



**Cost Efficient Options and Financing Mechanisms
for nearly Zero Energy Renovation
of existing Buildings Stock**

DELIVERABLE 3.5

***Report on existing performance contracting
examples and energy service models***

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CERTUS PROJECT IN BRIEF

Southern European countries undergo a severe economic crisis. This hinders the compliance to the latest Energy Efficiency Directive, demanding strict energy efficiency measures for the public sector. Investments required to renovate public buildings and achieve nearly zero energy consumption have long payback times. So the interest of financing entities and ESCOs is small, especially when banks have limited resources. Many of the municipal buildings in Southern Europe require deep renovations to become nZEB and this should not be regarded as a threat but rather as an opportunity for the energy service and the financing sector.

The objective of the proposed action is to help stakeholders gain confidence in such investments and initiate the growth of this energy service sector.

Municipalities, energy service companies and financing entities in Italy, Greece, Spain and Portugal are involved in this project. The plan is to produce representative deep renovation projects that will act as models for replication. Twelve buildings in four municipalities in each country have been selected. The partners will adapt existing energy service models and procedures and will work out financing schemes suitable for the 12 projects. Consequently, the partners will create materials, such as guides and maxi brochures, suitable to support an intensive communication plan.

The plan includes four workshops with B2B sessions targeted to municipalities, ESCOs and financing entities. These actions shall be complemented by four training activities targeting municipal employees and the participation in international events targeting all 3 stakeholders. We expect that our action will have a significant impact by triggering investments in renovations to achieve nZEB and the uptake of the ESCO market in Southern European member states.

EXECUTIVE SUMMARY

The present document is a deliverable of the Work package 3 “Energy Service Models and Optimal Financing Schemes” of the CERTuS project.

The aim of this report is to analyze the existing performance contracting examples and energy service models through:

1. An analysis of the projects funded by IEE, finished or under implementation;
2. A survey among partners on the existing performance contract and energy service models. To this end a questionnaire has been realized in order to compare the status quo of different countries participating in the CERTUS project relatively the legislation and the market on EPC contract and FTT (third party financing) mechanism;
3. An analysis of energy efficiency building projects realized by ESCo.

The report contains a list of performance contracting examples and energy service models with a short description of all identified examples and preliminary conclusions regarding potential adaptation in each of the CERTuS municipalities.

1. INTRODUCTION

The rate of building renovation needs to be increased, as the existing building stock represents the single biggest potential sector for energy savings. Moreover, buildings are crucial to achieving the Union objective of reducing greenhouse gas emissions by 80-95 % by 2050 compared to 1990. Buildings owned by public bodies account for a considerable share of the building stock and have high visibility in public life. So the recently directive 2012/27/UE establishes an annual rate of renovation of buildings owned and occupied by central government on the territory of a Member State to upgrade their energy performance according to the obligations with regard to nearly-zero energy buildings set in Directive 2010/31/EU.

Energy Performance Contracting is a smart, affordable and increasingly common way to make building improvements that save energy and money. Any large building or group of buildings is an ideal candidate for performance contracting, including council, state and federal sites, schools, hospitals, commercial office buildings and light industrial facilities.

So, it is necessary to promote the market for energy services to ensure the availability of both the demand for and the supply of energy services.

A lists of energy services providers (ESCO), model contracts, exchange of best practice and guidelines, in particular for energy performance contracting (EPC), can contribute to this and also help stimulate demand. As in other forms of third-party financing arrangements, in an energy performance contract the beneficiary of the energy service avoids investment costs by using part of the financial value of energy savings to repay the investment fully or partially carried out by a third party.

There is a need to identify and remove regulatory and non-regulatory barriers to the use of energy performance contracting and other third-party financing arrangements for energy savings. These barriers include accounting rules and practices that prevent capital investments and annual financial savings resulting from energy efficiency improvement measures from being adequately reflected in the accounts for the whole life of the investment. Obstacles to the renovating of the existing building stock based on a split of incentives between the different actors concerned should also be tackled at national level.

It is necessary to promote the use of the Structural Funds and the Cohesion Fund to trigger investments in energy efficiency improvement measures. Investment in energy efficiency has

the potential to contribute to economic growth, employment, innovation and a reduction in fuel poverty in households, and therefore makes a positive contribution to economic, social and territorial cohesion. Potential areas for funding include energy efficiency measures in public buildings and housing, and providing new skills to promote employment in the energy efficiency sector.

The financing facilities could in particular use those contributions, resources and revenues to enable and encourage private capital investment, in particular drawing on institutional investors, while using criteria ensuring the achievement of both environmental and social objectives for the granting of funds; make use of innovative financing mechanisms (e.g. loan guarantees for private capital, loan guarantees to foster energy performance contracting, grants, subsidised loans and dedicated credit lines, third party financing systems) that reduce the risks of energy efficiency projects and allow for cost-effective renovations even among low and medium revenue households, promoting the energy services market and helping to generate consumer demand for energy services.

The report analyse the EPC models used in Europe and, in particular, in the Southern European Countries as well as the drivers and the barriers to the development of the EPC market.

2. TARGETS AND METHODOLOGY

The aim of this report is to analyze and illustrate the status quo on the existing energy performance contracting examples and energy service models in the Southern European Countries in order to identify successfully the suitable energy service models for each municipal building considered in the Certus project (Italy, Greece, Portugal, Spain).

The specific focus of the investigation has been the identification of the main types of EPC contracts in Europe and, in particular, in the Southern European Countries emphasis is placed on the relevant projects that have been funded by IEE. I suppose the meaning of the Annex I is to identify successful EPC or other similar contracts in other EU countries, more advanced in terms of ESCO market, and learn from them.

The method adopted for the status quo analysis on Energy Performance Contracts consists of the following stages:

- Desk analysis of the topics studied in relation with the project partners and stakeholders;

- Systematic collection and statistical processing and analysis of data available in literature;
- Investigation among the project partners through a questionnaire;
- Analysis of investigation data and drawing up of the report.

The analysis of the status quo has considered also the results of some European projects such as, in particular:

1. *Increasing Transparency of Energy Services Markets" (TRANSPARENSE)*

The projects started in April 2013 and will be completed in September 2015.

The goal of the Transparense project is to increase the transparency and trustworthiness of Energy Performance Contracting (EPC) markets throughout Europe. With its twenty partners covering both mature and beginner EPC markets, the project has a great potential to develop and increase the European EPC market and thereby achieve substantial energy efficiency improvement.

Transparense focus on the major characteristics of the EPC projects in individual countries. One of its main outputs is a Code of Conduct for the implementation of EPC projects and its 20 national modifications in the participating countries.

2. *European Energy Service Initiative towards the EU 2020 energy saving targets" (EESI 2020)*

"EESI 2020 – the European Energy Service Initiative towards the EU 2020 energy saving targets" aims at fostering the use of Energy Performance Contracting (EPC) in major cities and metropolitan regions across Europe such as Antwerp, Barcelona, Berlin, Dublin, Graz, Prague, Oslo, Sofia or Zagreb. Although many European cities have committed to energy saving actions, certain barriers are still hindering the use of EPC as a tool to open up saving potentials. These barriers are mainly of a non-technological nature such as the lack of systematic information, trust, procurement procedures, know-how or the lack of market facilitators. The aim of the EESI 2020 project is to address these barriers and to support the implementation of long-lasting local EPC programmes in the targeted large municipalities or metropolitan regions. Within the project team some experienced EPC project facilitators will make the European best practice experiences on how to develop and facilitate an EPC project and programme available to new market players. Once trained to professionals, these new facilitators will be multipliers for the EPC concept in their region and secure long-term effects of EESI 2020.

3. *European Energy Service Initiative towards the EU 2020 energy saving targets" (EESI 2020)*

Public subsidies in the Central European region are often used to implement energy efficiency measures without considering the possibility of private co-financing by third parties through the Energy Performance Contracting (EPC) mechanism. This is due to a number of barriers on both the side of the subsidy programmes' structure and on the side of subsidy receivers and Energy Service Companies (ESCO). As a result, a given limited amount of public funding leads to a significantly lower number of energy efficiency actions in comparison to the potential of co-financing through EPC.

As the EPC is usually suitable for financing of energy efficiency measures with short or medium payback additional financing from subsidy programmes is needed to implement measures with longer payback.

The fundamental idea behind the project is to maximize energy savings through effectively defining and interconnecting activities of public subsidy programmes with the implementation of energy services.

The goal is to prepare both general as well as specific recommendations for the provision of subsidy resources and concurrently opening the market of energy services in a manner which will enable the highest possible energy savings by lowering the public expenditures.

CombinES will strengthen regional as well as trans-national cooperation of key players along the energy efficiency value chain with a long-term impact of better safeguarding EU natural resources and contributing to sustainability strategies.

3. EUROPEAN REGULATORY FRAMEWORK

The European legislation on energy efficiency has long identified the EPC contract and the FFT (Third-party Financing) as useful tools for achieving the European objectives of energy savings.

These tools believe to find private funding for energy efficiency projects involving the lender itself in savings and ensuring the underwriter of the contract about the energy savings promised.

The subjects involved in the achievement of the results of energy savings are the owner of the building-plant system that wants to save energy and the performer and/or designer and/or manager and/or the lender of energy saving measures.

In this particular historical moment in which public authorities are called to set an example on the issue of energy savings and, at the same time, many European countries, especially the European southern Countries are experiencing a period of great financial crisis, EPC contracts may be considered as useful tools to facilitate energy efficiency measures in the public administration.

3.1 EUROPEAN DIRECTIVES ON ENERGY EFFICIENCY

The main European Directives on energy efficiency are:

- a) Directive 2006/32/EU on energy end-use efficiency and energy services
- b) Directive 2010/31/EU on the energy performance of buildings
- c) Directive 2012/27/EU on energy efficiency

a) Directive 2006/32/EU on energy end-use efficiency and energy services

The Directive 2006/32/EU of the European Parliament and of the Council of 5 April 2006 on energy end-use efficiency and energy services, that has been abrogate dalla direttiva 27 introduces the EPC (Energy Performance Contract) contract, the tool of the Third-party Financing (FFT) and the figure of ESCo (Energy Service Company).

The article n. 3 introduces, in particular, the following definitions:

(i)'energy service company' (ESCO): a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and 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 energy efficiency improvements and on the meeting of the other agreed performance criteria;

(j) ‘energy performance contracting’: a contractual arrangement between the beneficiary and the provider (normally an ESCO) of an energy efficiency improvement measure, where investments in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement;

(k) ‘third-party financing’: a contractual arrangement involving a third party — in addition to the energy supplier and the beneficiary of the energy efficiency improvement measure — that provides the capital for that measure and charges the beneficiary a fee equivalent to a part of the energy savings achieved as a result of the energy efficiency improvement measure. That third party may or may not be an ESCO;

Moreover the directive assigns an exemplary role to public administrations (Art.5) and foresaw the birth of qualification systems for energy service providers to qualify the energy services market (Art.8). Also the directive identified, among the measures that public administration should define to develop energy efficiency measures, the “obligation to use financial instruments including EPC contracts” (ANNEX VI - List of eligible energy efficient public procurement measures)

b) Directive 2010/31/EU on the energy performance of buildings

The Directive 2010/31/EU of the European Parliament and of the Council of 19 May 2010 on the energy performance of buildings introduces the definition of “*nearly zero-energy building*”:

‘nearly zero-energy building’ means a building that has a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby;

Member States shall ensure that:

(a) by 31 December 2020, all new buildings are nearly zero- energy buildings;

and

(b) after 31 December 2018, new buildings occupied and owned by public authorities are nearly zero-energy buildings.

c) Directive 2012/27/EU on energy efficiency

The Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency, amending Directives 2009/125/EC and 2010/30/EU and repealing Directives 2004/8/EC and 2006/32/ECm confirm the goals of 2006 and make more stringent obligations.

This Directive establishes a common framework of measures for the promotion of energy efficiency within the Union in order to ensure the achievement of the Union's 2020 20 % headline target on energy efficiency and to pave the way for further energy efficiency improvements beyond that date.

Each Member State shall set an indicative national energy efficiency target, based on either primary or final energy consumption, primary or final energy savings, or energy intensity.

In particular, without prejudice to Article 7 of Directive 2010/31/EU, each Member State shall ensure that, as from 1 January 2014, 3 % of the total floor area of heated and/or cooled buildings owned and occupied by its central government is renovated each year to meet at least the minimum energy performance requirements that it has set in application of Article 4 of Directive 2010/31/EU (art. 5 paragraph 1).

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 use energy service companies, and energy performance contracting to finance renovations and implement plans to maintain or improve energy efficiency in the long term (art. 5 paragraph 7).

So, also this directive encourages the use of EPC contracts setting the minimum requirements that such contracts must have (ANNEX XIII "Minimum items to be included in energy performance contracts with the public sector or in the associated tender specifications").

