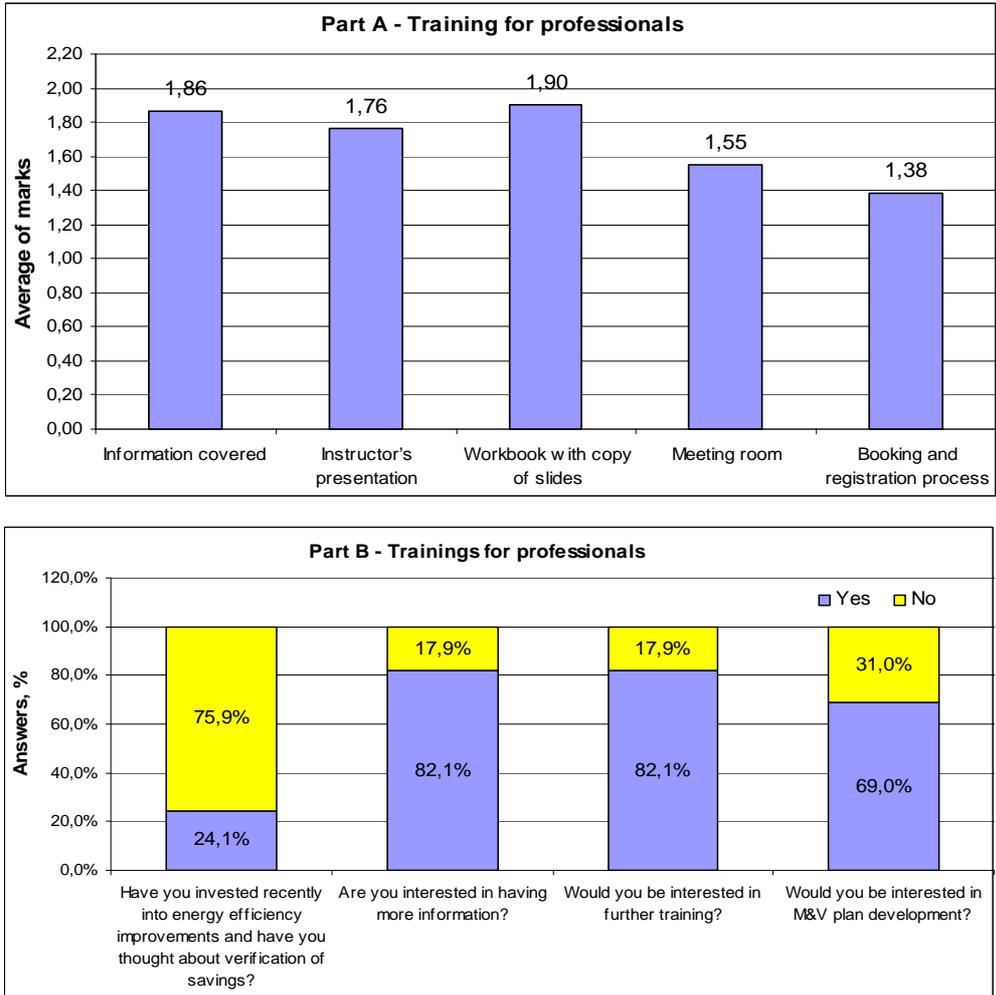
The highest number of attendees within the category „professionals and end users” referred to engineers (more than 50%). The smallest group of attendees represented persons working in marketing. During the trainings for financial specialists, most of the participants were persons categorized as „investment managers” (55% attendees). A significant group was constituted of engineers (30% attendees).

Evaluation results from Bulgaria.

In Bulgaria the questionnaire were given out only twice - during half-day events for professionals. The results present information from 29 received questionnaires. The analysis results are given in the Tables and diagrams below.

The diagram depicts the fact that only every fourth person has recently invested in energy efficiency. This is a result share two times lower than the one obtained in Poland. The asked persons were very interested in acquiring further information and trainings (more than 80% of interested persons among all participants). 9% asked persons were interested in developing a M&V Plan.

Figure 15: Results of evaluation, Bulgaria



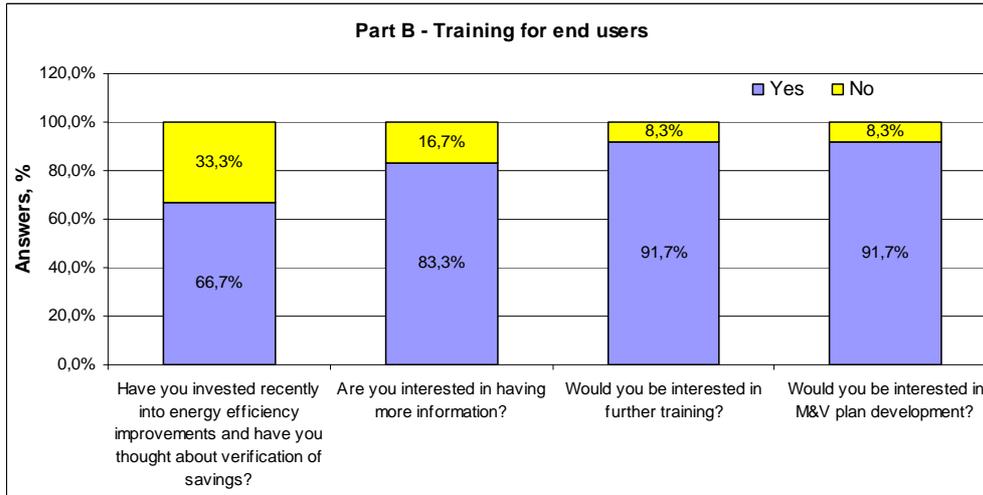
Evaluation results from Romania

In Romania, evaluation forms were distributed in trainings for two target groups of attendees: professionals and end users in 4 half-day meetings, one one-day event and one two-days event. Among 76 attendees of the events for professionals, a number of 51 filled-in questionnaires were collected. Evaluation was also asked for during one one-day meeting for energy end users. During this meeting, among 20 attendees a number of 12 questionnaires were collected.

