



JRC SCIENCE FOR POLICY REPORT

Energy Service Companies in the EU

*Status review and
recommendations for
further market
development with a
focus on Energy
Performance
Contracting*

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Title: Energy Service Companies in the EU (Status review and recommendations for further market development with a focus on Energy Performance Contracting)

Abstract

Building on its previous reports, investigating the status of the ESCO market in the EU, the Joint Research Centre (JRC) reviewed the efforts made by Member States to stimulate the market of energy services, and in particular the market for EPC, during the period 2014-2016 and the current size of the ESCO market. The findings in this report show new developments since the last report published by the JRC in 2014 for the period 2010-2013.

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Executive summary

Improving energy efficiency is one of the most important pillars of a sustainable energy policy and a key component of climate change mitigation strategies. The private sector, including energy service companies (ESCOs) can play a critical role in improving energy efficiency at the market level. ESCOs have the necessary know-how to provide turnkey services and solutions achieving significant energy cost reductions while addressing various market related barriers on the ground. ESCOs can handle projects, manage or mobilize financial resources, undertake installation and maintenance work as well as collaborate with other market players. When providing Energy Performance Contracting (EPC), ESCOs share the unique characteristic to assume performance risks by linking their compensation to the performance of their implemented projects, thus incentivising themselves to deliver savings-oriented solutions.

Their value of ESCOs in unlocking the energy saving potential in the market is recognized by various EU directives and initiatives in the European context, such as the Energy Efficiency Directive (2012/27/EU; EED), which sets explicit requirements to promote the market of energy services through its Article 18. The EED provides definitions for energy performance contracting, energy services and energy service providers and calls for Member States to take actions to strengthen the energy services market. The key role of Energy Performance Contracting (EPC) in driving energy efficiency investments is also highlighted in the "Clean Energy for All Europeans" communication¹. According to this communication, the role of EPC must increase, in particular in the public sector, as they offer a holistic approach to renovations, including financing, carrying out the works and energy management.

Building on its previous reports, investigating the status of the ESCO market in the EU, the Joint Research Centre (JRC) reviewed the efforts made by Member States to stimulate the market of energy services, and in particular the market for EPC, and the size of the national markets with their main characteristics during the period 2014-2016. The findings show new developments since the last report published by the JRC in 2014 for the period 2010-2013.

The average ESCO market of the European Union has been on a steady rise for the last decades. Even if the financial crisis of 2008 caused a short backdrop, the ESCO markets were able to rather easily overcome the challenges, and turn the financial restrictions into an opportunity. As of 2014-2016, in general the markets are on a growth path, although this growth is not as widespread across countries as it was in the period 2010-2013. Traditionally, in Europe, energy services markets included a variety of contract types, many types of contractors (suppliers) and a few types of clients (mainly industry and public sector). As of 2016, there are still many types of contracts; however energy performance contracting is more and more regarded as a distinguished contract type, and companies started to be classified based on their offerings. In parallel both ESC and EPC are by now extended to almost all types of projects (transport being an exception), including traditionally ignored ones, such as residential and SMEs.

The total EU market was estimated at \$2.7 billion (€2.4 billion) ESCO revenue in 2015, with a forecasted growth to \$3.1 billion (€2.8 billion) in 2024 at a 1.7% compound annual growth rate (Talon and Gartner 2015).

18 of the 28 Member States reported unchanged ESCO markets, and only 7 national ESCO markets have grown during the period 2014-2016, with 3 decreasing markets (AT, HU and EE) and 1 where it was unclear (IE). This compares to 9 and 18 MSs respectively during the previous period 2010-2013². Out of those markets that were growing, none of them grew significantly, as opposed to 4 of the 18 growing markets in 2013, which

¹ <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1481278671064&uri=CELEX:52016DC0860>

² As a result of the distinction between ESC and EPC emphasized in the current survey, respondents may have been also more cautious to indicate a market as growing strongly/booming.

experienced a boom then. It should be noted that there are MSs where increase was experienced in EPC usage.

1 Introduction

1.1 Background

Energy efficiency is one of the most important pillars of a sustainable energy policy. Regarded as one of the energy resources with the biggest impact, it can address the growing demand for energy, climate change, energy insecurity, import dependency, low competitiveness, rising energy costs and it can directly contribute to growth, jobs and better health. While investments in energy efficiency at first glance seem cost effective, they are not always undertaken due to a number of regulatory and non-regulatory barriers, leading to the so-called energy efficiency gap between actual and optimal energy use (Jaffe and Stavins 1994).

To overcome these barriers, governments design energy efficiency policies and measures, ranging from mandatory standards, through information tools, to economic instruments with the aim to narrow the energy efficiency gap. In addition to public policies, the private sector, including energy service companies (ESCOs) can play a critical role in improving energy efficiency at the market level. ESCOs have the necessary know-how to provide turnkey services and solutions achieving significant energy cost reductions while addressing various market related barriers on the ground. ESCOs can handle projects, manage or mobilize financial resources, undertake installation and maintenance work as well as collaborate with other market players. When providing Energy Performance Contracting (EPC), ESCOs share the unique characteristic to assume performance risks by linking their compensation to the performance of their implemented projects, thus incentivising themselves to deliver savings-oriented solutions.

Their value in unlocking the energy saving potential in the market is recognized by various EU directives and initiatives in the European context. The principal EU legislation is the Energy Efficiency Directive (2012/27/EU; EED), which sets explicit requirements to promote the market of energy services through its Article 18. The EED provides definitions for energy performance contracting, energy services and energy service providers and calls for Member States to take actions to strengthen the energy services market, including:

- dissemination of information about available energy service contracts and clauses as well as financial measures supporting energy efficiency service projects;
- publishing of EPC model contracts and list of available energy service providers;
- encouraging the development of quality labels;
- disseminating information on best practices for EPCs;
- providing a qualitative review of the current and future development of the market;
- identifying and publicising contact points for final customers;
- putting in place an independent mechanism for handling complaints and disputes;
- enabling independent market intermediaries, i.e. facilitators.

The EED provides additional basis to further support the development of the energy services market. Article 5, calling for renovation of at least 3% of the national central government building stocks, can, inter-alia, promote the use of energy services in the public sector, while the energy efficiency obligations (EEO) (Article 7) enables additional actors such as ESCOs to contribute towards meeting the energy end-use reduction target imposed on the energy companies. The obligation for large companies to do mandatory energy audits (Article 8) offers a boost for the uptake of energy consultations, a key segment of the energy services market. The call for Member States to evaluate and, if necessary, take appropriate measures to remove regulatory and non-regulatory barriers to energy efficiency (Article 19) shall take into account barriers to the uptake of energy performance contracting in the public sector with regards to public purchasing, annual

budgeting and accounting. Finally, the establishment or use of existing financial facilities including the set up an Energy Efficiency National Fund may also include dedicated streams of financing to support the uptake of energy services projects.

Despite the theoretical appeal of cost-effective energy saving opportunities and the currently supportive policy framework, the energy services market in the European Union is far from utilizing its full potential, even in countries with a developed energy services market. Experiences are difficult to share and utilise among countries, and the numerous barriers often block a kick-off of energy services markets in many of the EU countries. Moreover, even in Member States with an established ESCO market, successes in one sector (e.g. industry) do not easily transfer to other client sectors. Finally, there are a few countries with a history and experience with energy services, heat supply contracting or similar supply schemes, but find that the guarantee based contracting market is difficult to establish.

1.2 Aim and objectives of the report

Building on its previous reports, investigating the status of the ESCO market in the EU, the Joint Research Centre (JRC) reviewed the efforts made by Member States to stimulate the market of energy services, and in particular the market for Energy Performance Contracting, during the period 2014-2016. The findings show new developments since the last report published by the JRC in 2014 for the period 2010-2013.

Information gathering was divided into two phases.

1.2.1 Phase 1.

In the first phase, the JRC collected information on the energy services markets on a broad sense, including overall market information. The key source of information was the third National Energy Efficiency Action Plans (NEEAPs), and the information provided therein by the Member States in compliance with Article 18 of Directive 2012/27/EU. In order to complement and/or occasionally to verify the reported information peer-reviewed literature, national and international reports, governmental archives, and project documents (in particular those produced in the EESI2020³ and the Transparens⁴ projects) were consulted. Furthermore, the drafts of the national chapters were checked by national experts, who provided further valuable views to be integrated. The first phase was carried out during 2015.

1.2.2 Phase 2.

The second phase focused on collecting specific information about the EPC segment of the national ESCO markets. A targeted questionnaire was prepared and distributed among national experts. Contacts were used from the JRC's ESCO network, and new contacts were found by snow-ball technique. The survey was sent out and the responses were collected electronically. Occasional phone interviews were used to supplement the information. Finally, national documents and reports were consulted to complement the information. There have been a good number of relevant H2020 projects in the period of 2014-2016, whose findings proved useful to compare to the results of the survey and clarify possible differences.

As a result, the current report provides:

- an EU-wide comparison of the status of ESCO markets, with special emphasis on the EPC segment;
- review of policies and measures across EU Member States to support the energy services markets, with a special look at the public sector;

³ <http://eesi2020.eu/>

⁴ <http://www.transparens.eu/eu/home/welcome-to-transparens-project>

- an assessment of remaining key barriers;
- recommendations for enhanced energy efficiency improvements through ESCOs and EPC at the EU level, and at MSs level;
- Member States' reports, which include:
 - a summary of the national ESCO markets;
 - the status of the energy performance contracting segment
 - a short look at energy supply contracting;
 - the performance of energy services in the public sector;
 - the situation of energy services in other sectors;
 - remaining energy services potential and barriers;
 - current and planned policies to stimulate market growth including information and awareness raising measures; and
 - conclusions and recommendations.

1.3 Limitations and focus

As mentioned above, this report gives a review of the overall ESCO markets in the EU as of 2015 based on the NEEAPs regarding energy services and energy service contracting, in particular of Article 18 of EED. While these parts have been reviewed in 2016, the information on the general ESCO markets should be as a market status review for the year 2015.

On the other hand, the information focusing on the EPC market refers to 2016. Ambiguities were resolved; nevertheless, there are some cases where the information on ESCOs may not be fully in line with the information on EPC due to the time lag.

Comparison of data between Member States should be dealt with care, because data are robust and terms in one Member State (MS) may have slightly different meaning in another. While definitions are clearer today, and we find that it is significantly easier to communicate requests about numbers and sizes than 10 years ago, there are still major differences in the local understanding of the same concept.

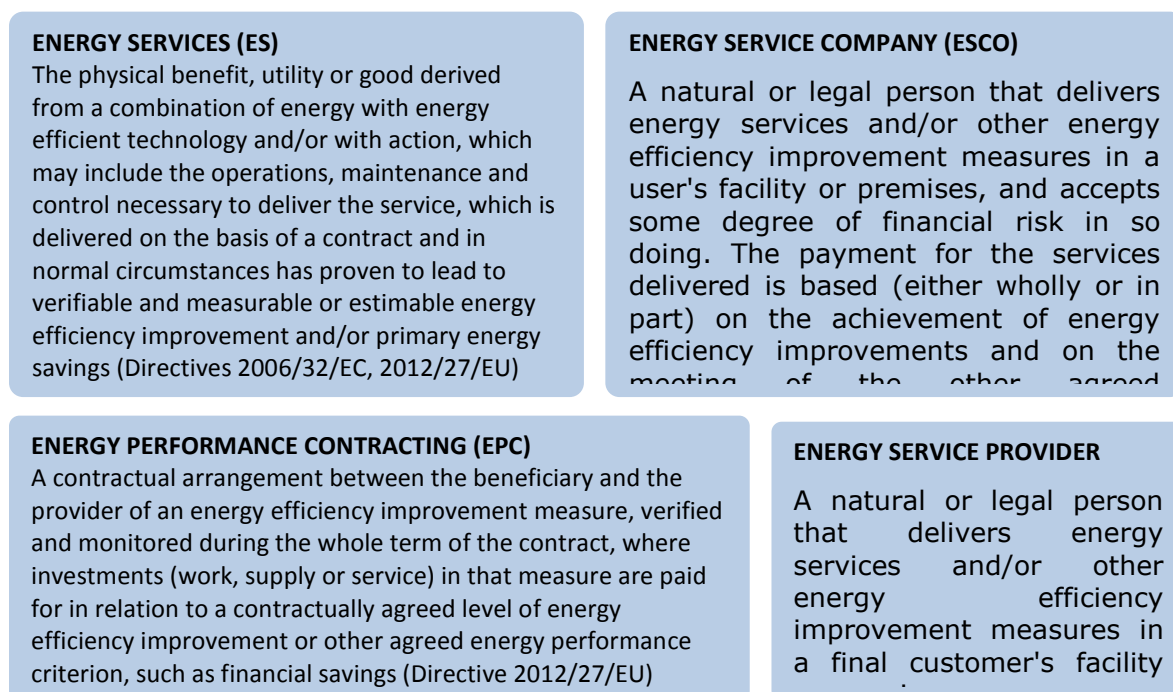
As a result of the introduced standards and the definitions used by EU Directives and transposed to national legislation and everyday practice, market actors started to "speak the same language". However, there are still many differences in the interpretation of "energy services" and other key terms. Whenever possible, these differences/limitations are highlighted throughout the rest of the report. Nevertheless, when information was collected about the numbers of ESCO/EPC providers, or market sizes and potentials, it was found that the understanding is now closer to each other than before. Differences appear in the understanding of "market volumes", and various indicators were used by respondents, including annual turnover or investment volume or other indicator. Comparison between countries is also limited because we have volume estimates for the whole sector in one place and only for a part of it (e.g. public clients) in another.

2 Terms and definitions

Despite a long history in Europe dating back to the 19th century, the energy services market is still characterised by definitional confusion, which is mainly attributed to the complexity of the offerings, to the traditional use of terms in certain countries, to the diversity of players in the market, and to the current interest of the situation where the terms are used.

Differences in the interpretation of what is entailed by Energy Services Company (ESCO) still exist among experts and stakeholders in the field. The Energy Services Directive (2006/32/EC) describes an ESCO as 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. It stresses that 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. The Energy Efficiency Directive (2012/27/EU), on the other hand, does not provide a definition of ESCOs but instead refers to the general term of energy service providers, which includes any natural or legal persons delivering energy services and/or other energy efficiency improvement measures in a final customer's facility or premises (see **Error! Reference source not found.**).

Figure 1. Key definitions in EU legislations



Definitional varieties also exist at national level, and by now, most of these converge with EU-level definitions, based on the transposition of the EED.

The following sections review these terms and definitions in more details, in particular indicating their use in the current report. Occasionally, national definitions are more appropriate in the national context, in which cases this is indicated appropriately. With a focus on EPC, a review of the transposition of the EED definition to national law is presented in Chapter 4.2.

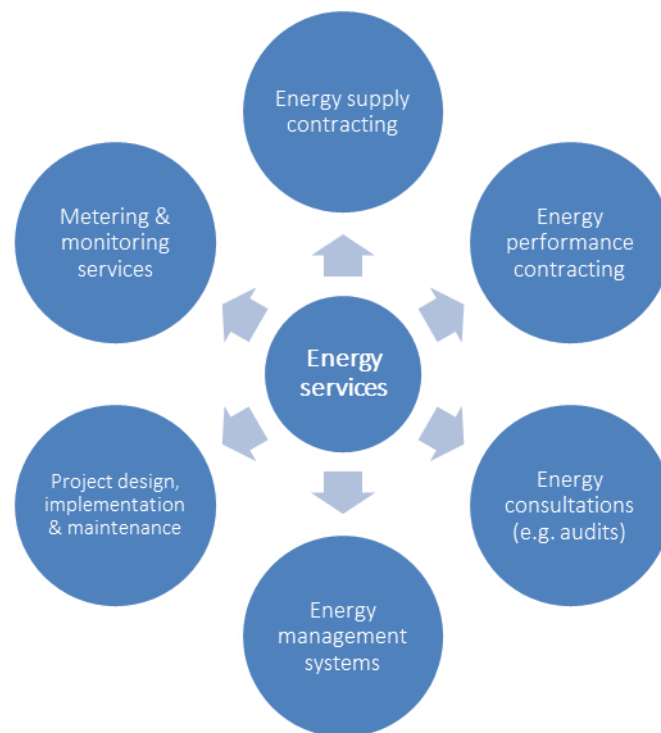
2.1 Energy services and energy efficiency services

A wide range of activities fall under the umbrella term 'energy services'. Bertoldi, Rezessy, and Vine (2006) describe energy services as various activities including energy audits, energy management, project design and implementation, maintenance and operation, monitoring and evaluation of savings, and energy and equipment supply. Along the same lines, the definitions provided in the Directives 2006/32/EC and 2012/27/EU point to various services delivered on the basis of a contract, which in normal circumstances have proven to lead to verifiable and measurable or estimable energy efficiency improvement and/or primary energy savings.

While the terms energy services and energy efficiency services are mostly used interchangeably, a distinction can be made to highlight the specific focus on energy efficiency of the latter. According to standard EN15900, energy efficiency services are defined as an agreed task or set of tasks designed to lead to an energy efficiency improvement and other agreed performance criteria. An energy efficiency service shall:

- be designed to achieve an energy efficiency improvement and meet other agreed performance criteria, such as comfort level, production throughput, safety, etc.;
- be based on collected data related to energy consumption;
- include an energy audit as well as identification, selection and implementation of actions and verification.

Figure 2 – Selection of types of energy services offered on the market



2.2 Energy service providers/suppliers

Energy service providers/suppliers may refer to all natural or legal persons who deliver energy services or other energy efficiency improvement measures in a final customer's facility or premises. They are regularly simply called ESCOs and the distinction is not well developed. The market is made up of various energy service suppliers, ranging from

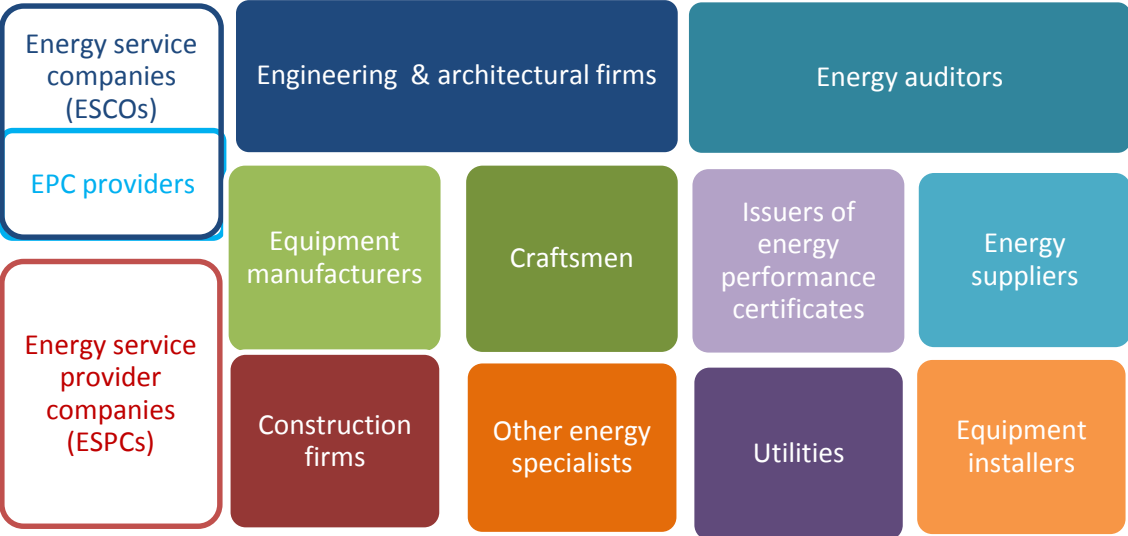
energy specialists, auditors, consultants, engineering and architectural firms to trades people and craftsmen. The EED's definition of energy service providers points to this broad umbrella term, which includes anyone delivering energy services and/or other energy efficiency improvement measures (see **Error! Reference source not found.**). This definition includes companies that do not assume performance risk for their projects but excludes companies that only engage in the design and installation of on-site generation or renewable energy systems without the deployment of energy-efficiency measures.

Energy Service Companies (ESCOs) hold a distinct role in the field of energy services providers. They are a key player in the supplier chain as they can provide turnkey services covering a full range of activities: energy audit, design engineering, construction management, arrangement of long-term project financing, commissioning, operations & maintenance, savings monitoring & verification. Their distinct feature is associated with their remuneration structure, and in particular, their performance-based projects (i.e. energy performance contracts, see section 2.2.1).

There are variations in the ways ESCOs operate; the key differences being the type of contract and financing sources.

The ESCO companies that carry out EPC contracts are more and more commonly referred to as EPC providers, in order to distinguish them from those ESCOs that do not use a performance guarantee. In this meaning EPC providers are a type of ESCOs that offer a savings guarantee and link their remuneration to the achievement of the contractually set savings target. In the current report, the terms ESCO vs. EPC providers are used accordingly.

Figure 3 – The diverse landscape of energy service suppliers/providers



On the other hand, energy service provider companies (ESPC) provide energy services for a fixed fee or as added value to the supply of equipment or energy (such as heating) (Pätäri & Sinkkonen, 2014). They operate on a design and build principle and their

compensation is based on a predefined fee. All companies such as energy auditors, issuers of energy performance certificates or engineering firms that do not assume performance risk fall under this term.

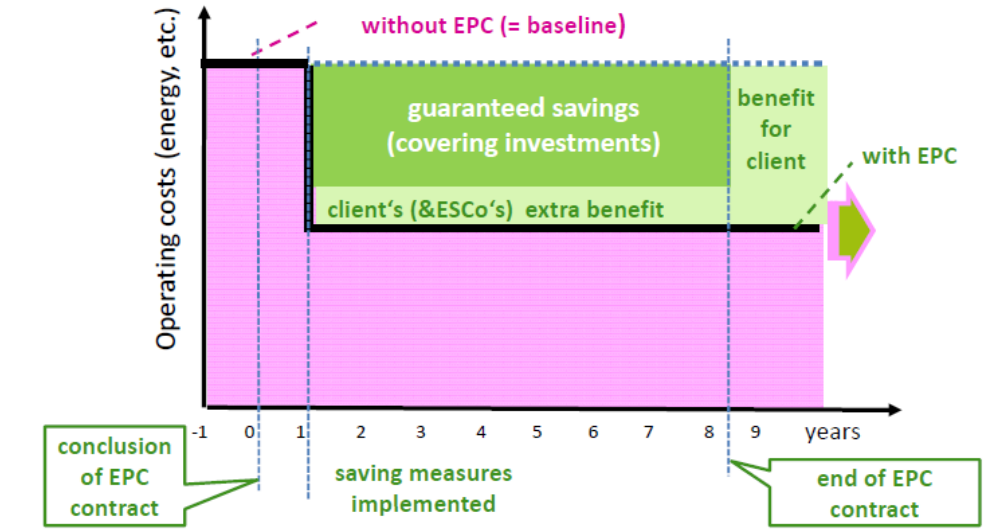
2.2.1 Energy service contracting

An energy service contract describes a contractual relationship between an energy service supplier/provider and final energy user (client). These can be classified in the following groups:

a) Energy Performance Contracting

Under an energy performance contract, an ESCO undertakes a project to deliver energy efficiency improvements in the premises of the client, and uses the stream of income from the cost savings to repay the costs of the project. The approach is based on the transfer of technical risks from the client to the ESCO based on performance guarantees given by the ESCO. The savings that are achieved are used to partly or fully pay for the investments that were made. After the end of the contract, the cost benefits brought about by the energy savings remain with the customer (Bertoldi, Rezessy, Vine 2006). Figure 4 shows the basic arrangement of an EPC project.

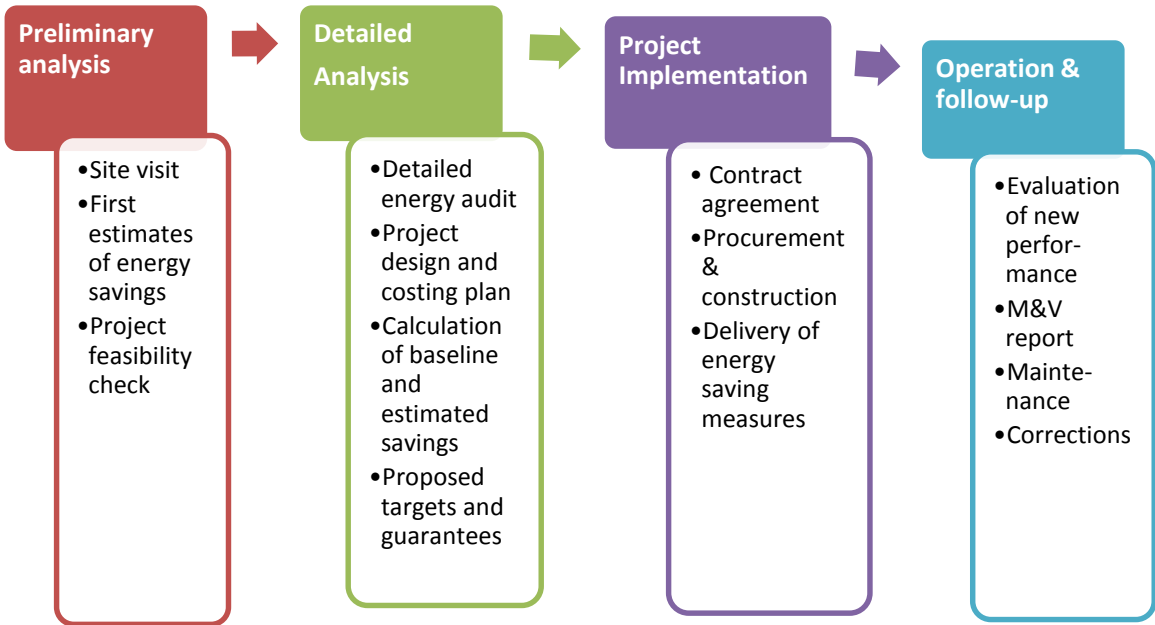
Figure 4 - The timeline and the savings expected in an Energy Performance Contracting scheme.