3.2 THE TRANSPOSING OF THE EUROPEAN DIRECTIVES IN THE SOUTHERN EUROPEAN COUNTRIES

The following state of art in the Southern European Countries has been registered through an interview to the project partners.

a) The legislation in Italy

The Directive 2006/32/EU has been implemented in Italy by Legislative Decree n. 115 of 30 May 2008 "Implementation of Directive 2006/32/EU on energy end-use efficiency and energy

services and repealing Directive 93/76/EEC" and had as its objective the improvement of energy supply and the reduction of greenhouse gas emissions through a series of measures to promote energy efficiency: the strengthening of incentive mechanisms and financial instruments (strengthening the mechanism of White Certificates, in force in Italy since 2004, and the establishment of a guarantee fund to 25 M€ for ESCOs), the reduction of regulatory barriers and laws, the definition of specific requirements for energy efficiency in the public sector (appointment of energy managers, use of financial instruments including energy performance contracts, energy audits mandatory in public buildings or public use and in case of restructuring of thermal plants or building renovations, energy certification of public buildings or public use, for total useful floor area exceeding 1,000 m² or new construction or renovation , purchase of equipment, facilities, vehicles and equipment with low energy consumption), and finally the development of the energy services market (through the introduction of a procedure of "voluntary ESCo certification", "certification for Experts in Energy Management (EGE)", "certification of the energy management system ").

Unfortunately the decrees of these measures have been issued with considerable delay (the implementing decree for the use of the guarantee fund has been published only in 2012).

The Annex II of the Legislative Decree n. 115/2008 defines the requirements and the performance of a contract called "Energy Service" and especially those of the contract "Energy Service Plus" that is a type of EPC.

The figure below describe the role of ESCo, customer and any third funding in a Energy Service Plus contract:



FIGURE 1 – SCHEME OF ENERGY SERVICE PLUS

The Italian Union of Chambers of Commerce (Unioncamere), with the collaboration of the different stakeholders such as Assital, has defined a standard of Energy plus contract, available to the following link:

<http://www.mi.camcom.it/contratti-tipo-cciaa>

The Italian Country has transposed the Directive 2012/27/EU on energy efficiency with the Decree 4 July 2014, n. 102. This decree, in line with the European Directive, defines certain sectoral provisions in different fields, among the main ones are:

- Buildings and public sector
- Industry and energy services
- Metering and billing
- Efficiency in energy supply

The decree provides that 3 % of the total floor area of heated and/or cooled buildings owned and occupied by its central government is renovated each year to meet at least the minimum energy performance requirements

It also defines the procedures and methods of procurement by public bodies and assigns a central role to the strategic white certificates, as a mechanism to strengthen a framework of measures aimed at saving energy.

In this context, also the energy performance contracting (EPC) are being promoted as a useful tool for achieving of the objectives of the Public Administration.

In Italy there is no a register of ESCO as the Legislative Decree 115/08 which established the voluntary certification has not been fully implemented but, after the publication of Decree 102/2004, the Italian Accreditation body (Accredia) is completing the certification mechanisms of ESCO and the Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA) will ensure the web publication of the list of the ESCO certificated.

b) The legislation in Greece

The Directive 2006/32/UE has been transposed in the Greek legislation with the enforcement of the law 3855/2010 “Measures to improve energy efficiency in end-use energy services and other provisions” . The law sets:

- I. the national targets for energy savings, establishes the necessary institutional and legal framework, provides the corresponding financial means to achieve these objectives as well as appropriate incentives and the necessary energy efficiency mechanisms to remove barriers and market deficiencies that impede the efficient end use of energy and,
- II. creates the conditions for growth and promotes the energy services market and other measures to improve energy efficiency to the final consumer. The law transposes all the articles of the Directive.

With regard to ESCOs the law defines the Energy Efficiency Contract and outlines its scope and content, and, mandates the creation of an ESCO Registry via a Ministerial Decree. With regard to public buildings the law requires that through a joint Ministerial Decision requirements will be set regarding measures to reduce energy consumption in buildings and public lighting. In

particular, energy efficiency requirements are set for purchasing, leasing or construction of buildings or parts. Also the mandatory use of natural gas (when there is available network) the gradual use of central solar thermal systems and other renewable energy technologies, facility management systems, and the use of energy efficient lighting systems. Similarly the requirements for energy efficient public lighting are foreseen.

The transposition of the Directive 2012/27/EU in Greece is currently under way. A draft of the law has been published in September 2014 for comments. The commenting period has ended on 29/September. The final draft law was expected to be discussed in the Parliament by the end 2014. However, the discussion is still pending. The draft law transposes all the articles of the Directive.

There are two standard EPC contract types which have been issued in early 2014. The first one is relates to “Guaranteed Savings”, whilst the second to “Shared Savings”. However, both contracts are available by the Ministry as guidance and they are not compulsory. A short description of both types is given below:

i) “Guaranteed Savings”

Under this type of contract, the Energy Service Company implements the energy efficiency project at the plant described in the contract. The payment of the Company comes from the energy savings achieved by the implementation of the Project. The project will be implemented by the ESCO with own resources providing full Funding for the project, with own and / or foreign capital, according to the financing scheme described in an Annex.

The Project consists of all activities and services provided by the ESCO (measures) that relate to the (i) supply and installation of new equipment, upgraded and / or modernization of existing equipment and, (ii) activities and interventions designed to improve the energy efficiency and energy saving in the whole plant of the contract.

Before signing the Contract, the ESCO carries out a feasibility study for the energy measures (as described in an Annex to the Contract), whereby the parties form and adopt the list of Measures and Equipment (in Annex) as well as the Implementation Plan (in Annex).

Furthermore, the contract describes the approval and commissioning procedures, the measurement and verification procedure, the duties for equipment maintenance, and training

of the users. The contract provides in an Annex an outline of the aforementioned feasibility study, a list of measures that is purely indicative as well as the regular reporting format.

ii) Shared Savings

This contract is very similar to “Guaranteed Savings” but differs in the payment approach as detailed below.

The ESCO agrees with the building owner an installment for the provided services which is paid at regular intervals coinciding with the monitoring periods. The installment is paid under the condition that the real overall benefit is not smaller than the guaranteed savings. In case the guaranteed savings are smaller the ESCO must reimburse the building owner.

There is a register of ESCo. It was enforced with the Ministerial Decision No Δ6/13280, (Official Journal 1228, 14/06/2011) on 2011. It is supervised by the Directorate for Energy Efficiency of the Ministry of Environment, Energy and Climate Change. Up to now there are about 24 companies registered. However, most of the registered companies have carried out projects relevant to electricity generation under contracts that were reimbursed based on income generated by the plants. Registering is not compulsory.

There is no any legal requirement regarding the time span of the contract. This issue is to be tackled between the service provider and building owner based on the type of services provided, the cost, financing and savings generated.

c) The legislation in Portugal

Decree-Law No 319/2009 of 3 November 2009 – transposes the Directive 2006/32/EC on energy end-use efficiency and energy services and defines the objectives and measures of the NEEAP.

The objectives and achieved results can be found at:

www.buildup.eu/system/files/content/PT%20-20Energy%20Efficiency%20Action%20Plan%20EN.pdf

www.esd-ca.eu/reports/outcomes-2008-2011/national-summary-reports/national-summary-report-portugal

www.esd-ca.eu/reports/outcomes-2008-2011/national-summary-reports/national-summary-report-portugal-2011

Council of Ministers Resolution No 20/2013 – defines the new NEEAP taking into account the Directive 2012/27/UE.

The new NEEAP can be found at:

http://ec.europa.eu/energy/efficiency/eed/doc/reporting/2013/pt_2013report_en.pdf

The implementation report can be found at:

www.esd-ca.eu/reports/national-implementation-reports/national-implementation-report-2014-portugal

A Tender Specifications EPC model was developed to be used by Public Administration in order to celebrate EPCs (ECO.AP Programme) and can be seen at the following link:

<https://dre.pt/application/dir/pdf2sdip/2013/02/025000000/0551605530.pdf>

The main aspects of the model are:

- Energy Savings (cost savings) are divided between ESCO and Public Bodies, and ESCO ensure Guaranteed Savings;
- Energy savings risk is assured by ESCOs;
- Necessary to establish normalized approaches to measure and verify savings according to IPMVP;
- There is a percentage of “Guaranteed Savings for Public Bodies” and a percentage of “Shared between ESCO and Public Bodies”;
- The financing of the project is entirely assured by the ESCOs.

In the ECO.AP financing scheme, the ESCO provides to the customer the technical solutions and the needed financial resources for the development of its energy efficiency project. The ESCO will determine the best option for the technical equipment to be installed, fully or partially finance the various stages needed to develop the project and will be responsible for the management and operation of the facility during the period required to return the investment.

The ESCO assumes all risks related to the project, and the recovery of their investment made based on the ensuing avoided energy costs over a given period of time, during which it owns and is responsible for operating the project. After this period, the ownership of the facility is transferred to the customer (end user). The customer can end the relationship with the

company or extend it through the conclusion of a new business relationship, such as a contract for exploration and / or system maintenance.

The process is as following:

1. Tender Specifications and Tender Program adaptation
2. ESCOs Tendering Invitation
3. Walkthrough Audit
4. Preliminary Proposals
5. Selection of 2 ESCOs
6. Energy Audit
7. Final Proposals
8. Negotiation
9. Final Selection and Contract Celebration

To foster market confidence, a qualification framework for ESCOs has been introduced with the Eco.AP. There is an approval system with strict financial and technical benchmarking. There are two different layers of projects, with different requisites to accommodate small and larger ESCOs, but all have the technical and financial structure to make long term energy performance contracts.

No registration needed for private EPCs, but the ESCOs need to be registered in order to be able to perform EPCs in the public sector.

On 3 July 2012 the Regulation of Qualification System of Energy Services Companies (SQESE) was approved for companies interested in participating in pre-contractual procedures relating to energy efficiency contracts with services and public administration bodies, establishing minimum requirements for technical and financial capacity, foreseen in two different levels:

- a) Level 1: buildings or equipment with annual energy consumption lower than 3 GWh;
- b) Level 2: buildings or equipment with annual energy consumption higher than 3 GWh.

The technical and economical requirements (Qualification System) are:

Level 1 (\leq 3000 GWh eq)

- Technical requirements: 2 Energy Experts (EPBD) and 1 Energy Auditor;

- Financial requirements: Turnover \geq 200 k€ and Financial autonomy \geq 15%

Level 2 (> 3000 GWh eq)

- Technical requirements: 2 Energy Experts (EPBD), 1 Energy Auditor, 1 CMVP and 2 Engineers (SGCIE);
- Financial requirements: Turnover \geq 1 M€ and Financial autonomy \geq 15%

Concerning the duration of the contracts with the Public Administration to include in the EPC contract, the total duration of the EPC cannot exceed 16 years and 20 years if there is energy production/selling to the grid.

d) The legislation in Spain

The Agreement of the Council of ministers of the 11th of December 2009, published in the Boletín Oficial del Estado (BOE) of 26th of January 2010, transposes the directive 2006/32/UE in Spain. The document is available to the following link:

<https://www.boe.es/boe/dias/2010/01/26/pdfs/BOE-A-2010-1235.pdf>

Currently a draft Royal Decree transposing partially Directive 2012/27/UE has been elaborated and passed to public information. This Royal Decree partially transposes the Directive regarding energy audits, hot water meters and accreditation schemes for energy services providers.

The Draft Royal Decree transposing partially Directive 2012/27/UE is available to the link:

<http://www.minetur.gob.es/energia/es-ES/Participacion/Documents/proyecto-rd-directiva-201227UE/proyecto-RD-directiva-eficiencia-energetica.pdf>

The implementation report can be found at:

http://www.google.es/url?sa=t&rct=j&q=&esrc=s&source=web&cd=5&cad=rja&uact=8&ved=0CEQQFjAE&url=http%3A%2F%2Fwww.esd-ca.eu%2Freports%2Fnational-implementation-reports%2Fnational-implementation-report-2014-spain&ei=5F3LVM_PN8vwaP3bgJgL&usg=AFQjCNF3OhnBIXZD5iGtYhqamkhXfYFFtQ&sig2=oU98SpJReZEUSYkWfU962A&bvm=bv.84607526,d.d2s

Inventory of the State General Administration buildings as required by Article 5 of Directive:

<http://www.minetur.gob.es/ENERGIA/DESARROLLO/EFICIENCIAENERGETICA/DIRECTIVA2012/Paginas/actuaciones-transposicion.aspx>

4. ENERGY PERFORMANCE CONTRACT MODELS

Energy Performance Contracting (EPC) is a form of ‘creative financing’ for capital improvement which allows funding energy upgrades from cost reductions. Under an EPC arrangement an external organisation (ESCO) implements a project to deliver energy efficiency, or a renewable energy project, and uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project, including the costs of the investment. Essentially the ESCO will not receive its payment unless the project delivers energy savings as expected.

The approach is based on the transfer of technical risks from the client to the ESCO based on performance guarantees given by the ESCO. In EPC ESCO remuneration is based on demonstrated performance; a measure of performance is the level of energy savings or energy service. EPC is a means to deliver infrastructure improvements to facilities that lack energy engineering skills, manpower or management time, capital funding, understanding of risk, or technology information. Cash-poor, yet creditworthy customers are therefore good potential clients for EPC. Figure 1 illustrates the concept.

