

D 3.5.1 Training course material

Training course for public employees and energy managers: training for technicians of local governments and energy managers from sector agencies concerning the Joint Actions for Energy Efficiency in public building stock and the use of the ENERJ web platform



WP 3 - Testing

Activity 3.5 – Training course for public employees and energy managers

Deliverable 3.5.1 – Training course material

Version	Status	Date
Final version		March 2018

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1. Introduction

The project's main objective is to enhance and improve the coordination and performance of SEAPs and other Energy plans concerning achieving EU and national targets on the energy efficiency in public buildings. The project's approach is based on belief that in order to achieve tangible effects in relation to energy efficiency in public building stock, policies and actions need to be coordinated and tailored to the territorial needs.

From an initial analysis of the current situation, four are the main common factors that have influenced the lack of effectiveness in the implementation of SEAPs. The first one is a general inadequacy of the proposed measures to take into account the specific territorial context. SEAPs are often too generic (not integrated into each city's specific features), based on incomplete data and not always integrated into existing local energy policies and plans. Secondly there is a general lack of "critical threshold", public awareness and qualified human resources at a governance level. Thirdly, the scarce funding opportunities, the lack of a multisector integrated approach and a scarce involvement of the private sector have been obstacles in making financial strategies work. Another common obstacle has been the incomplete, unshared, scattered or asymmetric information regarding energy efficiency performance of the building stock at the regional level. These are the main challenges that ENERJ project seeks to tackle by offering different forms of support to local authorities and stakeholders in order to facilitate the implementation of ad-hoc measures and target tangible results in energy efficiency for public buildings.

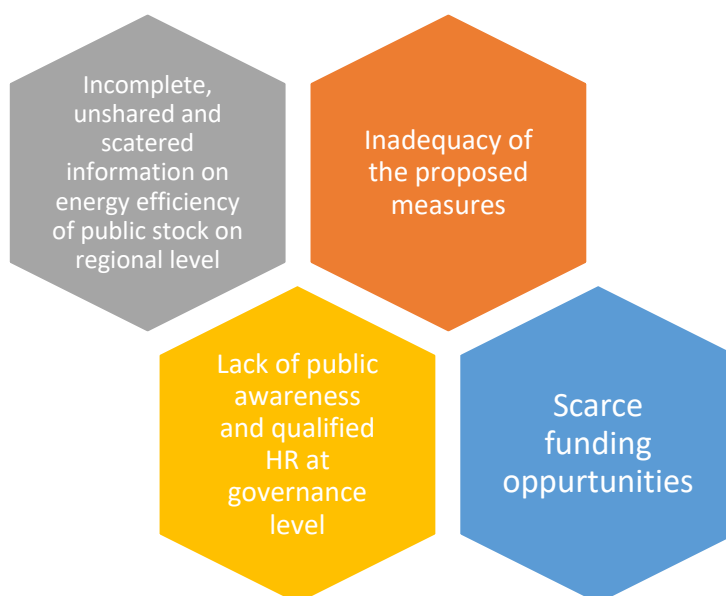


Figure 1: Four main factors for the lack of effectiveness in the SEAPs implementation in MED area

It is a peculiarity of many territories in the MED area to have to deal with scattered small size Municipalities that often lack the necessary technical expertise and organizational capacity to implement large EE projects. Thus, the project will support public bodies in the identification of specific achievable targets in EE through the coordination of **Joint actions** amongst Municipalities, countries and territories in a multi-level governance approach. To do so, the project will develop tools and provide services that aim at creating awareness as to the added

value of Joint Actions, simplifying the decision-making and implementation process of energy-related pilot actions and plans.

The project aims to form a new type of role among existing structures taking care for public building stock energy efficiency – a **Joint Actions Coordinator** (JAC). JAC will have qualifications of energy manager. His role is providing support to municipalities in the definition and coordination of integrated joint EE interventions on public building stock.

The ENERJ project's online database and platform will help JAC in the decision making and guidance at governance level. The platform contains a collection building stock energy efficiency data, regional overview of SEAPs, good practices, energy plans and policies, guidance on new financial mechanisms and allows a better visibility of the investment financing opportunities for private stakeholders (tenders, EPC, etc.), thus strengthening the collaboration with private companies that are willing to invest in this sector.

This document provides general training course material to be used in JAC training course. The material is further developed in Power Point presentations for training courses, and tailored to specific training needs in individual country. The main emphasis is given on Joint actions and use of the web platform, developed within ENERJ project.

2. Joint actions on energy efficiency in public buildings

The ENERJ project builds on the awareness that a joint approach to energy planning, especially for small local authorities, can allow achieving more effective results than an isolated one, since – as it was also acknowledged for by the EU Commission (see i.e. the Quick Reference Guide for Joint Sustainable Energy Action Plan issued within the framework of the Covenant of Mayors) – aggregated municipalities can:

- more easily identify opportunities for high-impact actions
- benefit from economy of scale
- more effectively tackle the problem of lack of human and financial resources
- bundle efforts on SEAP preparation, implementation and monitoring.

In cases of Joint SEAP approach, the group of signatories is strongly encouraged to appoint a body/authority responsible for coordinating the SEAP development and implementation processes. It is recommended to delegate this work to the respective Covenant Territorial Coordinator or the most active or advanced municipality among the group or the agglomeration in the case of urban areas.

It is important to stress, that the Covenant of Mayors, although widely accepted in EU member states (especially Italy, France and Spain) as an effective concept of an action plan to tackle climate change, is on a voluntary basis. Some member states have introduced similar mandatory Energy planning on regional or local level.

ENERJ establishes a joint action approach that parts from the current situation in a given geographical area, regarding the energy planning in place, data availability, funding options, etc. and promotes the implementation of the existing plan (mostly SEAP) with the help of a Joint action coordinator (JAC) who can effectively plan, design, implement, manage and monitor joint actions for energy efficiency.

In order to effectively plan, design, implement, manage and monitor joint actions for energy efficiency, preferably within the framework of joint SEAPs or similar strategies certain prerequisites must be met.

An **appropriate governance structure** is crucial for the successful implementation of any energy efficiency action plan. In case of joint energy planning, coordination and governance have an even greater importance. Therefore, it is necessary for municipalities undertaking joint energy efficiency actions to create a dedicated body/authority or a steering cabin, responsible for coordinating the development, implementation, management and monitoring of energy efficiency actions on the whole involved territory. The steering cabin could involve different competences and should be managed by the energy manager.

The **energy manager** is a crucial figure in all phases of the energy efficiency interventions, from the energy planning, to the elaboration of the main tendering documents, to the monitoring of the implementation of the energy measures. The energy manager should also stimulate the policy makers' commitment on energy efficiency issues. In most countries, the law makes it compulsory, for bigger municipalities, the appointment of an internal energy manager, and recommends it also for groups of neighboring small municipalities. An Energy manager is also the most suitable profile for JAC role.

Composition of the joint coordination & governance structure

The joint coordination and governance structure shall be established taking into account the following aspects:

- Representativeness of the involved local authorities (at political and technical level);
- Involvement of a territorial coordination body, regional energy agencies or national energy agencies (i.e. for Italy ENEA Italian National Agency for new technology, Energy and sustainable Economic Development);
- Involvement of multiple professional figures with different competences, according to a multidisciplinary approach: energy management, spatial planning, architectural design, engineering, financial management, public procurement, communication, data management, etc.;
- Organizational structure, formed i.e. (as suggested by SEAPs guidelines) by a steering committee, including politicians and senior managers providing strategic direction and political support, and a technical committee;
- Assignment of adequate financial resources.