Source: (Szomolanyiova & Sochor, 2013)

Once the installation of the energy efficiency measures is complete, the project moves to evaluation of new performance phase. The specific nature of service provided will depend upon the contract. Energy savings are a key benefit that should be achieved as the EPC service is paid by realized energy cost savings. The contract between the ESCO and client contains guarantees for cost savings and takes over financial and technical risks of implementation and operation for the entire project duration of typically 5 to 15 years.

Figure 5 - Phases of a project under the EPC model



There are two types of EPC-based projects. Under a guaranteed savings EPC-based project, the ESCO designs and implements the project and guarantees the energy savings, thus shielding the client from any performance risk (including technical and implementation risks). If the savings are less than the guaranteed level, the ESCO covers the shortfall. If the savings exceed the guaranteed level, the additional savings are shared between the ESCO and client. Conversely, under a shared savings EPC-based project, the savings are split in accordance with a pre-arranged percentage: there is no 'standard' split as this depends on the cost of the project, the length of the contract and the risks taken by the ESCO and the consumer (Bertoldi, Rezessy, Vine 2006). The differences between the two approaches relate also to the payment arrangements, the primary technical focus, and the allocation and apportionment of energy savings. These are illustrated in Table 1.

b) Energy Supply Contracting

The subject of this contract type is the supply of energy, typically in the form of heat, whereby the ESCO undertakes installation works and supplies energy to the client. The focus of energy supply contracting is the reduction of supply costs rather than demand-side efficiency gains, with energy efficiency measures being typically limited to the energy supply and transformation side. These measures include the optimisation of the equipment (e.g. purchase of heat produced by a biomass boiler), production of electricity from cogeneration plants, etc. The energy supply contracts require longer terms (10-30 years) and are best suited for centralised systems such as heating and cooling. Once the ESCO completes the installation, it is paid for the quantity of energy supplied over the term of the contract. In France, this is also known as "chauffage" model which has been in use for more than 60 years. Under this type of contract, the costs of all equipment upgrades, repairs etc. are borne by the ESCO, while ownership typically remains with the customer. The customer pays a fee which is based on its existing energy bill minus a percentage savings (often in the range of 3-10%) or a fee based on the conditioned floor space (Singh, et al., 2010).

Table 1 - Key characteristics of EPCs and ESCs compared

	EPC - Guaranteed savings model	EPC - Shared Savings model	Energy Supply Contracting (ESC)
Service provider	ESCO/EPC provider	ESCO	Energy Supply Provider Company (ESPC)
Key elements	Implementation of energy saving measures with on-going monitoring & verification services to provide guaranteed energy savings.	Implementation of energy saving measures (mainly demand side) to provide cost savings associated with the overall energy/utility bill.	Efficient supply of useful energy such as heat, steam or electricity is contracted, measured and delivered in physical units.
Energy savings to be achieved	High - comprehensive and detailed approach covering both supply and demand side.	High - primary focus and incentive is for cost savings with technical operation requirements as secondary.	Usually low - limited to the supply side (boilers, chillers, etc.) without regard to demand- side equipment.
Guarantees	Yes. The ESCO guarantees the performance related to the level of energy saved throughout the contract life (i.e. to energy cost savings in constant prices).	Not as standard. However, the ESCO may guarantee a minimum performance related to cost of energy saved in current prices throughout the contract life.	May include incentives related to energy use reduction on the supply side, but without assuming any risk in case the expected efficiency improvement is not reached.
Payment	Payment derived from the energy savings achieved in constant prices of the base year.	Payment linked to the achieved change in energy costs.	Payment of a fixed rate/tariff, normally without energy performance requirements.
Provider's risk	Assumes technical design, implementation and performance guarantee risks.	Assumes performance risk, risk of energy price change (depends on current prices) and customer credit risk.	Usually does not assume technical or financial risk.
Energy savings transparency	The energy consumption is measured before and after the measures are implemented. The transparency depends	Depends whether and what quality M&V is provided. In general, the more independent M&V, the more	Low - a specific energy bill reduction is established (in monetary, not physical units). Usually the contract

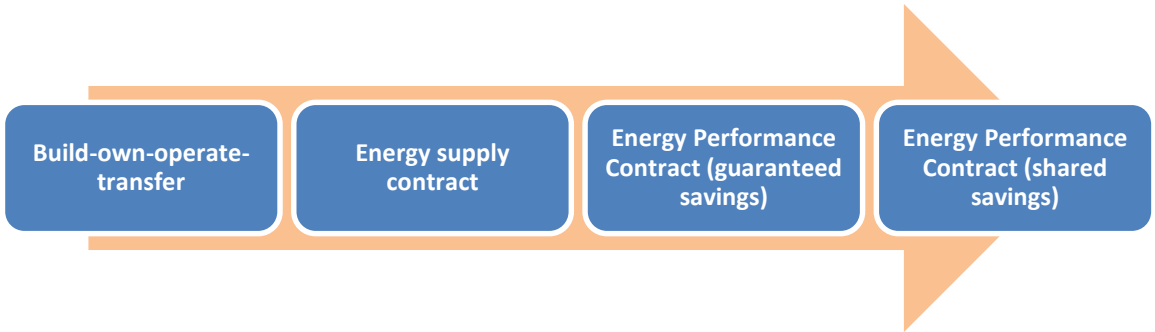
	on the quality of measurement & verification. In general the more independent M&V, the more transparent are the energy savings.	transparent are the energy savings.	does not take into account the measurement of the energy efficiency.
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c) Build-own-operate-transfer

Under a build-own-operate-transfer contract, the ESCO designs, builds, funds, owns and operates the scheme for a defined period of time and then transfers the ownership across to the customer. Customers enter into long term supply contracts and are charged according to the service delivered. The service charge includes capital and operating costs recovery and project profit. The contract type has been found to be more applicable when including large energy generation assets e.g. combined heat and power engines.

The relative risk associated with each contract is shown in Figure 6.

Figure 6 - Ranking of different energy contracting types according to growing associated risk level



2.3 Financing options

When reviewing past and current practices for energy efficiency financing using ESC/EPC projects, there are a number of variants that are widespread in the EU.

First of all, there must be a differentiation among projects financed entirely or partly by the client. In these cases the ESCO participates in the project as a manager and/or as a guarantee supplier, but not as a financier.

It may also happen that the investment costs are born entirely or partly by the supplier/ESCO, which is part of the ESCO project offer, in such a case.

It is also very common, in particular in the initial phases of the ESCO market development that national funds, international financing organisations streams are involved in project financing. This will drastically increase the economics of the project(s), reduce transaction costs and/or significantly reduce the payment period.

Furthermore, a third (or even fourth) party may be involved, which has been traditionally referred to as Third Party Financing, which is considered as a higher developed level of ESCO options. The following market based alternatives⁵ were identified, and used in the survey distributed to EPC market stakeholders:

⁵ The definitions were developed using those in Transparence project (www.transparence.eu) and earlier JRC reports.

(1) On-Balance sheet (Debt financing)

Situation in which investors lend a certain amount of money on credit in exchange for repayment plus interest. The most common EE financial product is a loan directly to the client (owner of the premises) or to the ESCO – this is known as third-party financing.

(2) On-Balance sheet (Equity financing)

Situation in which investors lend a given amount of money in exchange for a stake in a project. The most common example of equity financing is private equity. With respect to energy efficiency businesses, equity investment can take the form of an ESCO issuing additional shares in the company's common ownership.

(3) On-Balance sheet (Mezzanine Financing)

Mezzanine financing is a hybrid form of financing that combines debt and equity financing. In most cases, debt will be ranked as a preferred equity share. Mezzanine debt financing is thus riskier than traditional debt-financing but also more rewarding; it is associated with a higher yield. Mezzanine financing also allows a lender to convert debt capital into ownership or equity interest in the company if the loan is not paid back on time and in full.

(4) Off-Balance sheet (Project Financing)

Project finance (PF), by contrast to balance sheet financing (loans, debt and equity), bases its collateral on a project's cash flow expectations, not on individuals or institutions' creditworthiness. It is off-balance sheet financing. A typical PF is divided between debt and equity financing.

(5) Off-Balance sheet (Leasing)

Leasing is the energy market's common way of dealing with initial cost barriers. It is a way of obtaining the right to use an asset. Finance leasing can be used for EE equipment, even when the equipment lacks collateral value. Leasing companies, often bank subsidiaries, have experience with vendor finance programs and other forms of equipment finance that are analogous to EE. Leasing is the most common form of equipment manufacturers' vendor financing, which is often applied in the case of CHP equipment. Leasing is often done as part of a SPV.

(6) Special Purpose Vehicle (SPV)/Special Purpose Entity (SPE)

A firm or other legal entity established to perform some narrowly-defined or temporary purpose, which facilitates off-balance sheet financing of projects. A standard approach is to form a SPV/SPE and place assets and liabilities on its balance sheet. The investors accomplish the purpose for which an SPV /SPE has been set up – for example implementing a large EE project – without having to carry any of the associated assets or liabilities on their own balance sheet.

3 Overview of the EU28 energy services market

3.1 Market analysis

3.1.1 Market size and maturity

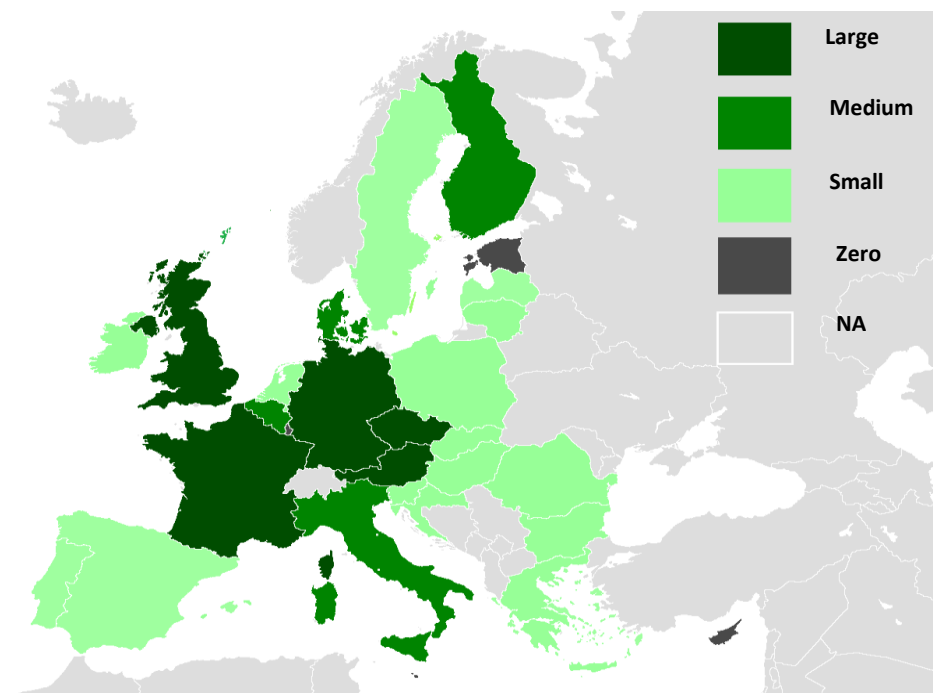
The average ESCO market of the European Union has been on a steady rise for the last decades. Even if the financial crisis of 2008 caused a short backdrop, the ESCO markets were able to rather easily overcome the challenges, and turn the financial restrictions into an opportunity. As of 2014-2016, in general the markets are on a growth path, although this growth is not as widespread across countries as it was in the period 2010-2013.

The national ESCO markets attract both local companies and in many cases international/multinational actors. The composition of the national ESCO markets varies significantly across Europe; nevertheless companies from outside Europe are not typical. For example French and German ESCOs are common in Eastern and Southern Europe, but also Danish and German ESCOs export their business to Northern Europe. According to Navigant Research, US ESCOs find a growing opportunity for new business in Europe (Talon and Gartner 2015). They claim that US companies with their strong North-American experience could bank on the important developments on the regulatory and policy front, and lessons learned from early market failures in the EU. Based on their analysis, a tipping point is nearing in Europe, and there will be momentum in the mid- and long-term.

The total EU market was estimated at \$2.7 billion (€2.4 billion) ESCO revenue in 2015, with a forecasted growth to \$3.1 billion (€2.8 billion) in 2024 at a 1.7% compound annual growth rate (Talon and Gartner 2015). This compares to a growth from \$6.3 billion (€5.6 billion) in 2015 to \$11.5 billion (€10.2 billion) in 2024 in the US, representing a 7.0% annual growth rate. According to the authors, the EU ESCO market growth is expected to be driven by demand for capital to overcome the challenges of deferred maintenance, mounting regulatory and policy pressures, and growing interest in more comprehensive energy management strategies.

The Economist Special Report Energy and Technology 2015 stated that the European ESCOs were a €41 billion industry in 2014, a figure which is much higher than the corresponding figures of America and China at \$6.5 billion (€5.8 billion) and \$12 billion (€10.6 billion), respectively (The Economist 2015). In their latest review of the European ESCO market Bertoldi, et al. (2014) reviewed the sizes of the national ESCO markets in qualitative terms across Europe and found that Germany, France, Austria, the Czech Republic and the UK were the most active markets in 2013 (see Figure 7). Germany is regarded as the champion amongst the European ESCO markets in terms of maturity and market development (with strong institutional context, including legal background, associations, facilitators, etc.). Italy, Belgium and Denmark were found to have medium-size markets, while the ESCO markets of Estonia, Malta and Cyprus were found as non-existent. All other European markets were identified as small.

Figure 7 – The relative size of the national ESCO markets across the EU based on the assessment in Bertoldi, Boza-Kiss, Panev, & Labanca (2014). Note: a few differences from the assessment in this report based on the NEEAPs can be present (notably Italy and Luxembourg)



The above picture has changed by 2016. In 2016, the level of market development is more varied and further changes took place across Member States.

The following tables give a quick overview of the national energy services markets, with a focus to identify specific features related to the EPC segment.

Table 2 - Narrative assessment of the development and change of the EU ESCO and EPC markets as of 2016 (JRC 2016)

	Level of development of		Change between 2013-2016	
	the complete ESCO market	EPC sector	ESCO part	EPC part
AT	excellent	excellent	slight decrease	slight growth
BE	moderate	moderate	unchanged	slight growth
BG	preliminary	initiation	unchanged	slight decrease (after a previous growth)
CR	preliminary	preliminary - just initiated	slight growth	slight growth
CY	initiation	initiation	only EPC	first trials
CZ	excellent	well developed	unchanged	slight growth
DK	well developed	well developed	unchanged	slight growth but reaching a halt
EE	non-existent	not existent	minor decrease	minor decrease
FI	moderate	moderate	unchanged	unchanged
FR	excellent	moderate	unchanged	unchanged
DE	excellent	excellent	unchanged	slight decrease , but growth in some regions e.g. In Baden-Württemberg
GR	initiation	initiation	unchanged	unchanged
HU	preliminary	preliminary	slight decrease	slight decrease (after some

	Level of development of		Change between 2013-2016	
	the complete ESCO market	EPC sector	ESC part	EPC part
				growth)
IE	n/a	moderate	n/a	increase
IT	excellent	excellent	unchanged	minor expansion
LV	preliminary	preliminary	unchanged	halt
LT	preliminary	preliminary	unchanged	unchanged in terms of size, but improved in terms of market situation
LU	moderate	preliminary	unchanged	minor growth
MT	non-existent	non-existent	unchanged	unchanged
NL	moderate	moderate	unchanged	large growth
PL	preliminary	preliminary	unchanged	slow growth
PT	preliminary	preliminary	small growth	very slow growth
RO	preliminary	preliminary	unchanged	unchanged (condition have somewhat improved)
SK	moderate	moderate	growth	large growth
SI	preliminary	preliminary	slight growth	slight growth
ES	moderate	well developed	n/a	growth
SE	preliminary	moderate	slight growth	decrease
UK	moderate	excellent	growth	major growth

Table 3 - Overview of the size of the ESCO markets across the EU. For comparison, two indicators of EPC market size are included.

	appearance of the first ESCO ⁷	number of ⁶					EPC providers		EPC projects
		2005	2007	2010	2013	2015	before 2016 ⁸	2016	2016
AT	1995	25	ca. 30	5-14	over 50	41	10-20 (2013)	15-20	25-28/yr.
BE	1990	4	ca. 30	13-15	10-15	10-15	3-5 (2013)	7(-20)	5/yr.
BG	1995	18/12	1-3 (12)	20	7-12 (?)	15	4 (12) (2013)	8-15	4-7/3 yrs.
CR	2003	1	1(-2)	2	10	10	0 (2013)	5	10/3yrs (60 in pipeline)
CY	2016	0	0	0	0	19	0	19	0 (2 in pipeline)
CZ	1993	3	7 (10-15)	8-10	20	15	5 (2010)	8-10	30-60
DK	ca. 2010	0	4-5	10	15-20	15-20	ca. 15 (2013)	6-8	10-12
EE	1986	20 (?)	2	2	2 (3?)	2-3 (<10)	0?	0?	few
FI	2000	4	9-11	8	5-8	6-8	n/a	5-7	ca. 12/3yrs

⁶ In many cases there are several contradicting values referring to the number of companies or ESCOs. These were consolidated based on expert knowledge. However, when there was information about the registered number (of e.g. ESCOs) vs. the actually active ones, both of these are indicated. The number of active ESCOs/providers is the main information and the total registered number is put in parenthesis: ()

⁷ based on Vine 2005 and the JRC reports, unless otherwise indicated

⁸ date of the information is in ()

	appearance of the first ESCO ⁷	number of ⁶						EPC providers		EPC projects
		2005	2007	ESCOs		2015	before 2016 ⁸	2016	2016	
				2010	2013					
FR	19th century /1937	n/a	3 key of total 100	10 + 100 small	350	300	3-4	10	ca. 40	
DE	1990-1995	500- 1000		250- 500	500-550	ca. 500	10 + occasional	7-10	30	
GR	ca. 2003	0	0-3	2	5	47	0	1	0-10	
HU	early 1990s	10-20		20-30	10	ca. 8-9	ca. 7	3-4	1-2	
IE				15	ca. 30					
IT	early 1980s	20	15-25	50 (100- 150)	50-100	200-300	ca. 20	4-5 (ca. 20)	ca. 50	
LV	2001	2	40	5	8	50-60	2 to 5-8	2-7	0	
LT	1998	3	6	6	3-5	6	n/a	4-5	3-4	
LU	1990s	few	3-4	3-4	3-6	3-6	0	1 (?)	1 pilot	
MT	not yet	0	0	0	0	0	0	0	0	
NL	mid 2000	0 (?)	very few	50	50	100	0	15	27	
PL	1995	8	<5	3-10	30-50	3-4 (30)	n/a	10-15 (??) ⁹	10-20 (??)	
PT	n/a	n/a	ca. 7-8	10-12	n/a	15-20		10-15	5-10/yr.	
RO	1996	2	2	14	15-20	20	7	<10	0	
SK	1995	10	30	5	6-8	8 (20-50)	n/a	10 (15- 20)	40-50	
SI	2001 ¹⁰	1	1-2	2-5	5-6	5-6	1	4-6	10-20	
ES	n/a	10-15	ca.100	> 15	20-60	1000	n/a	20-30 (124)	200-3000	
SE	1978	6-12	12-15	5-10	n/a	4-5	6	3 (5-6)	4-8	
UK	1966	20	20-24	20	30-50	>50	n/a	25	100	

Traditionally, in Europe, energy services markets included a variety of contract types, many types of contractors (suppliers) and a few types of clients (mainly industry and public sector).

As of 2016, there are still many types of contracts; however energy performance contracting is more and more regarded as a distinguished contract type, and companies started to segregate based on their offerings. In parallel both ESC and EPC are by now extended to almost all types of projects (transport being an exception), including traditionally ignored ones, such as residential and SMEs.

Therefore, after presenting the status and changes in the overall ESCO market, a dedicated overview is given about energy performance contracting.

3.1.2 Status of energy services markets

The general energy services market (referred to as ESCO market in this report and - in particular - in the above tables) and energy supply contracting (ESC) within this has not been growing with the previously known speed, but has largely remained stable. 18 of the 28 Member States reported unchanged ESCO markets, and only 7 ESCO markets have grown during the period 2014-2016, with 3 decreasing markets (AT, HU and EE) and 1 where it was unclear (IE). This compares to 9 and 18 MSs respectively during the

⁹ These numbers were reported in the JRC survey 2016, but probably these are not all EPC projects, but include also ESC and other ESCO type projects.

¹⁰ Geissler, M. 2004. General advise on contracting issues. In: Proceedings of Annual Conference of Energie-Cités: Working in Synergy with the Private Sector?

previous period 2010-2013¹¹. Out of those markets that were growing, none of them grew significantly, as opposed to 4 of the 18 growing markets in 2013, which experienced a boom then. It should be noted that there are MSs where boom was experienced in EPC usage (see Chapter 18).

In terms of the number of active ESCOs, Germany is the leader with 500 contractors. Large differences between these contractors in terms of offered services, company size and scale of undertaken projects, with only a quarter of the German ESCOs having energy service contracting as their main business activity. Spain also has a very large number of energy service providers. There are in total 968 registered ESCOs in Spain, a number which has been on the rise since 2010, mainly due to the active promotion and support of this business model in the Spanish market. It should be noted that only a portion of these are active in ESC or EPC contracting, and many of them are focused on engineering, installation and assembly companies, some of which are associated with building heating system maintenance or with subsidiaries of building companies and electricity suppliers. The profile of the 41 active contractors in Austria can be categorised as general firms focusing on energy services (13), energy supply companies (9), technical building system firms (10), engineering offices/planners (5) and consultancy firms (2). In Belgium the number of ESCOs has remained stable (at around 10-15) over for more than 10 years. A distinct feature of the Belgian market is that four ESCOs are public ESCOs. In Italy companies can be registered in a number of registries, and none of these are exclusively ESCO lists, but based on expert knowledge the active ESCOs are around 200-300. France features similar numbers, where Chauffage contracting is traditional, and the market has been very stable in this respect. The Nordic countries usually do not employ ESCs, and in this respect no change was experienced in Finland, Sweden, Denmark, and Estonia. The Estonian and Maltese markets are non-existent, and this has not changed over the years. There is no ESCO activity yet in Cyprus; however the government has put forward a complex set of measures to launch the market, and 2 projects are in the pipeline (EPC type). In addition, Bulgaria, Greece, Lithuania, Latvia, Luxembourg, Slovenia have only a few ESCOs with limited activity. Note that the market size or activity is not directly linked to the number of ESCOs (e.g. in Cyprus the market is only kicking-off now, nevertheless there are 19 companies, which are ready to participate and are registered.)

Another important feature of the EU's ESCO market is that it is now dominated by the small and medium sized enterprise (SME) sector in numbers. About two thirds of the German contractors are SMEs with fewer than 250 employees. The vast majority of Spanish ESCOs fall under the SME profile (93%), while only 7% of them are considered large enterprises. In Italy, 95% of the enterprises are SMEs (60% with less than 10 workers) and only 5% are large ESCOs forming part of large multi-national groups (with more than 250 workers). A large share of SMEs is also observed in the registries of ESCOs in Greece and Cyprus. Only In Belgium there is a more balanced share with 6 large companies (sister companies of large international companies) and 5-7 SMEs.

3.1.3 Status of EPC markets

As already discussed above, companies that offer energy performance contracts (EPC) or its subtypes (i.e. ESCO contracts with guarantees) represent a subset of an ESCO market. We refer to these companies as EPC providers. It is not possible and does not make sense to separate them, or consider the EPC market as stand-alone industry. In most cases companies will be open to offer various types of ESCO contracts, and suppliers that are focused exclusively on EPC are rare (more spread in the Nordic countries, such as Sweden, Finland, the Baltic countries, and also in Germany, Netherlands, and somewhat in Austria). On the other hand, there are ESCO companies that cannot participate in the EPC market, if they are not ready to or not experienced in

¹¹ As a result of the distinction between ESC and EPC emphasized in the current survey, respondents may have been also more cautious to indicate a market as growing strongly/booming.

providing a guarantee. That said, when reporting about the number of EPC providers, all companies that are active in this area (with at least one running contract) are included, but companies that are "only interested" (and have never done one) are not taken into account (see Table 3). The extent to which energy performance contracting is used varies from country to country. In Germany 86% of all contracting agreements in 2012 were for energy supply contracting, 9% for energy saving contracting, 2% for financing contracting and 3% for management contracting (VfW, 2013). In Austria, both ESC and EPC have been popular, with both types of contracts gaining significant momentum in the early 2000s. In Lithuania, "chauffage" contracts are more popular.

As opposed to the total ESCO markets, EPC markets have been largely growing across Europe. Fourteen countries have seen growing EPC sectors between 2014 and 2016. This can be attributed to the extensive legal improvement, promotion, clarification of the definition (legally and via model contracts and guidelines), etc. both at the EU level and the national/local level. In several countries major growth or even a boom was experienced (UK). Furthermore, there were countries, where the number of companies or projects (or the size of the projects) has not increased, but experts highlighted the improved potentials as a result of improved framework (e.g. in Cyprus, Latvia, Romania).