Average score for questions reached between 1,08 to 1,39. The total average score for all questions for all groups of attendees reached 1,25.

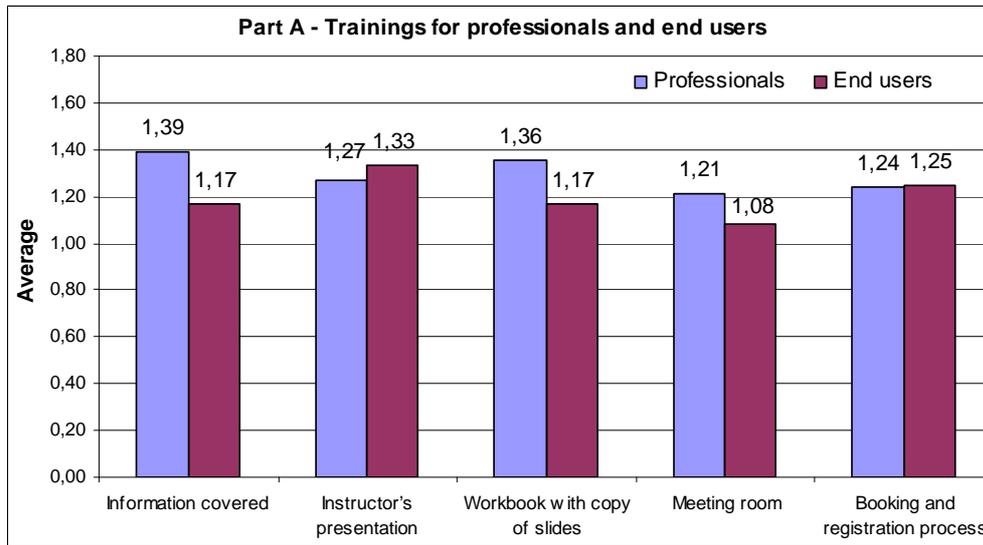
Only every fifth asked attendee among the professionals has recently invested in energy efficiency. All addressed persons were interested in getting further information in the subject and 96% of them were interested in developing a M&V Plan.

The most numerous group of professionals training attendees who responded to the questionnaire in Romania were engineers (71%). In case of trainings for end energy users the largest group also involved engineers (45%). The remaining attendees were persons working in the area of investment management (20%) and in other sectors not specified in the questionnaire.



The below Tables and diagrams depict the analysis results.

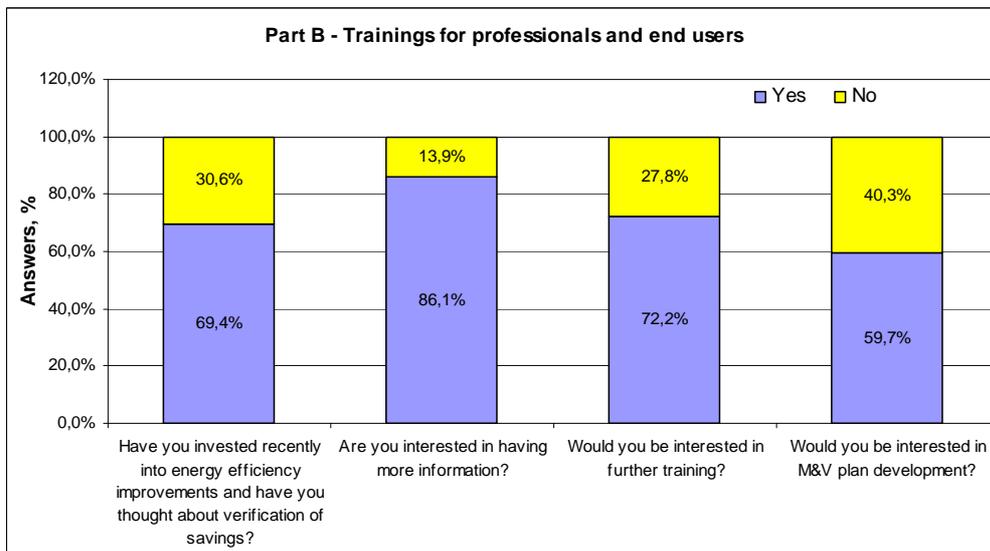
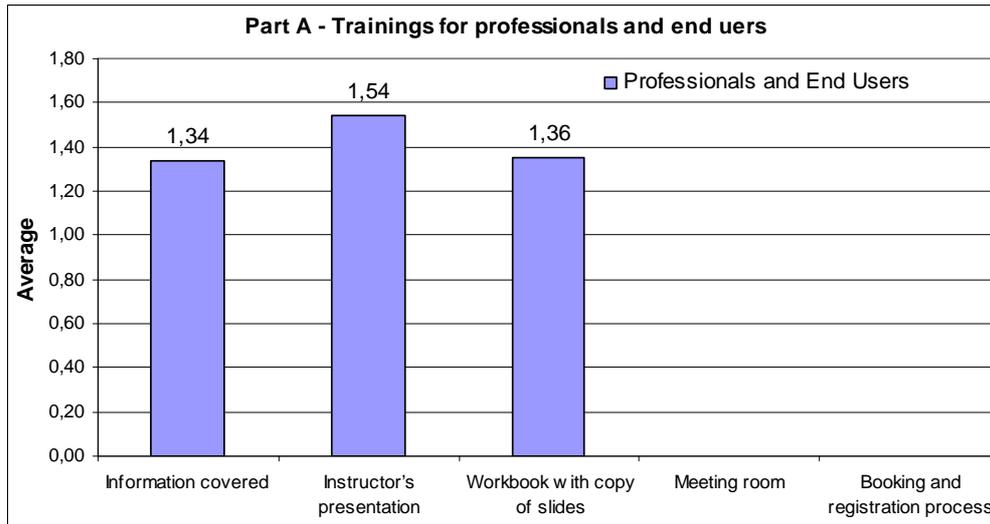
Figure 16: Score values for training in Romania