Functions of the joint coordination & governance structure

- Collecting and analyzing data on public buildings:
 - Collect and harmonize energy data at local level (municipality and provinces);
 - Coordinate energy audits and the identification of the most suitable EE measures to undertake (the management should be able to plan, in the short and medium term, the energy audit activity of its own building stock, by using internal human resources, after providing capacity building training, and/or using external resources);
 - Creation of an energy audit database (or update of an existing one) at local level, to be aware of the status of its own building stock and to allow the territorial coordinator body to manage a comprehensive energy audit database at larger scale.
- Planning and design of energy efficiency actions:
 - Develop joint energy plans (SEAPs or others);
 - Coordinate the design of the energy efficiency interventions, assessing their financial, technical and administrative feasibility and the potential environmental benefits, (once the database is implemented);
 - Inform, involve and coordinate the relevant administrative sectors;
 - Coordinate tendering procedures (preferably through a single public procurement authority - Central Purchasing Body), being able to include in tendering documents the technical and economic elements needed to improve energy performance at zero cost (i.e. through EPC contracts).
- Monitoring of the energy actions implementation (expected by SEAPs or others):

- Supervise and monitor the single actions implementation and their environmental impacts through the identification and measurement of an adequate set of indicators;
 - Monitor the status of SEAP implementation in term of number and quality of energy efficiency measures, and evaluate the real energy saving achieved in a defined time period.
- Training and communication activity:
- Perform transfer of knowledge and capacity building activities;
 - Organize and carry out training courses addressed to public officers and staff, with the purpose to improve knowledge of energy efficiency, and on the essential tools to evaluate EPC viability in public tenders. A professional figure (Energy manager) inside the structure is needed to coordinate these courses;
 - Design and implement awareness-raising activities addressed to the general public and/or to specific target groups, according to the type of energy efficiency actions to undertake.

3. Energy efficiency policy and relevant regulation

General information

EU energy efficiency policies are transposed to national legislation and regulation through directives. The two directives that cover the topic of energy efficiency in buildings are 2010/31/EU ("EPBD recast") and 2012/27/EU (Energy efficiency). As each member state has implemented the provisions of directive in its own legislation (building codes, etc.) adopting it to national specificities the training material has to be prepared for each individual country by partners of ENERJ.

On 19 May 2010, a recast of the Energy Performance of Buildings Directive - 2010/31/EU ("EPBD recast") was adopted by the European Parliament and the Council of the European Union in order to strengthen the energy performance requirements and to clarify and streamline some of the provisions from the 2002 Directive it replaced. The recast proposal confirmed the importance of effective implementation at the Member State level, the importance of Community-wide co-operation and the strong long-term commitment and role of the Commission itself to support such effective implementation.

The 2012 Energy Efficiency Directive established a set of binding measures to help the EU reach its 20% energy efficiency target by 2020. Under the Directive, all EU countries are required to use energy more efficiently at all stages of the energy chain, from production to final consumption.

On November 30, 2016, the European Commission presented a package of policy initiatives that impact energy efficiency policies to 2030. The Commission proposes a binding EU-wide target of 30% for energy efficiency by 2030, emphasizing the EU's commitment to put energy efficiency first.

EU countries agreed on a new 2030 Framework for climate and energy, including EU-wide targets and policy objectives for the period between 2020 and 2030. The target relating to energy efficiency is at least 27% energy savings compared with the business-as-usual scenario.

The framework includes three targets for 2030:

- at least 27% energy savings
- a 40% cut in greenhouse gas emissions compared to 1990 levels
- at least a 27% share of renewable energy consumption

The Commission proposes to update the 2012 Energy Efficiency Directive by:

- aligning energy efficiency targets with the EU 2030 climate and energy framework;
- extending beyond 2020 the energy saving obligation requiring energy suppliers and distributors to save 1.5% of energy each year from 2021 to 2030 with a view to attracting private investment and supporting the emergence of new market actors; to enable tailor-made policies that take account of national specificities, Member States can also meet this requirement through alternative measures having the same effect, such as energy efficiency support schemes;

- improving metering and billing of energy consumption for heating and cooling consumers.

The Commission also proposes changes to the 2010 Energy Performance of Buildings Directive, which is set to be:

- Smart, by encouraging the use of ICT and modern technologies, including building automation and charging infrastructure for electric vehicles, to ensure buildings operate efficiently;
- Simple, by streamlining or deleting provisions that have not delivered the expected output;
- Supportive of building renovation, by strengthening the links between achieving higher renovation rates, funding and energy performance certificates as well as by reinforcing provisions on national long-term building renovation strategies, with a view to decarbonizing the building stock by mid-century.
- In addition, the Commission is launching a smart finance for smart buildings initiative to unlock private financing for energy efficiency and renewable energy in buildings at a greater scale.

National/regional specific information

The national and regional specific information for ENERJ partner countries on energy efficiency policy and regulation was analyzed in detail in deliverable **D 3.2.1. – Plans and Measures Analysis**. The table below summarizes the Transposition of the EU directives along with the plans and the good practices in each partner country. In red are the areas where countries do not have anything present, in grey where it is partly present or incomplete and in green where it is present. The numbers indicate the number of plans or good practices in the respective countries.

	Albania	Croatia	Cyprus	Greece	Italy	Malta	Portugal	Slovenia	Spain
Transposition of EU directive 2010/31/EU									
Transposition of EU directive 2012/27/EU									
Other relevant National regulations		3	1			5	2	3	3
Relevant regulations at local and regional level	2		2		3		1		6
Plans at regional and local level	1	3	1	2	3	2	1	1	2
Database available	1	1	1	1	3	1	1	1	2
Good practices national level	1	1	4	1			1	1	
Good practices regional level	2				1	1			1
Good practices at local level	3				1				

present	
partly present	
not present	

Figure 2: Transposition of the EU directives along with the plans and the good practices in each ENERJ partner country

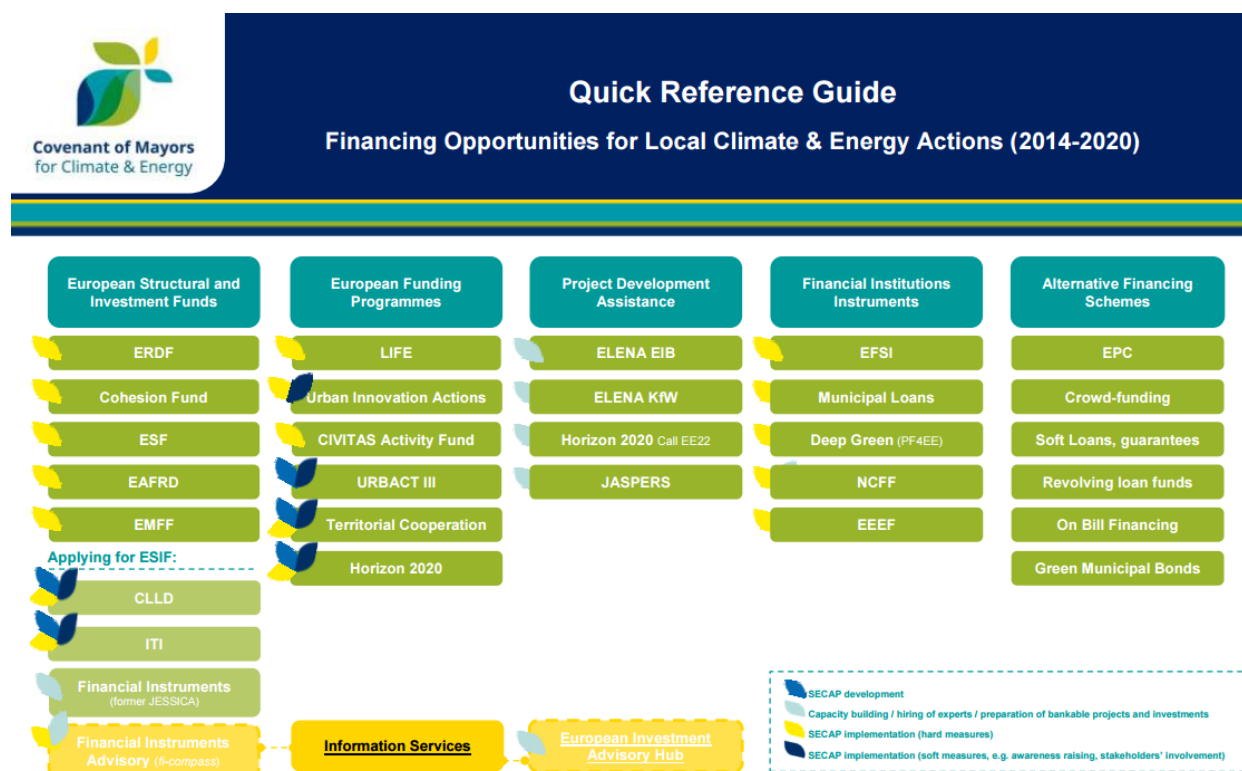
4. Information on existing funds for financing EE