Given the improved conditions in many countries, EPC markets are expected to grow in half of the MSs (see Table 4), even if experts highlight the high level of uncertainty. In most of the MSs, it was pointed out that there are certain key barriers, which need to be removed in order to substantiate the optimism. In particular the problems with the EUROSTAT understanding of EPC as part of the public debt was called for revision (in 14 countries – see Chapter 7.2), but in some cases, improved awareness raising, dissemination of experience from one client sector to the other were also emphasized (e.g. Finland, Denmark). External factors were also mentioned as key in turning the EPC market on a growth path, e.g. price levels or policy instability (Italy and Hungary) or divergent political priorities (Greece, Malta, Hungary).

Table 4 - Expected development of the EPC sectors in MSs based on expert opinion provided in JRC 2016 survey.

AT	large public EPC projects are expected to further prevail, while the future of smaller public and private projects is less secure	IT	continued slow growth, depending on the removal of barriers
BE	some growth both in ESC and EPC	LV	expected to revive/grow and extend beyond multiapartment buildings
BG	unsure due to (external) barriers, but if removed, growth is expected	LT	due to the foreseen support a slow growth and sectoral expansion are expected
CR	Experts expect a boom in EPC, as the framework has improved, and more measures are pipelined	LU	ESC is expected to prevail, but some growth in EPC may be also seen
CY	Unsure due to barriers, but growth/kick-off is expected on the basis of recent efforts	NL	with current circumstances, minor growth continued
CZ	continued slow growth	MT	no change (no development) expected
DK	ESC to develop, EPC is unsure (maybe starts in private sector)	PL	unsure
EE	unsure, seems but some growth is expected	PT	growth, as grants from EU dry out
FI	continue slow growth (mainly public sector)	RO	depending on the removal of barriers, a growth is possible
FR	continued growth	SK	with the current conditions, no change
DE	expectation for new (simplified EPCs), which may boost the market	SI	stable or slow growth
GR	no development expected	ES	significant growth based on the tenders already announced and based on the established frameworks + OP
HU	unsure, dependent on external barriers	SE	overall decrease, with a possibility that ESC growth continues
IE	minor development of total ESCO market (no special focus on EPC)	UK	further growth

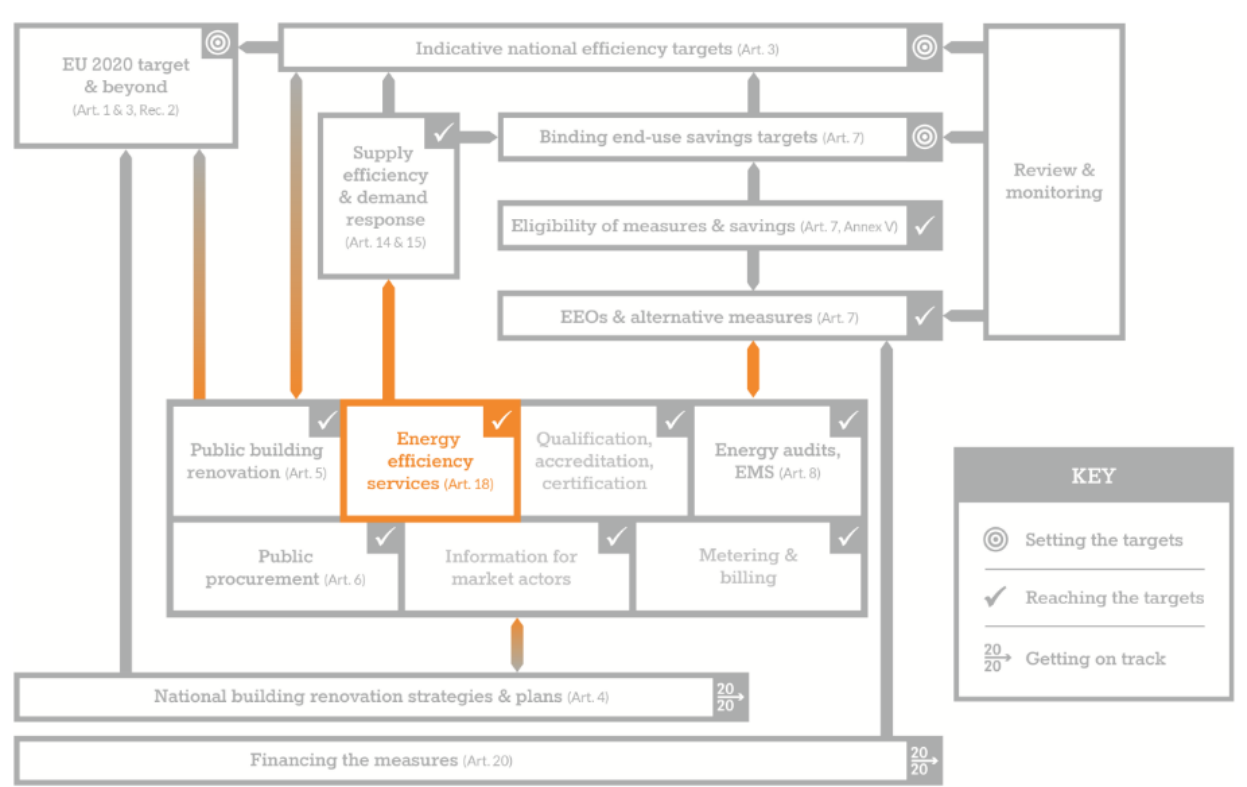
Among the main energy-consuming sectors in the economy, EPC providers have been the most active in the buildings sector, and in particular services and the public sector. Nearly all EPC providers target energy contracting offerings to large customers, partly explained by the large transaction costs of energy performance contracts. As a result, very few ESCOs work in the residential market, mainly targeting large multi-family and public housing facilities. The projects are usually based on EPC or other guarantee-based contract. Among non-residential customers, ESCOs (ESC and EPC providers) have had most success in public and institutional sector such as federal, state and local government facilities, schools, universities/colleges and hospitals. Street lighting projects (e.g. Latvia) are also common, but has been target for cherry picking in many countries (Germany, Hungary, Italy). ESCOs are also active in the commercial and industrial sectors, but have had more limited success in penetrating these markets, and EPC is less common in these areas.

4 Policies and measures supporting the energy services market

4.1 EU level policies

The strength of the European legislation in relation to its contribution to the development of the ESCO industry has been gradually growing. The Energy Efficiency Directive (2012/27/EU) is in the centre of this set of measures. It is summarized in **Error! Reference source not found.**Figure 8.

Figure 8 - The relationships amongst the articles of the EED. Arrows indicate the links related to the stimulation of energy services.



Source: The Coalition for Energy Savings (2013).

The key role of Energy Performance Contracting in driving energy efficiency investments is also highlighted in the "Clean Energy for All Europeans" communication¹². According to this communication, the role of EPC must increase, in particular in the public sector, as they offer a holistic approach to renovations, including financing, carrying out the works and energy management. They also can, under certain conditions, allow investing in efficiency without increasing public debt, which is of key importance for governments as well as local and regional authorities facing budgetary constraints, especially when it comes to social housing, hospitals or schools. Rules for public sector investments and for statistical treatment of assets renovation should therefore be transparent and clear in order to facilitate energy efficiency investment in public assets.

The Energy Performance of Buildings Directive 2010/31/EU (EPBD) is currently the main legislative instrument to reduce the energy consumption of buildings. Most of the requirements under this Directive are able to contribute to the increase of the ESCO

¹² <http://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1481278671064&uri=CELEX:52016DC0860>

market through promoting an energy efficient building stock and related public measures. Nevertheless the most relevant is Article 11 on Energy Performance Certificates, which has been found to be an important driver of ESCO contracts (see national chapters), by showing building owners a list of measures to be implemented to improve their buildings, thus increasing a demand for energy efficiency measures, while reducing transaction costs through mandating energy consumption information collection.

The European standard EN 15900:2010 defines energy efficiency services (EES) as an agreed task or tasks designed to lead to an energy efficiency improvement and other agreed performance criteria. According to EN 15900:2010 EES shall include an energy audit (identification and selection of actions) as well as the implementation of actions and the measurement and verification of energy savings. A documented description of the proposed or agreed framework for the actions and the follow-up procedure shall be provided. The improvement of energy efficiency shall be measured and verified over a contractually defined period of time through contractually agreed methods. A core element of each EES is thus an energy efficiency improvement (EEI) action, which is any action that directly leads to a reduction in energy consumption. EEI actions may be the substitution of technology, improvement of technology, better use of technology, and behavioural change.

The Covenant of Mayors (CoM) is "the mainstream European movement involving local and regional authorities, voluntarily committing to increasing energy efficiency and the use of renewable energy sources on their territories"¹³. When an authority signs for the CoM, they commit to reach (or exceed) the EU 20% CO₂ reduction target by 2020. The CoM signatories have to submit a Sustainable Energy Action Plan (SEAP) and report about its implementation. Promoting the ESCO market can be chosen as a key action to be able to reach these targets.

Intelligent Energy Europe has funded a large number of projects to vitalize Energy Performance Contracting. Most of these have been targeting the use of EPC in the public sector. Projects such as Eurocontract¹⁴ have produced documents and guides, proposing innovative financing alternatives, quality standards, and explored the link between White Certificates and EPC. The projects Esoli¹⁵, E-street¹⁶, and Butk¹⁷, have helped municipalities switch to energy efficient lighting technologies in the frame of innovative energy services contracting. The FRESH project¹⁸ (Financing energy Refurbishment for Social Housing) was a demonstration activity to test the application of EPC to Social Housing Operators to enable low energy refurbishment on a large scale. The model developed was tried out in 4 countries (France, UK, Italy and Bulgaria) and to develop generic tools for the broader dissemination of EPC in social housings.

The European Energy Service Initiative (EESI) project¹⁹ made use of previously existing standards and tools for EPC and other energy services, which had been developed in earlier European projects such as ClearContract and Eurocontract. EESI organized local and regional capacity-building through national online-help desks, frequent training events for local authorities, companies, and multipliers, as well as consultancy for applying and advancing EPC-standard procedures and instruments in concrete pilot projects. They established the "European Energy Service Award". The ChangeBest project²⁰ aimed at the intensification of the energy efficiency service market through country analyses, experience exchange, general strategy concepts and bilateral dialogues with individual companies on their business plans and product developments.

¹³ http://www.covenantofmayors.eu/index_en.html

¹⁴ <http://www.european-energy-service-initiative.net/francais/eu/toolbox/eurocontract-toolbox.html>

¹⁵ <http://www.esoli.org/>

¹⁶ <http://www.e-streetlight.com/>

¹⁷ http://www.elcfed.org/2_projects_kyoto.html

¹⁸ <https://ec.europa.eu/energy/intelligent/projects/en/projects/fresh>

¹⁹ <http://www.european-energy-service-initiative.net/francais/eu/project.html>

²⁰ <http://www.changebest.eu/>

PERMANENT and CombinES projects were focused on pieces of the energy services contracting, in particular the measurement and verification of savings, as well as on financing. The PERMANENT (Performance Risk Management for Energy efficiency projects through Training)²¹ project dealt primarily with TPF in the new European Member States. Its aim was to enhance the rate of investment in energy savings projects by addressing the lack of trust through the development and testing of harmonized and integrated approaches for end users to measure and verify their energy savings, based on instruments used by the Efficiency Valuation Organisation (EVO). The CombinES project²² was organised to maximize energy savings through effectively defining and interconnecting activities of public subsidy programmes with the implementation of energy services.

There are two other recently finished projects co-funded under the IEE programme, namely, EESI2020 and Transparens. The European Energy Service Initiative towards the EU 2020 energy saving targets (EESI2020)²³ was a project addressing the EU 20% energy saving objective by a significantly broader use of EPC. This project was a continuation of the activities of EESI by supporting large cities and metropolitan regions integrate long-lasting EPC implementation schemes in their energy plans. The EESI2020 has resulted in pilot projects and the training of project facilitators. Finally, the Transparens project²⁴ aimed to increase the transparency and trustworthiness of Energy Performance Contracting markets throughout Europe. For this result, the project developed a European Code of Conduct, assisted in the establishment of ESCO associations in the partner countries, where this was deemed necessary or proactive, and provided trainings for the various market stakeholders.

The GuarantEE project²⁵ started in April 2016, and targets the barriers related to split incentives in regards to EPC contracting. The project is expected to develop innovative EPC solutions for rented facilities, create a system for making EPCs more flexible to better serve private sector clients, and the project is expected to mobilize experienced facilitators to support EPC pilot projects testing the new models.

The multi-annual Financial Framework is an important source for funding EPC policies and measures (Petersen 2013). The funds distributed have been and will be available for leveraging private funds for – among others – ESCO markets. Structural and Cohesion Funds have been used for energy efficiency and ESCO investments in several countries although it is difficult for ESCOs to directly access these funds as they are not the final beneficiaries. The Framework for 2014-2020 is in line with EU 2020 strategy for “smart, sustainable and inclusive growth”, and therefore has been designed to serve to support a shift to a competitive low carbon economy.

To encourage the development of bankable project pipelines, the EU has established different Project Development Assistance (PDA) facilities to help project promoters turn their ideas into concrete investment programmes on the ground. One of these EU PDA facilities is called ELENA²⁶ and is managed by the European Investment Bank. Since 2009, it supports public project promoters such as local and regional authorities to develop and launch large-scale bankable sustainable energy investments (above €30 million), including in the area of sustainable transport. The other PDA facility²⁷ supported under the Horizon 2020 research and innovation programme helps public and private project promoters develop exemplary sustainable energy projects, focusing on small and medium-sized energy investments of at least €7.5 million to €50 million. Many of the projects supported under these facilities have contributed to support the development of the EPC market in Europe, by building capacity at the level of the public authorities, by supporting the aggregation of projects, and by testing innovative approaches.

²¹ http://eaci-projects.eu/iee/page/Page.jsp?op=project_detail&prid=1888

²² <http://www.combines-ce.eu/>

²³ <http://eesi2020.eu/>

²⁴ <http://www.transparens.eu/eu/home/welcome-to-transparens-project>

²⁵ http://cordis.europa.eu/project/rcn/200155_en.html

²⁶ <http://www.eib.org/products/advising/elena/index.htm>

²⁷ <http://ec.europa.eu/programmes/horizon2020/en/h2020-section/secure-clean-and-efficient-energy>

While the PDA facilities are targeted at project development, the EEE-F (European Energy Efficiency Fund) is a core funding source for ESCO projects and can be used both for project development and investments. The EEE-F can be used for loans, guarantees or equity participation in projects launched by public authorities, public bodies, or ESCO's working on a public contract. The fund is operationally managed by Deutsche Bank.

The EIB has been active lately with supporting ESCO projects through providing guarantees. The availability and easy access to a financial guarantee is probably more important than providing pure financial grants for EPC/ESCO projects. The benefit lies in the fact that a guarantee fund is able to mobilize market based investments and thus leverage private funding, and it does not compete with ESCO investments, but rather increases trust and secures projects.

JESSICA is a financial mechanism created in 2006 by the EIB. It allows Member States to mobilize grants from European Structural Funds in order to capitalize funds dedicated to urban development investments, or to conserve returns/receipts generated from the investments or return them to the managing authorities for reinvestment in other urban regeneration projects. JESSICA Funds can be used either as equity, debt or guarantee investment (Milin et al. 2011).

4.2 Policies and measures in the Member States

An overview of national policies and measures focusing on the energy services market is presented in Table 5. As of 2016, most of the countries, which have transposed the EED, have specific legislation for facilitating the development of the energy services market and other policy measures. This is important as legal barriers (see Chapter **Error! Reference source not found.**) can severely hinder the market development. For example, in Bulgaria, the Energy Efficiency Act and Regulation No RD-16-347 of 2 April 2009 form the main legislative measures addressing issues related to energy services. In Greece, the main legislative measures are the Law 3855/2010 on the institutional framework for the provision of energy services and Ministerial Decision D6/13280/07.06.2011 on Operation, Register, Code of Conduct and related provisions for energy service providers. To address legal obstacles to contracting in Germany, the Tenancy Law was revised in 2013 in order to allow the tenant to bear the costs of heat supply as operating costs when heat supply is switched to contracting.

A few countries have in place financial instruments promoting energy services in various sectors. In Bulgaria, co-financing and guarantees for ESCO service contracts are made available through the Energy Efficiency and Renewable Sources Fund. In Spain, the Jessica Holding Fund/FIDAE²⁸, established in 2010, financed sustainable urban development projects implemented by energy service companies and other companies through a budget of €122 million. The possibility for ESCOs to participate in comprehensive renovations of existing residential buildings has also been given through the Aid Programme for the Energy Renovation of Existing Buildings in the residential sector (PAREER). In Finland the development of the energy services market was promoted by two programmes coordinated by the Finnish Funding Agency for Innovation, namely the programme "Green Growth-Road to Sustainable economy" (2011-2015, €80 million) and "Built environment" (2009-2014, €75 million). In the Czech Republic, support to energy service providers in the form of subsidies for the installation of energy saving measures have been made available since 1999 through the State Programme on the Promotion of Energy Savings and Utilisation of Renewable Energy Sources.

Many countries have in place information, knowledge & advice measures to raise awareness on the benefits of the use of energy services. These include the development of a contracting portal (e.g. Austria), various dissemination activities (e.g. Spain, Finland, Croatia, the UK) and stakeholder consultations with the banking sector (e.g. Latvia). Ireland has set up the comprehensive National Energy Services Framework, providing guidance on project development, etc. Pilot projects are implemented by some countries.

²⁸ Energy Diversification and Saving Investment Fund

These include Ireland through its Better Energy Financing scheme and Cyprus with two on-going pilot ESCO projects in the public sector.

To support the uptake of energy contracting in the public sector, the EED calls Member States to provide model contracts for energy performance contracting which include at least the items listed in the EED Annex XIII. Only 10 Member States have so far made available EPC models (see Table 7).

Table 5 - Policy measures related to the energy service market based on the NEEAPs 2014 and the JRC 2016 survey (p: planned)

	Registry of EPC providers	Legal framework ²⁹	Financial Instruments (national)	Information, knowledge & advice	Other measures (e.g. pilot schemes)
AT	✓	✓	✓	✓	✓
BE				✓	
BG		✓	✓		
CR	p	✓ (focus on public sector)	✓	✓	
CY	✓ (ESCO)	✓		✓	✓
CZ	✓	✓	✓	✓	
DE		✓		✓	
DK	✓	✓		✓	
EE		p			
EL	✓	✓		✓	
ES	✓	✓	✓	✓	
FI	✓	(voluntary agreements)	✓	✓	
FR		✓		✓	
HU				✓	
IE		✓	✓	✓	✓
IT	✓ (various)	✓	✓		✓
LT		✓			
LU	✓				
LV		✓		✓	
MT					
NL	✓			✓	
PL	✓	✓			
PT		✓			
RO	✓ (not official)	✓		✓	✓
SE	p				
SI	✓	✓	p		✓
SK	✓	✓			
UK	✓	✓	✓	✓	

Note: For details on registries of ESPs, please refer to Chapter 0 (annex).

²⁹ A separate table is found below specifically about the availability of an EPC definition in the MSs.

4.2.1 EPC specific diagnosis of policies

Definition of EPC should be transposed into national legislation, based on EED. This has been completed in the majority of the Member States (see Table 6). A universal definition can create clearer market conditions, increase confidence, as potential clients will better know what offer they are facing. A well-known definition can furthermore decrease transaction costs, because EPC providers save the effort of explaining the basic idea, and can focus on highlighting their own specialities.

Table 6 - Status of transposition/adoption of an EPC definition in the national legislation or other official documents (n/r = not relevant)

	Is EPC defined in national legislation?	Is the national definition the same as that in the EED?	Reference
AT	yes	yes	Energy Efficiency Act (Bundesgesetz über die Steigerung der Energieeffizienz bei Unternehmen und dem Bund (EEffG))
BE	no	n/r	no reliable information about a definition
BG	yes	yes	The updated Energy Efficiency Act of May 2015 ³⁰
CR	yes	largely ³¹	Ordinance on Energy Efficiency Law (general) and Ordinance on contracting and implementation of energy services in public sector (specific for public sector)
CY	yes	yes	Several legal pieces deal with it. Main one: N.149 (I) / 2015 The Law on energy efficiency in end-use efficiency and energy services (Amendment) (harmonizing 2012/27 / EE)
CZ	yes	yes	The amendment to the Energy Management Act (July 2015) enacts definitions and obligatory content for EPC contracts
DK	no	no	Danish law defines "energy services", but not EPC
EE	no	n/r	Planned to be introduced in the upcoming "Organisation of Energy Management Act"
FI	no	n/r	n/r
FR	yes	no ³²	Grenelle 1 and 2 includes definitions. EPC was defined already in the so-called "Ortega Report" (2011). Also the NEEAP3 gave a definition.
DE	yes	largely ³³	The definition was set earlier than EED/ESD, by the standard: DIN 8930 Teil 5
GR	yes	yes	Law 4342 / FEK143A/9-11-2015
HU	no	n/r	Not defined by Law, but in certain financing schemes

³⁰ <http://www.seea.government.bg/documents/ZEE.pdf>

³¹ performance is to be based on the main project design details, it is not required to be measured and verified on monthly basis

³² French regulation sets that it is forbidden to pay for the investments from the savings when the customer is a public customer. This is opposite to the idea of EPC indeed. The only way to use savings to pay investments is a PFI project (PPP in France) but there are only few projects each year.

³³ The official law implementing EED (Energiedienstleistungs-Gesetz EDL-G) has no EPC definition, but there are several related guidelines / subsidy schemes with EPC definition

	Is EPC defined in national legislation?	Is the national definition the same as that in the EED?	Reference
IT	yes	yes ³⁴	Law 102/2014/07/04 and standard UNI CEI 11352/2015
IE	no	yes	Not in law, but EPC is defined in the National Energy Services Framework and in guidelines
LV	yes	yes	Energy Efficiency Law, Art.14 ³⁵
LT	no	no ³⁶	ESCO (not EPC) is defined in National Energy Efficiency Action Plan and in the Program for Improvement of Energy Efficiency in Public Buildings
LU	no info	no info	
NL	no	yes	Definitions are found in the Whitepapers and on the website of RVO ³⁷
PL	partially	no	There is no definition provided, nevertheless the Energy Efficiency Act includes energy service contracts as a one way to realize obligations. Also the NEEAP takes EPC into account.
PT	no	no ³⁸	Decree Law No. 68-A of 30 April 2015 does NOT define it
RO	yes	yes	Law No. 121/2014 on Energy Efficiency ³⁹
SK	yes	yes	Act No 321/2014 Coll. On energy efficiency and amendment of other laws (paragraphs No 17 and 18)
SI	yes	yes	The amended Energy Act EZ-1 (the Official Gazette of the Republic of Slovenia, No 17/2014)
ES	yes	yes	Royal Decree 56/2016, 12/02/2016 regarding energy audits, accreditation of service providers and energy auditors and promoting efficiency of energy supply (Art. 1.2.f). This Law transposes EED.
SE	no	no	A report by the Swedish Energy Agency provides a definition (2013), but does not match the EED definition exactly.
UK	no	not clear	but it is available in the model contract and guideline of Department of Energy and Climate Change's Energy Strategy and guidance documentation

As it can be seen from Table 6, 15 countries have transposed the legislation into national law. Experts highlighted in some countries that this exercise was seen as purely administrative, and did not have an effect on the EPC market (e.g. in Romania and in Latvia), whereas there were several countries, where an EPC definition already existed, and coincided largely with the EED definition (Germany, Denmark, France, UK). There

³⁴ Other (probably more accepted) models, such as Servizio Calore are also defined

³⁵ In force since 29.03.2016, available at <http://likumi.lv/doc.php?id=280933>; need to be followed up by secondary legislation

³⁶ Defined as a form of financing and implementation of public buildings' energy efficiency projects

³⁷ www.rvo.nl/esco

³⁸ The definition only refers to public sector projects

³⁹ the law will be further amended to improve provisions

are several MSs that provide a definition in guidelines or other secondary documents (UK, NL, HU, IE, LU).

The benefits of a universal, well known definition are explained above. In these circumstances, the Portuguese and Lithuanian definitions are expected to raise confusion, because they define the term as if it was specific to the public sector.

The situation in France is unique. There was already a definition before the EED, however exactly the notice on being reimbursed from the savings was avoided. French regulation sets that it is forbidden to pay for the investments from the savings when the customer is a public customer. As a result, EPC in the EED definition is not possible in France, unless a public-private-partnership (PPP) scheme is adapted, which is carried out very small numbers each year.

In Croatia, according to the definition, the actual project performance is not measured and verified on monthly bases (on the energy bills or energy monitoring), but project performance is based on the main project design details regarding energy performance calculation. The Polish definition also leaves space for concern, as the Energy Efficiency Act refers to energy service contracts as a one way to realize financial sector obligation, thus limiting the ESCO's scope. In Sweden, a definition of EPC was put through in a report by the Swedish Energy Agency in 2013, and it incorporates the suppliers' obligation to guarantee energy savings to the customer, but not the success dependent remuneration.

The EED also requires the development of model contracts and guidelines to enhance the EPC sector. The existence of these has been reviewed and the findings are presented in Table 7.

The situation regarding model contracts is very promising; most of the countries have developed model contracts and use them. Most of the countries officially endorsed the model contracts and/or the standard formats were developed based on legal requirements to start with. There were several model contracts developed under pilots, exemplary projects that were then adapted for the wider public, e.g. in the UK under the RE:FIT programme, or in Germany under the various EU programmes on EPC.