Evaluation results from Croatia

Croatia delivered results of the evaluation questionnaires combined for the training of professionals and end users. The questionnaires were filled in during 7 events, in total by 72 attendees, including: 4 half-day trainings, 2 one-day trainings and one two-days training. In the Part “A” of the questionnaire in Croatia the replies were given related to the presented information, the method of presentation and slides.

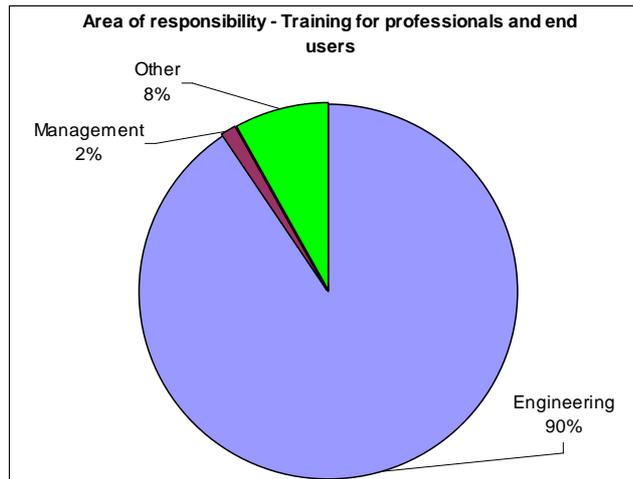
Figure 17: Score values for training in Croatia



Analysis of Part “B” of the questionnaires shows that 69,4% of attendees have invested recently in improving of energy efficiency. This is a result better than the result obtained in Poland, Romania and Bulgaria. Most of the attendees were interested in obtaining more information regarding the subject (86,1% of respondents) and were interested in further trainings (72% of respondents).

Table 10: Participants to the training in Croatia

Area of responsibility (number of participants for each area)		
	Professionals and End Users	
Engineering	114	90%
Management	2	2%
Investments managements	0	0%
Marketing	0	0%
Other	10	8%



Evaluation results - Czech Republic.

In the Czech Republic evaluation was asked for in all training events. Out of 259 attendees 181 returned the form. Below, the questionnaire results for the **group of professionals** are presented.

Question 1. Have you ever financed or supported any energy savings projects?

Yes	Rather yes	Rather no	No
24	7	23	5

Question 2. Do you think, that measurement and verification according to IPMVP are enforceable in our country?

Yes	I don't know	No
50	7	2

Question 3. If yes, do you think about using this method of measurement and verification according to IPMVP in your projects?

Yes	I don't know	No
43	14	2

Question 4. Did you change you opinion on the base of this training?

Yes	Rather yes	I don't know	Rather no	No
17	24	6	10	2

Question 5. Do you want to get more information?

Yes	I don't know	No
41	13	5

Question 6. Do you want to participate in the next training in measurement and verification?

Yes	I don't know	No
24	29	6

Questionnaires results for end users:

Question 1. Do you think that measurement and verification are needed in your business, offices?

Yes	Rather yes	I don't know	Rather no	No
37	33	13	9	2

Question 2. Have you ever invested in any energy saving measures?

Yes	I don't know	No
67	10	17

Question 3. If yes, do you think how to verify savings?

Yes	I don't know	No
54	23	17

Question 4. Did you change you opinion on the base of this training?

Yes	Rather yes	I don't know	Rather no	No
26	43	9	8	8

Question 5. Do you want to get more information?

Yes	I don't know	No
67	17	10

Question 6. Do you want to participate in the next training in measurement and verification?

Yes	I don't know	No
36	46	12

Questionnaire results for financiers and investments managers:

Question 1. Have you ever financed or supported any energy savings projects?

Yes	Rather yes	I don't know	Rather no	No
11	5	4	3	5

Question 2. Do you think that your supported/financed projects need measurement and verification?

Yes	I don't know	No
24	3	1

Question 3. If yes, have you ever thought how to verificate savings?

Yes	I don't know	No
21	4	3

Question 4. Did you change you opinion on the base of this training?