Funds for energy efficiency on EU level

The EU has increased the amount of public funds available for energy efficiency, but there is a need to boost private energy efficiency investments through the targeted use of public funds, the development of robust investment solutions, and support activities for project developers.

In the 'Clean Energy for All Europeans' Communication released on 30 November 2016, the Commission treats buildings as an essential part of Europe's clean energy transition and its financing. In particular, the 'Smart Finance for Smart Buildings' initiative, in the Annex to this Communication, is dedicated to accelerating clean energy in buildings.

Public support is available for sustainable energy investments. From 2014-2020, European Structural and Investment Funds (ESIF) will allocate €18 billion to energy efficiency, €6 billion to renewable energy - notably in buildings and district heating and cooling – and around €1 billion to smart distribution grids. Boosting investment in sustainable energy projects is also one of the strategic priorities of European Fund for Strategic Investments (EFSI). The vast majority of energy projects approved for financing cover energy efficiency and the renewable energy sector.



Picture 1: Financing opportunities (source: <http://www.covenantofmayors.eu>)

However, since energy efficiency investments are generally made in private properties, public funds should not provide the majority of support - the energy efficiency market must mature and become fully investible, and subsidies should be better targeted towards vulnerable consumers, specific market failures and particularly ambitious projects.

Public money can be used to reduce the cost of capital, provide loans with longer maturities, or lower collateral requirements. To move towards this more efficient use of public funds, the Commission and EU countries are developing innovative business and financial instruments to leverage private finance with public funding.

European funding regarding energy efficiency (EE) measures in public buildings comes in different forms. The general financing opportunities come from European Structural and Investment Funds (ERDF, Cohesion Fund), European Funding Programs (LIFE, Horizon 2020 etc.), Project Development Assistance (ELENA, JASPERS etc.) and Financial Institutions Instruments (EFSI, EEEF etc.). Some Alternative Financing Schemes for EE measures in public buildings come from Energy Performance Contracting (EPC), Crowd-funding, On Bill Financing, Green Municipal Bonds etc.

European Regional and Development Fund (ERDF)

As part of the European Structural and Investment Funds (ESI Funds) the ERDF funds projects related to the EE of public buildings. The main beneficiaries of the fund include local, regional, national authorities, NGOs, social cultural and educational institutions, companies SMEs and associations with the EU-28 Member States being eligible for participation. The focus areas for the ERDF depend on the Operational programs and can include RES, smart distribution systems and EE infrastructure. Other focus areas may include Research, Innovation, ICT the Competitiveness of SMEs, planning for low-carbon economy, climate change adaptation and risk management, environmental protection and resource efficiency. The type of funding may come as grants which is usually co-financed, Financial instruments such as guarantees, loans, equity participation and other risk-bearing mechanisms and technical assistance support. Furthermore, European Territorial Cooperation Programs may also provide funding opportunities.

Cohesion Fund (CF)

CF is another fund part of the ESI Funds which although sets some boundaries in the participating countries, including only 15 Countries of the EU (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia) with its main beneficiaries being local and regional authorities. The focus areas of CF include amongst others energy: the use of renewable sources and efficiency, the low-carbon economy, climate change adaptation, risk prevention and management, environmental protection and resource efficiency. The types of funding come in the form of grants, financial instruments such as guarantees, loans, equity participation and other risk-bearing mechanisms, a possibility of technical assistance and support, along with some indirect funding (e.g. loans, risk capital and seed funding).

Applying for ESI Funds

All ESI Funds can be used in integrated packages at local, regional or national level through the use of territorial integrated instruments such as Community-led Local Development (CLLD) and Integrated Territorial Investments (ITI). Both vehicles can be combined with overlapping elements, depending on the Operational Programs. It provides financing for urban or other territorial strategies through combined investments from more than one priority axis of one or more Operational Programs (ERDF, ESF and CF mainly, but complemented by EAFRD and EMFF).

Community-led Local Development (CLLD)

The beneficiaries are local action groups composed of public and private local socio-economic interests, in which, at the decision-making level any represents more than 49% of the voting rights. The participating countries depend on the Operational Program of the ESI Funds and the focus areas include capacity building, training and networking related to the Community-led local development strategies, i.e. climate change and transition to a low carbon society. The average project size is estimated to be a minimum of €3 million for the full funding period (7 years) with a co-funding rate between 50-90% depending on the ESI Funds and regions and it comes in the form of grants.

Integrated Territorial Investments (ITI)

The main beneficiaries are local and regional authorities, regional development bodies and NGOs although cities, sub-regional and local bodies should at least have a substantial responsibility in the ITI. Only 15 Countries of the EU (Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia and Slovenia) can participate in the ITI. The focus areas include Institutional capacity (multi-level governance, partnership building with local actors, monitoring and evaluation capacity), low-carbon economy, climate change adaptation and risk prevention and management, environment protection and resource efficiency, as well as sustainable transport. The funding comes in the form of grants, repayable assistance and financial instruments and the co-funding rate depends on ESI Funds and regions, but blending with local/regional/national and other funding is strongly encouraged.

Financial Instruments (former JESSICA)

It is possible for financial instruments to operate across all European and Structural Funds sources and thematic priorities in the 2014-2020 programming period. An example of the type of financial instrument that could be developed is the Urban Development Fund (UDF). The UDF can invest in public-private partnerships and other integrated projects for sustainable urban development. The main beneficiaries of these Financial Instruments are public authorities (including local and regional), commercial financial institutions, public agencies, investment fund holders, property developers, NGOs etc. and the participating countries depend on the operational program of the ESI Fund. The focus areas can be urban infrastructure including energy, heritage or cultural sites, for tourism or other sustainable uses, redevelopment of other brownfield sites, office space for SMEs, IT and/or R&D sectors, University buildings, including medical, biotech and other specialized facilities and energy efficiency improvements. UDF's can vary in mechanism and size, depending on the geographic basis and investment focus. Co-financing and Co-investment (from the private sector) is a requirement to access the EDRF resources. The funding comes in the form of financial instruments (revolving fund), which provides mainly loans, but also equity and guarantees.