There are a few member states that made available several alternatives, e.g. in Finland, Ireland, Italy, Spain. The responsible authorities explain the differences, the challenges and benefits of the alternative models, which is important for the client to be able to judge the best variant that fits them.

An officially promoted EPC model contract is available in Austria under the supervision of the Federal Ministry of Science, Research and Economy (BWF). In the Czech Republic, a model contract⁴⁰ was prepared by APES in cooperation with the Ministry of Industry and Trade, which primarily serves public EPC purposes based on guaranteed savings (Department of Electrical Engineering, 2014). Motiva in Finland developed three different types of ESCO models which are mainly used for contracts with municipalities and other public entities. The clients are aware of this concept. In Greece, the official EPC website⁴¹ (which also holds the EPC provider registry) contains information about the relevant legislation, registration process and models of energy performance contracts. The Irish SEAI⁴² maintains an informational website to raise awareness and inform market stakeholders, with a focus on clarifying ambiguous issues, it also presents an EPC model contract that was published in January 2014. There are also many guidelines and information about financing opportunities. In Spain, various agreement models have been developed since 2007, which are compatible with the two types of procurement allowed for this activity under the Public Sector Contract Law, namely the combined

⁴⁰ The model contract is available on the web site of the Ministry of Industry and Trade at: <http://www.mpo.cz/dokument105425.html>.

⁴¹ <http://www.escoregistry.gr/>

⁴² http://www.seai.ie/Your_Business/Energy-Contracting/The-ESCO-Market/

supply and services agreement and the public-private collaboration agreement. Procurement models are available to the public on the IDAE website.

In Denmark, the standard model contract for EPC was developed in 2009; but it has not been used by municipalities. As the Danish Municipalities use their own approach, the use of contracts that are specifically tailored to meet their purposes is usually the preferred solution. In the Nordic region, it is also worth noting that Norway launched in 2014 their first official standard for EPC (NS 6430:2014) covering the whole EPC project cycle.

Recommendations about guidelines and model contracts are presented in Chapter 7.

Table 7 - Availability of Energy Performance Contract models based on the NEEAPs and JRC 2016 survey

Published EPC models	AT, BE, CY, CZ, DE, DK, EL, ES, FI, FR, LT, LV, IE, PL, NL, SI, UK
Plans to publish EPC model	BG, SK, IT, HU
No plans/no information	EE, LV, MT, SE,

5 Remaining barriers and future expectations

Despite considerable efforts to promote the energy services market development, persistent obstacles inhibit many cost-effective energy efficiency projects and prevent the full development of the energy services industry. This section addresses the barriers limiting market penetration of ESCOs and EPC-related projects. Some of the barriers are interrelated and act together to inhibit the deployment of energy efficiency investments, while many of the barriers are hereditary to the general nature of energy efficiency. A summary of the barriers identified is shown in Figure 9. These are divided into: information & awareness, institutional & legislative, financial, market & external, technical & administrative and behavioural. With more projects taken off the ground, it is expected that several entry-level barriers will be overcome in certain countries. In addition to these general barriers, specific sectors and countries have unique constraints that must be addressed if the energy services market is to reach its full potential.

5.1 Information & awareness

The difficulty to understand these new concepts and the absence of positive examples and success stories is often an obstacle in markets with little experience. Latvia has cited the lack of positive examples as a barrier and many other countries with emerging energy services market are expected to face similar issues as there is low customer awareness about ESCO possibilities. The lack of knowledge among end-consumers of the economic potential for energy savings continues to impede the uptake of energy contracting projects on the market even in more advanced markets such as Germany. Partly as a result of the lack of trusted information, the energy efficiency benefits are often regarded as less certain and energy efficiency is undervalued relative to other investment options. Despite various efforts at different levels, many enterprises find it difficult to recognise opportunities for energy savings, procedures, various options and available products etc. and are thus not able to fully assess the benefits of an energy efficiency investment. Concrete advice (e.g. through targeted, tailor-made information on potential measures and their benefits), assistance, cost-effective measuring and metering systems and qualified facilitators or providers of energy efficiency measures can all help alleviate knowledge-related barriers.

5.2 Legislative and accounting

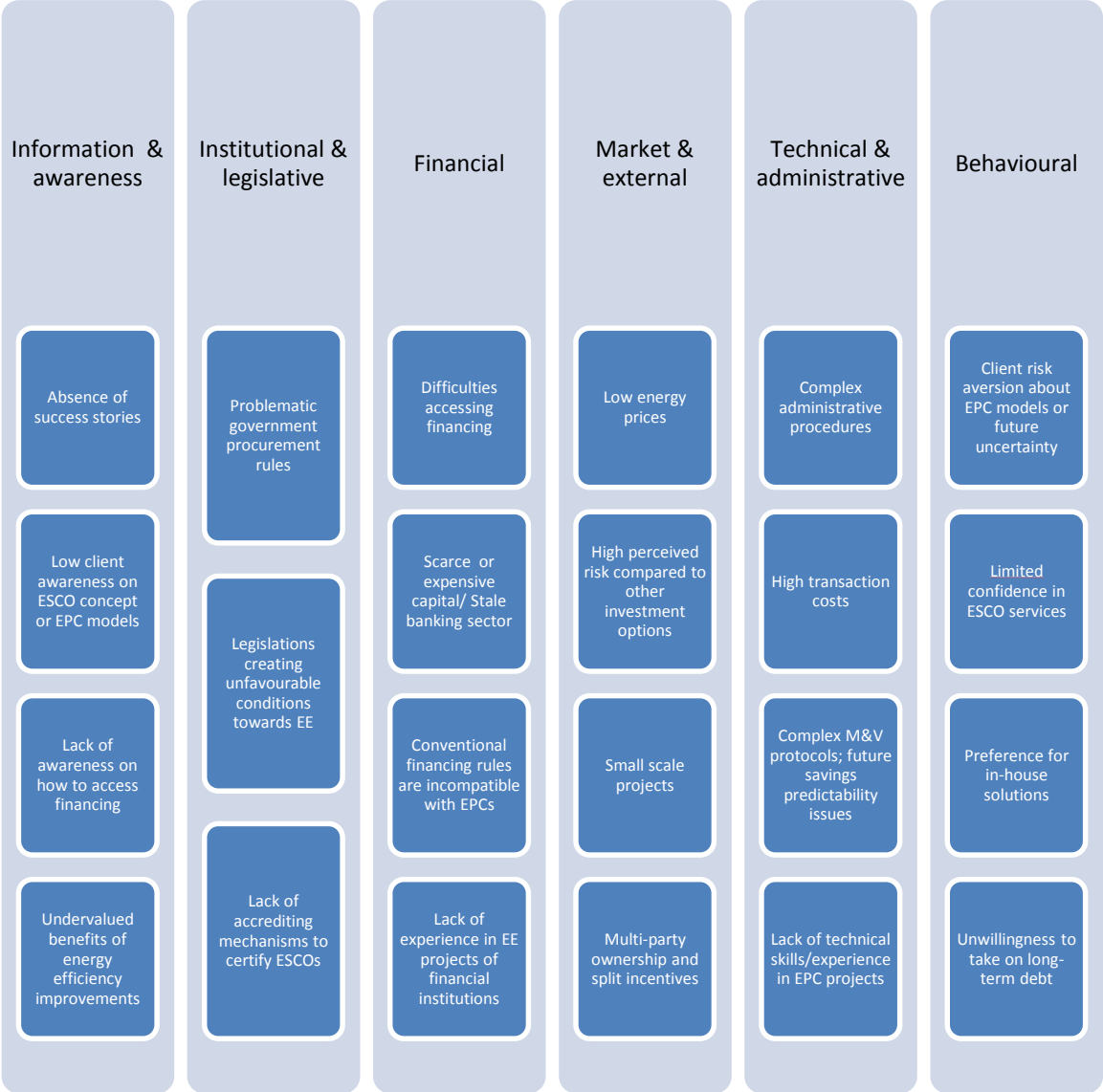
Under certain circumstances, the accounting treatment of EPC affects the ability of the public sector to account EPC projects as off-balance sheet investments. The ambiguity of legal aspects pertaining to service contracts such as title to the installed equipment has been mentioned by Latvia. In a survey carried out in Sweden, procurement procedure rules and legislation relating to the activities of municipal energy companies have been cited as a major barrier. Alongside these challenges, legal issues with tenancy laws may also inhibit the use of energy services in the rented sector. In Germany, there have been issues with the tenancy regulation of energy-related modernisation projects in balancing financial incentives for landlords against protection of social housing tenants, planning laws and energy management conditions affecting the generation and distribution of energy. This is expected to be addressed with the new amendment act put in place.

5.3 Behavioural

Users, clients and investors are faced with the complexity of certain markets and contracts. For example, energy performance contracting is a relatively risky business for energy suppliers and service and requires clear framework conditions and well-defined user behaviour in order to provide sufficient confidence that the investment will be recouped. While this is generally the case with commercial and public service customers, residential end-users represent a higher risk associated with an unpredictable element of user behaviour. This barrier has been included in the assessment made by France but is applicable across all Member States. Client distrust of energy services has been cited by

Estonia, which may be connected to general client risk aversion about EPC models or future uncertainty. Limited confidence in ESCO services (a feature of markets at development phase) or preferences for in-house solutions are also additional behavioural factors that can act as barriers to market maturation. The latter could be the case for major energy consumers have long since established internal structures and responsibilities to ensure a cost-effective supply of energy (e.g. Austria, Malta). In such cases, energy management systems are already in place and the potential for optimisation is regularly examined.

Figure 9 - Mapping of ESCO-related barriers



5.4 Market & external

Energy prices have a significant impact on what is cost-effective. Low energy prices mean that short-term returns on investment, in particular for extensive investments and associated services, are difficult to demonstrate. In addition, energy price volatility may have a major impact on the deployment of energy efficiency measures. This barrier has been included in the German analysis. When it comes to SMEs (e.g. in the case of Austria), the cost factor of energy is often less significant (due to lower energy intensity) and the potential to achieve cost-effective percentage improvements is not taken into consideration. In addition, small scale projects are not compatible with energy performance contracting as they generally imply high transaction costs. For example, the reluctance by municipalities to engage in EPCs, which can be in part explained by the small structure of many municipalities, is an impending factor for the uptake of energy performance contracting by the public sector in Luxembourg. In addition, split incentives can severely limit market penetration of ESCOs and EPC-related projects in the rental and multi-family sectors. Misaligned financial incentives exist in both residential and non-residential (e.g. offices) sectors. All countries with a large share of rented commercial or residential space (e.g. UK and Germany) face this market barrier.

5.5 Financial

Energy-efficiency projects compete for scarce capital with more traditional investments such as small power plants, other type of building improvement, or industrial expansion. Investors might not have sufficient capital and would be forced to draw on their lines of credit in order to invest in energy efficiency measures. Moreover, companies generally add energy costs under overhead costs, and energy consumption is considered as secondary issue with regards to investment decisions. The multiple benefits of energy efficiency improvements in terms of e.g. increased asset value, increase comfort or productivity, health improvements are also rarely known and taken into account when making the investment decision.

In parallel, banks have generally a low awareness in the area of energy efficiency (e.g. Estonia) and there is a lack of dedicated financing products tailored to energy efficiency investment on the market. For many banks and financial institutions, the concept of energy services is new and unclear. In certain countries (e.g. Latvia), there is a lack of clarity on financial aspects related to ESCOs.

The administration of ESCO projects contracted by the public sector as part of the public debt is a major, probably the largest and most distributed barrier that arose in recent years, and drastically limits the markets. This problem is explained in detail in Chapters 6.2 and 0.

5.6 Technical & administrative

The lack of technical knowledge, handling of technical risks as well as lack of experience in procurement are issues faced by many countries in which the concepts of EPCs and ESCOs are new (e.g. Estonia). Despite its long experience, Germany also refers to technical risks, particularly with complex technical solutions, and operational risks such as adverse effects of processes of changes in product attributes. Hidden costs, such as unexpected maintenance or training needs, may also arise, reducing the savings from efficiency measures.

Energy contracting, and in particular energy performance contracting, entails relatively high transaction costs associated with compiling information and identifying technically, financially and contractually attractive solutions. Transaction costs are also incurred in preparing projects, from arranging the financing, issuing the request for tender and implementing the measure, and from drawing up the contract. For this reason, contracting is often seen as an option for relatively large projects only. Reducing the transaction costs could help to exploit further market potential.

6 Public procurement, accounting, measurement and verification

6.1 M&V

The measurement and verification (M&V) phase has a pivotal role in the overall success of the projects, and especially it is an essential part of EPC projects. Without a proper M&V, collectively agreed between the participating partners, and fully transparent, a guaranteed savings EPC cannot be concluded successfully. M&V determines the project savings which are then used to pay the financing obligations of performance-based contracts. As the energy savings represent avoided energy consumption, they cannot be measured directly and a set of agreed rules in a so-called measurement and verification plan is therefore necessary to establish the actual impact of energy saving measures. The savings must be monitored through an appropriate measurement and verification plan in order to predict accurately the baseline consumption, account for changes in operational and external factors and evaluate the overall performance after the project implementation. The design and implementation of the M&V phase is therefore the foundation to the long-term success of EPC projects.

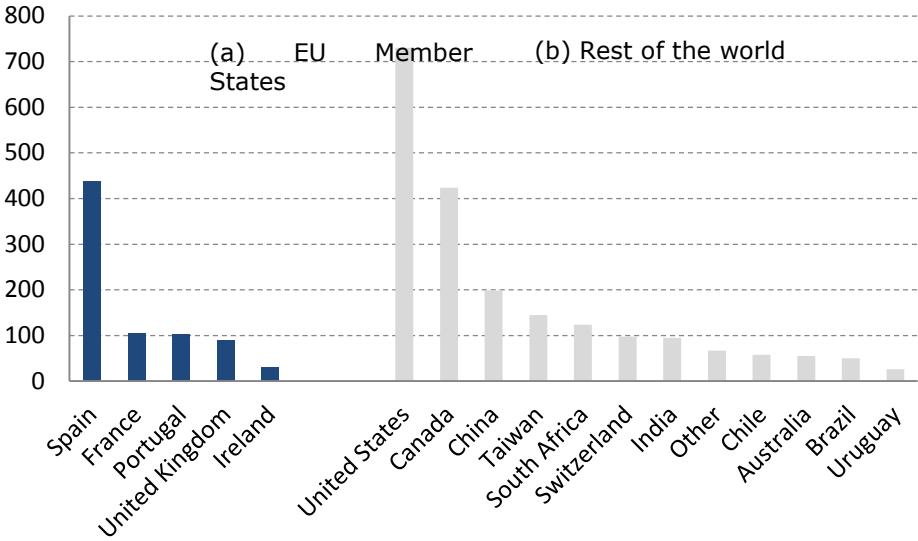
According to (Hansen 2006), M&V can be defined as the set of methodologies that are employed to validate and value changes in energy consumption patterns over a specified period of time, which result from an identified intervention or set of energy conservation measures. Three main components determine the energy savings:

$$\sum \text{Post – implementation Energy Use} - \underbrace{\sum \text{Baseline Energy Use} \pm \sum \text{Adjustments}}_{\text{Adjusted baseline energy use}}$$

where Baseline energy use refers to the baseline prior to the EPC measures, Adjustments to exceptional changes that are not directly coupled with EPC measures, and Post-implementation energy use refers to the energy usage after the EPC measures. In other words, the energy savings are determined by the difference between the post installation and adjusted baseline energy uses, where the adjusted baseline is a prediction of how the building/plant would have operated had the energy efficient change not been implemented. This confirms the complex nature of measurement of energy savings compared to energy production as the former involves the computation of adjustments to account for weather fluctuations, occupancy changes etc.

M&V can be done in various ways. A standardised method is considered a key element, necessary for strengthening client and financiers' confidence in ESCOs and the energy services market in general. The International Performance Measurement and Verification Protocol (IPMVP) was developed by the US Department of Energy at the end of the nineties to provide guidance to ESCOs on how to deal with EPCs and standardise the ways in which variables and adjustments can be made to baselines (e.g. if building occupancy rises). This protocol is used by many EPC projects as the basis for M&V and it is important that organisations understand the proposed M&V approach (and how it will work during the life of the contract), before the relevant contract is signed. The most recent worldwide distribution of Certified Measurement and Verification Professionals is shown in Figure 10. The Certified Measurement and Verification Professional programme was established by the Association of Energy Engineers and the Efficiency Valuation Organization (EVO) with the dual purpose of recognizing the most qualified professionals in this growing area of the energy industry, and raising the overall professional standards within the measurement and verification field. According to the figures published by EVO, certified professionals exist only in 5 EU Member States, with Spain being the leader.

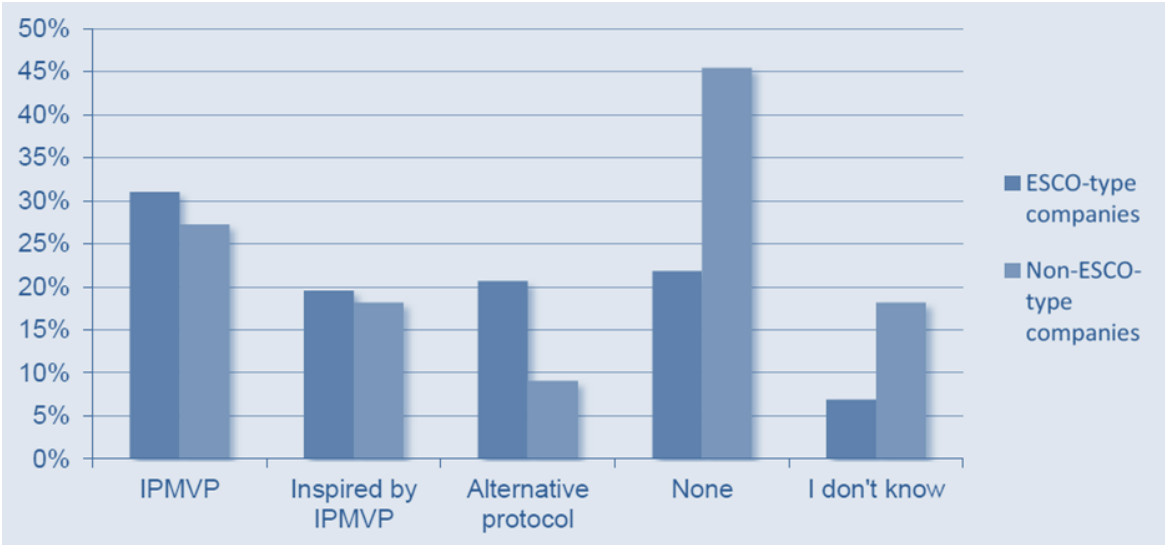
Figure 10 - Worldwide Distribution of Certified Measurement and Verification Professionals.



Source: (IPMVP 2014)

In a survey carried out by ten Donkelaar, et al. (2013) to investigate M&V practices adopted by energy service providers across the EU, it was found that the majority of the organisations (68%) follow an M&V plan. The results were based on 100 questionnaires distributed via European or national ESCO associations, national contact points of the EED Concerted Action, organisations in the JRC ESCO databases and other organisations active in the energy services market. Of the ESCO-type responders, 31% use the IPMVP protocol, 19.5% use a protocol inspired by IPMVP and 20.5% use an alternative protocol. Conversely, 27% of the non-ESCO type organisations use the IPMVP protocol, 18% use protocols inspired by IPMVP, while only 9% use an alternative protocol. The responses also showed that a significant 22% of ESCO-type companies and 45% of non ESCO type companies do not use any M&V protocol.

Figure 11 - Responses given to question "Do you use any M&V protocol" by surveyed organisations active in the energy service sector in 22 EU Member States



Source: (ten Donkelaar, et al. 2013)

Figure 12 - Overview of the four IPMVP Options

IPMVP Option	How Savings Are Calculated	Typical Applications
<p>A. Retrofit Isolation: Key Parameter Measurement Savings are determined by field measurement of the key performance parameter(s), which define the energy use of the ECM's affected system(s) or the success of the project. Measurement frequency ranges from short-term to continuous, depending on the expected variations in the measured parameter, and the length of the reporting period. Parameters not selected for field measurements are estimated. Estimates can be based on historical data, manufacturer's specifications, or engineering judgement. Documentation of the source or justification of the estimated parameter is required. The plausible savings error arising from estimation rather than measurement is evaluated.</p>	<p>Engineering calculation of baseline and reporting period energy from:</p> <ul style="list-style-type: none"> — short-term or continuous measurements of key operating parameter(s) and — estimated values — routine and non-routine adjustments as required. 	<p>A lighting retrofit where: 1) power draw is the key performance parameter that is measured periodically and 2) lighting operating hours are estimated based on facility schedules and occupant behaviour.</p>
<p>B. Retrofit Isolation: All parameter Measurement Savings are determined by field measurement of the energy use of the ECM affected system. Measurement frequency ranges from short-term to continuous, depending on the expected variations in the savings and the length of the reporting period.</p>	<p>Short term or continuous measurements of baseline and reporting period energy, or engineering computations using measurements of proxies of energy uses. Routines and non-routine adjustments as required.</p>	<p>Application of a variable speed drive and controls to a motor to adjust pump flow. Measure electric power with a kW meter installed on the electrical supply to the motor, which reads the power every minute. In the baseline period this meter is in place for a week to verify constant loading. The meter is in place throughout the reporting period to track variations in power use.</p>
<p>C. Whole Facility Savings are determined by measuring energy use at the whole facility or sub-facility level. Continuous measurements of the entire facility's energy use are taken throughout the reporting period.</p>	<p>Analysis of whole facility baseline and reporting period (utility) meter data. Routine adjustments as required, using techniques such as simple comparison or regression analysis. Non-routine adjustments as required.</p>	<p>Multifaceted energy management program affecting many systems in a facility. Measure energy use with the gas and electric utility meters for a twelve month baseline period and throughout the reporting period.</p>
<p>D. Calibrated Simulation Savings are determined through simulation of the energy use of the whole facility, or of a sub-facility. Simulation routines are demonstrated to adequately model actual energy performance in the facility. This option usually requires considerable skill in calibrated simulation.</p>	<p>Energy use simulation, calibrated with hourly or monthly utility billing data. (Energy end use metering may be used to help refine input data).</p>	<p>Multifaceted energy management program affecting many systems in a facility but where no meter existed in the baseline period. Energy use measurement, after installation of gas and electric meters, is used to calibrate a simulation. Baseline energy use, determined using the calibrated simulation, is compared to a simulation of reporting period energy use.</p>

Source: (IPMVP 2014)

A poor basis for M&V can create problems such as an unfair allocation of performance risk and savings calculations being unclear or taken for an inappropriate baseline. M&V can be, however, complex since variable factors, such as weather or building occupancy, need to be taken into account during the life of the contract. The NEEAP of the Wallonia Region refers to complex verification protocols as one of the main obstacles to reaching a mature market for energy services while the French NEEAP states that users, clients and investors are often faced with the complexity of certain contracts, which impede the development of the market. Other countries also cite technical problems (e.g. Estonia) as barriers, emphasising the need to develop clear guidelines for M&V.

Generally, an M&V plan should include:

- A clear delineation of the M&V standard selected
- Technical competences of M&V planner
- Deadlines: for M&V plan implementation, M&V equipment installation, M&V reports, et cetera
- Energy saving measures: a description of measures implemented that generates the savings
- Baseline definition: reference period, and parameters for adjustments, et cetera
- Methodology for savings calculation: equations defined, hypothesis considered, data sources for energy consumption (meters, invoices, et cetera) among other considerations
- Measurement specifications: sampling needed parameters to be monitored and the measurement interval

6.2 Public procurement, annual budgeting and accounting

In order to enable EPC implementation in the public sector, it is inevitable that the tendering procedures of energy efficiency investments in general and EPC in particular is clear and related obstacles to the public procurement of EPC and its accounting are removed. In this line, the EED calls Member States to take measures regarding public purchasing and annual budgeting and accounting, with a view to ensure that individual public bodies are facilitated to make investments in improving energy efficiency and use long-term energy performance contracting.