Yes	Rather yes	I don't know	Rather no	No
12	10	4	0	2

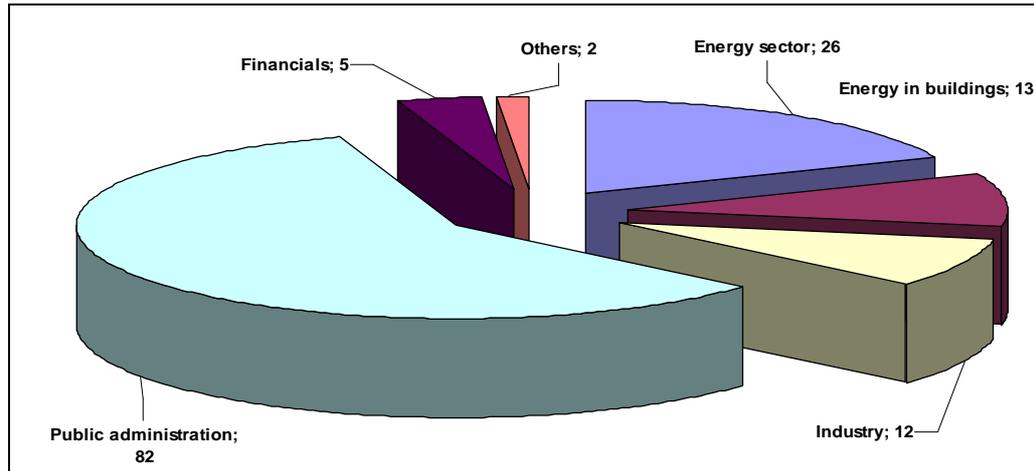
Question 5. Do you want to get more information?

Yes	I don't know	No
26	0	2

Question 6. Do you want to participate in the next training in measurement and verification?

Yes	I don't know	No
16	11	1

Question 7. In what sector do you work?



High public sector attendance was deliberate, because this sector is the major beneficiary to energy services with guaranteed results. Understanding to the principles of measurement and verification might improve trust of the sector in energy performance contracting and understanding to other energy services already required by the Energy Service Directive.

5.4 Summary of the questionnaires

Most of the partners developed different questionnaires for individual working target groups. Interpretation of the results for individual groups of respondents depends on their interpretation by the coordinator of the given partner country. The attendees group of professionals may also be understood as the energy end users and *vice versa*.

Table 11: Percentage share of received answers to some of the questions

Questions	Poland		Romania		Bulgaria		Croatia		Czech	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Have you invested recently into energy efficiency improvements and have you thought about verification of savings?	41,7 %	58,3 %	29 %	71 %	24,1 %	75,9 %	86,1 %	13,9 %	83,4 %	16,6 %
Are you interested in having more information?	78,9 %	21,1 %	96,8 %	3,2 %	82,1 %	17,9 %	86,1 %	13,9 %	88,7 %	11,3 %
Would you be interested in further training?	81,1 %	18,9 %	96,8 %	3,2 %	82,1 %	17,9 %	72,2 %	27,8 %	80 %	20 %
Would you be interested in M&V plan development?	59,7 %	40,3 %	95,2 %	4,8 %	69 %	31 %	59,7 %	40,3 %	76,5 %	23,5 %

The comparison allows to draw a conclusion that answering to the first question as much as 86,1% of attendees from Croatia have recently invested in energy efficiency measures. In the remaining member countries this share was much lower and reached in Poland 41,7%, in Romania 29%, in Bulgaria 24,1%. A very high percentage of respondents in all partner countries have confirmed their interest in acquiring further information connected with the action subject: in Poland 78,9%, Romania 96,8%, Bulgaria 82,1%, Croatia 72,2%, Czech Republic 80%, respectively. Also regarding the third question a significant majority of respondents in all partner countries have been interested in consecutive trainings: Poland 81,1%, Romania 96,8%, Bulgaria 82,1%, Croatia 72,2%, Czech Republic 80%, respectively. Answering to the last – fourth – question, as much as 96,7% of respondents from Romania have confirmed that they have been interested in developing a M&V Plan.

5.5 Internal evaluation of trainer’s performance by EVO experts

Maicon’s IMPVP Expert (John Cowan) and IEEFP Expert (Thomass Dreesen) attended the first relevant training given by each trainer to ensure they properly deliver the material. A “whisper” interpreter was always organised because training events were always performed in national language. In many of these events the experts also presented shortly EVO and its mission and the IPMVP / IEEFP development. Evaluation has been developed of the performance of trainers.



John Cowan visited 4 two day trainings in Poland, Czech Republic, Croatia and Romania and two 1 one-day trainings in Bulgaria as part of these supervisory trips. John found that trainers were generally well prepared, and interacted with the class appropriately. Three similar issues appeared in all five countries and were the basis of recommendations John made to each trainer immediately after the events.

9 events were visited by Thomas K. Dreesen of the IEEFP half-day training. As to his general conclusions, it was found that all trainers were very familiar with the IEEFP concepts and materials and presented it well. There was, however, difficulty for most of them to arrange to have the correct audience and/or enough local EE Stakeholders to attend as needed to meet the objective of being willing to provide resources to create a ‘localized’ IEEFP and a sustainable EE finance training program. The number of participating bankers was not always as originally expected.