European Funding programs

LIFE (Environment and Climate Action)

The main beneficiaries are public authorities, SMEs, private non-commercial organizations and NGOs and EU-28 Member States can participate. The focus areas of LIFE include environment and resource efficiency, nature and biodiversity, environmental governance and information, climate change and mitigation, climate change and adaptation and climate change governance and information. The EU contribution for 1-5 beneficiaries (traditional projects 1-5 years) ranges between €500,000-€1.5 million and for 2-10 beneficiaries (integrated projects 6 years or more) between €8 million - €15 million, with a co-funding rate

between 2014-2017 at 60% and between 2017-2020 at 55%, whereas for capacity building projects between 2014-2020 the funding is 100%. The types of projects that LIFE provides funding for include demonstration and pilot, best practices, information awareness and dissemination, technical assistance, capacity building and preparatory projects and the funding comes in the form of grants.

Urban Innovation Actions (UIA)

The beneficiaries include local authorities with a population of at least 50,000 inhabitants or an association or groupings of local authorities that their inhabitants sum up to 50,000 and the participating countries are the EU-28. The initial call focus areas were integration of migrants and refugees, jobs and skills in the local economy, energy transition and urban poverty, but next calls will also include: climate adaptation, circular economy, housing, urban mobility, green procurement, digital transition, air quality and nature-based solutions. The average project size must be a maximum of €5 million per project and the co-funding rate is set at a maximum of 80% with a project maximum period of three years. The types of projects that are being funded under UIA include new innovative actions to interconnected and interrelated local challenges thus testing new urban solutions in pilot projects and participatory processes involving stakeholders. The funding comes in the form of grants (co-financing).

European Territorial Cooperation programs – Interregional programs

INTERREG EUROPE

The main beneficiaries are municipal institutions and administrative bodies, social, cultural and educational institutions, NGOs, companies, SMEs and associations and the countries that are included are the EU-28 along with Switzerland and Norway. They must include at least three countries out of which at least two are Member States. The focus areas are research and innovation, ICT, competitiveness of SMEs, low-carbon economy, climate change adaptation and risk management, environmental protection and resource efficiency and transport. The specific objectives of these types of projects are the dissemination of good practices and expertise in sustainable urban development including urban and rural linkages and the reinforcement of the European Territory Cooperation Program and the effectiveness of the cohesion policy. The project size depends on the interregional cooperation and the co-funding rate is 85% for all the priority topics and 74.52% for the 'technical assistance' axis. The funding is made available in the form of grants.

URBACT III

The main beneficiaries are local authorities' local agencies (city's stakeholders) and NGOs and the countries that are included are the EU-28 including also Switzerland and Norway with at least three Member States included as beneficiaries. The focus areas include integrated sustainable urban development regarding: smart and inclusive growth, low-carbon economy, resource efficiency, environmental protection, labor mobility, social inclusion, poverty reduction, policy design and implementation and climate change adaptation. The specifics of the projects must include transnational exchange, capacity building and capitalization and dissemination via the creation of different types of networks between cities on strategies, implementations and best practice exchanges. The project sizes of different types of network are between €400,000 - €750,000 with a period between 6 to 24 months and the co-financing is at 70% for partners in more developed regions, 85% for partners in less developed regions and 50% for Norwegian or Swiss partners. The funding comes in the form of grants.

Secure, Clean and Efficient Energy: Energy Efficiency

The projects under this section are related to public authorities and include coordination and support actions, as well as public procurement of innovative solutions. The participating countries are the EU-28 along with overseas countries and territories and there have to be at least three legal entities, each located in different countries and in one call case one legal entity. The focus areas of these include heating and cooling, engaging consumers towards sustainable energy, buildings, industry, services and products and innovative financing for energy efficiency investments. The project size ranges between the different calls between €0.5-1.5 million, €1-1.5 million, €1-2 million and €3-4 million depending on the section chosen. The co-funding rate varies with the nature of the proposal to 100% for research and innovative actions, 70% for innovative actions (except for non-profit where 100% applies) and for coordination and support actions 100% in most cases.

Secure, Clean and Efficient Energy: Competitive Low-Carbon Energy

The projects under this section are related to public authorities and include coordination and support actions. The participating countries are the EU-28 along with overseas countries and territories and there has to be at least one legal entity established in an EU Member State or Horizon 2020 associated country. The focus area is the market uptake of renewable energy technologies and the recommended project size in the range of €1-3 million. The co-funding rate varies with the nature of the proposal to 100% for research and innovative actions, 70% for innovative actions (except for non-profit where 100% applies) and for coordination and support actions 100%.

Cross-Cutting Activities: Smart and Sustainable cities

The projects under this section are related to public authorities and include innovation actions and research innovation actions. The participating countries are the EU-28 along with overseas countries and territories where at least three entities, each located in a different country need to be involved. The focus areas include smart cities and communities, sustainable cities through nature based solutions and the inclusion of climate change adaptation. The recommended project sizes range from €12-18 million, to a €10 million minimum, to around €7.5 million depending on the proposals thematic section. The co-financing for research and innovation actions is 100% and for innovation actions is 70% (except for non-profit legal entities, where a rate of 100% applies).

European Project Development Assistance Facilities

ELENA EIB

The main beneficiaries are local and regional authorities or other public bodies and a grouping of such bodies (legal entity with public service mission, controlled by a public authority and financed by more than 50% by public sources). The participating countries can be the EU-28 and the overseas countries and territories. The projects can be co-financed up to 90% with a budget cost of more than €30 million and the focus areas include energy efficiency in buildings or street lighting, integrated renewable energy sources in buildings, sustainable district heating/cooling systems, CHP and RES, energy efficiency and integrated renewables in urban transport and sustainable freight logistics. Furthermore, the focus areas include smart grids, ICT infrastructure for EE, inter-modal transport facilities and climate change adaptation. The leverage factor for these projects needs to be 1:20.

ELENA KfW

The main beneficiaries are local and regional authorities or other public bodies and a grouping of such bodies and eligible for participation are financial intermediaries, targeting small local investments in France, Italy, Austria, Poland and Denmark. The focus areas include energy efficiency in public/private buildings and street lighting, integrated renewable sources (RES), energy efficiency and integrated RES in urban transport including freight logistics in urban areas, local infrastructures for energy efficiency and municipal waste-to-energy projects. The average investment size of such projects need to exceed €50 million with a leverage factor of 1:20 and a co-financing rate up to 90%.

Horizon 2020: Call EE22 PDA

The main beneficiaries are local and regional authorities, public bodies, public and private infrastructure operators, ESCOs and SMEs. The participating countries eligible include the EU-28 and the overseas countries and territories. The focus areas include public and private building stocks, public lighting, district heating and cooling networks, urban transports in urban and sub-urban agglomerations, energy efficiency in industry and services along with investments in RES when combined with energy efficiency gains. The projects need to have a leverage factor of 1:15 and the average investment has to be within the range of €7.5 to €50 million and the co-financing is up to 100% of the eligible costs.

JASPERS

The main beneficiaries are local, regional, national authorities or other entities with public interest. The countries that are eligible to participate include all EU countries along with the IPA countries. The focus areas include infrastructure, roads, rails, air and maritime transport, water and waste water, waste management, energy projects including energy efficiency in buildings, district heating, RES production and CHP, as well as urban transport. The project size needs to be above €50 million and for transport cases above €75 million and the co-financing can be up to 100% of the eligible support.

Financial institution Instruments

European Fund for Strategic Investments (EFSI)

The main beneficiaries include the public sector, entities of all sizes, including utilities, special purpose vehicles or project companies, SMEs, mid-caps, national promotional banks or other intermediate banks, funds and any other form of collective investment vehicles and investment platforms. The eligible participating countries include the EU-28 and Albania, Iceland, Israel, FYROM, Montenegro, Serbia, Turkey, Norway and Switzerland. The focus areas include (Digital) infrastructure development in transport and energy, renewable energy, energy efficiency and energy interconnections, risk financing for SMEs and mid-caps, education, health, environmental and natural resources. There are no restrictions in the eligible project size. A guarantee of €16 billion should cover first losses of higher-risk projects and an additional €5 billion allocation of EIB capital to co-invest.