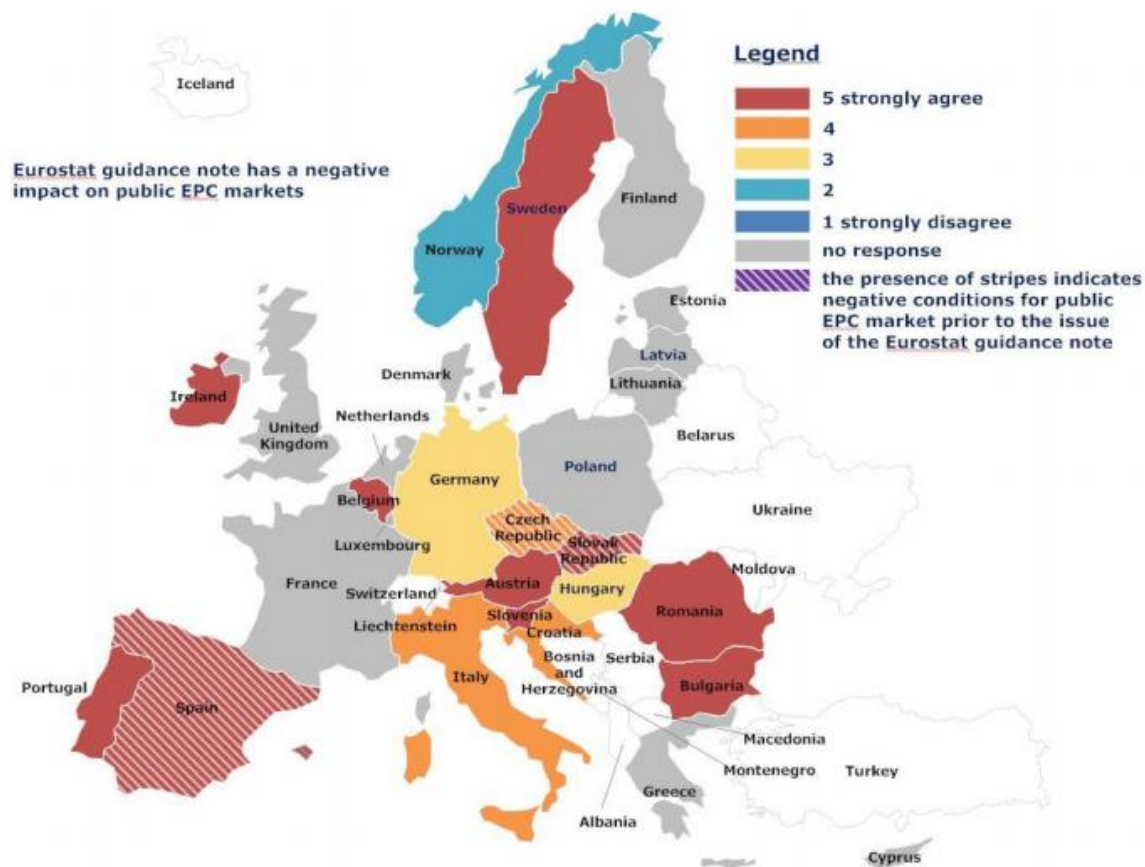
Germany, Finland and the UK stated in 2015 that no legislative barriers preventing the public sector from accessing ESCO services exist. In the UK, a working group, established in 2012 to analyse the specific accounting rules governing energy efficiency improvements and look at available financing and structuring options, concluded that there are no specific barriers, it was decided that guidance on the precise accounting treatment of energy efficiency projects may be helpful and a toolkit to assist public sector organisations develop business cases for energy efficiency investments is to be considered.

In 2015, in the JRC survey about ESCO markets, Spain, Croatia, the Czech Republic and more Member States pointed at the problems related to the ambiguity about the interpretation of the European System of National and Regional Accounts by Eurostat (known as ESA 2010 and valid since September 2014). Based on the ESA 2010, it was not fully clear whether investments made by an energy service company in publicly-owned buildings or installations were supposed to be added to the national accounting, thus to public debt, or not. Consequently, a Eurostat guidance note was published on 7 August 2015⁴³. While the Eurostat guidance note clarified the situation, it confirmed the harsher interpretation, i.e. that in order for a project to be considered a public-private partnership (PPP), capital expenditure for improving energy efficiency by private entities in the contract should reach at least 50% of the total value of the building after the energy efficiency renovation (Besnard 2015), which is not normally the case of ESCO projects, and it is not taken into account that the full investment or at least a part of the investment into the energy efficiency projects is offset by monetary savings and that EPCs can provide an energy savings guarantee. Therefore, ESA 2010 represents a major burden to the ESCO business in the public sector, because public administrations or financial decision makers are hesitant to engage in ESCO projects, in order to avoid the increase of public debt (Litiu et al. 2016).

A review of the EPC markets confirmed the negative impact of the Eurostat ESA 2010, and the following figure represents what the EPC markets' stakeholders think about the ESA 2010.

⁴³<http://ec.europa.eu/eurostat/documents/1015035/6934993/EUROSTAT-Guidance-Note-on-Energy-Performance-Contracts-August-2015.pdf/dc5255f7-a5b8-42e5-bc5d-887dbf9434c9>

Figure 13. Geographical spread of opinion about the impact of Eurostat guidance note across the EU.



Source: (Litiu et al. 2016)

. Note that the Czech Republic, Slovakia and Spain were less critical about the guidance note of 7 August 2015, because they added that EPC projects in public buildings had already had a negative impact on public debt in their countries before the publication of the guidance note based on the local interpretation of ESA 2010 until then.

The impact of the guidance note differs on the level of government, depending on the MS, too. Stakeholders from Spain and the Czech Republic stated that EPC was impacting central government' debt. Germany reported that the issue mainly concerned municipalities and the supervising bodies on the regional level. Bulgarian, Slovak and Romanian stakeholders observed a negative impact of EPC on municipal debt (Litiu et al. 2016). In its communication on "Clean Energy for all Europeans", the European Commission announced this accounting issue to be dealt with by Eurostat. It also says that the Commission is analysing, in close cooperation with the Member States, the impact of public accounting rules on the market for energy performance contracting and, as appropriate, will update its guidance on the statistical treatment of such partnerships before late spring 2017. The discussions with Eurostat are ongoing as of early 2007 to explore how to address the impact of energy efficiency-related investments on the debt and deficit of governments. The aim is to provide a more flexible accounting framework of EPCs to allow to take into account their specific nature. The results are foreseen for summer 2017.

The legal provision related to the measures required by Article 19(1b) EED is standardised in Austria in Article 19(5) of the Federal Procurement Act, which stipulates that environmental compatibility must be taken into account in the public procurement process. This may be achieved, in particular, by including environmental aspects (such as

final energy efficiency) in the performance or technical specifications or by defining concrete environmental criteria for awarding contracts.

In Sweden, a study commissioned by the Swedish Government to audit the public sector identified various barriers to energy efficiency upgrades in public bodies. One of the most significant barriers included organisational issues, such as failure to engage in collaboration between administrative bodies, failure to produce steering documents for energy requirements in connection with procurement procedures and failure to give sufficient priority to such work in terms of time. Lack of skills, for example in relation to how energy requirements may be imposed in the context of procurement and financial management were also stressed, where budgeting methods may constitute a barrier. With regard to public procurement, one in four local authorities have said that they do not have steering documents for energy requirements in procurement procedures, and more than three in four local authorities and county councils said that they do not have the skills for imposing energy requirements in the context of procurement procedures. Approximately, half of the local authorities and county councils rarely or never follow up the energy requirements that are imposed in the context of procurement and purchasing and nearly half of the local authorities felt that their budgeting methods were a barrier to energy-efficient measures, with a primary focus on short-term rather than long-term measures. Similar barriers also exist for housing companies. Various existing instruments and initiatives aim to tackle the identified barriers to improving energy efficiency at public bodies. For example, the Swedish Environmental Management Council is working on a broad portfolio of information initiatives aimed at energy-efficient procurement, and the Swedish Environmental Protection Agency has support in the form of various networks for national authorities. In addition, the authorities are working on a benchmarking network for authorities with a focus on measures to reduce their own energy consumption. The Swedish Government's assessment concluded that no additional measures need to be adopted with regards to legislation and practices in the areas of public procurement, annual budgets and annual accounts but provides a valuable basis for establishing how the Swedish Competition Authority's support for national authorities, local authorities and county councils for the procurement of energy-efficient goods and services could be developed.

7 Recommendations to promote EPC

The ESCO markets have received increasing support at the EU level in terms of legal actions as well as in terms of actions on the ground during the last 10-15 years (see Chapter 4.1). The EU efforts were translated into national actions, and complemented by locally specific promotion. These and economic market trends contributed to the ESCO market expansion trends, and in particular the EU promotion of the Energy Performance Contracting scheme is reflected in the respective growth of the segment.

The period under our review (2014-2016) was a period of follow-up of previous policy initiatives and measures, and limited initiatives were implemented at the EU level in this period. The period can be considered as a consolidation phase, whereas most of the overall markets remained stable, with most of the EPC markets growing.

The remaining and the newly arisen barriers should be dealt with, therefore experts opinion was collected on how to further improve conditions for more energy efficiency via ESCOs, and in particular for EPC projects.

7.1 More ambitious targets

Experts welcomed the introduction of energy efficiency targets and sector specific targets. These are seen as strong drivers for the demand for ESCO services.

The EU has set energy efficiency and climate goals, which are translated to national targets. Occasionally these national targets are high enough to drive the energy efficiency markets and therefore a demand for EPC provision increases.

As of January 2014, Member States have to renovate 3%/year of the total floor area of heated and/or cooled buildings owned and occupied by its central government, to meet at least the minimum energy performance requirements. To do so, Member States would have to invest public budget where financial burden may already be too high. On the other hand, EPC providers can intervene exactly at this point by providing renovation expertise and financial services at the same time. The renovation requirement was quoted in Croatia, Cyprus, Austria, Lithuania, and Estonia as creating a new market for the national ESCO markets. In Portugal, Lithuania and Poland, EPC providers are defined as services for the public sector, including the fulfilment of the renovation obligation. In Belgium, Fedesco is to act as "third party investor" and to pre-finance projects that contribute to energy savings in the federal government buildings.

Furthermore, the EED provisions to mandate energy efficiency obligations (EEOs) for energy companies in Art. 7 can have a side effect on the ESCO market. In some markets (e.g. Italy, France) ESCOs are directly or indirectly involved in the implementation of EEO solutions.

Based on these experiences, experts suggested that more ambitious targets and national level actions should be required by the EU to more aggressively push the energy efficiency market forward.

7.1.1 National examples

National and local administrations can set targets that shoot above the EU minimum requirements. In the UK the use of EPC grew in recent years as a result of the support by the central and local governments. In 2010, the Government introduced the Greening Government Commitments which, alongside other targets, require a 25% reduction in greenhouse gas emissions from the central government estate by 2015.

The elevated building standards levels in Brussels can significantly attract EPC solutions. As a result there will be a need for quicker renovation rates, implying higher costs, which opens the ground for alternative financing and the entry of private funding.

7.2 Increase consistency among EU legislation

Energy efficiency policy in the EU is guided by a combination of overarching energy and climate policy documents initiatives and EU specific laws (e.g. Directives) that give specific attention to energy efficiency. The long term climate and energy strategies should be better matched with relevant policies from seemingly unrelated areas including economy, finance and tax. For example, ESCOs and the opportunity offered by the ESCO markets could be taken into account in other areas.

Such a lack of successful coordination has been experienced in relation to the Eurostat ESA 2010 interpretation. As shown in Section 6.2 there are a number of indications that the Eurostat guidance note "The impact of EPCs on government accounts" of 7th August 2015 had a negative impact on the EPC markets of the public sectors of Member States. Respondents to a survey in 2016 from ten Member States: Austria, Belgium, Bulgaria, Ireland, Portugal, Romania, Slovenia, Slovakia, Spain and Sweden strongly agreed with the negative impact (Litiu et al. 2016). Similar conclusions can be drawn from the survey carried out for the current report in 2016, where 14 countries mentioned or even emphasized this as a key barrier, including Croatia, Czech Republic, Estonia, and Latvia above the previously listed ones.

The Eurostat rules on public debt and deficit represent a hindrance to the development of public sector EPC projects and a serious regulatory obstacle to energy efficiency in the public sector. In some countries this was mentioned as blocking factor, e.g. in Slovenia and Romania. Besides limiting the ESCO market, possibilities to ensure provisions in line with Article 19, Energy Efficiency Directive (2012/27/EU) are also significantly reduced. Having in mind the overall aim and usefulness of ESA 2010 and its EUROSTAT interpretation, it was suggested by Romanian experts that an evaluation instrument is set-up to overcome the total blockage of EPCs – which is obviously not the reason for the ESA 2010. They propose an evaluation grid, which extracts the critical identification factors of an EPC – differentiating it from other "loans" or "leases", i.e. using uniform, clear and unquestionable criteria, in order to clearly exclude them from ESA 2010, and allow the implementation of energy efficiency projects that are actually cost-effective.

Therefore, the announcement of the "Clean Energy for all Europeans" communication on EPC is timely and necessary to tap on the cost-efficient potential of energy efficiency improvements offered by ESCOs. As a consequence, discussions with Eurostat are ongoing as of early 2017 to provide a more flexible accounting framework of EPCs to allow to take into account their specific nature. The results are foreseen for summer 2017.

7.2.1 National solutions

A few national governments have installed a solution to deal with ESA 2010 and the following Eurostat guidance note at national level as a fall-back option until an EU level solution is instituted.

In Austria, bilateral awareness raising was conducted to leverage the uncertainty within public administration on how to procure ESCO contracts without recording such investments on the public balance sheet.

In Belgium, it was found that decision makers that were in support of EPC before and had a general understanding of the advantages of EPC, realised that off-balance sheet financing via EPC was not possible anymore. Because this specific advantage was a strong driver to engage in EPC projects, and it was also an added value easy to explain at the beginning of the „EPC sales process“, and the loss of it raised doubts amongst potential clients. As a result, it is expected that the number of new EPC projects will drop by over 50%, and thus in general will impact the development of energy efficiency projects negatively in general. As a counteraction, Belgian and Dutch EPC supply side stakeholders develop technical and communication solutions to reduce the impact of the Eurostat note.

In Bulgaria, a number of actions were taken to deal with EPC created public debt based on ESA 2010. For example, an amendment was introduced to the Law on Municipal Debt (Art. 17b), Art. 32, P.1 of the Law on Public Finances, based on which municipalities may undertake new debt under EPCs every budgetary year up to 15% of their average annual capital expenditure for the last 4 years. The EPC investments will not be taken into consideration when calculating the general limit of the overall annual liabilities of the municipalities for repayment of debt. Furthermore, the Energy Efficiency Law was changed so that EPC projects can be signed for up to 10 years, instead of the 5 years before. Another amendment to the Public Procurement Law allows that projects are financed by forfeiting - applicable to receivables assignment agreements (including factoring and forfaiting agreements) concluded after 13 May 2014.

In Croatia, the Eurostat definition poses major obstacles for the development of public EPC projects. To overcome this situation, an EPC model contract is being prepared that is standardised for public sector facilities and ensures that the EUROSTAT definition and restriction is respected. It is planned to be presented and accepted for Eurostat.

In Germany the previously wide-spread projects – which were accounted off-balance – have dissipated, except for those projects in Berlin, because the projects in Berlin are financed with forfaiting and – by definition – must be regarded off-balance.

7.3 Further clarification of models, concepts

The EED and ESD provide the Member States and the EPC market with definitions relevant for Energy Performance Contracting, and somewhat to the rest of the ESCO markets (Chapter **Error! Reference source not found.**). The majority (15) of the Member States have adopted a national definition on EPC provider in legal documents, and 14 of them match the EU definition. There are two countries where the EU equivalent definition was adopted in guidelines and model contracts only. Although this is a good success, the EPC definition still varies, which should be further improved.

Moreover, the differentiation between ESC and EPC providers could increase transparency, as today still many companies claim themselves ESCO or EPC providers, while they do not offer a guarantee and or do not take over risks. It is seen in a number of registries that the entry is rather loose, e.g. in Cyprus 19 companies are registered, but none have implemented projects so far. In Italy, the UNI standard registry is one of the reference lists, but there is no full overlap with the list of EPC providers or ESCOs. In Bulgaria there is no distinction between ESCs and EPCs.

Distinction and clear understanding are key success indicators of ESCO markets, because potential clients have trust in the market and are fully aware of what they “purchase” and they have the power to choose from alternative contract types. This – in return – can decrease transaction costs and shorten negotiation time.

There is a need for further dissemination of information and awareness raising, after all the key definitions related to the ESCO markets are widely agreed. Another way to enhance the proper distinction is to make uniform, basic model contracts available and known.

National ESCO markets which forego for “new” client segments plan to aid this process by the development of sector specific model contracts. Estonia and Belgium are in the process of preparing a model contract for the residential housing sector.

EPCs are too complex and hinder the adoption by clients, and do not succeed to go through the public procurement process. In Germany, one of the causes thought to be behind the current slowdown of the EPC markets is the complexity of the contracts, and they decided to develop simpler versions.

7.4 Negotiated contracts, increased flexibility

While there is a need for model contracts, to establish trust in the concept, reduce transaction costs, and help the development of partnership between the client and the ESCO, in a more mature situation and/or when implementation details are not so well known beforehand, but there is already a partnership (seed) between the supplier and the client, the so called negotiated contracts or flexible contracts are useful.

According to procurement rules, typically, the project cannot be changed – in this case – adjusted after the successful offer was accepted. However, this is against the logic of the EPC, whereas the measures should be set after a very detailed audit, in order to keep the costs down, and the savings high. However, tenderers do not have the capacity and possibility to complete a deep audit during the bidding process, thus ending up in a vicious circle.

To resolve this problem, some countries use a less strict tender procedure, e.g. flexibility is allowed in the contracts or the contracting process in Denmark and the UK, and in Belgium the so called “negotiated procedure” is followed. A recommendation from Romanian ESCOs suggested that EPC contracts should be conducted using competitive dialogues.

At EU level⁴⁴, these options could be explored and a solution that respects public procurement rules as well as the natural needs of an EPC should be prepared. Furthermore, the experiences in countries where it already works could be promoted.

7.5 Focused EPC campaign(s)

There is a wide-scale need for more information in ALL member states, even in those with a developed ESCO market. It is clear that in most countries awareness about EE and even about ESCOs and EPC has grown significantly in the last few years. There are member states where environmental and climate awareness is a leading cause of EE investments, and thus a driver of EPC projects. At the same time, there are countries where more effort is needed.

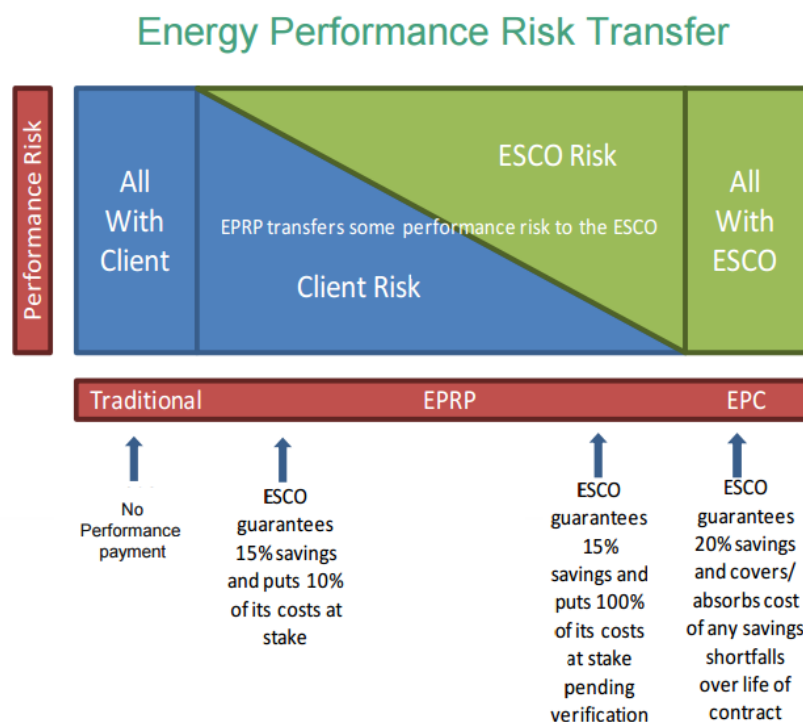
The EU EPC Campaign was launched in 2012 with the aim to enable country-specific discussion and capacity building of the core stakeholders, to enhance the understanding of the business model, its challenges and opportunities, increase confidence regarding its reliability and effectiveness, and help Member States in establishing a legal and financial framework for the market with energy services. The campaign was focused on general discussions, but well-tailored to the local circumstances.

As of 2016, it is time to go one step further, and select those issues that are critical for the success of EPCs, while not-understanding is blocking development. Such an issue was found to be risk sharing/risk transfer. Another area could be understanding and appreciating split incentives, both on the clients’ and the suppliers’ side. Finally, the value of deep retrofit should be also communicated.

The SEIA presents the underlying idea in a simple manner. Such dissemination would clearly contribute to the wider acceptance of EPC. After understanding the underlying risks in a renovation project (for example), and understanding that there are related costs, potential clients would get a clearer picture of the role and the reasons for the costs of an ESCO.

⁴⁴ In fact, a H2020 project runs between 2016 and 2019 to make EPC more flexible to better serve private sector clients (among other objectives)

Figure 14.



Source: http://www.seai.ie/Your_Business/Large_Energy_Users/LIEN/LIEN_Events/Events-2014/National-Energy-Services-Framework-%E2%80%93-Energy-Performance-Contracting-%E2%80%93-the-opportunities.pdf

7.6 Quality assurance, quality label

Trust, confidence, and commitment are among the key problems faced by Member State by ESCOs. While the situation has greatly improved since 2010, when almost all of the countries faced problems of trust in the ESCO markets (Marino et al. 2010), as of 2016 around half of the countries still named it as a key barrier.

The Code of Conduct for EPC⁴⁵ developed under the Transparens project⁴⁶ and managed for a long-term sustainability by EFIEES and eu.ESCO associations is a starting point. It defines critical values and principles that the signatories announce to hold to. However, the accession is voluntary and there is no mechanism for quality control, which can hinder the trust in the label. ESCO market stakeholders suggested upgrading the Code of Conduct to a properly controlled quality assurance system.

7.6.1 National examples

Quality assurance of energy services providers has been introduced in Slovakia, whereas EPC may be provided only by holder of licence on specialized skills for providing Guaranteed Energy Services or an energy auditor. Obtaining of the licenses is subject to passing of exam. All holders of the license are obligated to take part at updating specialized courses every three years. This measure is in place since 2015.

In Austria, the Ministry of Agriculture, Forestry, Environment and Water offers the Energy Performance Contracting Eco-label. This certificate formulates requirements on the contractor, the course of the project and EPC, necessary for awarding the label (Austrian Energy Agency, 2014).

⁴⁵ <http://transparens.eu/eu/epc-code-of-conduct/>

⁴⁶ <http://transparens.eu/eu/home/welcome-to-transparens-project>

7.7 The role of intermediaries

The role of facilitators has not been duly acknowledged in the development of ESCO markets (Bleyl-Androschin et al. 2013; Nolden, Sorrell, and Polzin 2016). In a well-developed ESCO market, the buyers look for solutions to implement energy saving measures and/or property renovations and improvements. In this process they should consider the ESCO contract as an alternative to for example own implementation, leasing, outsourcing, etc. However, ESCO solutions are complex and are difficult to evaluate and compare – especially with alternatives. In most countries potential clients are not even aware of the existence of ESCOs. Bleyl et al. (2013) collected a list of tasks that facilitators can and do perform. The list includes overall information, amplification of the use of the ESCO concept, helping interested customers of the public sector to prepare a tender or other announcement, selecting the winner, concluding a contract, monitoring and verifying savings, etc. From the clients perspective all of these and other steps in procuring or contracting an ESCO is – to say the least – challenging. These tasks require specialized knowledge in technology, financing, management, even communication, which a facilitator can offer.

7.7.1 National examples

There are a number of organisations that act as facilitators in Europe, for example national (or local) energy (efficiency) agencies (e.g. Motiva in Finland, SEAI in Ireland, the Graz Energy Agency in Austria, the Berlin Energy Agency in Germany, the Cyprus Energy Agency in Cyprus, the Energy Efficiency Center in Slovakia, etc.), (private) energy audit companies, some legal advisors and private facilitators (e.g. procurement advisors in Denmark and Hungary), or the EPC procurement advisors in the Czech Republic. In a few countries the government can take up this task. In the developing ESCO markets IFIs are still present and can act as facilitators, e.g. EBRD in Romania and Bulgaria.

7.8 Leading by example

The value of showcasing successful public projects is reflected in some of the energy efficiency legislation of the EU, including the Energy Services Directive (ESD), the recast Energy Performance of Buildings Directive (EPBD) and the Energy Efficiency Directive (EED). Under the ESD, Art. 5., Member States shall ensure that the public sector fulfils an exemplary role in energy end-use efficiency. The EED enhances this provision (Art. 5), and stipulates that central governments purchase only products, services and buildings with high energy performance, meeting specified conditions (Art 6), furthermore set out a quantified refurbishment target for central government buildings. The recast EPBD provides for an earlier date of compliance with nearly zero-energy efficiency requirements of new buildings owned and occupied by public authorities. The requirement of displaying an Energy Performance Certificate also enhances the information and motivation value of public buildings.

If the public sector implements successful ESCO projects and these are widely disseminated and/or displayed, it can trigger a market effect. Therefore, it is recommended to strengthen the role of public sector in this process, carefully implementing the existing requirements and devising new possibilities. In particular, the EU Institutions could follow through to lead by example.

7.8.1 National examples

In Denmark, the ESCO market was kicked-off by the example of one municipality (Middelfart) using the ESCO model in 2010, which proved to be very successful. The local government representatives made a lot of effort to disseminate the results widely in the Member State and to convince and help others to follow. As of 2016, around 30% of all municipalities are involved in EPC projects.

7.9 Revolving or guarantee fund

An EU level revolving fund or a guarantee fund has been repeatedly mentioned by experts in the JRC ESCO surveys as an opportunity to overcome some of the risks of an EPC project.

A revolving fund could play a role in providing EPC projects with the necessary initial investments. The financial liquidity is challenged when long term and/or many projects are carried out if they are financed from the suppliers' or the clients' own resources. After a few projects running, they have no financial capacity to engage in new ones. But this can be resolved by making funds available, where the savings return the outlaid financial resources. There are a few examples that work at national level, such as the Energy Efficiency and Renewable Sources Fund in Bulgaria for financing energy efficiency investment projects, which has been operating for more than 10 years as a revolving fund. The plans for boosting the EPC market in Croatia include the establishment of a revolving fund. In Italy there is a revolving fund to cover up client default.