5.6 Lessons learned

Coordinator: Czech Republic

- Getting commitment from the key country stakeholders before the trainings proved to be of key importance. ENVIROS has involved the Czech association of energy service companies from the beginning. They commented on the Czech language version of IPMVP and also committed to send their staff to the 2-day IPMVP training. The ESCOs finally agreed that an M&V plan should become part of the model contract for EPC.
- The number of hours available for trainers to present even the two day course was less than Maicon anticipated when pruning the EVO course materials to suit PERMANENT's two day schedule. In future, the materials should either be spread over more days or reduced in size, as needed by the particular audience

According to the evaluation as well as the trainers' own opinion, the IPMVP training was most useful for technical energy efficiency experts. Interesting was the interaction with those technical experts, who were on one hand in favour of IPMVP, but at the same time recognised a lot of practical problems that made it difficult to apply IPMVP exactly as the protocol mentions. Some of the practical problems were:

- How to calculate the baseline, this is time demanding, especially when not all data are there
- Accuracy, deviation and other statistical parameters. This becomes difficult, especially when there are more parameters to take into account.
- Complex projects regarding IPMVP are especially in industry, hospitals are another example of complex projects

In schools and recreational facilities like hotels it is easier to apply IPMVP.

Despite the fact that experts recommended detailed processing of M&V plan even if it is more expensive (because it brings consequently „more certainty“ of energy savings and thus saver investment), investors more care about initial costs. Investors have not been forced by legislation or other instruments to calculate and process the energy savings in detail as it is in IPMVP.

BULGARIA

Lesson 1: A short training program to be developed for technical and economical evaluations of energy efficiency projects for bankers, with emphasis on the project risk evaluation. The training should be organized in different towns of the country – regional centers.

Lesson 2: Credits for energy efficiency projects, implemented through ESCO contracts could be guaranteed with receivables from already implemented projects portfolio. Commercial banks must be educated to assess the technical and economic risk from energy efficiency projects portfolio in order to recognize the receivables from ESCO portfolio of projects as liquid collateral.

Lesson 3: Packaging of small energy efficiency projects is good solution for reducing the financial institutions administrative efforts in project management. Packaging of projects could make financing of energy efficiency projects attractive for the commercial banks. The proposal is training sessions to be organized on packaging of projects and assessment of the risk parameters of the package.

The workshops are the most powerful communication tool as they permit QA sessions – direct contacts with the trainers, and provide the participants with training and information materials. Practical exercises and good practices examples were highly appreciated by the participants.

Although the current Bulgarian regulation is open for M&V methods in energy efficiency projects, the effective implementation of IPMVP needs specific adoption as recognized, standard method of energy savings assessment and verification.

A short training program should be developed for technical and economical evaluations of energy efficiency projects for bankers, with emphasis on the project risk evaluation. The training should be organized in different towns of the country – regional centers.

Credits for energy efficiency projects, implemented through ESCO contracts could be guaranteed with receivables from already implemented projects portfolio. Commercial banks must be educated to assess the technical and economic risk from energy efficiency projects portfolio in order to recognize the receivables from ESCO portfolio of projects as liquid collateral.

Poland - Lesson learned

Polish ESCO market is underdeveloped – there are few strong ESCOs (4-5) and more small businesses (3 to 10 multinational and local actors according to EU reports). They offer energy services mainly supplementary to their core business.

ESCO projects implemented in the public sector mainly concern co-generation, street lighting and district heating. Projects involving process and horizontal technologies in the industrial sector are also developed, but they are rather outside ESCO's interest.

Energy efficiency projects are financed with commercial banks, client's internal funds, often with subsidies (for example Poland's National Funds for Environmental Protection and Water Management in cooperation with Poland's Environmental Protection Bank offer investment support to energy efficiency projects at national, regional or municipal level).

Financing with subsidies (national or EU) rather exclude ESCO mechanism. The current value of ESCO projects is estimated at €5 - €10 million/year

In Poland public procurement procedures impede the selection of the best bids and are difficult to be implemented into long-term contracts. Participants of the trainings found that ESCO contracts as complicated. The main conclusion was that laws could be adjusted to allow for easier implementation of EPC and ESCO contracts.

Because ESCO offer is not popular so there is not strong demand for IPMVP and IEEFP trainings. People decided to participate in FEWE's training because they wanted to find what IPMVP and IEEFP were, to find out how to finance energy efficiency. These circumstances are important for recommendations for improvements.

In Polish conditions one can find the place for dissemination event rather than for detailed training.

Croatia – lessons learned

1. M&V is a must in energy efficiency projects
2. IPMVP methodology may not be suitable for some simpler energy efficiency projects

Romania – lessons learned

The most important lesson learnt during communication and dissemination activities was the necessity to develop and to model our presentations considering the feedback received from the audience. We tried to improve our given information from one presentation to another following the interests of the public and trying to develop easy to understand messages with the information received from EVO.

PERMANENT Project as a whole

At the end of the project we can conclude that:

- Not all candidates proposed by the partners passed the IPMVP exam, but enough were selected so there were at least 2 trainers to present the long (2 day) IPMVP course in each country.
- Passing the IPMVP exam proved to be the easier part of the trainer preparation. The more active process of developing the M&V plans was the most time intensive, and the most effective, part of the learning experience for the 10 candidates taking the advanced training.
- Translation of the IPMVP and IEEFP protocols was more time-demanding than expected and were only finalised shortly before the trainings started. In all cases involvement of the IPMVP and IEEFP trainers was required.
- M&V trainers found that there was more training material provided by EVO than they could fit into a typical training day.
- Meeting the target number of people to be trained was more difficult than expected. Finding the right communication channels for getting the message through took time. Only at the very end of the project were the targets met in the Czech Republic and Poland. Bulgaria, Croatia and Romania met their target at an earlier stage.
- Feedback from attendees at the one or two day trainings was generally positive.
- For the short awareness raising presentations, the reactions were mixed. Some did not grasp the importance of M&V, probably reflecting their need for more information.