EIB Municipal Framework Loans

The main beneficiaries are local and regional authorities with more than 75,000 inhabitants and the participating countries may include the EU-28 and other countries (e.g. Turkey, Montenegro and Ukraine). The focus areas include urban roads and public transport, water, sewage, solid waste, education, health facilities, social housing, public buildings, energy (e.g. energy efficiency in public buildings), cultural and sport facilities. The projects average

investment size need to be smaller than €50 million and the financing comes in the form of a loan.

Debt for Energy Efficiency Projects (DEEP GREEN initiative): PF4EE instruments

The beneficiaries are divided into four pillars:

- Pillar 1: local/regional authorities and public bodies
- Pillar 2: Banks (Private Finance for Energy Efficiency)
- Pillar 3: ESCOs
- Pillar 4: Utilities

The countries operating are only Spain, Czech Republic and France. The focus areas include public and private building stocks, public lighting, district heating and cooling networks, urban transport in urban and sub-urban agglomerations and energy efficiency (investments in RES are eligible in combination with EE gains). The average investment size is for projects below €5 million and is done through the support of local financial intermediaries via low-cost long-term loans, credit risk protection and enhanced lending expertise for energy efficiency.

EEEF

The main beneficiaries are local and regional authorities, public and private entities acting on their behalf (i.e. utilities, public transportation providers, social housing associations) and it is eligible for the EU-28 countries. The focus areas include energy efficiency, renewable energy and clean urban transport. The project size needs to be in the range of €5-25 million and the financing come in the form of loans, guarantees and equity.

Alternative financing schemes

Energy Performance Contracting (EPC)

EPC is a contractual arrangement between a beneficiary and an Energy Service Company (ESCO) about energy efficiency improvements or renewables installations. Normally an ESCO implements the measures and offers the know-how and monitoring during the whole term of the contract. Essentially the ESCO will not receive its payment unless the project delivers energy savings/production as expected.

Soft loans, loan guarantees and portfolio guarantees

Soft loan schemes (below market rates and longer payback periods) and loan guarantees (buffer by first losses of non-payment) are mechanisms whereby public funding facilitates/triggers investments in EPC. Furthermore, portfolio guarantees for ESCOs reduces the risks of payment delays, so reduces the overall costs of financing (solid protection from later payments).

Revolving Loan Funds

A revolving loan fund is a source of money from which loans are made for multiple sustainable energy projects. Revolving funds can provide loans for projects that do not have access to other types of loans from financial institutions, or can provide loans at a below-market rate of interest (soft loans). This counts as an example of financial instruments using ESIF.

Cooperatives, Citizen based financing and Crowd funding platforms

A crowd-funding platform pools resources of different actors, utilizing most of the time an internet-based platform. This can happen in combination with energy cooperatives, which are business models based on shared ownership and democratic decision-making procedures.

On Bill Financing

Energy suppliers collect the repayment of a loan through energy bills. It leverages the relationship, which exists between a utility and its customer in order to facilitate access to funding for sustainable energy investments.

Green Municipal Bonds

Local government (or their agencies) can issue green bonds to fund their sustainable energy projects. A green bond can operate as a normal bond, which is a debt that will be paid back, depending on the characteristics of the bond, with interest. These can be made attractive via tax-exemptions.

National/regional specific information

The national and regional specific information for ENERJ partner countries on energy efficiency policy and regulation was analyzed in detail in deliverable D 3.2.2 – **Funding Tools**. The table below summarizes the funding tools found in the partner countries of project ENERJ. The red indicates the sections where no tools are present in the respective countries, the grey where tools are partly present and the green where tools are present, with the numbers indicating the number of tools present.

	Albania	Croatia	Cyprus	Greece	Italy	Malta	Portugal	Slovenia	Spain
National Funding	1	3	4	4	2	5	3	1	3
Regional Funding				1	1		1		1
Local Funding									1
Bank Loans									
Public-private partnerships									
ESCO's									
Other Funding					1	3			1

present	
partly present	
not present	

Figure 3: Funding tools overview in the partner countries of project ENERJ

5. Energy contracting

Due to current budget constraints, both at national and local levels, the necessary investments are often postponed or neglected even when the aim is to maintain or overhaul public buildings in order to reduce their energy consumption. In order to achieve energy saving targets on national and EU levels, additional funding source must be obtained.

Public partners with sufficient funds can self-finance EE projects. However, in current times of budgetary constraints, public sector is under enormous spending pressures. Usually a limit is set on amount of capital that a municipality can invest and the amount of money that it can borrow.

Public and private sectors work in partnership to deliver public infrastructure projects such as roads, railways, airports, schools, hospitals and prisons. **Public private partnerships (PPP)** generally share the following features:

- a long-term contract between a public contracting authority and a private sector company based on the procurement of services;
- the transfer of certain project risks to the private sector;
- a focus on the specification of project outputs rather than project inputs;
- the application of private financing in most instances; and
- payments to the private sector which reflect the services delivered.

"Experience over the past 30 years have demonstrated that PPPs can be used to yield energy savings in the public sector; the main features of EE PPPs are similar to those of accommodation PPPs. They use **Energy Performance Contracts ("EPCs")** and the private partners in these arrangements are known as **Energy Service Companies ("ESCOs")**. ESCOs can also be set up by public entities"¹.

An ESCO can generally offer two main models of contracts for energy services:

Energy Supply Contracting (ESC): In order to reduce the price of the energy bill of the client, a long-term arrangement with the ESCO is signed. The ESCO may install more efficient equipment, employ more affordable fuels or implement solutions in order to achieve the savings.

Energy Performance Contracting (EPC): EPC is an agreement between the ESCO and the client on the share of the energy savings and its inherent risks as a result of the implementation of energy efficiency measures.

Thus, in the case of ESC, the service simply provides power/energy to the customer, while **the EPC offers a more complex and complete service, since it covers both the optimization of energy supply and increases the energy efficiency** in the client's facilities. Therefore, the EPC option has the greatest potential of savings.

¹ Guidance on Energy Efficiency in Public Buildings The European PPP Expertise Centre (EPEC)

Definitions²:

Energy Performance Contract ("EPC"): Contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings.

Energy Service Company ("ESCO"): A natural or legal entity that delivers energy services and/or other EE improvement measures in a user's facility or premises, and which accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of EE improvements and on the meeting of the other agreed performance criteria.

The various criteria that characterize PPPs (financing by the private partner, partial or total risk transfer, output specification) also apply to EPCs, so that an EPC may be considered an EE PPP. However, from a contractual perspective, several variants of EPCs have been developed over the past 30 years.

There are three main types of EPC:

Shared savings: under a shared savings contract, the investment is assumed entirely by the ESCO, including investment financing, management and control of energy consumption. This mechanism is attractive for the ESCO as long as it excludes penalties in the event that the implemented measures perform poorly or the initial estimation proves to be too low. In return for providing financing, the ESCO undertakes comprehensive management. In order to compensate for the managerial complexity involved, the ESCO typically prefers large or medium-sized customers. Main advantages for the private facility owner in case of shared savings model is that it does not have to borrow money **(the investment will not appear on public body balance sheet)** and ESCO takes the performance & credit risk. Basic model/repayment scheme is given in figure 4.