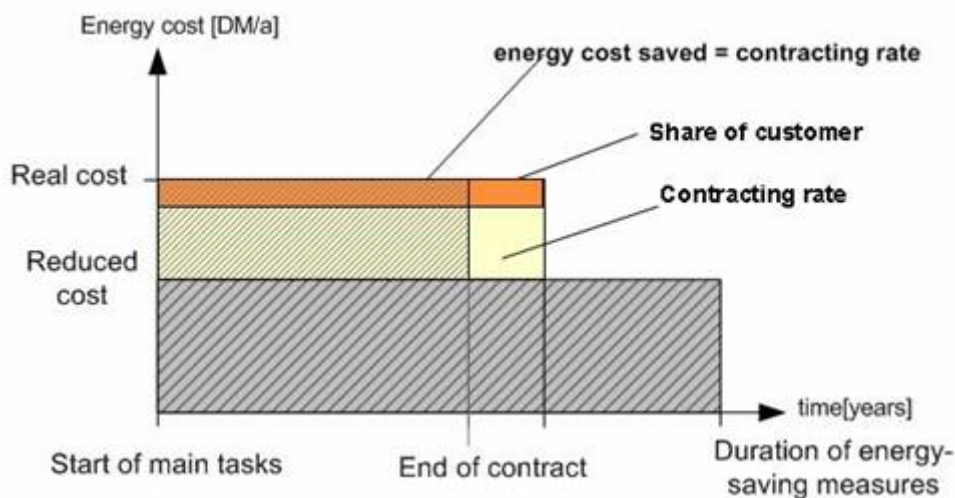


FIGURE 2 - ENERGY PERFORMANCE CONTRACTING (SOURCE: BERLINER ENERGIEAGENTUR GMBH)

A typical EPC project is delivered by an Energy Service Company (ESCO) and consists of the following elements:

- *Turnkey Service* – The ESCO provides all of the services required to design and implement a comprehensive project at the customer facility, from the initial energy audit through long-term Monitoring and Verification of project savings.

- *Comprehensive Measures* – The ESCO tailors a comprehensive set of measures to fit the needs of a particular facility, and can include energy efficiency, renewables, distributed generation, water conservation and sustainable materials and operations.
- *Project financing* – The ESCO arranges for long-term project financing that is provided by a third-party financing company. Financing is typically in the form of an operating lease or municipal lease.
- *Project Savings Guarantee* – The ESCO provides a guarantee that the savings produced by the project will be sufficient to cover the cost of project financing for the life of the project.

The following table reports the types of EPC contracts most frequently used in the market. They are characterized mainly by the subject, customer or ESCo, who takes the technical and/or financial risk.

TABLE 1 - TYPES OF ENERGY PERFORMANCE CONTRACTING

CONTRACT TYPE	CUSTOMER	ESCO	BANK
FIRST IN	<ul style="list-style-type: none"> – The customer pays a fixed fee that guarantees a guaranteed minimum saving of energy costs historical. – If the saving is major of the minimum fixed the customer have a positive adjustment at year end 	<ul style="list-style-type: none"> - ESCO finances interventions with equity capital or through third Party Financing (“credit risk”) - The ESCO makes the interventions of energy savings and governs installations, of which will maintain the property until the end of the contract (technical risk) - ESCO it is for to 	<ul style="list-style-type: none"> - The Bank finances the ESCO if not use the equity

		100% of the expected savings in contract; if the saving is major, the difference is shared with the customer	
FIRST OUT	<ul style="list-style-type: none"> - For the duration of the contract the customer continues to spend like before upgrading the energy efficiency - At the end of the contract the customer benefits of the savings resulting from energy saving measures 	<p>ESCO finances the interventions with equity capital or through third Party Financing</p> <p>For the duration of the contract, receives 100% of the savings achieved by energy saving measures by which the ESCO can recover the credit, the costs and the profit</p>	<ul style="list-style-type: none"> - The Bank finances the ESCO if not use the equity
GUARANTEED SAVINGS	<ul style="list-style-type: none"> - The customer finances the interventions with equity capital or through third Party Financing, accept the “credit risk - For the duration of the contract, receives 100% of the savings achieved - The customer pays a fixed fee for the services of the ESCO 	<ul style="list-style-type: none"> - ESCO finds and organises the financing - ESCO guarantees a minimum energy savings agreed with the customer - Accept only the risk to the guaranteed performance “technical risk” 	<ul style="list-style-type: none"> - The Bank finances the Customer if not use the equity
SHARED SAVINGS	<ul style="list-style-type: none"> - Energy saving is divided between ESCO and the customer 	<ul style="list-style-type: none"> - ESCO finances interventions with equity capital or 	<ul style="list-style-type: none"> - The Bank finances the ESCO if not use the equity

		<p>through third Party Financing</p> <ul style="list-style-type: none"> - The ESCO accepts the risk to the guaranteed performance (“technical risk”) and accepts the “credit risk” - Energy saving is divided between ESCO and the customer 	
PAY FROM SAVINGS	<ul style="list-style-type: none"> - The customer Finance interventions through third Party Financing - The customer returns the debt in payments proportional to the savings achieved (the funder evaluates the technical project) - The customer accept the “credit risk” - For the duration of the contract, receives 100% of the savings achieved - The customer pays a fixed fee for the services of the ESCO 	<ul style="list-style-type: none"> - Finds and organizes the financing - ESCO guarantees a minimum energy savings agreed with the customer - Accept only the risk to the guaranteed performance “technical risk” 	<ul style="list-style-type: none"> - The Bank participates in the project and finances the customer, accepts a financial risk since it is reimbursed annually based on the cost savings achieved
FOUR STEPS	<ul style="list-style-type: none"> - The customer pays a fixed fee for the services of the ESCO 	<p>ESCO finances the interventions according to the</p>	<ul style="list-style-type: none"> - There is not third-party financing

		<p>following mechanism:</p> <ul style="list-style-type: none"> - Step 1: optimization of operation and maintenance (no investment) - Step 2: the saving obtained from Step 1 finances measures of energy saving simple and low cost - Step 3: the saving obtained from Step 1 and Step 2 finances energy saving measures medium size - Step 4: the saving obtained from preceding steps finance large energy saving measures and with return times longer 	
<p>Build-Own-Operate & Transfer (BOOT);</p>	<ul style="list-style-type: none"> - The customer pays the energy bill and the service provided to the ESCO - At the end of the contract, the customer has the ownership of the property 	<p>-the ESCO designs, builds, finances, governs the new plants and owns the property for a defined period of time (usually with Purpose companies);</p>	<p>- The Bank finances the ESCO</p>

		<p>when the period of time established is finished, it transfers ownership to the customer (technical and credit risk)</p> <p>-For the duration of the contract, receives 100% of the savings achieved</p>	
CHAUFFAGE	<p>- the customer entrusts the management of its plants to the ESCO and it pays a fee equal to the historical spending or lower</p>	<p>- ESCO pays the energetic bills and bills of fuel for the duration for the contract (technical risk)</p> <p>- ESCO finances the maintenance/ redevelopment / upgrading interventions of the existing installations</p> <p>- For the duration of the contract, receives 100% of the savings achieved</p>	<p>- The Bank finances the ESCO if not use the equity</p>

Below the description of the types of EPC contracts.

4.1 FIRST IN



FIGURE 3 - SCHEME OF FIRST IN CONTRACT

<p>STRENGTHS</p> <ul style="list-style-type: none"> – Immediate return for the Public Administration in terms of savings on energy bills even if not higher. – A minimum amount of savings is also guaranteed by the contract with the ESCO who assumes the financial and technical risk of the operations; additional savings beyond those guaranteed to the customer are recognized to the customer 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> – Type of contract too biased in favor of the Public Administration, so unattractive to the ESCOs – The relatively long duration is a problem both for the public and private sector
<p>OPPORTUNITY</p> <ul style="list-style-type: none"> – Guaranteed savings and immediate on energy bill, and any residues savings in favor of the customer (public). 	<p>THREATS</p> <ul style="list-style-type: none"> – Little incentive to ESCOs to improve results (additional savings remain customer) – Volatility of the energy market – Difficult access to incentives and fundings for ESCO

TABLE 2 - ANALYSIS SWOT OF FIRST IN CONTRACT

4.2 FIRST OUT



FIGURE 4 - SCHEME OF FIRST OUT CONTRACT

<p style="text-align: center;">STRENGTHS</p> <ul style="list-style-type: none"> - Good performance incentives for the ESCO - The Public Administration should not raise initial capital, has a standard bill and then a standard spending, both the financial risks that the technical ones are cared for by the ESCO 	<p style="text-align: center;">WEAKNESSES</p> <ul style="list-style-type: none"> - The Public Administration gets the savings only a few years after the start of the contract - The ESCO owns the entire financial risk
<p style="text-align: center;">OPPORTUNITY</p> <ul style="list-style-type: none"> - Short time return that let you find more competition in the market 	<p style="text-align: center;">THREATS</p> <ul style="list-style-type: none"> - Perception of lack of savings for the first few years in the face of immediate benefits for the private sector

TABLE 3 - ANALYSIS SWOT OF FIRST OUT CONTRACT

4.3 Garanteed Savings

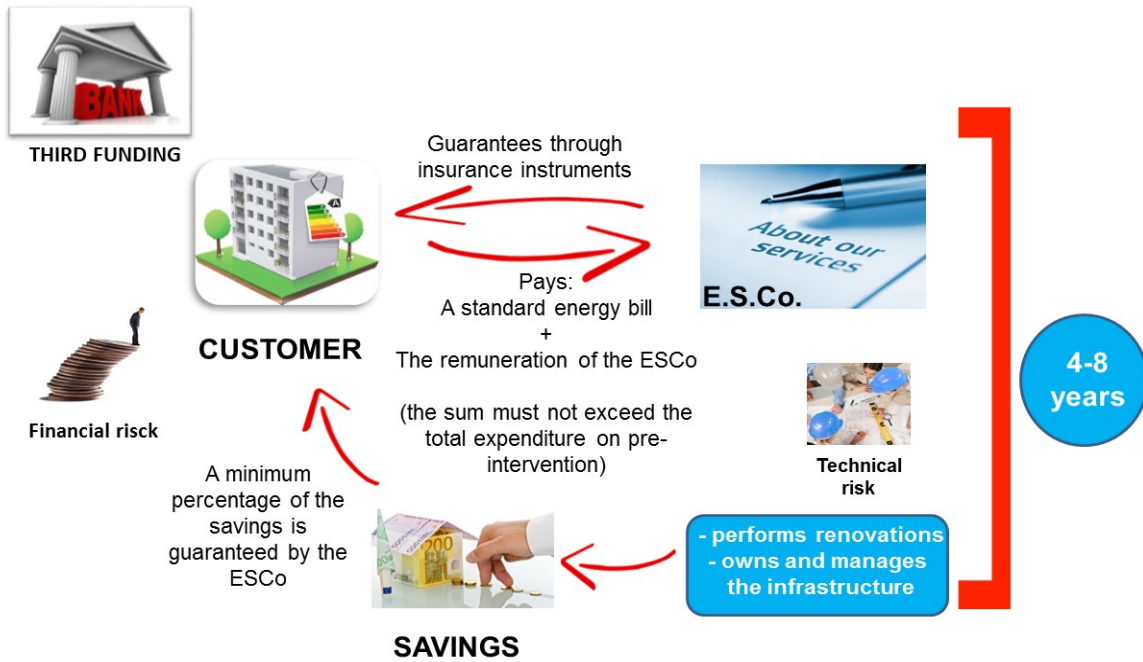


FIGURE 5 - SCHEME OF GARANTED SAVINGS CONTRACT

<p style="text-align: center;">STRENGTHS</p> <ul style="list-style-type: none"> - Garanted savings for Public Administration - The Public Administration assume a financial risk related through adequate coverage 	<p style="text-align: center;">WEAKNESSES</p> <ul style="list-style-type: none"> - The model requires financial resources by the Public Administration - Financial risk for the loan that the Public Administration should require a third
<p style="text-align: center;">OPPORTUNITY</p> <ul style="list-style-type: none"> - The contractual conditions can be modeled so there is no uncertainty for Public Administration in the ability to repay the loan - There are a lot of tools to ensure the expected savings (insurance, project bonds, etc.) 	<p style="text-align: center;">THREATS</p> <ul style="list-style-type: none"> - Difficulty in raising the necessary capital on the market, because of their limited availability and high interest rates, combined with the Stability Pact which brakes the Public Administrations who want to participate with their capital to energy efficiency measures - Volatility of the energy market - Capacity of the ESCo to refund the Public Administration to repay the debt - Difficulties obtaining financing and incentives especially for small projects that require aggregations

TABLE 4 - ANALYSIS SWOT OF GARANTED SAVINGS CONTRACT

4.4 SHARED SAVINGS



FIGURE 6 - SCHEME OF SHARED SAVINGS CONTRACT

<p>STRENGTHS</p> <ul style="list-style-type: none"> – Return balanced investment between the customer and the ESCO – Both parties will immediately benefit from the savings while only the ESCO assumes the technical and financial risks 	<p>WEAKNESSES</p> <ul style="list-style-type: none"> – The duration of the medium-long term of this contract could be a problem for some ESCO rather than for the Public Sector
<p>OPPORTUNITY</p> <ul style="list-style-type: none"> – Good incentive to the result: the higher the energy saving and the higher the gain for customer and ESCO 	<p>THREATS</p> <ul style="list-style-type: none"> – First savings on energy bills relatively low – Problem of financing for the ESCO for early gains low

TABLE 5 - ANALYSIS SWOT OF SHARED SAVINGS CONTRACT

4.5 PAY FROM SAVINGS



FIGURE 7 - SCHEME OF PAY FROM SAVINGS CONTRACT

<p style="text-align: center;">STRENGTHS</p> <ul style="list-style-type: none"> – High degree of flexibility of payments for the Public Administration – Payments to third party lenders will be conditional on the actual savings, so that any deficiencies do not cause problems with the payment of the loan 	<p style="text-align: center;">WEAKNESSES</p> <ul style="list-style-type: none"> – The banks can not schedule the time for the return of their investment and they have to share the risk of the project with the ESCO about the level of guaranteed energy performance
<p style="text-align: center;">OPPORTUNITY</p> <ul style="list-style-type: none"> – Low Financial risk for Public Administration 	<p style="text-align: center;">THREATS</p> <ul style="list-style-type: none"> – The credit system has difficulty accepting the project risk – The ESCO is very involved on achieving the goals of scheduled saving