Recognition created by PERMANENT amongst key policy makers has helped to ease the barriers to financing of energy efficiency project. Several countries recently explicitly mentioned the ESCO mechanism and/or the wisdom of following IPMVP in public buildings, in special EE funds, and in their National Energy Efficiency Action Plans. Such public endorsement can only help reticent private sector players to employ ESCOs more fully across the economy.

PERMANENT cannot claim full responsibility for easing the financing barrier. However PERMANENT actively promoted an independent view, without an ESCO sales pitch or bias. It created independent learning and discussion forums for reluctant private and public players to learn about IEEFP and IPMVP methods. PERMANENT's mass promotion program created an awareness 'shock,' from an unbiased source, raising understanding so that local market influencers realize important steps to clear common financial barriers to energy efficiency projects.

The barriers are not all gone by any means. But PERMANENT accelerated progress in this direction. Section 7, below, offers a way forward, based on the foundations built by PERMANENT, and current market challenges created by the Commission's revised Energy Efficiency Directive.

6. THE IMPACTS OF PERMANENT AND WAY FORWARD

6.1 Acceptance of the Protocols and impacts of the Action

This chapter provides an overview of the acceptance of IPMVP and IEEFP among stakeholders in each of the countries and the achieved results of PERMANENT.

BULGARIA – achieved results

Acceptance of IPMVP

IPMVP methodology and benefits were very positively accepted by all energy experts trained, since it could increase the transparency and credibility associated with current energy audit practices for investors and financial institutions.

Most of participants in the training sessions stated that the training on IPMVP should be continued, since it provides a new approach and knowledge benefitting energy efficiency project implementation.

Energy auditing and ESCO companies have shown real interest in incorporating the IPMVP principles in their contracts, methodology and practice.

Acceptance and reactions on IEEFP

The main barrier for implementing the IEEFP is that commercial banks do not have expert capacity to evaluate the project technical risk. Commercial bank representatives expressed interest to create their own capacity or to co-finance project with institutions, which can assess project risk such as the Bulgarian Energy Efficiency and Renewable Sources Fund.

Bulgarian banking legislation still restricts the uncollateralized credits by means of requirements for additional provisions of credits, payable to the Central Bank. Thus future savings generated from the projects could not be used as collateral without helping bankers and/or legislators to better understand the collateral value in guaranteed energy savings.

Energy efficiency projects usually have small investments and a number of EE measures, requiring substantial expert resources of commercial banks for project risk evaluation when no performance guarantee is in place.

Bulgaria – impacts of the project

The presentations and dissemination of PERMANENT project results will continue at national and international events in 2012 and further.

The target groups remains the energy experts, energy managers, energy auditing companies, energy users, ESCO and utilities companies, professional associations/networks, which will eventually implement the IPMVP methodology in their every day practice, but also the governmental and municipal officers, universities, NGOs, who could support the recognition of EVO Technical protocol by the current specific regulation .

In-house PERMANENT/IPMVP targeted presentations are planned to be provided within February – May 2012 for corporate energy related bodies and companies in industrial sector, public utilities companies, etc.

Czech Republic – achieved results

Acceptance of IPMVP

The PERMANENT trainings met a positive response in general.

Although some instruments already exist in the Czech Republic, e.g. compulsory energy audits, it misses an M&V plan, that says how to measure the calculated energy savings

Interest in M&V or certification of savings would be interesting for:

- Banks that handle applications of energy savings projects
- Applications for grants under the Czech operational programmes (OPZP, OPPI). These applications should include a methodology of how to verify savings – this will lead to an additional check of the upfront energy audit and will show whether the estimates are correct. In a way it's an additional check of the money flow.

Acceptance and reactions on IEEFP

Financing institutions in most of the banks are not developing their own in-house capacities for evaluating energy efficiency projects due to the low financial volume of such projects in total, due to their diversity and already developed professional environment in the Czech Republic. The bank declared in most of the cases that it is more convenient and efficient for them to cooperate with external experts for technical and financial projects evaluation which includes reliability of energy savings. The banks and other financiers appreciated the IEEFP training and took part also in IPMVP training course to learn more about the IPMVP methodologies and approaches. They are interested in this methodology.

Methodology of IPMVP - especially through M & V plan help to satisfy the needs of financial institutions and banks in minimising the technical risks in energy-saving projects and related revenues. It was clearly shown that some risk (e.g. non permanent achievement of savings) can be by integrating M & V plan into the contract almost completely avoided.

Most interesting topics considered by the audience was the risk analysis of projects and the description of ESCO projects (including forfeiting).

Czech Republic – impacts of the project

ESCOs, providing services EPC (Energy performance contracting) support their clients with complex energy savings projects and take all finance risk in project investments. They have already included in their standard contracts verification methods of energy savings. As a results of the PERMANENT project IPMVP is going to be used as a reference methodology in Guidelines for M&V practice in Czech EPC projects as agreed with the Association of energy service companies (APES) in the Czech Republic.

The number of Energy Performance Projects has been dramatically increasing in the Czech Republic. This increase results mainly from, the existing lack of investment funds in public budgets, due to widespread training and awareness programmes in EPC (in addition to PERMANENT) and thanks to support to EPC by the Ministry of Industry and Trade. Clear methodology in Measurement and verification of energy savings us important in efforts to open governmental sectors financed directly from the state budget to Energy Performance Contracting.