There are also a few examples of forfeiting funds, whereby the future energy savings are bought or carried by a financial institution, thus relieving funds for new projects. For example in Latvia, such a fund is being considered in order to overcome the lack of capital experienced by the ESCO that had implemented a number of projects in multiapartment buildings, therefore the internal capital and also the creditability is used. A forfeiting fund could allow the ESCO to move the past spendings off-balance and access new funds for new projects. The development is carried out under the SUNSHINE⁴⁷ project.

In an EPC project the energy saving guarantee is a central element. On one hand, it is a very high risk for the ESCO to provide a guarantee on a site where demand is influenced by the user, and where data on energy consumption may be miscalculated or estimated. The ESCO also takes a risk by entering in contract with a client on the long-term, while the client may disappear in the meanwhile due to change of business, being bankrupt, or other reasons. On the other hand, potential clients are often suspicious of the guarantee from the EPC providers and are afraid to engage in long term contracts. A guarantee fund can resolve these issues by securing the financial recovery of the losses in case of failure. A guarantee fund is being prepared in Slovenia with the collaboration of the Slovenian Investment Bank, the Ministry of Infrastructure and EIB.

The EIB has been suggested as a possible source for the establishment of such revolving funds, but potentially a collaboration of EPC providers could also lead to the establishment of such funds.

7.10 Building on policy interaction

Some of the Member States have seen an ESCO market development due the introduction of energy efficiency requirements or policies, not directly linked to ESCOs. It has been crucial to allow, or openly call for the energy services stakeholders to offer solutions under these policies. For example, ESCO projects can be considered as an alternative way to achieve the Energy Efficiency Obligations (EEOs), whereas energy suppliers are obliged to carry out energy efficiency projects for their customers.

7.10.1 National examples

In Latvia and Slovenia DSM programmes are implemented by ESCOs. In France, the White Certificates scheme (Energy efficiency certification system) also encourages the development of EPCs. Two specific standard operating sheets, for the residential and tertiary sectors, enable the application of low-interest rates to energy saving actions carried out within the context of an EPC. The boom of ESC in Italy in the last decade is also partially linked to the introduction of the White Certificates scheme, through which

⁴⁷ <http://www.sharex.lv/en/project-overview>

ESCO projects receive extra profit. However, the impact of EEOs has been debated by some experts, because it did not contribute to the success of energy services in Denmark, nor in Poland.

7.11 Summary of recommendations in the area of EPC providers

The following is an overview of the recommendations - explained above - to enhance energy savings using the ESCO or EPC concept. These seem to be the most relevant development routes to support the ESCO markets at EU level.

Table 8 - Review of recommendations

Problem	EU level solution suggested	MS level solutions possible
Slow improvement of EE and untapped potential for EPCs	More ambitious targets in areas relevant for ESCOs and extension of art7 of the EED	Adopt more ambitious targets than prescribed
Eurostat ESA 2010 interpretation	Adapt, when relevant, the guidance note from Eurostat on the accounting treatment of EPCs ⁴⁸	Develop contracts and guidelines to respect ESA 2010 requirements; finance projects from internal budgets
Low level of trust, confidence in the concept; confusion about various contracts – causing, among others, higher transaction costs	Improve adoption of clarified definitions; Development of model contracts, with simplification; Support the development of the EPC market with more project development assistance; Capacity building and Awareness raising.	Adopt the EU definition; develop contract models; provide project development assistance, support capacity building, the deployment of facilitators and support awareness raising
Implemented measures do not fully coincide with client's best benefit, split incentives	Develop rules to respect flexibility inspirations for contracts, resolve contradiction with procurement rules; share experiences from successful markets; improve the understanding of the multiple benefits of energy efficiency	Allow flexible development of contracts
Continued lack of clarity, awareness about the benefits and challenges of EPC projects, and especially about the additionality of EPCs	Start a new EPC campaign, with specific focus on critical questions, such as risk sharing/risk transfer, split incentives, the value of deep retrofit	Disseminate information locally, based on a market review of what should be communicated: general information or specificities of EPCs
Complexity of the EPC contracts, capacity limitation of the clients	Support the development of facilitators and quality assurance/certification schemes	Support the development of facilitators and quality assurance/certification schemes

⁴⁸ Note that as of early 2017, there is ongoing effort led by Eurostat to review the above mentioned guidance note in order to provide a more flexible accounting framework of EPCs to allow to take into account their specific nature. The results are foreseen for summer 2017.

Problem	EU level solution suggested	MS level solutions possible
Lack of trust, lack of best practice examples, difficulty of taking off the ground	EU Institutions to showcase own examples of using EPC; encouraging/requiring national authorities to do so; showcasing the EPC good practices supported under the EU PDA facilities,	Implement EPC projects in public sector and disseminate success examples, display results
Liquidity problems, perceived risk of failed projects	Support the development of investment platforms providing access to financing to ESCOs with attractive financing terms while supporting the combination of EU funds, support the disclosure of technical and financial performance data of existing EPC projects (e.g. the De-risking Energy Efficiency Platform)	Establish financial instruments such as local revolving fund and/or a guarantee fund
National government prefers not to influence the market directly and aims to enable ESCOs as an alternative solution	Require that ESCOs can provide solutions for certain energy efficiency policy implementation (e.g. EEO)	Require the participation of ESCOs in the EEO scheme. Introduce obligatory audits, which may increase awareness about the saving potentials and increase a demand for energy services, while reduce transaction costs.

8 Individual country reports

8.1 Austria

8.1.1 ESCO market overview

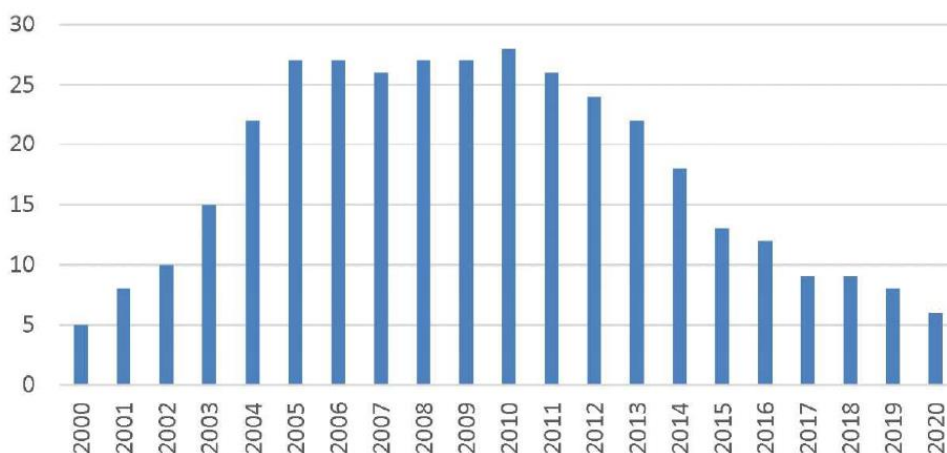
The Austrian ESCO market is considered to be a well-established market. As of 2015 around 40 companies provided energy services, of which 15-20 are EPC providers (JRC 2016). 13 of the ESCOs provide energy services as a core business, 9 are energy suppliers and 10 are technical building systems companies offering energy services within their portfolio (Windsprenger, et al., 2014). This is a minor decrease in the number of companies compared to previous years; evident on the national level, but does not translate to an overall decrease of the market size. In addition there are major regional differences, and for example, the EPC market in Upper Austria has been increasing. Most active ESCOs on the Austrian market are small- and medium-sized enterprises.

The Association of "Austrian Energy Efficiency and Performance Contractors" (DECA)⁴⁹ was established in 2013 on the basis of the Umbrella Organisation of Energy Service Contractors. The 31 members (as of June 2016) consist of companies and organisation such as ESCOs, planning offices, energy advisors, other associations active in energy and real state field and banks. Its aim is to promote energy services, represent their members' interest, especially in the processes of the development of policy and legal framework for energy services, cooperate with research organizations and create networks with similar associations.

8.1.2 Status with Energy Performing Contracting (EPC)

As of 2016, there are around 15-20 companies offering Energy Performance Contracting, i.e. rigorously including performance guarantees in the ESCO contract. The number of running EPCs was on a steep increase until 2005, when it remained constant between 2005 and 2010, followed by a small decline (see Figure 15). Based on interviews in 2016, the decrease has stopped (in contrary to the predictions in Figure 15), and the number of EPC projects kicked-off each year remains mostly constant (JRC 2016) with ca. 25-28 EPC projects per year.

Figure 15 – The development of the number of EPC projects in Austria, including forecast for the period after 2012



Source: (ÖGUT, 2013)

⁴⁹ DECA is abbreviation of "Dinstleister Energieeffizienz und Contracting Austria". More information can be found at: http://www.deca.at/view_site/site.php?lang=de&mid=1, the list of members is provided at http://www.deca.at/view_site/site.php?lang=de&mid=77

EPCs are primarily implemented in the public sector (administrative buildings, schools and educational buildings), but private projects exist, too (commercial offices, shopping centres, sports facilities, rarely industrial sites). Typical measures include thermal improvements of building envelopes, installation of new systems for heating and cooling, optimization of heating systems, organisational changes and renovation of peripherals. Street lighting projects have increased in numbers significantly recently.

On average EPC projects last for 3 years in the private sector, and up to 10 years in case of public clients (JRC 2016).

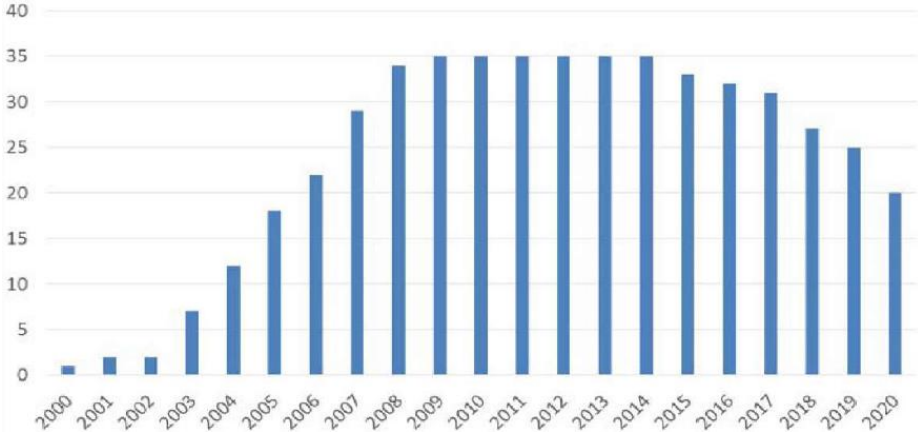
The average size of investment in an EPC project is ca. 500.000 euro/project (JRC 2016). In 2008, the total investment of approx. EUR 26.7 million in EPCs resulted in cost savings of EUR 2.3 million (Windsprenger, et al., 2014). In 2016, the market potential of the EPC market was estimated to be greater than EUR 10 million (JRC 2016).

Experts interviewed in 2016 have varying experiences about the source of financing typical in Austria. In general it is common to involve financial institutions in the funding of EPC projects. In case of smaller projects, internal funds of the client are usually combined with loans. For larger projects, the EPC provider often also contributes. Both leasing and forfaiting are common, while SPVs are not seen in the market, and only very few mezzanine financing has taken place.

8.1.3 Status with Energy supply contracting (ESC)

Energy supply contracting⁵⁰ experienced a sharp increase since the beginning on 2000s as in the case of performance contracting. A small decline in the number of ESC projects at federal level began around 2014, which is not reflected in all regions, whereas some of them experience a market increase. In contrast with EPCs, the measures carried out as part of ESC projects are less varied and typically involve the installation or replacement of an energy system such as biomass boiler (ÖGUT, 2013).

Figure 16 - The development of the number of ESC projects over time in Austria



Source: (ÖGUT, 2013)

⁵⁰ In Austria this is referred to as "plant contracting". Plant contracting involves the complete outsourcing of responsibility for the supply of useful energy (e.g. space heating).

8.1.4 Demand side

8.1.4.1 Energy services in public sector

The Austrian public sector is the main ESCO client and a very important driver for the energy services market in the country. The market for energy services in this sector was strengthened significantly via the Federal Property Contracting programme, which focused on the renovation of more than 300 federal buildings. The average annual saving potential for these buildings is 19.83%. Taking into account this average saving potential, it is expected that the CO₂ emission will be reduced by 40,000 tCO₂/year and the energy costs will be declined by EUR 6.9 Million /year for 300 buildings (BMWFW, 2015).

The buildings are grouped into different "pools". Some pools cover heat and electricity, some only heat. Savings up to 30% are achieved for heat, whereas for electricity only 4-5%. Most EPCs in the public sector are concluded with local authorities, then with public schools and public buildings (Windsprenger, et al., 2014).

In addition to the federal programme, regional programmes were also started, mainly in Upper Austria, Lower Austria and Styria. For example, the EPC programme in Upper Austria has funded over 200 projects since its start in 1996, focussed on the municipal sector, but with examples also in the commercial buildings sector.

It should be noted that energy performance contracting (with guaranteed savings) is listed as one of the alternative measures which shall be implemented in the buildings owned by the central government in order to meet the EED Article 5 obligations (Austrian Energy Agency, 2014). The total useful floor area of these buildings is 630,384 m² and expected savings resulting from implementation of EPCs are estimated at 8 GWh and represent 16.6% of the total estimate energy savings (48.145 GWh) for the period 2014 -2020. EPCs are also indicated as a very important tool in the NEEAP for the implementation of EE measures in other public buildings. Notable examples include the premises (Penalty institutions) owned by the Federal Ministry of Justice for which plans are made to implement EPCs in 86% out of their total net floor area.

8.1.4.2 Energy services in other sectors

Regarding the business sector, the Austrian NEEAP 2014 mentions that due to the impact of energy consumption on the costs of a business, major energy consumers have long since established internal structures and responsibilities to ensure a cost-effective supply of energy (Austrian Energy Agency, 2014). In these businesses, which make up approx. 2/3 of the energy consumption in industry, the potential for optimisation is regularly examined and monitoring systems and/or energy management systems are already in place. The economic potential has largely already been tapped in this sector and further on-going improvements may be expected to have payback periods of several years.

While the federal contracting program has come to a halt, regional ones, for examples in Upper Austria are running well. Furthermore, in Upper Austria, ESCO projects have been successfully extended to the private sector (JRC 2016).

8.1.5 Remaining market potential and barriers

Although Austria has been seen as one of the success examples of European ESCO markets, there is still a large untapped potential in energy contract provision. Primarily Austrian municipalities are considered to have a significant ESCO potential for energy contracting (EPC or ESC). They are considered by ESCOs to be reliable partners for long term contracts with a great potential for EE improvements. There are more than 2300 local authorities out of 2354 which have not yet entered in any energy services contract. The service sector can be another key target for energy services with an energy saving potential of up to 30%. Out of around 119,000 companies in the retail and trade sector, only 530 undergo energy audits (Windsprenger, et al., 2014).

In the building sector, a large potential for energy contracting is found in dwellings owned or managed by the non-profit housing associations (co-operations). These associations have been responsible for the administration of more than 840,000 dwellings. Today they own/manage 522,000 rented dwellings and manage 240,000 owner-occupied dwellings as well as 35,000 dwellings in municipality housing. This stock represents about 25% of the total Austrian housing stock. In multi-apartment buildings they administrate/manage more than 40% of the dwellings. The majority of realised renovations of this stock have been financed with the assistance of public funds. Thus public funding is controlled by the Austrian Federation of Limited-Profit Housing Associations⁵¹ (GVB, 2015). The housing associations are still reluctant to undertake energy contracting and only few associations enter into energy service contracts. For the ESCOs, this sector is seen as a potential client with regards to long-term contracting (Windsprenger, et al., 2014).

There are a number of reasons for the large remaining potential and not-yet-tapped sectors. EPCs for pre-financing of renovations are still perceived as a highly risky business model for energy suppliers and service providers. While there are a lot of good examples of EPCs in the public sector, there have been a few projects that did not fulfil the expectations, and they could discourage new customers. The level of awareness and knowledge of the ESCO/EPC concepts is still limited, and therefore there are no tenders for EPC, except for a few regions, where intensive dissemination and training have taken place. Even in places where tenders are announced, the number of tenderers is very low or none. Smaller municipalities are not familiar with the legal requirements for public tendering of contracting projects.

The announcement of the Eurostat guidance note of 7 August 2015⁵² raised concerns about the procurement and accounting of ESCO projects, and has discouraged many potential clients, and it is difficult to turn around again.

An important barrier is posed by the increasing difficulties of raising financial liquidity which is affordable. In recent years, financing institutes became more restrictive in granting credits. For small and medium sized ESCOs this constitutes a barrier which makes it more difficult to enter the market. Also, smaller municipalities have poor creditworthiness and are not able to borrow.

The private housing sector, on the other hand, entails high payback risks for energy performance contractors and, furthermore, the potential for customer dissatisfaction. Financial grants have been available for housing retrofit, and from the clients' point of view EPC is significantly more expensive, and too complex. In addition, the split incentive phenomenon can cause limitations in this sector. While tenants profit from energy saving measures due to lower energy bills, the landlord pays the investment costs (often in the form of increased common costs) and does not directly profit from these measures. A transfer of the costs toward the tenants is difficult and regulated in the tenancy law. Improved information about the co-benefits of such investments could overcome the problem, e.g. by emphasizing the increased value of the property, fewer repair actions, easier renting, etc.

8.1.6 Policies and measures supporting ESCOs and EPC

The Energy Efficiency Act (Bundesgesetz über die Steigerung der Energieeffizienz bei Unternehmen und dem Bund (Bundes-Energieeffizienzgesetz – EEffG)⁵³) transposes the

⁵¹ The Austrian Federation of Limited-Profit Housing Associations (GBV) functions as compulsory audit organization for its members as well as interest representation body. Its members are 191 housing providers all over Austria; 99 of the members are constituted as cooperatives the other 91 as capital societies with a broad scope of shareholders (public authorities, bodies of interest representation such as unions, private business enterprises).(GVB 2015)

⁵² <http://ec.europa.eu/eurostat/documents/1015035/6934993/EUROSTAT-Guidance-Note-on-Energy-Performance-Contracts-August-2015.pdf/dc5255f7-a5b8-42e5-bc5d-887dbf9434c9>

energy services provisions of the EED, including the definition of EPC and EPC providers (JRC 2016), where EPC is explicitly mentioned, even though only for national facilities.

For the quality assurance of contracting projects, the Ministry of Agriculture, Forestry, Environment and Water offers the Energy Performance Contracting Eco-label. This certificate formulates requirements on the contractor, the course of the project and EPC, necessary for awarding the label (Austrian Energy Agency, 2014).

Austria has adopted the Code of Conduct developed by the Transparens project and e7, which was acceded by DECA and 2 other market players.

An officially promoted EPC model contract was prepared under the supervision of the Federal Ministry of Science, Research and Economy (BMWFW). The model EPC outlines three main objectives: (1) sustainable increase of energy costs, (2) reduction of energy consumption/CO₂ emission and (3) increase of user comfort. In one of its provisions for the contractor duties, it is stated that the contractor has to carry out a basic analysis before the EPC is agreed in order to investigate whether and on which level the reduction of energy costs and energy consumption through implementation of EE measures can be approached. If the contract is agreed, the contractor is obliged to carry out a detailed analysis in order to set a baseline for the EE measures. The contract also needs to include instruments for risk coverage in the case of contract, e.g. in a form of an irrevocable letter of guarantee. In addition, the model EPC includes provisions for guaranteed energy savings, reimbursement, controlling and monitoring of the project (contract) duration. In addition, the model EPC includes provisions on contractor penalties to account for various violations such as violation on the agreed response time in case of production failure caused by problems in energy supply.

The Federal Property Contracting programme has been central to ESCO development through the renovation of more than 200 federal buildings since 2001. Other regions also had specific programmes and by implementing EPC in their own buildings, have led by example for other public buildings and private building (JRC 2016).

EPC facilitators are present on the Austrian market, and their role can be expected to grow in promotion and bilateral awareness raising. Their support from national or regional programmes could be a good opportunity to help the ESCO market indirectly.

8.1.6.1 Information and awareness raising measures

While the ESCO concept and EPC projects have been present in the Austrian market, and there have been 100s of successful projects, experts claim that the level of awareness of potential customers is still low. There are a few regions, where the public sector is better informed as a result of successful information dissemination and the large number of examples (JRC 2016).

Austria has put a lot of emphasis on information dissemination, awareness raising and promotion of the ESCO concept, and has acted successfully to improve the quality of the services. The 'Umbrella Organisation of Energy Savings Contractors' was set up in 2005 through financial support from the federal government, to help raise awareness on energy performance, to promote quality assurance and to contribute to market transparency. The Organisation was succeeded by the Association of 'Austrian Energy Efficiency and Performance Contractors' (DECA) in 2013.

DECA promotes energy services through dissemination of material published on their website, DECA newspapers and publications. DECA regularly organises workshops and awareness raising events, as well as press release activities.

The federally funded klima:aktiv contracting portal provides information on the topic of energy performance contracting, including basic information and sector-specific information, a list of contractors, etc.

⁵³ StF: BGBl. I Nr. 72/2014 (NR: GP XXV RV 182 AB 205 S. 36. BR: 9204 AB 9222 S. 832.) [CELEX-Nr.: 32009L0028, 32009L0072, 32012L0027]

In addition, several regions have local initiatives, e.g. Upper Austria, Lower Austria and Styria.

The problems raised by the Eurostat guidance note were found to be possible to overcome through bilateral awareness raising which could leverage the uncertainty within public administration on how to procure ESCO contracts without recording such investments on the public balance sheet (Litiu and Wardal 2016).

8.1.7 Conclusions, projections and recommendations

While the energy services market in Austria is considered as well developed, there is still a large untapped potential in the market. Moreover, while both the EPC and ESC markets, which emerged in the mid-1990s, have been on a promising growth trajectory since their start, a small halt has been observed in recent years at federal level (see Figure 15 and Figure 16). Significant regional differences exist, because the market has been proceeding well in Upper Austria, Lower Austria and Styria as opposed to the national market.

It is foreseen that large public EPC projects that offer a larger profit will continue. This is underlined by the promotion and involvement of the biggest public authority which is very experienced and has a very positive attitude towards EPC. On the other hand, smaller public EPC projects as well as private EPC projects represent the bottleneck for expansion. Financial restrictions for municipalities and lack of awareness for private clients are the key challenges.

In order to ensure continuous market growth in all segments of the energy services market and tap into the remaining potential, several actions need to be taken. While various policies and programmes have been successful in stimulating the market within a short timeframe, more efforts are needed to enhance trust, market competition and demand for energy efficiency measures. For example, more information and awareness raising measures can increase awareness on the benefits of energy efficiency and inform potential clients of the services that can be available to them. The interpretation of the Eurostat guidance note (related to ESA 2010) needs awareness raising and a joined effort by clients and suppliers to find ways to overcome it. Positive experiences gained through implemented EPC projects (especially in the public sector) should be disseminated in order to increase confidence among clients and allow providers to strengthen in less popular sectors. This is particularly important for the private sector where the introduction of ESCO concepts has so far been limited, but not without good examples. Furthermore, a great potential exists in the operation of heating systems, particularly in connection with optimal operation and the interaction of different heating system as well as ESC-based projects for private individuals through energy service companies. More energy advisors are also required, particularly in light of the large number of firms and their varied nature (Austrian Energy Agency, 2014).

8.1.8 Summary

Total ESCO market status (2015)	well developed, ca. 40 ESCO companies
EPC market status (2016)	well developed, 15-20 EPC providers, ca. 80 projects during 2014-16
Total ESCO market size	n/a
EPC-only market size (investment)	>€10million/yr.
EPC market potential	€12billion/yr. (very rough estimate in 2010 for following next few years)

EPC definition	...follows the EED, set by Bundesgesetz über die Steigerung der Energieeffizienz bei Unternehmen und dem Bund (Bundes-Energieeffizienzgesetz – EEEffG)
Established sub-sector(s)	<ul style="list-style-type: none"> • EPC is known and relatively widespread; • public buildings, schools, educational buildings, and streetlighting; • commercial offices, shopping malls; • Industrial sites and processes;
Key general barrier(s) to be removed	lack of trust, split incentives
Key barriers in the public segment	financial liquidity; lack of familiarity, ESA 2010 public debt definition
Key driver(s) to date	<ul style="list-style-type: none"> • the Energy Efficiency Act that transposes EED, • role of facilitators, • quality systems and assurance; • best practice examples; • DENA's work.
Expected development/forecast	large public EPC projects are expected to further prevail, while the future of smaller public and private is less secure
Opportunities for further development	more dissemination to reach new (private) clients, increase trust, remove EUROSTAT barrier

8.2 Belgium

8.2.1 ESCO market overview

The energy service market in Belgium is considered stable and moderately-sized. The current market size for Energy Performance Contracts (EPC) is estimated to be around EUR 1-5 million and is expected to grow further. The public ESCOs are the main driving force whose role is mainly to act as ESCO market facilitators (Government of Belgium, 2014).

The number of ESCO companies remained unchanged in 2014, with a total 10-15 companies, of which 6 are large (daughter companies of large international companies) and 5-7 are small- or medium-sized enterprises. Furthermore, there are three public ESCOs, which typically provide a basis for third part financing, since they are able to provide an advance payment and be repaid from the annual savings. They can usually allocate a substantial budget to be spent on energy performance improvements, often in the form of a revolving fund (Government of Belgium, 2014).