TABLE 6 - ANALYSIS SWOT OF PAY FROM SAVINGS CONTRACT

4.6 FOUR STEPS

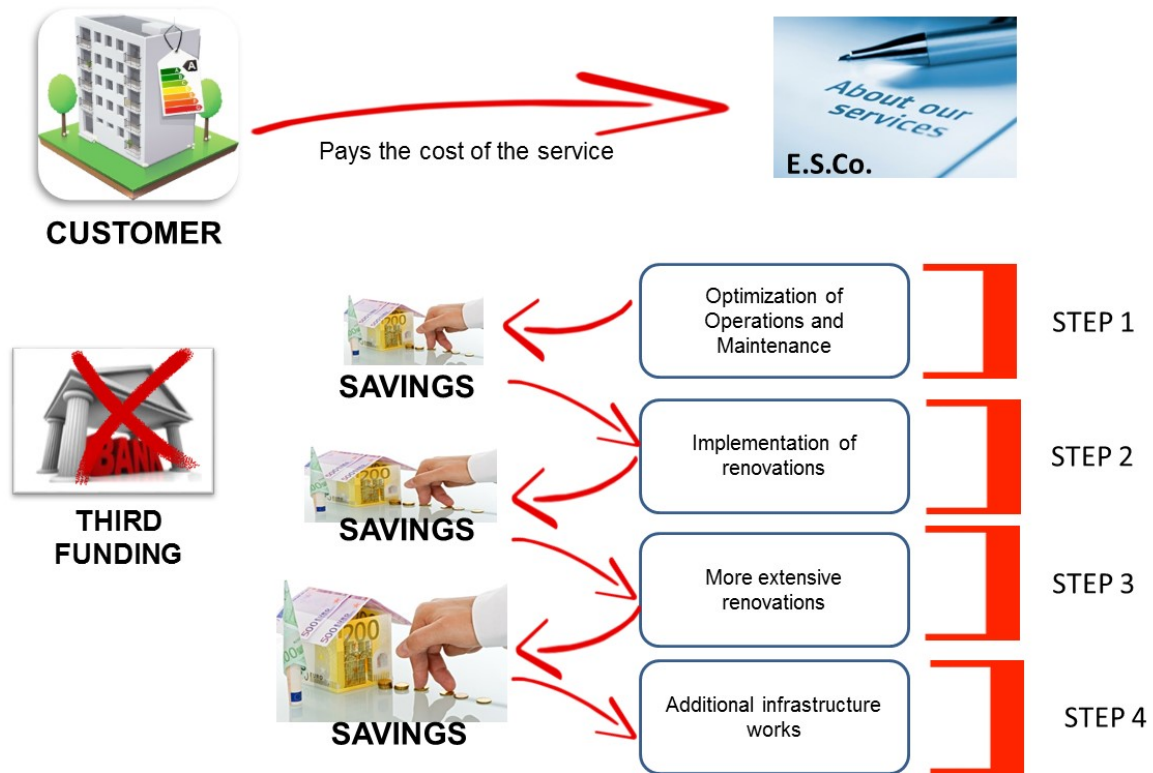


FIGURE 8 - SCHEME OF FOUR STEPS CONTRACT

<p align="center">STRENGTHS</p> <ul style="list-style-type: none"> – Flexibility is the main advantage that characterizes this model. – No need for initial capital investment and long-term planning – The model permit to the Public Administration to carrying out renovation projects 	<p align="center">WEAKNESSES</p> <ul style="list-style-type: none"> – There is no guarantee of a high energy savings, at least in the short time – The model is designed to be extended over a long period of time; the impact of the measures is low in the short term
<p align="center">OPPORTUNITY</p> <ul style="list-style-type: none"> – The customer is not required to pursue the project if the results are not tangible and satisfactory, or if the initial conditions change (financial resources, energy cost, etc.). 	<p align="center">THREATS</p> <ul style="list-style-type: none"> – Volatility of the energy market makes no programmable return times of small measures

TABLE 7 - ANALYSIS SWOT OF FOUR STEPS CONTRACT

4.7 BUILD-OWN-OPERATE & TRANSFER (BOOT)

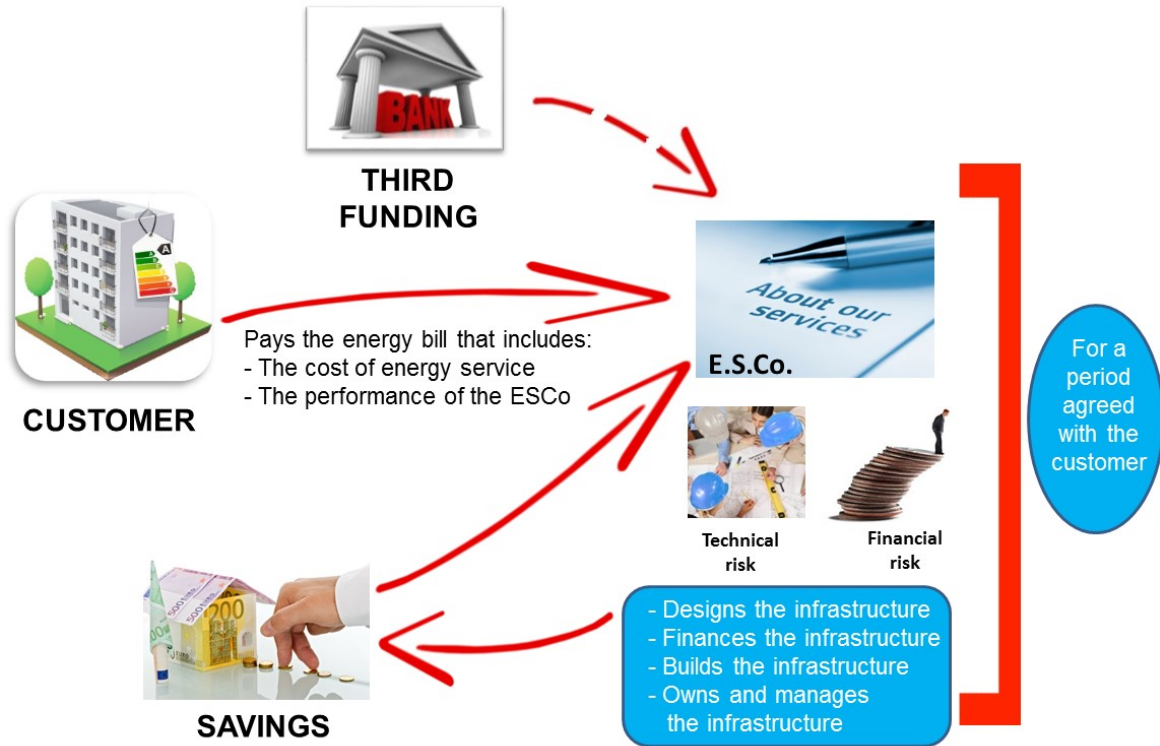


FIGURE 9 - SCHEME OF BUILD-OWN-OPERATE & TRANSFER CONTRACT

<p style="text-align: center;">STRENGTHS</p> <ul style="list-style-type: none"> – Ideal solution for public authorities in which there is a lack of internal expertise in the planning and management of complex energy projects. – The customer can take advantage of the technical expertise of the ESCO in all phases of the project. 	<p style="text-align: center;">WEAKNESSES</p> <ul style="list-style-type: none"> – Long term contract
<p style="text-align: center;">OPPORTUNITY</p> <ul style="list-style-type: none"> – The ESCO follows the project during the entire life cycle. – Creation of a strong partnership between the public and private actors. 	<p style="text-align: center;">THREATS</p>

TABLE 8 - ANALYSIS SWOT OF BUILD-OWN-OPERATE & TRANSFER CONTRACT

4.8 CHAUFFAGE

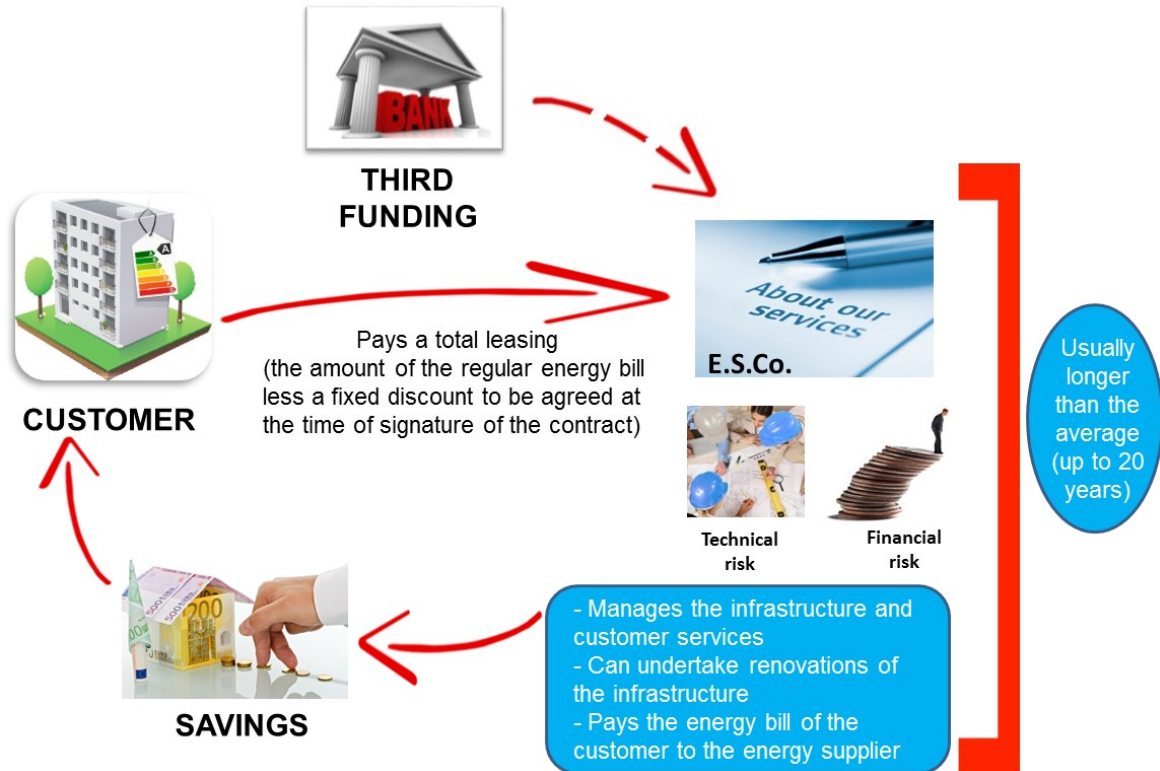


FIGURE 10 - SCHEME OF CHAUFFAGE CONTRACT

<p style="text-align: center;">STRENGTHS</p> <ul style="list-style-type: none"> – Suitable for renovation and management of energy systems in buildings that require specific standards of comfort (eg hospitals, schools, government offices where the respect of a certain comfort has priority over the level of energy savings). 	<p style="text-align: center;">WEAKNESSES</p> <ul style="list-style-type: none"> – Energy savings lower than other models – Long time for the contract
<p style="text-align: center;">OPPORTUNITY'</p> <ul style="list-style-type: none"> – The flexibility of this model is advantageous because it allows for the ESCO easier to find private partners – The ESCO will have the opportunity to choose whether and to what extent perform the renovations 	<p style="text-align: center;">THREATS</p> <ul style="list-style-type: none"> – Intervention on infrastructure is not always guaranteed, unless otherwise agreed in the contract.

TABLE 9 - ANALYSIS SWOT OF CHAUFFAGE CONTRACT

5. Types of EPC contract in the Southern European Countries

The following situation has been registered in the Southern European Countries through an interview with the project partners.

a) The EPC contracts in Italy

The only defined model of the EPC contract was the "Energy Service Plus" contract for which the Legislative Decree n. 115/08 defines the requirements and performance (Annex II). In particular the main requirements are:

- (i) guaranteed savings of 10% of primary energy for heating,
- (ii) obligation of the company to perform renovations with economic burden on your own
- (iii) contract duration from 1 to 10 years
- (iv) management of facilities, including the supply of energy, by the ESCO for the duration of the contract,
- (v) energy measurement

Other types of EPC contracts has also been made with the Public Administration; in particular, the model "BOOT" is applied in many cases of realizations of the district heating networks with Public Private Partnerships (PPP) and in the health sector for the construction of Combined Heating and Power (CHP) plants.

Other forms of contract used are:

- Shared Savings, especially in the private market,
- First Out, especially for plant interventions that have short return times
- First In, especially for interventions of construction of renewable plants for which the incentives (conto energia) reduce the return time of the investment.

b) The EPC contracts in Portugal

In Portugal there aren't important EPC Contracts already signed between municipalities and ESCO and three contract type are usually used :

1. BOOT
2. Shared Savings
3. Guaranteed Savings

Traditionally, most frequent contracts were the supply contracting and BOOT contracts, mainly in the CHP sector in large industries and large hospitals, particularly through the establishing of public-private partnerships, hotels, schools, swimming pools and

shopping centres. In the more recent years, following the political will to promote energy services in Portugal, the establishment of EPCs is gaining popularity, and the market for EPCs is emerging slowly, mainly in hotels, hospitals, leisure centre sports, schools and public buildings, but also contracts with industry. The EPC model can either be a shared savings model or a guaranteed savings model according to the survey (October 2013), and the clients can be public or private business.