Figure 4: Shared savings model scheme³

² Directive on Energy End-use Efficiency and Energy Services, the European Parliament and the Council (April 2006) Article 3: Definitions

³ European Commission - DG JRC, Directorate C - Energy, Transport and Climate

Guaranteed savings: conversely under guaranteed savings contract, the client assumes the entire investment required. In this case, the ESCO shall ensure real savings and if they are not enough to cover debt service, then ESCO might pay the difference. If however, the savings exceed the guaranteed level, then the customer must pay an agreed upon percentage of the savings to the ESCO. This mechanism is typically used when the investment associated with the project is undertaken by the customer. This is why this type of contract is only suited for clients with sufficient financing, typically large or medium size companies.



Figure 5: Guaranteed savings model scheme³

Mixed savings: this kind of contracting is a highbred combination of the two previous models.

The ESCO guarantees savings to the client with any additional savings shared between the ESCO and the client. Thus, the ESCO makes the investment in the new equipment, which is owned by the ESCO for the duration of the contract. Ownership of the equipment is transferred to the client at the end of the contract.

Usually, there is a fixed payment (investment amortization) a maintenance fee and a variable payment based on the savings achieved (shared savings).

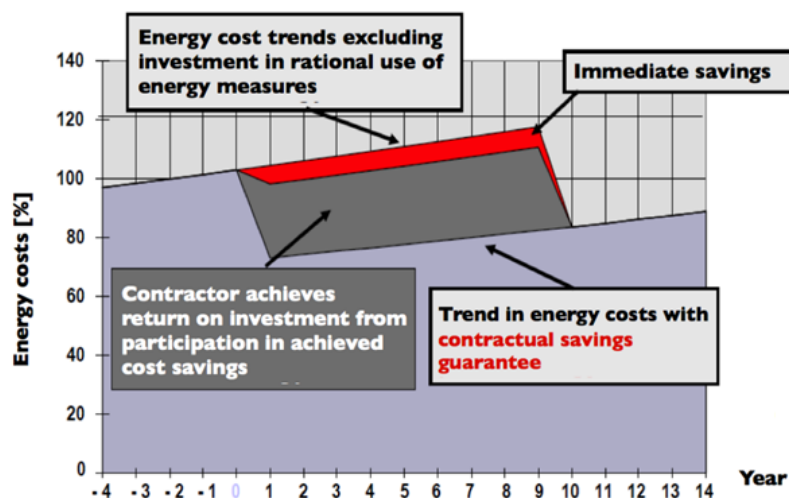


Figure 6: A basic scheme of EPC savings

Each of the models presented has some advantages and disadvantages. It is important to choose the right model based on investment capabilities and priorities, the project characteristics, etc. Some pros and cons of the shared and guaranteed savings are presented in the table below:

Table 1

GUARANTEED SAVINGS	SHARED SAVINGS
Performance related to level of energy saved	Performance related to cost of energy saved; the ESCO bills upon actual results
Value of energy saved is guaranteed to meet debt service obligations down to a floor price	Value of payments to ESCO is linked to energy price; betting on price of energy can be risky
ESCO carries performance risk Energy-user/customer carries credit risk	ESCO carries performance and credit risk as it typically carries out the financing
If the energy-user/customer borrows, then debt appears on its balance sheet	Usually off the balance sheet of energy-user/customer
Requires creditworthy customer	Can serve customers that do not have access to financing
Extensive M&V	Equipment may be leased
ESCO can do more projects without getting highly leveraged	Favours large ESCOs; small ESCOs become too leveraged to do more projects
More comprehensive	Favours projects with short payback ('cream skimming')
	How to share the 'excess' savings

Especially interventions on buildings envelope or deep energy retrofit (complete energy refurbishment of building thermal envelope and HVAC systems) require long payback period and consequently have low Internal Rate of Return (IRR). This is the reason that EPC market is not attracted to the energy refurbishments of public buildings and especially in MED countries the uptake of EPC financing of public buildings energy refurbishments is low. With that in mind, when designing a EE project, different sources of financing need to be combined and the most suitable model of EPC needs to be found.

A CASE STUDY:

Energy retrofit of municipality of Brda Town Hall in Slovenia (EPC contract)

Municipality Brda, for the purpose of comprehensive energy rehabilitation of 3 public buildings, turned over the management based on energy performance contracting (a shared savings contract), of three facilities, namely the municipal administration building (Town hall) in Dobrovo, where the renovation was carried out by an ESCO contractor, Primary School Dobrovo where renovation was carried out by the municipality through public tender with a grant and Branch Primary School Kojško, where the rehabilitation project was implemented by the municipality through public tender with a grant of the Swiss Contribution project "RES in the Primorska Municipalities". The municipality invested future savings on both schools renovated by own funds (and grants obtained) in the EPC project. The duration of the contract is 15 years.

Investment	ESCO	Municipality	Grants	TOTAL (VAT exc.)
DOBROVO Town hall	316.783,00 €	- €	- €	316.783,00 €
DOBROVO primary school	9.430,00 €	266.747,00 €	504.088,00 €	780.265,00 €
KOJSKO primary school	37.500,00 €	2.879,04 €	128.394,74 €	168.773,78 €
TOTAL (VAT exc.)	363.713,00 €	269.626,04 €	632.482,74 €	1.265.821,78 €

In 2014 the ESCO contractor carried out a comprehensive energy rehabilitation of the municipal administration building, as described in the table below. In addition, at the other two buildings, equipment was installed for remote monitoring and control. For all three facilities, in addition to contractually guaranteeing savings, the contractor will also supply heat from biomass boilers and a heat pump.

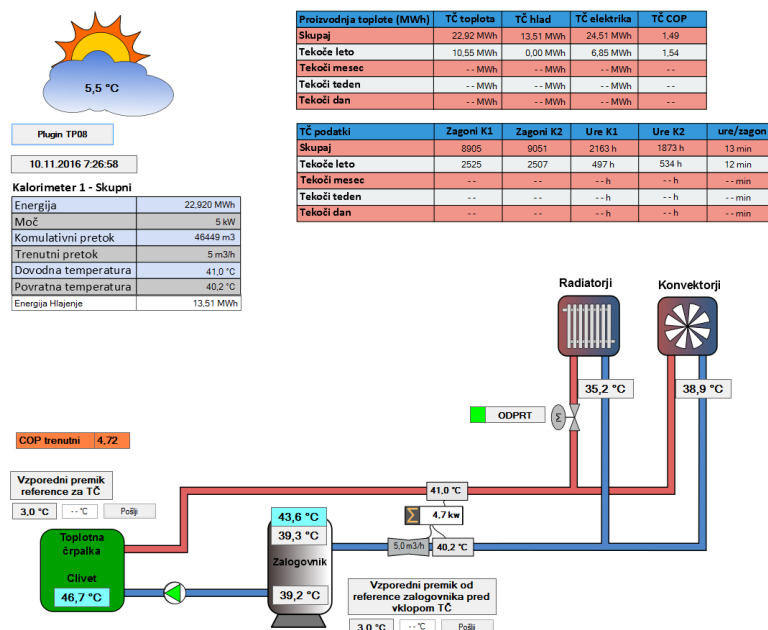


Picture 2: Energy retrofit of Brda Town Hall before & after

	Before	After
Façade	No insulation ($U=1,2-2,0 \text{ W/m}^2\text{K}$)	+ EPS 15 cm ($U=0,2 \text{ W/m}^2\text{K}$)
Roof	Insulation 4 cm ($U=0,7 \text{ W/m}^2\text{K}$)	+ 20 cm XPS ($U=0,175 \text{ W/m}^2\text{K}$)
Windows	Wooden frame, single glazing ($U_w=3,5 \text{ W/m}^2\text{K}$)	ALU frame, triple glazing ($U_w=1,17 \text{ W/m}^2\text{K}$)
Heat source	LPG fired boiler 40 kW	Heat pump (Air/Water) 30kW
Cooling source	Individual DX air conditioners	Heat pump (Air/Water) 25kW
Heat distribution	Radiators	Fan coils (heating and cooling)
Ventilation	Natural	Natural
Lightning	T8 fluo	Partial renovation T16 fluo, LED
Control	ON/OFF boiler control	SCADA system, remote control

Picture 3: Technical data on the retrofit

The project turned out to be successful, achieving and even surpassing all planned indicators. The specific energy use for heating of Town hall decreased from 153 kWh/m² to 28 kWh/m². Specific electric energy use (without energy for the heat pump) decreased from 25 to 19 kWh/m². Total energy costs for town hall decreased from 11.500€ to 2.200 €, while achieving far better standard of indoor thermal environment. Before the renovation only individual offices had air conditioning, now the whole building has a central cooling system via fan coils and a heat pump. Remote monitoring by SCADA has proved to be crucial for achievement of such low energy use. Indoor temperatures, time schedules, heat pump parameters, pumps, as well as status of each individual fan coil is constantly monitored by ESCO and in this way energy use is optimal according to actual need. After some initial miscommunication and adoption to new technology, a strong cooperation was established between ESCO and building users which are now very satisfied with their retrofitted building.