Fedesco⁵⁴ was a public energy service company established in 2005 as an initiative of the Federal government with the aim to provide energy services to public administrations and organizations (Government of Belgium (2014), Bertoldi, et al. (2014)), but was dissolved in 2015. Fedesco worked exclusively for the Federal Public Services (FPS), Federal Public Services Programming (SPP) and other federal government bodies (Government of Belgium, 2014).

The Flemish government founded the Flemish Energy Company (VEB)⁵⁵ in early 2012 to provide energy services for Flemish public administrations and organisations, and to act as a public ESCO.

⁵⁴ Fedesco (the Belgian Federal authorities' energy services company and third party investor) was a joint stock company under the public law with a capital of EUR 6.5 million. For more information: www.fedesco.be

⁵⁵ Vlaams Energiebedrijf

The distribution grid operators for gas and electricity in Flanders created ESCO departments to offer services to cities, municipalities and provinces in their operating area: EDLB (Energy Services for Municipalities) was opened in 2010 by Eandis.

Infrax established Infrax ESCO also around 2010, driven by regulatory schemes that define energy services as a public service obligation.

The public ESCO model used by Fedesco, Infrax and Eandis has been referred to as an "integrating" organisation⁵⁶, contracting public entities directly, and then subcontracting the tasks to smaller, private suppliers on a competitive basis. This has included framework contracts with engineering companies and equipment installation companies or general contractors.

There are two ESCO associations in Belgium. BELESCO is the Belgian ESCO Association to promote good practices, provide networking opportunities and represent the interests of the sector at the regional and federal policy level. It was created in 2010 when ESCOs identified a lack of policy support for the development of EPCs in Belgium, both at the national and at the regional level (Belesco, 2015). The second one is AGORIA, the Green Building platform, which groups energy service providers within the Belgian Federation of Industrial Companies.

8.2.2 Status with Energy Performing Contracting (EPC)

In recent years, the awareness of public authorities as well of the regional public authorities increased considerably about EPC, which is partially the result of a number of promotion activities (see in section 8.2.5.1). As a result, the demand for EPC-projects started to grow, even if the total number so far is still low, as it is estimated to be around 5 running projects in the last 3 years (JRC 2016). There continues to be a slight growth in the appearance of (pilot) projects.

Among others, the Federal Buildings Agency initiated an EPC project arranged by Fedesco in 2011. The Belgian Federal Council of Ministers approved the launching of the procurement of the first EPC-project in Belgian governmental/public buildings in 2013. Furthermore, the two largest Belgian cities (the City of Antwerp and Ghent) decided to implement an EPC-pilot project in 2012, in the frame of EESI2020 and Transparensse projects, followed by several Belgian cities and provinces (e.g. Kortrijk, Geel, Etterbeek, province of Antwerp), which expressed their interest in starting up EPC-projects. The province of Antwerp launched a tender for an EPC-facilitator in October 2013 (Coolen et al. 2015).

Many BELESCO members can provide or facilitate EPCs in the public and private sectors.

EPCs are used by private enterprises – with SMEs leading the above described growth in Flandria, by public buildings, including schools and universities. Furthermore, industrial sites are also interesting for ESCOs, although the contract type (whether EOC or ESC) is not well known.

Regarding the size of the projects, they largely fall into two groups. SME projects range between €50°000 and €150°000, while the large projects are realised mainly in the public sector with over >€1.000.000 value. The overall size of the EPC market is very difficult to estimate, and only an insecure estimate exists of ca. €1°000°000 of turnover per year. (JRC 2016).

The length of the contracts is between 10 – 15 years for the public sector and around 5 years for private (SME) clients (JRC 2016).

The "multi performance model" of smartEPC has extended the classical EPC project to non-energy benefits, including comfort, maintenance and building value performance. This model can lead to the next generation of ESCO models, based on a different set of arguments and values.

⁵⁶ Singh et al. (2010) have applied the term "super ESCO".

8.2.3 Demand side

8.2.3.1 Energy services in public sector

Pursuant to Article 5 of the EED, the central government⁵⁷ has notified alternative measures for federal government buildings, which combine investments, rationalization and behavioural change measures. The measure implementation will be carried out through the Belgian Buildings Agency, Fedesco and the users of federal government buildings.

Fedesco provides and pre-finances projects that contribute to energy savings in the federal government buildings. The repayment of the financing is spread over several years and is based on the actual realized annual savings. Fedesco is also known as the "third party investor" (Fedesco, 2015). According to the Belgian NEEAP, Fedesco has invested about EUR 30 million in projects (studies and investments) in federal buildings. It offers two types of measures for public buildings: standard and cross sectorial. The standard measures are measures that can be applied to all buildings which are mainly connected to energy management and monitoring of energy consumption in the buildings. The cross sectorial measures are measures implemented following the analysis of separate buildings. These actions are directly related to the weaknesses of the building in question and significantly improve its energy efficiency. The FEDESCO services include energy need analysis, identification of EE potential in buildings, resulting benchmarking and full monitoring of technical phases of a project. The latter involves conducting energy audits or quick scans, preparation of necessary studies, writing (or delegation of writing) of technical specifications, procurement procedures, monitoring sites, etc. This allows customers to focus on their core business (Fedesco, 2015).

Private ESCOs have undertaken some projects in the public sector, but they are much more involved in providing energy services for industry and private building owners.

Due to the lack of in-house experience to identify and carry out EE measures in buildings owned by local authorities, since 2010 energy providers have offered energy services to local councils in the Flemish part of Belgium. The ESCOs are in charge of the implementation of EPC projects based on guaranteed savings (Government of Belgium, 2014).

8.2.3.2 Energy services in other sectors

In the Flanders, ESCOs can provide energy efficiency investments for SMEs. Implementation of EE measures through ESCO can save time and fund for SMEs for calculation of energy savings and identification of EE measures.

8.2.4 Remaining market potential and barriers

Coolen, et al. (2015) identified a number of remaining barriers in the Belgian context. In terms of regulatory and administrative barriers, these include the lack of subsidies for EPC-investments and the organisational complexity of the country. The latter stems from the fact that the region implement EU Directives differently, have their own energy efficiency policy measures as well as approach towards the ESCO market in general. These complexities in turn create unfavourable conditions for ESCOs which are typically active in all three regions. EPC-based projects are still an unproven approach in Belgium and are considered complex. Financial barriers and reduction in investment resources of public authorities are also mentioned as a barrier hindering further market development.

⁵⁷ The central government refers to the federal state and federal entities that are the Brussels-Capital Region, the Walloon Region, the Flemish Community and the German-speaking Community, The Flemish Community, the Common Community Commission, the French Community Commission and the Flemish Community Commission.

⁵⁷ The Guide for EPC can be find on: <http://www.belesco.be/epc-guide-download-form>

Some region-specific issues also exist. The Belgian NEEAP 2014 outlines a number of barriers to the development of the ESCO market at regional level. In Flanders, the difficulty for ESCOs to enter in contracts with SMEs is considered a key barrier, inhibiting the stimulation of the ESCO market in this segment of the sector (Government of Belgium, 2014). For smaller companies in particular, there is too much legal uncertainty. The ESCOs are excluded from ecological grants. Significant changes in the legislation for grant awarding (aid) will be therefore needed.

The review of the Wallonia ESCO market in the Belgian NEEAP 2014 cites the following hindrances to further market development in the region (Government of Belgium, 2014):

- Large size of EPC projects necessary to make the project profitable;
- Implementation complexities associated with EPC contracts (e.g. various skills, stakeholders and stages involved, complex M&V protocols to adopt)
- Long payback of EPCs – duration of 10-15 years is rarely compatible with the objectives of short-term profitability of investors or building owners
- Complexities associated with public procurement
- Variability of energy prices

8.2.5 Policies and measures supporting ESCOs and EPC

The legal framework for the ESCO sector in Belgium is not yet developed. EPC is not defined by law, in spite of the provisions of the EED (JRC 2016), yet, it is expected that when the EED requirements are translated into actions, it will boost the market (Coolen et al. 2015). At the same time, the growing attention and acknowledgement is indicated by the fact that the concepts of ESCO and EPC appear in official documents. For instance, a note of the Flemish government spent a whole page on the possibilities of ESCO's for saving energy in SME companies (Van den Bossche and Peeters 2013).

The ambitious targets for building energy performance in Brussels⁵⁸, as well as the EU-wide renovation targets of central authorities' buildings can be expected to increase the working area of ESCOs.

8.2.5.1 Information and awareness raising measures

The awareness at the level of the Federal public authorities as well of the regional public authorities increased considerably, nevertheless the lack of enough and well disseminated best practice examples, makes it hard to convince potential clients. SMEs are in particular in need of more knowledge.

In 2013, Enterprise Flanders developed an ESCO initiative in order to promote energy services and ESCOs to energy suppliers as well as to end users. The initiative focused on the organization of a platform to highlight barriers to the ESCO market development and gather proposals for possible solutions. It includes preparation of analysis of current legislations for ESCOs, preparation of recommendations for promotion of ESCO market in Flanders and implementation of pilot projects focused on ESCO in SMEs (Government of Belgium, 2014).

The PACE measure in Brussels Region promotes the use of ESCO for owners of offices and companies by encouraging them to use ESCOs. Through the measure, it is planned to appoint a public operator that will offer assistance for tenders to launch on groups of buildings are made as part of this measure as well as develop and disseminate a model contract targeting households.

⁵⁸ The Building Code in Brussels requires the Passive House construction mandatory from 2015, going ahead of the EPBD deadline and setting stricter levels than the minimum performance of NZEB.

8.2.6 Conclusions, projections and recommendations

The energy service market in Belgium is considered to be relatively stable with some growth expectations coming mainly from both EPC and ESC projects facilitated by the public ESCOs and facilitators. While most private ESCOs have been targeting private building owners and industry, there is a clear need for public market and project facilitators to accompany public building owners (Government of Belgium, 2014).

In terms of future plans, Fedesco (dissolved in 2015) delivered a feasibility study for the creation of a new legal entity – ESCO which can provide a full range of energy services related to the whole value chain, including financial solutions, to public and private entities. This entity shall ensure that financing of its activities will not be consolidated with public debt (Government of Belgium, 2014).

To develop the EPC market in Belgium, the Government should focus on removing the major barriers found on the market. Measures to be considered include administrative adaptation of subsidy schemes, development of an output oriented energy efficiency policy, and support of the tendering process of EPC-projects in the public sector, creation of a National Observatory on EPC projects and governmental promotion of EPC concept in general. Financial instruments to support EPC (e.g. subsidy of the facilitation of EPC-projects and subsidy of innovative pilot projects and applied research) can also help provide the needed push towards a more active EPC market by making the work of facilitators accessible (Coolen, et al., 2015).

The resolution of the ESA 2010 definition of public debt and related Eurostat note would be also key in allowing public authorities to participate in EPC projects.

8.2.7 Summary

Total ESCO market status (2015)	moderately sized, stable, 10-15 ESCO companies
EPC market status (2016)	7 EPC providers, ca. 5 projects during 2014-16 (slight growth)
Total ESCO market size	n/a
EPC-only market size (investment)	n/a
EPC market potential	€500,000-fewbillion/yr. (very rough estimate in 2016)
EPC definition	no information
Established sub-sector(s)	<ul style="list-style-type: none"> • EPC is well-known on supply side, and in certain demand sectors; • public buildings, schools, educational sites • commercial buildings, offices • industrial sites, processes
Key general barrier(s) to be removed	lack of examples to follow, reluctance by in-house expertise, reluctance to use facilitators
Key barriers in the public segment	ESA 2010 definition of public debt, rare use of facilitators (which are considered expensive)
Key driver(s) to date	<ul style="list-style-type: none"> • impact of promotion by public ESCOs and other facilitators • ambitious targets for buildings in Brussels
Expected	As experience is piling up, the market is expected to follow/learn from the best practice examples. At the same

development/forecast	time, there are doubts particularly in case of EPC, which is considered too complex.
Opportunities for further development	more dissemination to reach new (private) clients, increase trust, remove EUROSTAT barrier

8.3 Bulgaria

8.3.1 ESCO market overview

The Bulgarian ESCO market is very small and its main activity is concentrated in the public sector with only few projects realised in the private and industry sectors. The market potential is estimated to be in the order of EUR 500-900 million, although a reliable and official market size assessment is not yet available (Bertoldi, et al., 2014).

The ESCO market in Bulgaria has gone through several phases in the last 20 years. It appeared in the late 1990s, but was negligible until around 2005-2006. The number of ESCOs was 18 in 2005 (Marino et al. 2010), but one company was responsible for most of the market activity (Nikolaev et al. 2015). The number of ESCOs was slowly increasing, reaching to 20-25 by 2010, with the help of the market support of the Bulgarian Energy Efficiency and Renewable Sources Fund (EERSF, at that time called BEEF). In spite of the positive impacts of the fund on the market, the number of companies dropped to 5 by 2013 (Gerginov, 2014), and could recover only recently. As of 2016, there are at least 15 ESCOs.

There is no ESCO association in Bulgaria (Bertoldi, et al., 2014).

8.3.2 Status with Energy Performing Contracting (EPC)

The Sustainable Energy Development Agency (SEDA, succeeding the Energy Efficiency Agency) keeps a register of EPC providers which signed the European Code of Conduct for EPC (SEDA, 2015), and their number has reached 12 as of 2016. These EPC providers have carried out EPC projects at least once in the past, but not all of them are active currently. There are several micro enterprises (less than 10 employees) specialized in energy audits, a couple of medium-sized equipment supply companies (e.g. biomass energy utilization technologies, lighting technologies, control equipment), and several large ones (several hundreds or thousands employees) that offer a wide variety of energy services, including energy supply (Nikolaev et al. 2015). Two of these companies are international ones.

EPC projects in 2013 were known to be carried out by 4 ESCOs in around 300 public buildings for refurbishment and modernization purposes. In municipalities two projects on the basis of EPC were implemented with the aim to improve existing lighting systems (Bertoldi, et al., 2014). As of 2016, the number of active EPC providers is put at around 8-15, with a slowly increasing trend. On the other hand, less than 10 projects have been started between 2014 and 2016 (JRC 2016).

EPC project primarily target educational buildings (such as schools and kindergardens) and healthcare facilities, as well as public buildings, student dormitories, street lighting, and industrial sites (JRC 2016), with average sizes of €200 000 - €500 000. The project length is around 7-9 years. The main player for financing both EPC and ESCO energy efficiency investment projects in Bulgaria is Energy Efficiency and Renewable Sources Fund /EERSF/. While the banks require high percentage of clients' own sources and complex rules, the EERSF require a maximum of 10% clients' own sources, fixed interest rate, without taxes and commissions. Nevertheless, financing by the EPC provider and/or by third party (bank) is not unknown. The main energy efficiency measures include replacements or upgrades of the heating installations, insulation of building envelopes and window replacement (European Labour Institute & Sofia Energy Agency, 2013), or improvement of the lighting system (Nikolaev et al. 2015). Full renovation of buildings is popular amongst public clients (Nikolaev et al. 2015).

The size of the EPC market was estimated between €100million and €500million in 2016 (JRC 2016).

8.3.3 Status with Energy supply contracting (ESC)

Most of the ESCO sector seems to be focused towards EPC as of 2016. The Bulgarian Energy Efficiency and Renewable Sources Fund (EERSF), formerly known as the Bulgarian Energy Efficiency Fund (BEEF) is one of the main drivers for development, and it was BEEF that kick-started the market around 2005.

Information about ESC is very scarce.

8.3.4 Demand side

8.3.4.1 Energy services in public sector

The Bulgarian public sector is the main ESCO client because of their reliability of payments (esp. compared to the private ones) (Nikolaev et al. 2015).

ESCOs have implemented several projects in different municipalities in Bulgaria. Examples include the Municipality of Dobrich, which signed an energy service contract for period of 7 years (with an investment volume of EUR 0.8 million) in order to carry out thermal renovations of 3 municipality buildings in 2010. In 2012 the monitored results showed that the average energy consumption of all buildings was reduced by 58% compared to the baseline consumption in 2010. In 2012, this municipality signed a 5-year contract for thermal improvement of a health institution (Mileva, 2013).

SEDA and the Public Procurement agency have jointly developed Guidelines on the application of energy efficiency and energy saving requirements when awarding contracts for purchasing of equipment and vehicles. These guidelines became an annex to the Public Procurement Act in 2010.

8.3.4.2 Energy services in other sectors

Although the potential of EE projects in the residential sector on the basis of EPC is particularly high, the market penetration of energy services is still at a very low level. In terms of the industry sector, a few Bulgarian companies have realized ESCO projects. Examples include projects implemented in the textile industry to reconstruct systems for steam production and transportation, replacement of fuel, insulation of steam or hot water pipelines, reconstruction of heating systems, lighting system improvement, monitoring of energy consumption and energy management.

8.3.5 Remaining market potential and barriers

The public sector (central government and municipalities) is associated with a large energy saving potential. There are 6400 registered public buildings with total floor area more than 1000m² (Ministry of Economy and Energy, 2014). In particular, the municipality of Sofia owns almost 1000 buildings. Most of these public buildings are old and require renovations, including energy efficiency improvements (European Labour Institute & Sofia Energy Agency, 2013).

The housing sector is another one with a legacy of very high energy inefficiency. The Bulgarian government announced to allocate 1 billion LEV (more than €500 million) for EE improvements of multi-family housing over the period 2015-2016. This could be a great help to finance residential projects outlined in the Sustainable Energy Action Plans of Bulgarian signatories (Covenant of Mayors, 2015).

There are several barriers limiting the market in the Bulgarian context. While the backdrop around 2008-2010 was largely due to the financial crisis, internal factors remain to curtail the opportunities of ESCOs.

The most important structural barrier to energy efficiency in general is the low and unpredictable energy tariffs (JRC 2016) – one of the lowest in Europe – which limit the possible profits. This is combined with the limitations due to the low income of the population and the financial restrictions of private businesses and public sector.

Lack of information and limited understanding of the ESCO concept remains important in Bulgaria. Although EPC-based projects have already been realised by ESCOs, the achieved results have not been disseminated to public or private entities thus many stakeholders are still not aware about this kind of energy services. There is a lack of trust in ESCOs.

In addition, financial institutions perceive financing of energy services as high risk business, especially for long-term finance, and neither EPC (as scheme) nor ESCOs (as beneficiaries) are eligible for public funding (excluding EERS Fund).

There are a number of factors that distort the ESCO market, and give preference to public sector projects. Regulations facilitate EPC in public buildings, and less in lighting or private sector. Public sector projects can access financing easier. Banks are more likely to finance projects within public sector, while small scale projects are deemed unattractive. The residential sector is not perceived as “good and safe” client. Another issue is that the prevalent condominium ownership in Bulgaria which is regarded as a barrier by ESCOs as it requires making contracts with many clients.

But the public sector is not without barriers either. There is low capacity in public sector for the preparation of EPC tenders and there was a legal limitation of the amount of EPC contracts for municipalities, based on the Eurostat note, until 2015. The legislation required that EPC related debts were below 15% of the average annual expenditures of the municipality, which made EPC in practice inapplicable, because most of them have already reached the threshold. However, changes to the policies were introduced to ease this situation. Another issue is related to the lack of reliable energy consumption data, which are important to set up the baseline consumption and calculate energy savings (Bertoldi, et al., 2014).

8.3.6 Policies and measures supporting ESCOs and EPC

The Energy Efficiency Act (promulgated SG No. 98/14.11.2008 and amended in 2015) is the main legislation regulating the provision of energy services, setting the main provisions about the process of energy service to energy end-users (Ministry of Economy and Energy, 2014). Furthermore, the Public Procurement Act and the Law on Municipal Debt are also relevant.

In order to overcome some barriers, several actions have been taken since August 2015. For example, an amendment was introduced to the Law on Municipal Debt (Art. 17b), Art. 32, P.1 of the Law on Public Finances (P. 12 of the Transitional provision of the Law on Municipal Debt), based on which municipalities may undertake new debt under EPCs every budgetary year up to 15% of their average annual capital expenditure for the last 4 years. The EPC investments will not be taken into consideration when calculating the general limit of the overall annual liabilities of the municipalities for repayment of debt.

The Energy Efficiency Law was also amended so that EPC projects can be signed for up to 10 years, instead of the 5 years before, and this may be further extended.

Another amendment to the Public Procurement Law allows that projects are financed by forfeiting - applicable to receivables assignment agreements (including factoring and forfaiting agreements) concluded after 13 May 2014.

The methods for the assessment of energy savings from energy services are set out under Article 9(2) of the Energy Efficiency Act and the conditions and procedure for the establishment and payment of the funds planned under EPCs are outlined in the Regulation No RD-16-347 of 2 April 2009.

In terms of financial mechanisms, the Energy Efficiency and Renewable Sources Fund (EERSF), earlier BEEF plays a major role in developing the energy services market as a co-financing and guarantee institution for ESCO contracts (Ministry of Economy and Energy, 2014). There is also a revolving fund operated by EERSF. The initial capitalization for the Fund was provided by the Global Environmental Facility, Government of Bulgaria, and the Government of Austria as well as from private donors-grants, and the ESCOs had access to the portfolio guarantees and purchase facility (project). By September 2014, the Fund had funded 197 projects with a total of USD 61.8 million, of which USD 45.7 million were allocated for loans and USD 16.1 million for guarantees (Gerginov, 2014).

The SEDA issued guidelines for applying EPCs in public and administrative buildings. These guidelines have been prepared to support the implementation of the Energy Efficiency Act and gives provisions for services which are included in the contracts for energy services.

SEDA and the Public Procurement agency have jointly developed Guidelines on the application of energy efficiency and energy saving requirements when awarding contracts for purchasing of equipment and vehicles. These guidelines became an annex to the Public Procurement Act in 2010.

8.3.6.1 Information and awareness raising measures

Dedicated workshops for ESCOs and energy services have been organized in Bulgaria in the last few years mainly with the help of international financial institutions (e.g. EBRD and EIB) or international organizations. The aim of those events has been to promote the concepts of EPCs as well as to inform participants about ESCOs.

Further promotional activities are undertaken by the ESCOs themselves (European Labour Institute & Sofia Energy Agency, 2013).

8.3.7 Conclusions, projections, and recommendations

The Bulgarian energy services market has been fluctuating for about 20 years, but never growing to a significant size, and it is still largely limited to the public sector. This is despite the fact that the potential for EPC and ESCO activities in Bulgaria, especially in the building sector, is high due to its old, energy inefficient building stock. The potential is also significant in other sectors such as services and industry.

As an emerging market, the EPC market is very vulnerable to negative signs in the business environment and can experience ups and downs. The barriers are grave and experts are divided on the future expectations of the market, even though all expect at least some level of growth.

Seeing the increasing number of participants, it is expected that the EPC market will develop and more companies will offer Energy Performance Contracting in the next 4-5 years. In the next 4-5 years the energy prices will rise significantly and the commercial banks will become more familiar with EPC and ESC and will be ready to finance this kind of projects and companies.

Some of the key barriers are external, such as energy prices, and their change will have significant impact on the development.

As a result of the promotion and awareness raising activities higher quality projects are foreseen (due to more transparent tenders and higher competition), increased customer trust in EPC, more informed customers and more competent ESCOs.

To support the development of the ESCO market in the residential sector, some local experts suggest that PPP regulations should allow ESCOs to act on behalf of homeowner associations as beneficiaries. Furthermore, amendments of Condominium Act and Tax should be considered (Georgiev, 2013). More information and awareness raising activities targeting all actors involved (from clients to banks) are necessary in order to increase confidence in the EPC and ESCO concepts.

8.3.8 Summary

Total ESCO market status (2015)	preliminary phase, around 15 companies
EPC market status (2016)	12-15 EPC providers, with slight growth in the last decade, but only max 10 projects in 2014-16
Total ESCO market size	€33 million (investment)
EPC-only market size (investment)	n/a
EPC market potential	€500-900 million (refers to whole ESCO market!)
EPC definition	provided in the updated Energy Efficiency Act (exact translation of EED)
Established sub-sector(s)	<ul style="list-style-type: none"> EPC in public sector: buildings and street lighting; industrial sites, processes.
Key general barrier(s) to be removed	<ul style="list-style-type: none"> Low, but unpredictable energy tariffs Lack of eligibility for public funding Lack of information about EPC providers Lack of trust in ESCOs
Key barriers in the public segment	<ul style="list-style-type: none"> EUROSTAT definition Low capacity in public sector for the preparation of EPC tenders Lack of trust Legal limitation of the amount of EPC contracts for municipalities
Key driver(s) to date	<ul style="list-style-type: none"> price increase promotion and IFI assistance some legal changes, e.g. extending the possibility of contract length
Expected development/forecast	Unsure, as there is now experience to build on, but some barriers are external and major
Opportunities for further development	remove EUROSTAT barrier; avoid bad experiences (failed projects); increase awareness raising, further legal adaptation (e.g. PPP legislation and Condominium Act and Tax).

8.4 Croatia

8.4.1 ESCO market overview

The Croatian ESCO market is relatively small, but has experienced growth since 2012. HEP ESCO, a public ESCO company created in 2003⁵⁹, is still the main provider of energy services, but there are new entrants gaining importance. HEP ESCO has implemented more than 100 projects in different sectors (buildings, street lighting, industry, energy supply) (Zanki, 2014) Wilhelm 2015). As of 2016, around 10 ESCO companies operate in Croatia. The majority of them are small private companies. Of these, 5 are EPC providers (JRC 2016). The value of the Croatian market for energy services is estimated to be

⁵⁹ HEP ESCO is a public company owned by the public enterprises HEP-Hrvatska Elektroprivreda, producer and distributor of energy. The company was established in the framework of The Energy Efficiency Project Croatia initiated by the World Bank (IBRD) and Global Environment Facility (GEF) in collaboration with Hrvatska Elektroprivreda d.d. and Croatian Reconstruction and Development Bank (HBOR). Source: HEP ESCO website: www.hep.hr

around €50 million, and its potential was put at around €250 million in street lighting and €1,250 million in public buildings.