The more recent estimate available for the turnover of ESCOs in Portugal is in the range €10-30 million per year [ESCO Report 2010, Bertoldi]. The Eco.Ap programme estimated that the programme could be able to create an industrial and service cluster generating investments of about 13 000 million euros until 2020. However there are no reliable sources for this market estimation. According to Miguel Feliz [News from Countries, 2013], the private sector has probably around €50 M in actual contracts - mainly in industry. Based on the survey respondents (Transparence Survey, Sept/Oct 2013), the investment outlay of EPCs projects established in the last 3 years is roughly estimated to be around 10 million euros, (total of 20 -30 projects, between 100 000€ and 500 000€ each).

The length depends on the period required to return the investment, but cannot exceed 16 years (or 20 years if there is energy generation).

c) The EPC contracts in Greece

The ESCO market is at a very preliminary stage in Greece. Most of the contracts already performed are regular energy efficiency refurbishment works- such as window replacement. The construction company is paid either in installments or through the bank if the project is subsidized by the Government. Currently there is a subsidy programme for energy refurbishment named “Eksikonomo kat’ oikon” where subsidies are available at 15%, 30% and 70% of the overall cost, depending on the recipient’s income. The subsidy is given directly to the construction company after completion and commissioning of works. The recipient must deposit his/her share of equity in a specific bank account from which, as mentioned above, the construction company is paid.

In Greece there aren't important EPC Contracts already signed between municipalities and ESCO and there are two standard contract types :the first one is relates to “Guaranteed Savings”, whilst the second to “Shared Savings”.

Because:

- The relevant legal framework for the operation of ESCOs is in force since 2010. However, there are apparently conflicting official decisions in the public sector that inhibit the use of an EPC. For example recently enforced decisions by the Ministry of Interior Affairs do not approve expenses of municipalities relevant to construction projects that involve both design and construction works carried out by a single company. For example the design of a refurbishment project should be made by a different company than the one that will undertake the implementation. This is a real barrier for an ESCO carrying out an EPC or 'shared savings' contract. However, the issue has been addressed lately by the Ministry of Environment, Energy and Climate Change and it is expected that will be solved shortly.
- The economic crisis has caused a decrease in funds available for project financing especially if payback times are not short or close to short terms.
- The lack of successful ESCO projects in the public sector reduces confidence among the Municipalities that are reluctant to undertake a pioneering role.
Since there are not yet implemented EPC contracts, there is no available typical length. However, exercises and discussions among parties (e.g. ESCOS, public sector, banks) show that EPC contracts are expected to have a duration less than or utmost around 10 years.

d) The EPC contracts in Spain

The EPC contract is an important tool used in the sector of public buildings but is difficult to carry out for a series of administrative or legal barriers. Thus, for example, the item devoted to investment in energy-savings technologies in the budget of the public sector is different from the one devoted to the energy maintenance and equipment supply. This division into two different areas entails difficulties at the time of choosing new equipments with energy efficiency criteria, since only the economic investment is taken into account, without connecting it to its energy bill and maintenance along the lifetime of the plant.

In Spain there are some major EPC contracts already signed between municipalities and ESCO:

- Bilbao:
<http://www.madrid.es/UnidadesDescentralizadas/Sostenibilidad/ContenidosBasis/Ficheros/Ferros2.pdf>

-
- Bakio:

http://www.bakio.org/es-ES/Ayuntamiento/Perfil-Contratante/Paginas/Tramitacion_ContratosdeserviciosenergeticosconmantenimientoygarantiatotaldelasinstalacionesdealumbradopublicodelAyuntamiento.asp
[x](#)

Two contract type are usually used :

1. Shared Savings
2. Guaranteed Savings

6. EPC MARKET IN THE SOUTHERN EUROPEAN COUNTRIES

The results of the project "Transparens - Increasing Transparency of Energy Service Markets", published in December 2013, are a useful tool to analyze the market for EPC contracts in Europe and particularly in Southern European Countries that are partners of the Certus project.

It's important considering that these results derive by the policies of the Directive 2006/32/EU and not by the Directive 2012/27/EU that has been published on the 25 October 2012.

The survey shows that the EPC market is still in early development (fig.11).

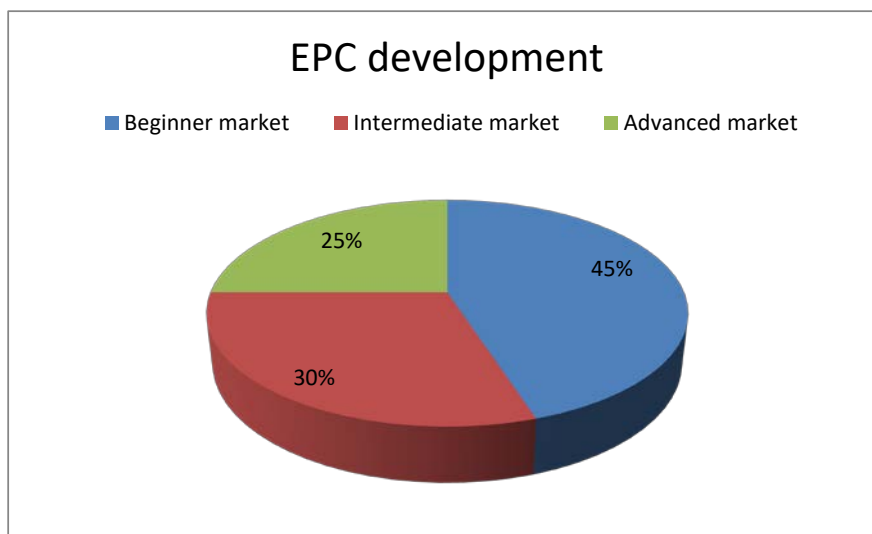


FIGURE 11 - EPC DEVELOPMENT IN EUROPE (SOURCE: TRANSPARENSE PROJECT)

The same survey shows that the development of the EPC market is most critical in the public sector (fig. 12)

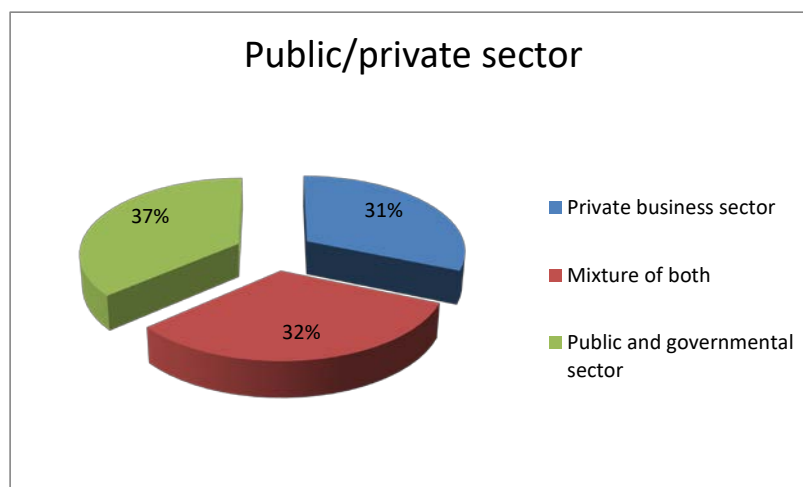


FIGURE 12 - EPC MARKET IN PUBLIC AND PRIVATE SECTOR (SOURCE: TRANSPARENSE PROJECT)

The above situation is aggravated even more if we consider only the Southern European Countries (fig. 13).

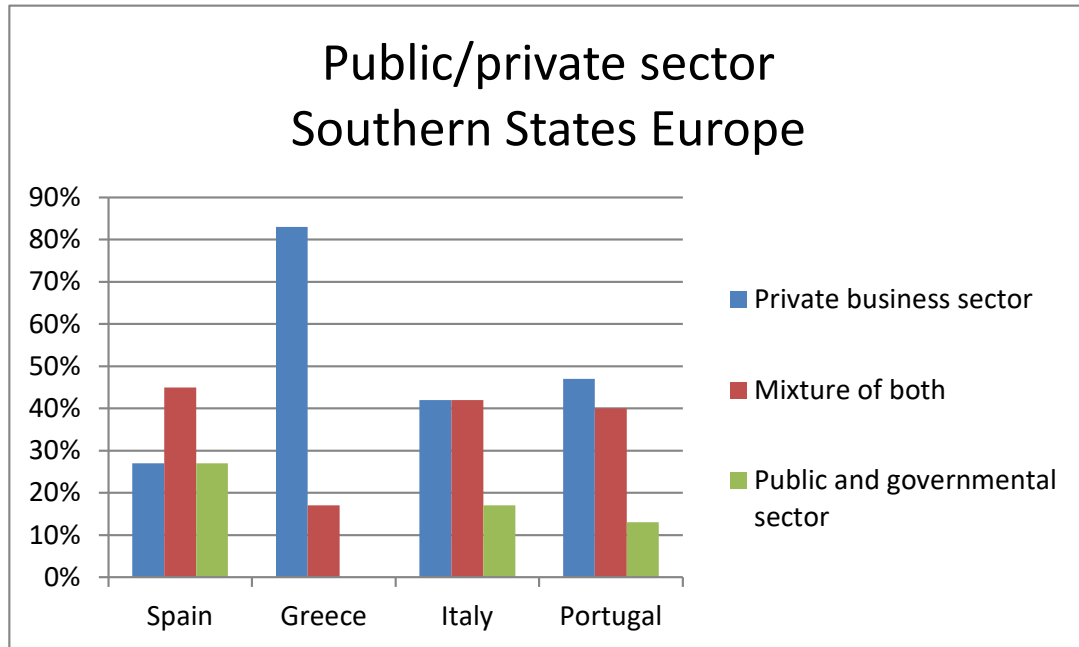


FIGURE 13 - EPC MARKET IN PUBLIC AND PRIVATE SECTOR IN THE SOUTHERN EUROPEAN COUNTRIES (SOURCE: TRANSPARENSE PROJECT)

The following situation has been registered in the Southern European Countries through an interview with the project partners.

a) EPC market in Italy

In Italy EPCs are mostly used for financing cogeneration plants, heating management and efficient lighting.

The most commonly used version of energy performance contracts is that ensuring the client a % reduction in his energy bill, in terms of amounts to pay. Energy performance contracts based on savings in energy units are extremely rare as they imply that the provider be able to determine the level of energy consumption (in KWh) prior to the implementation and subsequently to forecast and guarantee the energy savings (in KWh) achievable after the implementation of the project.

Energy performance contracts are not widely used across the Italian territory. This is especially because there are barriers to third party financing which is essential for projects where available funds (of the EES provider) are not sufficient to cover the

whole initial investment. Such barriers are rooted in the banking system that remains very reluctant to finance projects based on energy savings guarantees for collateral. In general therefore, energy performance contracts tend to be used on small energy efficiency projects, especially by ESCOs, whereas utility companies are more likely to use contract types which include the supply of electricity and heating (also on larger projects).

Besides the difficulties found in obtaining financing from third parties, other existing drawbacks are due to the fact that EPCs are very recent and therefore the legal system itself is not acquainted with them (of course, standard models for energy performance contracts are still very rare), so there can be for instance risks linked to volatile energy market prices, or a risk of fraud.

Another important barrier to energy performance contracting is the lack of accurate frequent measurement of energy consumption at final user level. Energy is strategic at national level but it is rarely so for final users. It is the public sector that mostly uses this type of contracts as the decision-makers often do not care whether they own the plant or equipment installed or not.

However the scarce financial resources typically available for non-core business activities should encourage the use of energy performance contracts as these do not necessarily require investments by the company requesting energy efficiency services.

All in all problems related to energy performance contracting mainly come from three uncertainty factors:

1. normative/economic uncertainty linked to the magnitude of future cash flows from an energy efficiency project's energy savings as legislation is in constant progress and transformation (this is especially related to the applicable energy tariffs and monetary incentives in place);
2. financial uncertainty linked to incentives such as white certificates as these are market-based mechanisms and are therefore subject to market volatility;
3. technological uncertainty linked to new and innovative technologies used.

It is hoped that the Guarantee Fund for Energy Efficiency introduced by the Legislative Decree n. 102/14, as well as other measures provided in this decree, can give new impetus to the sector.

b) EPC market in Portugal

The EES market is more developed in the industrial sector, particularly co-generation projects in large industries, and in large hospitals. ESCO Projects can also be found in hotels and large shopping centres with EESs available for lighting and for co-generation. Some new energy efficiency services appeared in the market in recent years, especially in the area of lighting (public lighting and buildings), renewable energies and HVAC, but these are still in an early stage of development.