Picture 4: SCADA system for remote control of HVAC systems

6. Monitoring

Monitoring is a key element to successfully implement action plans (SEAPs, strategies, specific action plans, etc.) as well as individual energy efficiency projects. In terms of energy planning, for example SEAP, energy monitoring is dedicated to monitor the implementation status of key actions.

It is important however to point out, that monitoring itself does not guarantee a successful implementation of a project. For example, if no corrective action is taken when monitoring identifies a deviation or nonconformity, then it is almost certain that project goals or targets will not be met.

It is requested in DIRECTIVE 2012/27/EU that Member States shall encourage public bodies, including at regional and local level, and social housing bodies governed by public law, with due regard for their respective competences and administrative set-up, to put in place an **energy management system**.

Only if monitoring is integrated in a management system, like for example an **Energy management system** based on **ISO 50001** international standard, or similar, we have a guarantee that necessary mechanisms have been implemented, which enable monitoring to have a reverse loop to the decision making both in terms of corrective action and future planning.

ISO 50001 is based on the management system model of continual improvement also used for other well-known standards such as ISO 9001 or ISO 14001. This makes it easier for organizations to integrate energy management into their overall efforts to improve quality and environmental management.

ISO 50001:2011 provides a framework of requirements for organizations to:

- Develop a policy for more efficient use of energy
- Fix targets and objectives to meet the policy
- Use data to better understand and make decisions about energy use
- Measure the results
- Review how well the policy works, and
- Continually improve energy management

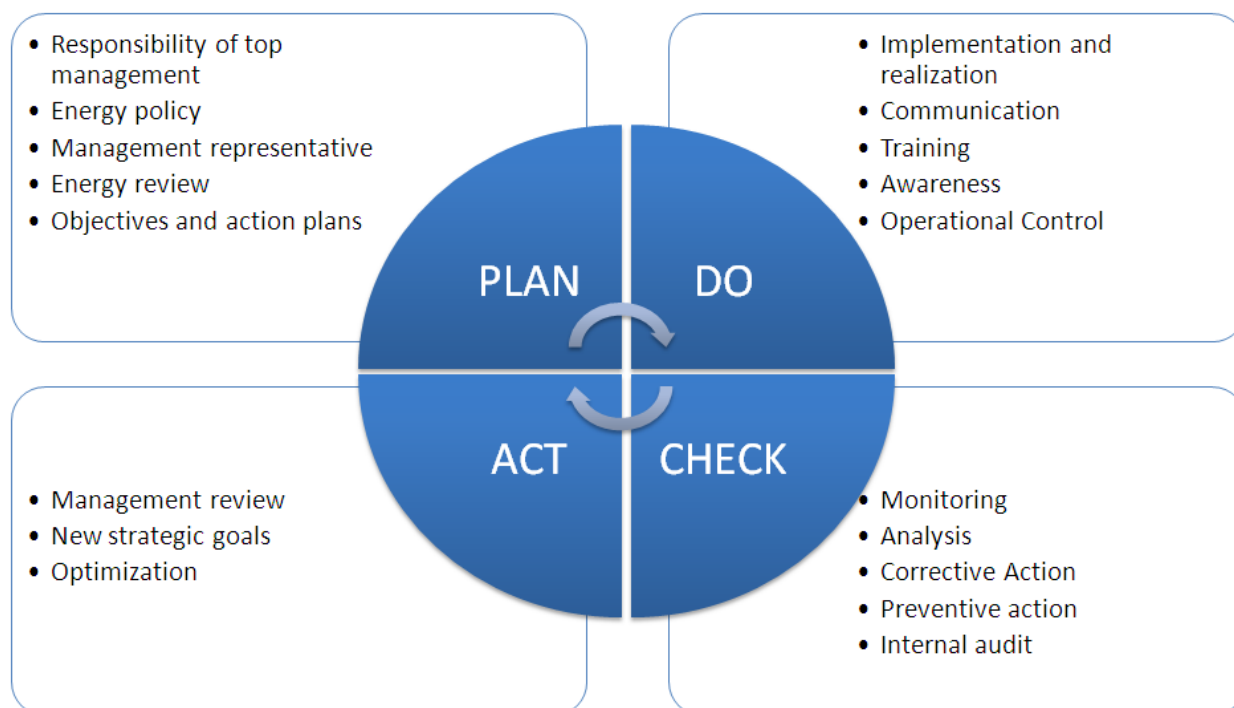


Figure 7: ISO 50001 PDCA circle

In case of third party financing for example EPC (energy performance contracting) projects, development of appropriate Measurement and Verification protocol is crucial for transparency and trustworthiness of the project. The knowledge that energy savings can be transparently reported is also vital to the acceptance of energy efficiency proposals.

“Measurement and Verification” (M&V) is the process of using measurement to reliably determine actual savings created within an individual facility by an energy management program. Savings cannot be directly measured, since they represent the absence of energy use. Instead, savings are determined by comparing measured use before and after implementation of a project, making appropriate adjustments for changes in conditions⁴.

There are some protocols for M&V developed, for example IPMVP, that can be used for a definition of a M&V plan that suits and individual energy saving project the most.

M&V activities consist of some or all of the following:

- meter installation calibration and maintenance,
- data gathering and screening,
- development of a computation method and acceptable estimates,
- computations with measured data, and
- reporting, quality assurance, and third-party verification of reports.

⁴ IPMVP Concepts and options for determining Energy and water savings Volume 1, January 2012