Initial interest has been shown by building managers in M&V for buildings where energy savings measures were undertaken and for subsequent checking of performance.

Poland – achieved results and impacts of the project

- More and more municipalities and communities are becoming interested in ESCO and private-public-partnership methods. For example, Wrocław is preparing a large program of thermal modernization for 250 public buildings using ESCOs, developing rules of financing and savings verification according to IPMVP.
- The Ministry of Economy now plans to put on its website a model ESCO contract and list of qualified ESCOs.
- The National Fund of Environmental Protection (NFOŚiGW) with KAPE (National Agency of Energy Conservation) are preparing a method for EE projects to use ESCOs. The special fund (100 mln zł or about 25 ml €) will be established by NFOŚiGW and EBRD.
- FEWE has been asked by 5 Marshall Offices (Poznań, Kielce/ Świętokrzyskie, Rzeszów, Wrocław, Katowice) to provide training addressed to communities.

Support for ESCOs is among the key actions in the new EE policy of Poland

- ESCO are now mentioned in the 2nd National Energy Efficiency Action Plan for Poland 2011 (Jan 19th 2012). Specifically:
 - ESCO is shown as one of the ways to implement EE projects;
 - A national campaign promoting the financing of EE with ESCOs;
 - Facilitation of the implementation of ESCOs in public facilities;
 - A change in the rules of the detailed classification of public debt related to ESCO contracts, as an additional incentives for communities to undertake EE projects;
 - Establishing a National Contact Point for ESCO;
 - ESCOs can be beneficiaries of the white certificate system;
 - Public sector, being obliged by the EE law to improve EE, will be able to enter into contracts with ESCOs;
 - Facilitating EE by recognizing as ‘owner’s funds’ any grant the owner receives from entities such as the EU, NFOŚiGW or the Norwegian Financial Mechanism.
 - Model of Specific Terms of Procurement and contracts useful in EE projects, including ESCO contracts.

CROATIA – achieved results

EE projects completed without M&V gave no feedback on actual results, leaving many doubts. Participants in PERMANENT workshops were clear in their recognition of the fact that proper application of good M&V practise can remove those doubts. However, often M&V will put additional financial burden on the project, without investors recognizing its value in maintaining the savings so planned payback is achieved, or exceeded.

IPMVP provides a standardized approach to M&V. If the concept of guaranteed savings becomes recognized in the public sector for energy efficiency projects, IPMVP may become the methodology for M&V. Then there would be wide requirement for M&V training and certification. The private sector will follow success in public sector. EE projects completed without M&V gave no feedback on the actual results, thus leaving many doubts. Participants in workshops were clear about fact that application of M&V in EE projects can remove those doubts.

Recent developments in energy efficiency (National EE action plans, Preparation of Law on Energy efficiency and sub-laws, implementation of national programmes ‘House in Order’ etc.) clearly show that M&V should be part of every EE strategy and project.

IPMVP provides standardized approach to M&V. If concept of guaranteed savings is recognized with public sector as model to perform energy efficiency projects, IPMVP may become the methodology for M&V of savings. That can open wide requirements for CMVP trainings and certification which can be carried out by EVO trainers. In private sector similar occurrences can happen following on success in public sector.

Romania – achieved results and impacts of the project

At the November 2011 International Energy Trade Fair in Romania, numerous persons mentioned their recognition and appreciation of the PERMANENT project.

The partner ENERGOECO managed the established target in numbers of people trained during the Permanent Project and the difficulties encountered in organizing the trainings when it comes to assure the number of participants to each training event. Number of invitees for one training event amounted to several hundred in order to finally get no more than 20 persons. The financiers and bankers were by far the hardest people to address but a strategy was developed to persuade this group to come.

Other success story could be the fact that on 21st of November 2011 the partner participate to The 5th International Energy Trade Fair - Romania's State Energy Trade Fair that took place at Palace Hall, Bucharest, Romania. With a number of 4000 visitor this event is the biggest environmental event in Romania. There we had the opportunity to present to a very large number of people the Permanent Project. I was very pleased to see that along with people who heard for the first time about Permanent we've meet plenty of people that recognized the Permanent Logo and said that they have been to our trainings all over the country and they are very satisfied with what they learned during our trainings. So it was a great feeling that maybe we at least “scratch the surface” and made ourselves heard through Permanent Project.

6.2 The Way Forward

PERMANENT clearly increased awareness in 5 countries of the role of M&V in enhancing energy efficiency investments. Combined with the increase of M&V awareness created by EVO's associates in at least 12 other European countries², the PERMANENT project has illuminated further areas where better understanding is still needed to help investors recognize the value in energy savings. A follow-up activity could further help break energy efficiency investment barriers across Europe, as discussed below.

Direct Activities

Feedback from some PERMANENT attendees showed a desire for further guidance in applying IPMVP and IEEFP principles to their projects or situations. Logical direct responses should be:

- a) Creation of more local example M&V case studies. PERMANENT created 2 M&V examples for each country, but more should be generated by a community of local experts, vetting their case studies through the global community's peer review process conducted by EVO.