According to the survey carried out by the Transparens project, over the last 3 years the market for EPCs saw a little change for 40% of respondents, a slight growth for 50%, a major growth for 1% and a major decline for another 1%. Concerning the number of ESCOs currently active in the market, responses were highly heterogeneous, ranging from 4 to 50 ESCOs! This wide range variation in the replies can be related to the number of ESCOs with capacity to offer energy services that are registered and qualified to participate in the ECO.AP tender, which is around 40, and also with the number of ESCOs that are indeed establishing EPCs. According to the official database established by the Directorate General of Energy, the pool of contractors is more than 100 ESCOs, but not all received the accreditation to participate in the Public tender (to foster market confidence, a qualification framework for ESCOs has been introduced with the Eco.AP; there is an approval system with strict financial and technical benchmarking; there are two different layers of projects, with different requisites to accommodate small and larger ESCOs, but all have the technical and financial structure to make long term energy performance contracts) and others have already given up due to the long time that is taking to put the programme running properly. The ECO.AP programme has been launched for almost three years, and no EPC has been established yet. Currently, the number of ESCOs that actually are operating in the market is much lower, and is estimated to be 15-20, mainly Utilities, international ESCOs and International sister companies (equipment providers and big consultancy companies).

c) EPC market in Greece

There is no any real development of the EPC Market over the last 3 years, as discussed earlier. However, it is expected that with the following initiatives that are being taken care of by the Ministry of Environment, Energy and Climate Change, the market will start to pick up:

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- (i) Resolve the current legal and bureaucratic obstacles that inhibit the implementation of an ESCO project.
 - (ii) Carry out a few examples of ESCO projects with the public sector so that there will be successful examples to raise confidence in the public sector especially in the municipalities.
 - (iii) Cooperate with the banks through a Committee already established to resolve problems regarding project financing in Municipalities.

d) EPC market in Spain

EPCs are constantly evolving because there is an incipient market in Spain. Offered services are increasing and the financial models are tuning more flexible.

Spanish ESCOs currently offer the following energy services:

- Engineering viability studies, energy audits
- Design projects
- Purchasing, installation and reception of equipment
- Energy supply
- Systems and water management
- Risk management
- Maintenance and operation of equipments
- Monitoring of the consumption
- Management of the energy information
- Formation and consciousness-raising services
- Quality air services
- Measuring and verification of the real energy savings
- Guarantee of energy services and efficiency of the installed equipments

Energy supply companies sometimes act as ESCOs by means of partnerships created with private companies, specially in hospitals and industry.

Some years ago the market was dominated by foreign companies. Nevertheless, in the last five years the number of national companies is fastly increasing. These companies have different origins: equipment manufacturers, engineering companies, energy suppliers.

There is no exact definition of ESCO in Spain, therefore the market is not clearly defined. Most of the Spanish ESCOs do not offer energy services as their unique business.

7. EXAMPLES OF ENERGY SERVICE MODELS

7.1 REFURBISHMENT OF PUBLIC BUILDINGS IN THE PROVINCE OF MILAN, ITALY

Project in short

In the framework of IEE-ELENA Facility, the European Investment Bank (EIB) has supported the Province of Milan in a 3-years project entitled Energy Efficiency Milan Covenant of Mayors. The investments mainly concern the energy refurbishment of existing public buildings (mostly schools) located in selected small municipalities in the Province of Milan and the Municipality of Milan, all of which have joined the Covenant of Mayors. The obtained funding from ELENA facility is about EUR 1.8 million, corresponding to approx. 90% of assistance costs. The expected investment of EUR 90 million has been articulated in three calls for tender, two of which have been awarded: the first one including 98 buildings in 16 municipalities, the second one addressing 38 buildings in the Municipality of Milan.

Although facing different difficulties, especially of contractual and financial nature (see below), this project has pushed forward the diffusion and recognition of EPC models in Italy, providing inspiration and support also to other public administrations involved in other ESCO projects (e.g. Provinces of Modena, Padova and Rovigo, Trento).

Facility	Public buildings owned by members of Covenant of Mayors in Milan Province
Country	Italy, Lombardy
Customer	Municipalities in the Milan Province
Type of building	Schools and other public buildings

TABLE 10 - SUMMARY OF THE PROJECT

Implemented via	EPC + ELENA funds from EIB
Type of measures	Building envelope insulation, fitting of thermal and electric plants, installation of renewable energy sources and energy management & control systems; actions on the urban transport sector and the local infrastructure
Date of contract signature	2013 and 2014
Year of installation measures	2014 – ongoing
Contract duration	15 years
Period of provided guarantees for energy savings	15 years
Investment volume	at present date about EUR 18 million

TABLE 11 - OVERVIEW OF THE PROJECT

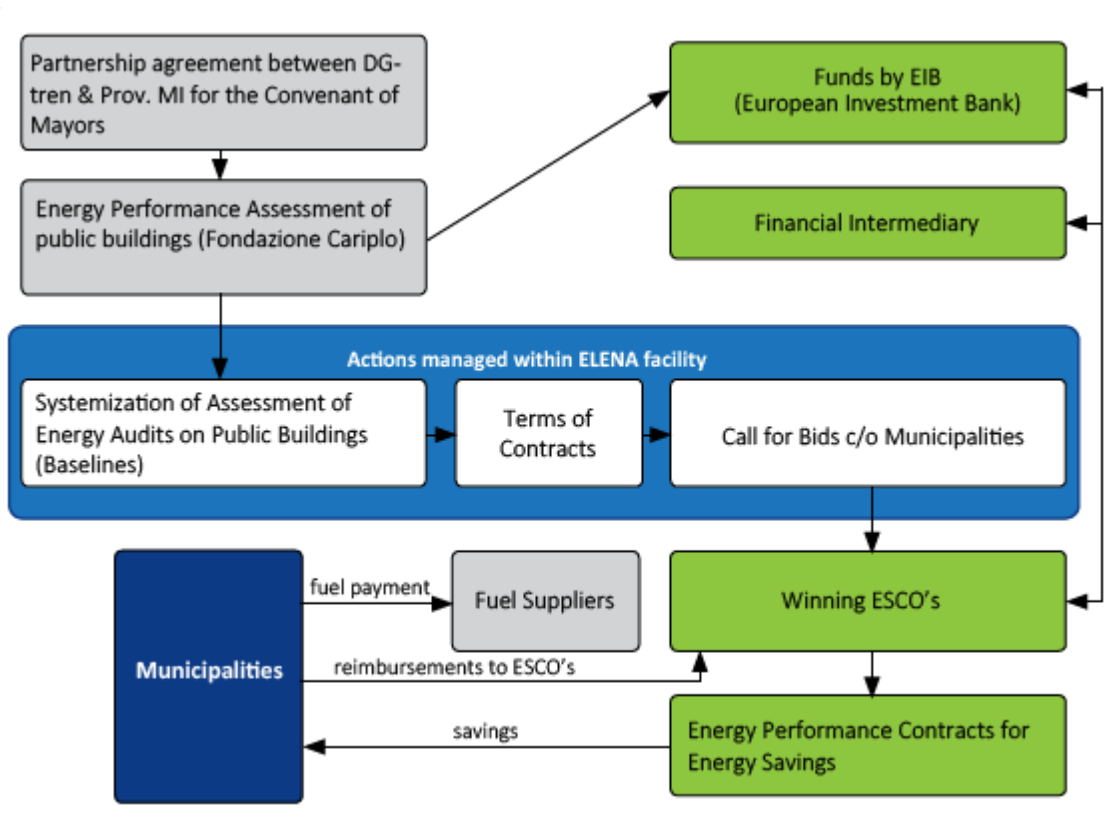


FIGURE 14 - TECHNICAL FINANCING SCHEME FOR PUBLIC BUILDINGS ENERGY REFURBISHMENT

Supplier of subsidized measures	European Investment Bank, IEE-ELENA Facility
Type and source of financing	<p>The initial provision approved by EIB consisted in EUR 65 million, while EUR 25 million were expected to be financed via the ESCOs awarding the EPC. The actual total investments amount so far to about EUR 18 million, part of which have benefitted from the credit line provided by EIB.</p> <p>The ELENA assistance activities consists in assessing the final saving requirements, drawing all the tender documentation, organizing and coordinating all the procedures for the award of public work contracts, public supply and public services contracts, then follow and supervise the work and finally monitoring and auditing the results and disseminate the acquired experience.</p>
Implemented measures	<p>The project aims at the energy requalification of public buildings (mostly schools) in municipalities of the Province of Milan, by insulating the building envelope, fitting the existing thermal and electric plants (including condensing boilers, micro CHP plants, pumps and lights), installing RES and adopting reliable energy management & control systems.</p> <p>Within the first tender, interventions have included: 25</p>

	<p>interventions on the building envelope, 31 on the roof insulation, 72 condensing boilers, 17 heat recovery systems, thermostatic valves in 78 buildings, 17 variable-flow circuits, 34 thermal solar systems, 73 micro-CHP plants, 16 heat pumps, 12 radiant systems in gyms, 56 interventions on presence sensors, 81 interventions on thermoregulation with zone valves and tele-control. The investments foreseen amount to EUR 13 million. The minimum energy savings guaranteed to the Municipalities is 35%, while a shared-saving model has been applied (5% of savings guaranteed to the Municipalities).</p> <p>A tenders went void twice (in 2013 and 2014) for different financial and contractual issues, such as (i) the difficulty for small ESCOs to access bank loans and hold long and complex contracts, (ii) the resistance of banks, that generally refuse to consider the cash flows generated by energy savings as main collateral.</p> <p>A third tender for the Municipality of Milano was awarded in August 2014, involving 38 schools. The proposed interventions include natural gas conversion of all oil plants, PV installations and a few solar thermal plants, insulation of building fabric and roof, window replacements, interventions on the lighting system and the introduction of BEMS. The guaranteed savings accounted for 35,4% of the baseline, 5% of it directly in the form of shared saving for the municipality.</p>
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TABLE 12 - MEASURES IMPLEMENTED BY THE COMBINATION OF EPC AND SUBSIDIES

7.2 REFURBISHMENT OF 14 HIGH SCHOOLS OWNED BY ALSACE REGION, FRANCE

Project in short

Fourteen high schools in the Alsace region were chosen because of the following criteria:

- High level of energy consumption
- No refurbishment investments planned in the next years
- Including recent and older high schools

The total space is 190 000 m².

The initial situation: Energy costs paid by high school with regional funds, investments paid by the region.

Goals of building owner:

- Allow quick investments for energy savings that could not be included in the budget of the Region
- No risks on works
- Guarantee of savings

Facility	Educational buildings
Country	France, Alsace Region
Customer	Alsace Region
Type of building	14 high schools

TABLE 13 - SUMMARY OF THE PROJECT

EPC provider	Cofely
Implemented measures	<ul style="list-style-type: none"> • 6 wood boilers • 1 heat pump • New boilers • District heating connection • Insulation • Windows • Photovoltaic electricity (5 000 m²)
Financing	<ul style="list-style-type: none"> • Investments (30 M€ in 2 years) • Running, maintenance and refurbishment of installations • Wood supply (5 boilers with chips, 1 with pellets)

TABLE 14 - TECHNOLOGY MEASURES IMPLEMENTED BY EPC

Costs for the Region:

- 3,5 M€/year for the ESCO (including subsidized photovoltaic electricity selling)
- 0,9 M€/year of savings on energy purchase - paid to energy sellers (not the ESCO) - guarantee on consumption level by the ESCO

Contractual relationships:

- Public-Private Partnership for 20 years (from 1/1/2010)
- Guarantees: primary energy consumption reduction: 35 %, GES emission reduction: 65 %
- Payment of the rent for investments to ESCO starts when the investments are done - 2 phases, all investments to be finished in 21 months (30/9/2012)

Facts

- The ESCO will also implement information actions for users (teachers, pupils and technicians) with the help of an association for energy awareness (Alter Alsace énergies)
- First EPC contract in France by the way of PPP (pilot project)

7.3 RENOVATION OF JOSEF GOČÁR SECONDARY CIVIL ENGINEERING TECHNICAL SCHOOL IN PRAGUE, CZECH REPUBLIC

Project in short

The project consisted of energy saving measures in all modern school buildings with use area of 5,283 m².

In the second half of 2009, thermal insulation of the building, supported by a subsidy from Operational Programme Environment commenced. The insulation measures were completed during the spring of 2010.

In 2010, an EPC project was launched. The EPC project has lead to renovation of the boiler house, installation of new air conditioning system and heat pumps and new regulation system. In total these technology measures estimated to save 16.7 GWh of heat and 2.7 GWh of electricity during the whole lifetime of 15 years.

Savings guaranteed in the contract were about 0.1 million EUR/year.

Facility	Josef Gočár Secondary Civil Engineering Technical School
Country	Prague, Czech Republic
Customer	Municipal Prague City Council
Type of building	Campus of the secondary school

TABLE 15 - SUMMARY OF THE PROJECT

Implemented via	EPC	Subsidies
Type of measures	Technology measures	Thermal envelope measures
Start date for the procurement procedure	December 2009	May 2009
Date of contract signature	July 2009	September 2009
Year of installation measures	2009–2010	2009–2010
Contract duration	8 years	7 months
Period of provided guarantees for energy savings	8 years	8 years
Investment volume	EUR 0.4 million	EUR 1.3 million

TABLE 16 - OVERVIEW OF THE PROJECT

EPC provider	MVV Energie CZ a.s.
Implemented measures	<p>Within the EPC project a gas boiler plant, engine room of heating and hot water and air-conditioning were reconstructed, as well as 2 heating pumps (air-water) and modernised measurement and regulation have been installed.</p> <p>Interventions on the building (wall insulation and replacement of windows and doors) were implemented one year prior to implementation of the EPC project.</p>
Financing	The investment costs of energy saving measures within the EPC project were in the amount of EUR 0.4 million. The client's own funds invested in the project amounted to about 20% and the rest of the investment is being repaid from energy savings achieved.