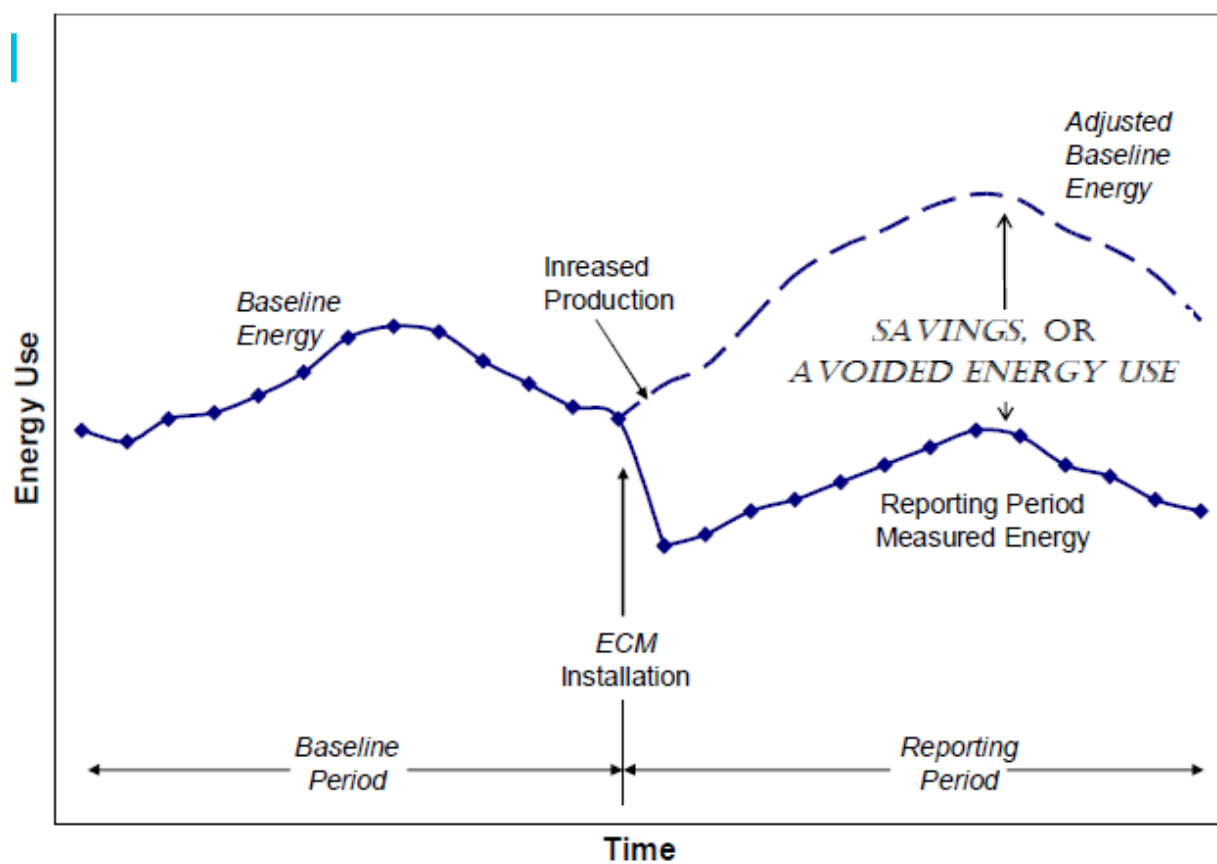


Figure 8: Example of energy savings determination (Source IPMVP, January 2012)

7. Information on relevant and suitable technologies

Up to date knowledge of energy efficient solutions and technologies for renovation of the building stock is of significant importance for the targeted group training. Although the design phase of an energy efficiency (EE) measures is usually carried out by professional experts, civil servants of local authorities involved in energy-related activities, energy managers of local authorities and members of energy agencies have to identify opportunities for EE measures implementation on the building stock they are responsible for and advise decision makers in the process of planning, implementing and monitoring an EE measure.

The development of technologies is an ongoing process. Technology is one of the main factors affecting competitiveness of the product in the market. Every new generation of products is by default more energy efficient than the previous generation, as energy efficiency is an important cost factor during the entire service life of the product.

But it is not only the technical potential which is crucial for successful introduction of energy efficient technologies. When considering use of a technology, it is necessary to consider their economic, realizable and also realistic potential.

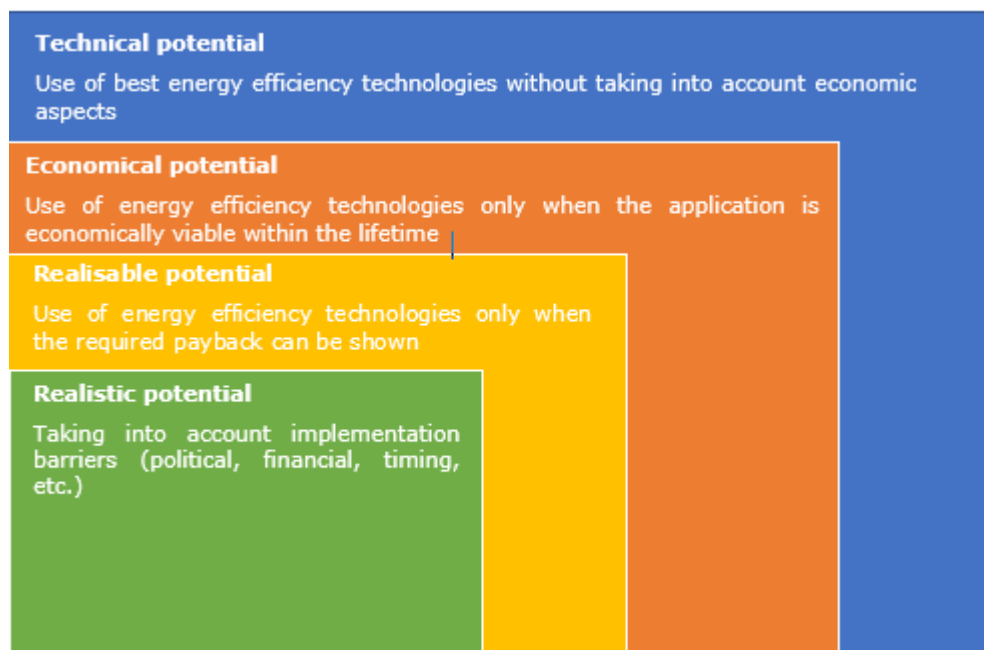


Figure 9: Assessment of potential

Since the technology topic is quite extensive, for the purpose of this general course material the technology topic is further developed in the PPT material to be used in training events. The overview of individual energy efficiency measures and technologies are listed below.

MEASURES ON THE BUILDING ENVELOPE

- thermal insulation of the façade
- renovation or replacement of windows and doors

- thermal insulation of the ceiling against the unheated attic
- thermal insulation of the roof
- insulation of the cellar or Floor slab
- insulation of thermal bridges

MEASURES ON THE HEATING SYSTEM

- installation of efficient biomass boiler
- installation of a heat pump for the preparation of sanitary hot water and / or central heating
- installation of heat substations or stations for connection to the district heating network
- installation of high-efficiency CHP units
- installation of a condensing gas boiler
- hydraulic balancing of the heating system
- Central control of the heating system
- local regulation of heating
- thermal insulation of the pipeline (distribution network)
- improvements to fans, pumps

MEASURES IN THE VENTILATION AND AIRCONDITIONING SYSTEM

- installation of a central mechanical ventilation system with heat recovery
- installation of a local mechanical ventilation system with heat recovery
- installation of heat exchangers for heat recovery in existing ventilation units
- installation of efficient cooling systems
- air conditioning and ventilation

MEASURES ON SANITARY HOT WATER

- installation of a heat pump for the preparation of sanitary hot water
- installation of heat substations or stations for connection to the district heating network
- installation of a condensing gas boiler
- installation of efficient biomass boilers

MEASURES FOR ELECTRICAL CONSUMERS

- energy efficient lighting
- energy-efficient electrical appliances

MEASURES FOR THE PRODUCTION OF ELECTRICITY

- installation of devices or Construction of facilities for electricity generation (sun, water or wind)

- installation of high-efficiency CHP units

MEASURES ON BUILDING AUTOMATION SYSTEMS

- Installation of energy monitoring systems
- Installation of SCADA systems

8. Instructions on how to use and implement the ENERJ web platform

The aim of ENERJ web platform is to help the Joint Action coordinators to define the JA at district level, offering easy access to the database of the EE actions adopted by each municipality, SEAPs and other energy plans.

The platform is organized as a geo-database of the Energy Efficiency measures adopted by the municipalities within the SEAPs or other local energy plans. It is a useful tool for the development of scenarios and the assessment of the impact of the implemented joint actions.

To be completed when ENERJ web platform will be developed.