² Austria, Belgium, France, Ireland, Italy, Macedonia, Portugal, Russia, Spain, Switzerland, Ukraine and United Kingdom

- b) Support further training where it is not yet commercially self-sustaining. M&V related training is already self-funded in some parts of Europe. The encouragement created by the PERMANENT project helped open the markets in the 5 target countries and also helped alert the remainder of Europe to the importance of well-documented savings. IEE should further sponsor activities in selected countries to help kick-start market driven training and awareness on the value of proper savings documentation.
- c) Labelling of good applications of M&V principles in specific projects. Local expert groups should be created to provide a “stamp of approval” on M&V plans, Energy Savings Reports, or for M&V service suppliers. National grantors of such “stamps” must meet all the usual requirements for a certifying body to ensure the marketplace views them as truly expert and independent. Such grantors would not have to provide a full energy engineering consulting service, simply an M&V review service. The labelling of good quality M&V could be a combination of “savings verification” awards and labelling of the savings verification aspects of projects and/or firms.
- d) Integration of IEEFP principles into local financing and lending practise. Each country has its own specific financing and lending practises related to its own energy audit rules, banking practises, financial hurdle rates, economic incentives, and national objectives. Though the principles of IEEFP are widely applicable, they need customization to local practises by development of country-specific examples of items such as:
 - o a) energy audits using risk adjusted rates of return, life cycle cost analysis, and M&V Planning;
 - o b) model performance contract terms for specifying good M&V at the time of tendering and contracting;
 - o c) model loan agreements for a variety of borrower situations that recognize the collateral value in documented savings.
- e) Development of an IEEFP for Bulgaria. The localization of IEEFP is recommended in Bulgaria due to the large number of LFIs and their interest in doing so, coupled with the relatively reasonable banking infrastructure there.
- f) EE Finance Capacity Building. Due to the severe lack of knowledge by LFIs in evaluating the risks and benefits of financing EEP, the EU should consider a Europe-wide EE Finance capacity building for the LFIs that is focused on training them about the reliability of EE savings if proper design and M&V is performed. To minimize the learning curve, the EU could use the IEEFP as a starting point to localize for Europe supported by an increasing repository of EEP case studies that utilize IPMVP.

Indirect Activities

The above direct activities at the country level will need support from three other Europe-wide programs:

- a) Create **customized common European guidance documents** on the application of IPMVP and IEEFP principles to suit: requirements in the European Commission’s revised Energy Efficiency Directive, and generic guidance coming from CEN and ISO. Though the EED focuses on EU Member State actions, their results are achieved by the actions of energy users, possibly following CEN or ISO management guidance. Member States’ “bottom up” reporting of results will be simplified if energy users’ measurement and reporting is consistent with the way national objectives are set and ultimately reported upon. Therefore new common guidance is needed for energy users so that energy savings are reported consistently across a Member State. Such EED-specific M&V guidance would select out of the good practise elements in IPMVP a coherent subset of EED-driven detailed M&V practices, such as:
- mandatory facility level reporting (IPMVP Option C) of site energy savings, for all facilities consuming over x MJ/year;
 - baseline time period and length (e.g. data for a continuous 12 month period predominantly in the calendar year chosen by the nation as baseline for its reporting, in addition to any other user-selected 12 month period for its own reporting);
 - basis for adjusting measured quantities (e.g. report under condition of: long term average values of the independent variables such as weather, production and/or occupancy, and the baseline year’s static factors, in addition to any other reporting basis such as the common use of reporting period conditions);
 - any special EED disclosure requirements;
 - required minimum reporting accuracy, and default procedures when this minimum is not achievable using other techniques such as: retrofit isolation (IPMVP Options A or B), calibrated simulation (IPMVP Option D), operational verification of ex-ante savings, and deemed savings for verified installations.

Since the global (ISO) and European (CEN) guidance or requirements (EED) are common across Europe, a further initiative should be launched to develop the appropriate common guidance in a document entitled something like Documenting Energy User Savings Results In Europe 2012. It would include guidance for Member States on harmonizing its sectoral targets with documentation standards for energy users.

Similarly EED requirements for Member States to promote energy audits will be aided by common guidance on how the principle of IEEFP can enable the technical facts to be presented in a way that is readily financed. So guidance should be provided for public bodies and private enterprise on the preparation of energy audits in packages that are readily understood by financiers. A further project should be launched to develop the appropriate guidance in a document entitled something like Presenting Financeable Energy Savings Business Transactions In Europe 2012.

EVO has expressed interest in cooperating with the development of such Euro-centred guidance activity, since it meshes with EVO’s global vision.

IEE could further help targeted *countries* by elaborating custom documents such as Documenting Energy User Savings Results In Bulgaria 2012, and Presenting Financeable Energy Savings Business Transactions In Poland 2012.

- b) Develop a **common program to identify professionals** possessing appropriate skills, at various levels, for reporting energy savings, to help Member States comply with the revised EED requirements for national certification schemes. Such program might adapt the current global Certified Measurement and Verification Professional (CMVP) program³ to European energy manager certification methods, in concert with local organizations such as SECEM in Italy.
- c) Establish a **European centre of excellence** in energy efficiency reporting for business transactions. Such centre would:
 - o be a permanent (but roving) training and certification centre, for skills development in the common elements of savings reporting, evaluation of M&V activities, and savings financing;
 - o be the focal point for development of documents suggested above; and
 - o offer the labelling service mentioned above.

³ The CMVP program is jointly conducted by EVO and its only current partner, the Association of Energy Engineers. This 11 year old program now has more than 1,700 individuals registered as CMVPs around the world, with over 300 of them in Europe. The list of CMVPs is currently growing at an annual rate of nearly 100%. EVO (and AEE) report being willing to partner with others to access the CMVP brand, or other levels of certification.



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