TABLE 17 - TECHNOLOGY MEASURES IMPLEMENTED BY EPC

Supplier of subsidized measures	Vltavín Holding, stavební podnik, Ltd. (construction company based in Prague)
Implemented measures	Insulation of building thermal envelope
Type and source of financing	The client received a subsidy from Operational Programme Environment (OPE) for insulating the building thermal envelope amounting to EUR 1 million i.e. 74% of the total investment costs).

TABLE 18 - THERMAL ENVELOPE MEASURES CO-FINANCED BY SUBSIDY

7.4 COMPREHENSIVE RENOVATION OF EDUCATIONAL BUILDINGS OF THE MUNICIPALITY RADZIONKÓW IN PUBLIC-PRIVATE PARTNERSHIP, POLAND

Project in short

The subject of the contract is to achieve guaranteed energy savings in educational buildings of the Municipality Radzionków through the execution of comprehensive works consisting of buildings thermal renovation and modernization of the lighting, combined with the maintenance of these facilities for a period of 10 years from the date of signing the contract (i.e. March 2010).

The Radzionków project is first long term ppp contract in Poland signed under new PPP Act of 19th December 2008. It has been announced on 15th July 2009 and signed on the 4th March 2010.

It provides a model example of the green public procurement and combines the technology and the thermal envelope measures implemented under EPC with guarantees of savings but financed by the client. The contract, under rules of public-private partnership, has been concluded after competitive dialogue procurement procedure. The ppp agreement provides for the joint implementation of the project based on the division of tasks and risks between the parties. The municipality bears the demand risk i.e. that the facilities are used effectively as the educational buildings within the contract duration.

The private partner covers both the construction and availability risk and in addition provides energy management of the facilities for a decade (ten years) and guarantees that agreed level of savings and thermal comfort is delivered.

The competitive dialogue, a unique public procurement procedure, has enabled to create optimal contract documentation describing the energy saving measures to be implemented. The contracting authority has acquired the know-how directly from the tenderers. The assistance of the partners in determining the accounting, tax and law issues especially in relation to the public debt issues cannot be underestimated. Municipality had not hired external counseling nevertheless project has successfully undergone several state controls.

The realized savings are steadily growing, reaching in 2013: 57.99% on heating (41.96% on electricity).

Facility	Educational buildings owned by/entities of/ the municipality
Country	Poland, Silesia
Customer	Municipality of Radzionków
Type of building	4 schools and 1 kindergarten

TABLE 19 - SUMMARY OF THE PROJECT

Implemented via	EPC and maintenance	Energy management
Type of measures	Technology and thermal envelope measures	Technology measures
Start date for the procurement procedure	July 2009 competitive dialogue	July 2009 competitive dialogue
Date of contract signature	March 2010	March 2010
Year of installation measures	2010	2010 and onwards
Contract duration	1/2 construction+10 years	10 years
Period of provided guarantees for energy savings	10 years	10 years
Investment volume	EUR 2 million	EUR 0.2 million

TABLE 20 - OVERVIEW OF THE PROJECT

EPC provider	SIEMENS Spółka. z o.o.
Implemented measures	Thermal insulation of walls and roofs, Replacement of windows and doors, Modernization of lighting system, Reconstruction of 5 heating sources, regulation EPC provider decided not to replace the whole heating systems but only partially renovate them taking the risk of higher maintenance costs
Financing	Guaranteed savings: 54.03% – heating and 39.77% – electricity. Costs of all measures in the amount of EUR 2 million paid by the client will be partly repaid by the guaranteed savings estimated at EUR 0.8 million (in 2010), currently (2014) valued EUR 1 million. Thus client expects savings will exceed 50% level.

TABLE 21 - EPC: CONSTRUCTION AND TECHNOLOGY MEASURES IMPLEMENTED

Supplier of the energy management system	Siemens
Implemented measures	BMS – on-line individual each and every room temperature measurement and control
Type and source of financing	Deferred semi-yearly payments, clients' savings

TABLE 22 - ENERGY MANAGEMENT FINANCED ON THE YEARLY BASIS

7.5 COMPREHENSIVE RENOVATION IN BUILDINGS OF FEDERAL POLICE ST. AUGUSTIN, GERMANY

Project in short

The St. Augustin project provides an example of combining the technology measures implemented through EPC with the thermal envelope measures financed by the client.

The Bundespolizei (Federal Police Authority, FPA) commissioned Cofely to energetically optimize its facilities in Sankt Augustin, near Germany’s former capital Bonn. The BPA in St. Augustin is one of 9 regional FPAs in Germany, with about 3,500 police and administrative staff, and is responsible for all federal police assignments in the State of Northrhine- Westfalia. The site comprises 84 buildings with a main floor space of 127,000 m².

Cofely guarantees an energy cost reduction of 55% during the contract term of 10 years and will reduce local CO₂ emissions by 5,200 tons per year. Direct contracting entity is the BlmA (Bundesanstalt für Immobilienaufgaben) and indirectly the Federal Police, whose high security standards have to be observed. The contract is based on an energy performance contract bid issued by dena, the German Energy Agency. Main requirements of the contract: 50% of the heat are to be supplied carbon-neutral; energetic refurbishment of one building; reduction of energy consumption. Cofely developed a package of tailor-made measures for the optimization of heat and power supply, lighting systems, domestic hot water, building automation and metering technology as well as building reconstruction. To our best knowledge, this is one of the most comprehensive energy performance projects in Europe to date, with a high degree of technical complexity, an above-average energy savings guarantee of 55%, the integration of renewable energy sources and above all, the refurbishment of the building shell.

Cofely was awarded with the European Energy Service Award 2014 with reference to this project.

Facility	Public buildings of Federal Police St. Augustin
Country	Germany, St. Augustin
Customer	Direct contracting entity is the BlmA (Bundesanstalt für Immobilienaufgaben) and indirectly the Federal Police
Type of building	84 buildings with a main floor space of 127,000 m ²

TABLE 23 - SUMMARY OF THE PROJECT

Implemented via	Comprehensive EPC	Financed by the client
Type of measures	Technology measures	Thermal envelope measures
Year of installation	2013 – 2025	
Contract duration	10 years	
Period of provided guarantees for energy savings	10 years	
Investment volume	EUR 6.3 million	

TABLE 24 - OVERVIEW OF THE PROJECT

EPC provider	Cofely Deutschland GmbH
Implemented measures	<ul style="list-style-type: none"> - Refurbishment of the building shell; - New heating supply with wood chips and gas boilers; - Cogeneration plant; - New building control system; - About 3,000 new luminaries, partly LED; - Hydraulic optimization; - Optimization of existing HVAC systems.
Financing	<ul style="list-style-type: none"> - Funding source: Forfeiting i.e. the ESCO sells the future ESCO rates from client to the bank, which is providing the project financing. - Investment volume: EUR 6.3 million

TABLE 25 - TECHNOLOGY MEASURES IMPLEMENTED BY EPC

Implemented measures	Refurbishment of the building shell
Type and source of financing	100% of the costs of thermal envelope measures have been financed by the client

TABLE 26 - THERMAL ENVELOPE MEASURES FINANCED BY THE CLIENT

7.6 MUNICIPALITY KARCZEW IN PUBLIC–PRIVATE PARTNERSHIP CO-FINANCED WITH GREEN INVESTMENT SCHEME PROGRAM, POLAND

Project in short

The subject of the contract is “Comprehensive thermal renovation of public buildings of municipality of Karczew in public-private partnership”. The contract encompasses modernization of the indoor lighting as well as the energy management and maintenance of ESM for a period of 14 years after energy savings measures are implemented.

It is a successor of Radzionków project based on the concept of TPF (Third Party Financing). First valued at EUR 3.1 million (including financial costs, payment in equal instalments) has been renegotiated to meet the Green Investment Scheme programme rules. The GIS1 programme is run by NFOŚiGW (National Fund for Environmental Protection and Water Management) and it allows to refund up to 30% of eligible actual expenses (not costs). The contract has been concluded after competitive dialogue procedure. The municipality decided to hire a legal consultant do deal with expected changes in the legal system. The investment has been completed in 2013 but the measurable effect will be known after first year of operation.

The realized actual energy savings will be announced yearly. To meet the GIS1 obligation the project during next 5 years must generate minimum of 145 mg avoided CO2 emissions each year.

The Karczew case study set base for discussion on ‘hybrid projects’ i.e. ppp operations described in new CPR regulation 1303/2013/EU subsidized with EU funds of new 2014–2020 perspective.

Implemented via	EPC and maintenance	Energy management
Type of measures	Technology and thermal envelope measures	Technology measures
Start date for the procurement procedure	January 2012 competitive dialogue	January 2012 competitive dialogue
Date of contract signature	January 2013	January 2013
Year of installation measures	2013	2014-2027
Contract duration	1 year of construction + 14 years management	14 years
Period of provided guarantees for energy savings	14 years	14 years
Investment volume	EUR 1.9 million	EUR 0.2 million

TABLE 27 - OVERVIEW OF THE PROJECT

EPC provider	Siemens Building Technologies Sp. z o.o.
Implemented measures	<ul style="list-style-type: none"> - Insulation of walls and roofs, - Replacement of windows and doors, - Modernization of lamps and fixtures, - Reconstruction of heating sources, - Regulation of heating system installation of automatic valves, - Basic maintenance.
Financing	<p>Costs in EUR million: investment – 1.9; financial 0.4; energy management 0.2 million. Timing: 1st year – after construction 1.3 million (0.2 m EUR non-eligible +1 m EUR eligible, of which 0.3 m EUR refunded); years 2–15: 168 monthly instalments of approx. EUR 0.006 million</p>

TABLE 28 - TECHNOLOGY MEASURES IMPLEMENTED BY EPC

Supplier of the energy management system	Siemens
Implemented measures	BMS – on-line individual each and every room temperature measurement and control
Type and source of financing	168 monthly payments, clients’ savings of approx.. EUR 0.001 million

TABLE 29 - ENERGY MANAGEMENT FINANCED ON THE YEARLY BASIS

7.7 MODERNIZATION OF HEATING AND BUILDINGS OF THE CITY OF MALACKY, SLOVAKIA

Project in short

This project was implemented as the first EPC project in Slovakia combining the usual technology measures together with significant volume of construction measures. The project was initiated as a result of technical assistance provided by Energy Centre Bratislava for the City of Malacky within project Minus 3% co-funded by the Intelligent Energy Programme, in which both entities took part as project partners.

Following recommendations provided within Energy efficiency action plan of the City of Malacky, the city administration started preparation of the project at beginning of 2013. The inevitability of construction measures implementation was considered from early beginning of the project development and was followed by decision of the city to co-finance part of the investment costs with the aim to enable implementation of the project within economically feasible duration. Implementation of the project will ensure increased energy efficiency of three city buildings gained through comprehensive modernization of one building – Cinema Záhoran, partial modernization of City sports hall (technological measures combined with selected construction measures) and modernization of heating system in the City centre of social services.

Implemented via	EPC
Type of measures	Construction and technological measures
Start date for the procurement procedure	December 2013
Date of contract signature	April 2014
Year of installation measures	2014
Contract duration	10 years
Period of provided guarantees for energy savings	10 years
Investment volume	EUR 0.442 million

TABLE 30 - OVERVIEW OF THE PROJECT

EPC provider	Cofely a.s.
Implemented measures	<p><i>1/ City sports hall Malina:</i> Technology measures – modernization of boiler room, heating system, ventilating system and lightning. Construction measures – replacement of glass wall on the swimming pool hall;</p> <p><i>2/ Cinema Záhoran:</i> Technology measures – optimization of heating system. Construction measures – thermal insulation of the building, replacement of windows and doors;</p> <p><i>3/ City centre of social services:</i> Technology measures – optimization of heating system.</p>
Financing	Initial investment (EUR 441,870 VAT included) into the implemented measures was financed by the EPC provider which is enabled to sell the claim against client after first year when level of guaranteed savings is reached. To enable implementation of project within economically feasible duration, the City of Malacky will co-finance the investment with amount of 68,898 EUR through increased payments in first two years of the contract duration.

TABLE 31 - TECHNOLOGY MEASURES IMPLEMENTED BY EPC

7.8 ADMINISTRATIVE BUILDING OF THE CITY MUNICIPALITY OF KRANJ, SLOVENIA

Project in short

Due to energy efficiency measures implemented in the administration building of the City Municipality of Kranj not only energy and cost savings have been achieved; thermal comfort of the building users has been improved both in winter and in summer, too.

The energy demand for heating and cooling has been reduced by introducing a cogeneration of heat and electricity and also by installing a 30 kWp photovoltaic power plant placed on the roof of the building. The average annual heat consumption amounted to 826 MWh before renovation.

A comparison was made with the actual measured heat consumption from the heating season 2012/13 (end of recordings: February 2013) combined with the calculated approximation until the end of the heating season based on data from previous years. It is expected that the use of energy for heating at the end of the heating season reaches around 590 MWh, which represents a reduction of approximately 29%.

Installations have also been renovated and a central control system and soft measures such as education and capacity building of employees have been introduced as well, which brings additional savings of energy and related operational costs.

Implemented via	EPC
Type of measures	Concessions for the supply of heat and cooling with natural gas from cogeneration of heat and electricity, cooling unit, and other use of renewable energy sources
Start date for the procurement procedure	2011
Date of contract signature	2011
Year of installation measures	2012
Contract duration	2011-2027
Period of provided guarantees for energy savings	15 years
Investment volume	EUR 1,678,300

TABLE 32 - OVERVIEW OF THE PROJECT

EPC provider	El-tec Petrol
Implemented measures	<p>Gas boiler, power of 635 kW</p> <p>Central cooling, power of 250 kW</p> <p>CHP system – 80 kW, heat output – 50 kW</p> <p>Renovation of mechanical installations</p> <p>Air conditioning of meeting halls, power of 55 kW</p> <p>Photovoltaic power plant, power of 30 kWp</p> <p>Central control system</p>
Financing	El-tec Petrol

TABLE 33 - TECHNOLOGY MEASURES IMPLEMENTED BY EPC

7.9 ENERGY SAVING PARTNERSHIP, POOL 27, GERMANY

Facility

Client: State of Berlin, District of Steglitz-Zehlendorf

- 59 properties with overall 239,049 m² net floor area
- primary and secondary schools, retirement homes, youth centres, administration buildings between 199 and 26,209 m² net floor area

Initial Situation

- Inefficient boilers and heating systems as well as centralized heating generation and sub-optimal measurement and control systems
- 36 of the properties were already part of a building pool within an earlier EPC project in the years 2002 – 2014

Goals of building owner

- Identification and implementation of significant measures to reduce energy consumption and costs.
- Modernization of heating systems including boilers, heat distribution, measurement and control technology.

Measures

- Measurement and verification of energy consumption and savings of each object;
- Refurbishment of boilers and decentralization of heating generation;
- Modernization of heating systems and heat distribution;
- Optimization of measurement and control systems;
- Increase energy efficiency through the use of CHP;
- Further energy efficiency measures: lighting optimization (through the use of sensors) and optimization of hot water generation

DURATION OF THE CONTRACT	14 YEARS
INVESTMENT	1,900,000 €
ENERGY COSTS 2012 (BASELINE)	2,709,752 €
GUARANTEED SAVINGS IN EURO	541,950 €/Y
GUARANTEED SAVINGS IN %	20.0%
REDUCTION OF CO ₂ -EMISSIONS	13,821 T/Y

TABLE 34 - OVERVIEW OF THE PROJECT

Innovations and Client's Advantages

- The District of Steglitz-Zehlendorf reduces annually 13,821 tons of CO₂ emissions contributing to achieve the climate protection targets of Berlin.

-
- Many of the old boilers as well as inefficient heating systems and sub-optimal measuring and control systems will be refurbished or modernized.
 - Furthermore the staff members of the public properties take part in trainings on energy efficiency and user motivation seminars.

7.10 BIG POOL 4, AUSTRIA

Facility

- 38 public schools in the federal state of lower Austria
- Outdated and inefficient technical equipment
- Motivating 1'250 classes with 30'000 students

Initial Situation

38 public schools in the federal state of Lower Austria were pooled together in a performance contracting project. Much of the technical equipment used in the schools was in a state of suboptimal performance and efficiency. In addition to implementing building performance improvements, approximately 1.250 classes with 30.000 students participated in the project "User Motivation for Energy-Conscious Behaviour".

Goals of building owner

- Lowering the operational costs
- Reducing energy demand
- Increasing the plant's reliability
- Raising awareness of students, teachers, and school staff
- Introduction of a new energy management system to simplify the use of the system and to reduce the energy waste

Measures

Ten year energy savings contract, new regulation and control systems, individual room controls, application of reference detectors and thermostats, hydraulic equipment, damping and insulation of windows, condensing boiler and exhaust chiller, heat pumps and solar plants, heat recovery at ventilation systems, optimization of ventilation systems, energy efficient lighting, time switch towards stand-by, and energy metering.

DURATION OF THE CONTRACT	10 YEARS
ENERGY COSTS 2010 (BASELINE)	3'120'000 €/Y
GUARANTEED SAVINGS IN EURO	722'330'000 €/Y
GUARANTEED SAVINGS IN %	23.15 %
REDUCTION OF CO2-EMISSIONS	> 2'880 T/Y

TABLE 35 - OVERVIEW OF THE PROJECT

Innovations and Client's Advantages

- Lower operational costs
- Increased reliability

-
- Reduction of CO₂-Emissions
 - Supporting management initiatives
 - User motivation
 - Preventing energy waste
 - Lowering energy demand
 - Supporting alternative energy
 - Creation of green jobs
 - Creation of energy analysis and benchmarks
 - Reduction of energy consumption and maintenance requirements
 - Customer support for a period of over 10 years
 - Extension of the contract by 10 years due to high customer satisfaction
 - Guaranteed savings were exceeded by several percentage points
 - The project had a great role model effect.

7.11 EPC LIGHT PANKOW, GERMANY

Facility

District of Pankow, 15 buildings:

- 12 schools
- 1 youth facility
- 1 cultural institution
- 1 public service building

Initial Situation

- Baseline (2009): 882,714 €/a
- Administration has no staff capacities to undertake adequate (technical) support / energy management of the buildings
- No constant consumption control / monitoring as well as no professional revision of the incoming invoices of utilities
- Existing saving potentials, particularly a possible optimization of operations
- Classical EPC is not suitable:
 - Too low project volume (energy costs)
 - Buildings without long-term perspective of constant use
 - No investment requirements (e. g. new buildings or modernized objects)
 - Goals of building owner
 - To reduce energy consumption by mid-2012 in schools and administration buildings.

Measures

- Energy management: reducing energy consumption and energy costs through external know-how;
- System optimization and continuous monitoring;
- Extension of existing savings potential (without investment);
- Guaranteed energy savings contract.

DURATION OF THE CONTRACT	2 YEARS
INVESTMENT	1.184.075 €
ENERGY COSTS 2010 (BASELINE)	882.714 €/Y
GUARANTEED SAVINGS IN EURO	90.037 €/Y
GUARANTEED SAVINGS IN %	10.2%
SHARE / PAYMENT TO ESCO:	5 % = 44.118
SHARE CLIENT:	5.20 % = 45.919 €/A
REDUCTION OF CO ₂ -EMISSIONS	> 3.000 T/Y

TABLE 36 - OVERVIEW OF THE PROJECT

Services of the ESCO

- Inventory of the technical equipment of the buildings (if necessary)
- Active optimisation of heating, (ventilation and cooling) by building control systems including documentation
- Analysis of consumption, monitoring of meters
- Control of the invoices of supply companies
- Energy reporting every 6 months
- Weak-point analysis / recommendation for investments in energy efficiency
- Optional: additional concept for user motivation

Innovations and Client's Advantages

- In comparison with the conventional EPC, in "EPC light" there is usually no need for large investments;
- The energy is saved by maintaining a certain level of consumption. Since there is no need to refinance the investment, the contract period is only for two or three years;
- The client may use a portion of the savings to fund additional educational trainings on energy conservation;
- "EPC light" is a first step in the external energy management.

7.12 OPERA HOUSE OF BARCELONA, SPAIN

Facility

Opera house building in old center of Barcelona

- Surface: 35.000 m²
- Opera room: 9.000 m³ (2.292 seats)

Initial Situation

The opera house of Barcelona (Gran Teatre del Liceu) resides in the old city center. It has a total surface of 35.000 square meters. The main opera room has a surface area of 9.000 square meters and can hold 2.292 seats. The building initially consumed 9 GWh of electricity and 1.3 GWh of heat annually. There was a need to implement energy efficiency improvements, but no funds were available.

Goals of building owner

- Action Plan 2009 – 2015: to improve energy efficiency to achieve savings
- Reducing the energy consumption of the whole building
- This action plan was structured in 2 phases: First: one year of Good Practises and Measure; Second: Investments and management (5y)

Measures

- Chillers retrofit: Implementation of oil free magnetic chillers (high technology and efficiency)
- New control system for the whole facility (BMS)

DURATION OF THE CONTRACT	6 YEARS
INVESTMENT	1'300'000 €
ENERGY COSTS 2010 (BASELINE)	824'393 €/y
GUARANTEED SAVINGS IN EURO	330'000 €/y
GUARANTEED SAVINGS IN %	43.8 % (ELECTRIC) 35.8 % (THERMAL)

TABLE 37 - OVERVIEW OF THE PROJECT

Innovations and Client's Advantages

- The possibility for financing energy saving measures
- Reducing costs and demonstrating savings
- The project was financed within a framework of PPP contracts (public private partnership)
- A continuous improvement cycle was implemented and the building obtained the ISO 50001 certificate for its EMS in 2011
- Additional reduction of noise pollution and water consumption

8. CONCLUSIONS

The EPC contract is considered a key tool for achieving the goals of efficiency, especially for the public administration at a time of financial crises; however these standards were implemented by member states with measures of limited effectiveness that has not in fact facilitated the use. The EPC contract essentially is a tool that involves all parties to achieve a single objective which is the energy savings, through a fair distribution of the savings, the technical and financial risks and investments. Therefore it is a very flexible contract that can be adjusted among the parties (customer/ESCO/Third funding).

The survey carried out among the partners of the project shows that the types of EPC contract most frequently used are 5:

TYPE of EPC Contract	Italy	Portugal	Grece	Spain
Garanteed Savings	X	X	X	X
First In	X			
First Out	X			
Shared Savings	X	X	X	X
Build-Own-Operate & Transfer (BOOT)	X	X		

TABLE 38 - SUMMARY OF THE EPC CONTRACT MOSTLY USED IN THE CERTUS PROJECT PARTNERS COUNTRIES

- In Greece two models of contract has been published: Garanteed Savings and Shared Savings but for both of them there is no obligation to use for the public sector.
- In Portugal a model contract for the public administration, similar to the Shared Savings, has been published: the ESCO assumes all risks associated with the project and the Public Administration has a share of the guaranteed savings.
- In Italy, only the "Energy Service Plus" contract has been published: this contract applies only to interventions for thermal energy saving, where the ESCo finances the measures, manages facilities, supplies the primary energy and a reduction of at least 10% of energy consumption has guaranteed to the customer. There is no obligation to use for the public sector.
- In Spain, IDEA, a government institute related to energy efficiency, has drafted an agreement model for energy services including maintenance for public buildings. This model is available to the following link (in Spanish):

http://www.idae.es/uploads/documentos/documentos_10704_Propuesta_modelo_contrato_serv_energ_07_32458412.pdf

Also the survey carried out within the project "Transparensa - Increasing Transparency of Energy Service Markets", published in December 2013, confirms that only in 19% of cases the funding of the energy saving measures is the customer. This percentage begins 6% in the Southern European Countries.

The use of the EPC contract by the public administration is zero in the Southern European Countries: this data emerges both from the survey among the project partners that from the project "Transparensa - Increasing Transparency of Energy Service Markets".

Concerning the projects supported by the IEE program, completed or nearing completion, we can underline that there are few case studies of energy improvement projects on buildings for which both the technical details and the types and sources of funding used are available; in addition there are no available case studies of projects of energy upgrading of existing buildings became nZEB.

Although there is a definition of "building to nearly zero energy" as a result of the European Directive 2010/31/EU (EPBD recast), each Member State has adopted or is adopting this directive identifying its minimum requirements of the energy performance of buildings and its own methodology of calculating benefits.

The wide variety of these national approaches makes impossible their aggregation into a single approach.

However, despite the many differences, the common denominator is usually traced to the design strategy aims primarily at reducing energy needs through the use of energy-efficient technologies and then produce enough renewable energy to cover the annual energy consumption significantly. The technologies and the facility available in the market are many and are also numerous studies aimed at defining a hierarchy of design interventions for the "nearly zero energy buildings". The principle underlying this work concerns the improvement of energy efficiency and the use of the renewable energy sources. It is understood that the variables to consider are many, including, in particular, the needs of the user, the geographic location, the intended use and economic and financial availability.

In addition to the regulatory standards and incentives, energy efficiency need to attract private investment and ESCo play often an important role: through EPC contract the ESCo is able to offer a range of services and integrated interventions aimed at upgrading and improving the efficiency of the energy system, which may be a cost savings on energy bills.

In this regard considering the distribution of risks, the possible forms of financing and the role of ESCOs, in practice there are different types of EPC contracts related to the following 8 contracts:

- First In
- First Out
- Guaranteed savings
- Shared savings
- Pay from saving
- Four step
- Build-own-operate & transfer (BOOT)
- Chauffage (asset ownership)

9. GLOSSARY

Certification Procedure by which an external entity provides written guarantees that a product, process or service is compliant with specific requisites.

Energy All forms of energy products, combustible fuels, heat, renewable energy, electricity, or any other form of energy, as defined in Article 2(d) of Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics

Energy service The physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings;

Energy audit A systematic procedure with the purpose of obtaining adequate knowledge of the existing energy consumption profile of a building or group of buildings, an industrial or commercial operation or installation or a private or public service, identifying and quantifying cost-effective energy savings opportunities, and reporting the findings;

Energy performance contracting A 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 (work, supply or service) 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 person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and 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 energy efficiency improvements and on the meeting of the other agreed performance criteria;

Qualification The formal result (certificate, diploma, title or trademark) issued by a process of ascertainment and validation, obtained when the certifying body determines that training results have been reached for a specific standard and/or that the person has the skills necessary to undertake a task in a certain area of employment. A qualification is the official recognition of the validity of the results of the learning on the job market and in the education and training sector. In training, a qualification is the formal certification issued by an authority having jurisdiction upon the completion of a training path to certify that the student has acquired skills compatible with the standards established in the national educational system.

Historical Energy Bill Energy costs flat rate, calculated on the historical cost of the energy of the system before surgery and possibly discounted compared to variation in fuel prices

Standard Energy Bill Energy costs actually incurred in the year on which we calculate and break down sides savings

10. REFERENCES

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