8.4.2 Status with Energy Performing Contracting (EPC)

EPCs were introduced for the energy renovation of public buildings in the framework of the Programme of Energy Renovation of Public Sector Buildings 2014-2015. In this framework, an EPC model was developed based on following assumptions (Ministry of Economy, 2014):

- The model contract is based on the Public Procurement Act;
- Payment are based on achieved energy savings;
- Savings are proven by a project, verified by energy auditors and an expert commission;
- The contract duration maybe up to 14 years;
- The minimum scope of intervention (EE measures) is determined before the start of the contract;
- After project implementation (energy renovation of building) , the contractual parties are obliged to monitor energy consumption;

It is estimated that there are 5 EPC Providers in Croatia in 2016. However, the number of implemented EPC projects is very low, below 10 during the last few years. It is foreseen that the EPC market is on a growing trend.

The targeted clients of EPC include street lighting and public buildings (including hospitals), industrial sites and processes, as well as water utility establishments. Smaller projects (e.g. street lighting) are in the value of €200,000 - €500,000, while larger ones (buildings) range between €1,000,000 - €5,000,000. In terms of project length, the small ones are contracted for 3-5 years, longer ones for 12-15 years.

At the moment, the distribution of EPC is limited due to the lack of understanding by potential clients of the general benefits of energy services, and little it is understood what the added value of EPCs could be.

8.4.3 Status with Energy supply contracting (ESC)

HEP ESCO has already implemented approximately 100 projects in industry, energy supply, buildings and public lighting, most of them in the form of energy service contracts with fixed payments (Wilhelm 2015). Energy performance guarantees are not yet given in the usually applied business models. Energy savings are defined at the time of contracting (based on project documentation). In addition the achieved energy savings have not been monitored and verified during the project lifetime (Streetlight-EPC project, 2015). The level of project investment typically ranges from €130,000 to €1.3 million. Calculated pay-back periods are in the range of 5-10 years.

8.4.4 Demand side

8.4.4.1 Energy services in public sector

In October 2013, the Government of Croatia adopted the Programme of Energy Renovation of Public Sector Buildings 2014-2015 (hereinafter: Programme). In the framework of the Programme⁶⁰, 200 public buildings or buildings for public use were to be renovated, with investments of HKR 400 million (approx. €53.3 million). In the initial stage, the programme was implemented by the Centre for Monitoring of Business activities in the Energy Sector and Investments (CEI) and from August 2015, the

⁶⁰ Information about the Programme implementation can be obtained through the workshops and presentation, as well as the website of APN at: www.apn.hr

responsibility lies with the Agency for Transactions and Mediation on Immovable Properties (APN). For implementation purposes, CEI prepared tender documentation for energy services. The tender documents were drawn up in the framework of the Public Procurement Act and, specifically, for the open public procurement procedure. The renovation of buildings has been implemented through private ESCOs using EPCs developed in the framework of the programme (Ministry of Economy, 2014).

The programme financing is partially provided by the Croatian Fund for Environmental protection and Energy Efficiency. The Fund procures loans for co-financing of the section of the programme related to energy renovation, amounting 40% of eligible costs, as well as the section pertaining to drawn up energy audits, energy performance certificates and when necessary terms of reference, amounting 100 % of the eligible costs (Ministry of Economy, 2014).

In addition to the above, in order to improve the market conditions for private investments (including ESCOs) within the framework of the programme, the Guarantee Consortium was established. This Consortium provides guarantees to ESCOs which participate on Programme implementation for earmarked loans for eligible costs related to the provision of energy services (Ministry of Economy, 2014).

HEP ESCO realized several projects in the public buildings such as schools and hospitals owned by the central government or municipalities. For example, energy renovation (envelope insulation, replacement of windows, improvement of heating systems) was undertaken in 41 public schools with a project value in the range of €195,000-1,625,000 as well as in two hospitals with an investment value of €990,000 and €1,510,000. In addition, several projects for street lighting were implemented in 9 municipalities and towns in Croatia (Zanki, 2014).

8.4.4.2 Energy services in other sectors

ESCO projects implemented by HEP ESCO also targeted the industrial (6 projects) and service sectors. The implemented projects in industry included EE improvements in heating and cooling systems in building and production facilities, installation of heat exchangers for heat recuperation, improvement of indoor lighting in buildings and production facilities, installation of energy monitoring systems, installation of frequency converters for electro motors etc. Hotels on the Adriatic coasts were also among the client list of HEP ESCO. For these clients, implemented projects were related to the installation of thermal solar collectors for heating of buildings and swimming pools, introduction of recuperation of waste heat from chillers and improvement of heating and cooling systems (Zanki, 2014).

8.4.5 Remaining market potential and barriers

The potential for energy services and EPC is especially high across all sectors. Most public buildings owned by cities and municipalities are old with poor energy performance levels. They were mainly constructed in the period 1945-1990 according to outdated building codes which were used before 1987. In particular, the City of Zagreb owned around 1,700 buildings with an average energy consumption 150 – 300 kWh/m²year for heating. They account for 7.5% or 550 GWh of the energy consumption of the total building stock in City of Zagreb (Segon & Domac, 2013)

Within the service sector, the highest energy saving potential lies with hotels located mainly on the Adriatic coast and constructed in the period before 1990.

Various barriers to market growth have been cited in the literature and by respondents to our survey. Strong lack of experience with energy services and especially with EPC is one of the barriers that constrain faster development of the Croatian ESCO market. With the current implementation of the Programme based on EPCs, this barrier is, however, expected to be partly addressed. Although the EPC model is recognized by local authorities in cities and municipalities, the risk of EPC financing (achievable energy savings, guarantees, maintenance) is of concern for local authorities. EPC is considered a

risky venture by them with open contractual (legal) issues. The projects implemented by HEP ESCO (not based on an EPC) are also believed to have destabilised the EPC market by creating mistrust for EPC models due to the lack of knowledge about the difference between ESC projects with fixed fee vs. EPC projects with a performance guarantee (Streetlight-EPC project, 2015).

Based on the answers from the EPC survey 2016, Table 9 summarises the many barriers that remain in Croatia.

Table 9 – Main barriers and their solutions in Croatia (source: JRC 2016)

Barrier	Potential solution
Availability of financing and high interest rates	EPC providers see this as one of major roadblocks. The level of risk is determined for EPC provider and client separately by the banks. Financing is not project based and banks tend to use additional safeguard conditions as mortgage. Because of the country risk and perceived client risk interest rates are high, prolonging the needed contract duration. Possible solutions could include a guarantee fund to stimulate project financing, independent technical and economical agency trusted by the banks and clients to reduce the calculated risk and clearer legislation or instructions from the government to provide easier administration.
Low energy prices	Low energy prices, compared in absolute value to other EU MSs, have an effect of prolonging contracts. As a solution, EPC providers tend to invest in buildings and processes that have high energy consumption, targeting, in absolute value, high energy cost savings. With this approach smaller projects are not interesting and are left for potential clients to invest themselves. Solution that has been mentioned by some companies is additional taxation of energy to increase unit prices.
Lack of knowledge and trust	Most of the barriers for the development of the market potential are all somehow related to the lack of trust. The longevity of contracts wouldn't be an issue if customers had confidence on the results of the project. Same happens with the common belief of being able to bypass the EPC provider and develop projects without their intervention. Independent technical and economical agency trusted by the banks and clients and/or calculation tool could form the solution.
Potential client believe that they can implement energy measures themselves	When financing is not an issue for potential client, energy efficiency measures are implemented as an in-house project. In these situations EPC providers tend to convince potential clients that off the books financing offers greater flexibility for future planned non-energy related projects. Only, fully developed market and standard business practice can eliminate this roadblock.
Market insecurity	Economic crisis has scared many of the companies and potential investments, and they see EPC as an investment, are carefully studied and picked for realization. Economic recovery will stabilize the market for the increase in investment activity.
EPC is not interesting for companies that do not own the building that they are using	Companies that rent buildings are not interested in EPC solutions even if they are paying for the energy costs (not included in rent). Those companies have stated that building owner has to be stimulated or compelled by governmental policy to implement EE/RES measures.
Lack of trained and	Introduction of internationally (EU) verified and approved training

well versed personnel	programs (preferably EU supported)
High transaction costs	Improvements of legal and regulatory framework and introduction of guarantee based schemes
Lack of guarantees	Top – up alternative investment funds and schemes providing risk mitigation products (preferably EU/government supported) would be needed
Lack of clear regulatory and contractual rules	Standardization of rules and procedures and introduction of publicly supported pilot projects

Very high costs for capital for ESCOs (high interest rates and high loan collaterals provided by commercial banks) make lending for private ESCOs very expensive in comparison with own investments. For the public sector, financing is partially provided by the Fund in the form of grants.

8.4.6 Policies and measures supporting ESCOs and EPC

The Law on Energy Efficiency⁶¹ transposes the EED, including an EPC definition, which is an exact translation of the EU definition (JRC 2016). The Ordinance on contracting and implementation of energy services in public sector⁶² was adopted in 2015 based on the Energy Efficiency Law, which defines the same rules specifically for the public sector. The important difference in the national definition of EPC compared with the Directive is that actual project performance is not measured and verified on monthly bases (on the energy bills or energy monitoring). Project performance is based on the main project design details regarding energy performance calculation.

8.4.6.1 Information and awareness raising measures

According to the NEEAP of Croatia the measure "Promotion of energy services", aimed at raising awareness on energy services among building owners and users, are included. The measure plans to promote ESCOs and energy services through the organization of informative campaigns disseminating material on the benefits of EE projects through ESCOs and EPCs. In addition, a web portal on energy services will be created in order to provide citizens with information on:

- Energy services principles and models;
- Good practice example;
- ESCOs and their qualifications;
- Examples of EPCs and ESCs;
- General promotion of achieving savings by using energy services;

Within the scope of this measure, plans on regulations for qualification of energy services providers are also envisaged.

8.4.7 Conclusions, projections and recommendations

There is a clear and urgent need for rehabilitation of both public and private buildings in Croatia, while available funding is scarce. This makes the potential for the ESCO market, and in particular EPC an interesting business model.

The EPC sector seems to be preparing for a boom, there are several start-up businesses that have trained themselves and promote the variations of the business. A huge growth is expected based on the estimated €100-500 million potential.

⁶¹ http://narodne-novine.nn.hr/clanci/sluzbeni/2014_10_127_2399.html

⁶² http://narodne-novine.nn.hr/clanci/sluzbeni/2015_01_11_212.html

The legal framework conditions have been created. There have been large number (over 100) examples of projects realised by HEP-ESCO. These projects are however designed as ESC arrangements requiring a fixed price for the d services without providing any energy performance guarantee. There are lot of energy related companies (e.g. energy retail companies, equipment suppliers, engineering firms) interested to extend their core-business to EPC services.

Other governmental actions are expected to have a positive impact on the market, too. For example, implementation of the Programme of Energy Renovation of Public Sector Buildings 2014-2015 should contribute to better promotion of the energy services and EPCs in Croatia. Adopted tender procedures, model EPC prepared for the Programme are established and monitoring bodies shall set up standards for EPC implementation in the public sector. If these model documents and guidelines are picked up by the market as standardised documentation, it will provide further starting force. It is important for the standard documents for public sector facilities to be acceptable for Eurostat.

The legislator and different energy related agencies will promote EPC more actively in the coming years, which can make commercial banks more familiar with the concept. A list of ESCO firms will be shown on the energy efficiency national portal. EPC projects will continue to be co-financed by national grants and it is expected that a revolving fund will be set up.

8.4.8 Summary

Total ESCO market status (2015)	pre-moderate, there are ca. 10-15 ESCOs, and one ESCO has completed 100s of projects
EPC market status (2016)	just initiated, 5 interested
Total ESCO market size	€10 million (2010) and €100 million (2015 – might be the potential)
EPC-only market size (investment)	n/a
EPC market potential	unclear information, may be around €100 million
EPC definition	given in the Energy Efficiency Law
Established sub-sector(s)	<ul style="list-style-type: none"> • ESC has been applied quite widely
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • lack of trust • lack of third party interest
Key barriers in the public segment	<ul style="list-style-type: none"> • EUROSTAT definition, • low demand, • legal barriers, • lack of fiscal measures
Key driver(s) to date	<ul style="list-style-type: none"> • model documents and guidelines • Energy Efficiency Law
Expected development/forecast	Some growth in ESC and a boom is foreseen by experts in EPC
Opportunities for further development	There are lot of energy related companies (e.g. energy retail companies, equipment suppliers, and engineering firms) interested to extend their core-business to EPC services. If some barriers are dealt with, a proper growth can happen.

8.5 Cyprus

8.5.1 ESCO market overview

The ESCO market in Cyprus has been long awaited to start off the ground, but it is currently still underdeveloped. However, recent policy actions are expected to create a favourable environment for market growth. In particular, the implementation of the 2014 Amending Law and Regulations on the operation of Energy Service Providers is expected to lift various regulatory barriers to the ESCO market growth. Important issues are now addressed such as the licensing of energy service providers, their operating and registration terms as well as establishment of minimum provisions to be covered in energy performance contracts.

In total, 19 ESCO companies were registered in the official registry as of the end of 2015⁶³. The creation of the registry is seen as positive development, before which ESCOs did not exist on the market. In the next years, a number of energy efficiency contracts are expected to be signed by public authorities, which falls under Cyprus' commitment to upgrade the energy performance of 3% of buildings owned by the central government every year (EED Article 5).

8.5.2 Status with Energy Performing Contracting (EPC)

Forecast about the number of contracts to be signed is not available. The Cypriot NEEAP 2014 stated that the preparation of template tender documents for the selection of energy service providers and template documents for Energy Performance Contracts falls under the responsibility of the Electrical and Mechanical Services Department. The department organised a public consultation process in July 2014 and finalised the relevant documents in October 2014 (Thomas, 2014). The EPC template documents, presented in November 2014, include the legal framework, EPC definition, methodologies (shared or guaranteed savings, variable contract term), applications, details on the technical & financial capacities of operators, main provisions of contracts etc. (Department of Electrical and Mechanical Services, 2014). The template is expected to be used by other bodies wishing to use energy service providers for the implementation of energy efficiency measures.

8.5.3 Status with Energy supply contracting (ESC)

There is no experience with ESC-based projects in Cyprus yet.

8.5.4 Demand side

8.5.4.1 Energy services in public sector

A contract notice was launched in 2015 for the energy upgrading of two public buildings through energy performance contracting. The two chosen buildings are the Central Offices of the Department of Public Works and the Central Offices of the Department of the Electrical and Mechanical Services, which are of G and D energy class, respectively. In the next years, a number of energy efficiency contracts are expected to be signed by public authorities in the context of Cyprus' commitment to an annual energy upgrade of 3% of the useful floor space of buildings owned by the central government. At this stage, it is impossible to make any estimations on the number of contracts (Piripitsi, K; Stougianis, E; Thomas, G; Kakouris, M, 2014).

8.5.4.2 Energy services in other sectors

Due to the limited experience, only the public sector has been in the light for ESCOs (Piripitsi, K; Stougianis, E; Thomas, G; Kakouris, M, 2014).

⁶³ increasing from only 5 on 08 April 2015

8.5.5 Remaining market potential and barriers

The potential for the market development of energy services in Cyprus has been described as promising given the substantial energy saving potential in buildings. This is attributed to the poor performance levels of the Cypriot building stock, high energy intensity of the economy and increasing trends of energy supply product costs. Furthermore, it seems that there is the prospect for the development of the institution of energy services by the public. Sectors of interest include street lighting, large hotels, hospitals and generally large commercial buildings or office buildings belonging either to the public sector or large enterprises (Maxoulis, 2012).

Possible explanations behind the absence of ESCO activities in Cyprus include the lack of trust of end-users with regards to the procedure and lack of expertise and experience of ESCOs. In addition, the relatively small market, high interest rates, lack of access to finance — especially under current economic conditions — and lack of specialized expertise, are also important factors which hinder the development of the market (Maxoulis, 2012). Verifications of savings — and safeguards — are also regarded as important (Charalambous, 2013).

8.5.6 Policies and measures supporting ESCOs and EPC

The ESCO legislative framework and standard procedures including template energy performance contracts (public sector) are now in place. The latter has now been addressed through the new legislation KDP210 / 2014, which cover the following main points:

The operating conditions and the registration terms of energy service providers in the registry of energy service providers and the issuance of the relevant licence by the competent authority (Energy Department of the MECIT).

The duties of the Energy Auditors Committee in relation to energy service providers.

The type of energy services provided to final consumers through energy efficiency contracts and the minimum provisions to be included in such contracts.

The stages to be followed by energy service providers to confirm increasing energy and financial benefits.

The way in which the competent authority must perform the audit and evaluation of the energy services provided.

Other relevant legal acts are:

- N.149 (I) / 2015 The Law on energy efficiency in end-use efficiency and energy services (Amendment) (harmonizing 2012/27 / EE)
- N. 56 (I) / 2014 Law amending the Laws on energy efficiency in end-use efficiency and energy services laws of 2009-2012
- N. 53 (I) / 2012 amending Law on energy efficiency in end-use efficiency and energy services Law.
- N. 31 (I) / 2009 Law on energy efficiency in end-use efficiency and energy services (harmonizing 2006/32 / EC)
- Regulations
- KDP 163/2012 Inspectors Energy Services of the Energy Service
- KDP 184/2012 Energy Auditors (registry and qualifications)
- KDP 210/2014 Registry energy service companies (ESCOs)
- KDP 421/2014 Inspectors Energy Services of the Energy Service

8.5.6.1 Information and awareness raising measures

No awareness raising measures were planned for in the Cypriot NEEAP. The new regulations include a provision for the publication of guidelines on energy efficiency contract templates in the public sector. The publication of information on best practices for energy efficiency contracts and lifting the regulatory and non-regulatory barriers to the implementation of energy efficiency contracts have been included in the relevant provisions of the harmonising draft law.

8.5.7 Conclusions, projections and recommendations

A number of key elements, deemed as key drivers for a kick-start of the ESCO market, are now in place in the Cypriot framework. A supportive legislative framework, a prerequisite for the development of an ESCO market, has now been developed, addressing, inter-alia, the licensing of ESCOs, their operating conditions registration terms, minimum provisions in contracts, etc. A registry of ESCO companies is also made available and a template for EPC contract has recently been published. The two pilot projects involving ESCOs in the public sector are expected to showcase the benefits of the ESCO concept in practice. Moreover, recent building regulatory developments are expected to encourage potential clients to seek energy efficiency improvements and subsequently help of ESCOs. More awareness and information sharing measures are necessary to attract the interest and increase the trust among potential partners.

8.5.8 Summary

Total ESCO market status (2015)	on the ground, 19 ESCOs registered, no projects
EPC market status (2016)	initiation (all ESCO initiatives seem to be EPC)
Total ESCO market size	0
EPC-only market size (investment)	0
EPC market potential	n/a
EPC definition	provided in the 2014 Amending Law and Regulations on the operation of Energy Service Providers
Established sub-sector(s)	<ul style="list-style-type: none"> • pilots are prepared currently
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • lack of examples to follow, • lack of trust • high interest rates
Key barriers in the public segment	<ul style="list-style-type: none"> • complexity of the concept • in-house expertise
Key driver(s) to date	<ul style="list-style-type: none"> • framework legislation established • templates • supplier interest
Expected development/forecast	Depends on the success to kick-off the market, but expected to start-off
Opportunities for further development	the two pilots should be successful and showcase EPC

8.6 Czech Republic

8.6.1 ESCO market overview

The ESCO market in the Czech Republic is considered well developed. After the first projects in 1993, the market reached a tipping point in 2001, since when it has been continuously growing. Since then, more than 200 ESCO projects have been implemented, many of which EPC projects.

Currently, the key driver is seen to be the amendment to the Energy Management Act (July 2015), which enacted definitions and obligatory content for EPC contracts, which are expected to further boost, particularly the EPC market (JRC 2016).

Furthermore, the availability of facilitators and the application of information measures contribute to the health of the Czech ESCO market.

The Association of Energy Service Providers (APES) was established by 7 ESCOs and 6 consulting companies in 2010 to promote the EPC and energy services in the Czech Republic (NEEAP, 2014), and remains to be a key stakeholder on the Czech market.

8.6.2 Status with Energy Performing Contracting (EPC)

As of 2016, there are 8-10 active EPC providers, which focus on the provision of guarantee based energy performance contracts. About half of them (5-6 companies) have a long experience with EPC-based projects on a regular basis.

In recent years, 10-20 new projects take place annually. The number of EPC projects has been slightly growing, because there is an increasing interest from potential clients. However the total turnover remains unchanged when compared to 2010 (JRC 2016).

EPCs are mostly implemented in the public sector whereby SMEs together with large municipalities organise tendering for energy services, for which typically 4–6 offers are submitted. The typical project size varies from EUR 0.5-5 million (Valentova & Szomolanyova, 2013, JRC 2016), and projects typically last for 8-12 years. Projects are typically financed by the suppliers (ESCO's own budgets and/or using short term loans). After project completion forfaiting (selling receivables) is used for long term project financing, in which banks are most active.

The annual investment volume for implementation of EPC has been around EUR 10 million (Department of Electrical Engineering, 2014).

8.6.3 Status with Energy supply contracting (ESC)

According to experts, the difference in the concepts of ESC and EPC is well understood by the market. There are currently about 20 ESCOs operating on the market. Most of them are members of the Association of Energy Service Providers (APES) (NEEAP, 2014).

8.6.4 Demand side

8.6.4.1 Energy services in public sector

The majority of EPC projects have been carried out at municipal and regional levels, mostly in primary and secondary schools and public buildings. The second most important sector for ESCOs is the healthcare sector (with more than 20 realised projects), followed by universities and cultural facilities (e.g. the National Theatre or State Opera in Prague) (Szomolanyiova & Sochor, 2013). Typically, EPC-based projects aim to decrease the heat consumption and therefore the implemented measures in most projects focus on the replacement of boilers, installation of heat recovery or heat exchangers, installation of boiler controls, etc. (Valentova & Szomolanyova, 2013).

In the Czech Republic, subsidies to support the implementation of energy saving projects are available from the EFEKT programme⁶⁴ administrated by the Ministry of Industry and Trade. The subsidies can be used for different kinds of activities related to energy savings such as the implementation of energy management systems according to ČSN EN ISO 50001, where the category of applicants has been extended to include cities with more than 20.000 inhabitants, reconstruction of heat systems in the buildings for regional, municipal, district, social and health care facilities, schools, housing associations and entrepreneurs, revitalization of public lighting in municipalities and cities. In addition, the EFEKT 2014 Programme provides the possibility to subsidise up to 80% or CZK 100.000 (around EUR 3.600) of the overall eligible costs for the preparation of energy-saving projects undertaken by EPC (Ministry of Industry and Trade, 2014). In 2016, the EFEKT⁶⁵ subprogramme "Energy efficiency measures in buildings applied via EPC" (B3) made available 70 million CZK (ca. €2.5 million)⁶⁶ for governments and public organisations to implement EPC projects (max 70% share of the accepted costs can be subsidised) (JRC 2016). In the period 2009 – 2013, a number of EE projects were implemented with combined financing by subsidies and EPCs. Examples include the most extensive project with for the reconstruction of 15 public schools in "Prague 13 district". Subsidies (EUR 7.5 million) from the Operational Programme Environment (OPE) were used for the thermal insulation of buildings in 2009. In addition, in 2010 an ESCO was selected to implement EPC-based project in school buildings with a total investment volume of EUR 15 million, out of which EUR 10.8 Million were spent for thermal insulation and EUR 4.4 million were invested for other measures specified in EPC which were repaid from the energy cost savings for 10 years (Szomolanyiova & Sochor, 2013).

8.6.4.2 Energy services in other sectors

A small number of EPC-based projects are implemented in the industrial and service sectors (office buildings and hotels). There is greater risk associated to private clients (reliability and partnership) during financing, as well as these clients seem to use more stringent rules regarding the specification of requirements when selecting the ESCO.

It is, however, expected that the share of EPC projects in these sectors will grow in the period until 2020 (Valentova & Szomolanyova, 2013).

There are no EPC projects in the private domestic sector as a result of legal restrictions and ownership problems.

8.6.5 Remaining market potential and barriers

The building sector in the Czech Republic is considered to have a significant potential for energy services and EPC-based projects due to the fact that most buildings have been constructed before 1992 and have old heating systems and poor energy performance levels. However, it should be noted that for the residential sector, although the potential benefit (in terms of energy savings and financial benefit) is substantial, EPC and energy services are not considered suitable due to very high transaction costs and complex ownership structures. The renovation targets for governmental buildings opens up a large ESCO potential, as far as the barriers described below can be resolved.

Although there are not major legal or other barriers to the implementation of EPC projects in the Czech Republic, experts have identified various obstacles to faster development of the EPC market. A significant obstacle is the restriction to implement EPC contracts in the "Organisational Units of State – OUS", which are the largest part of public facilities owned by the state. The OUS are neither allowed to receive nor provide supplier loans to finance projects pursuant to the Section 49 of Act no.218/2000. They can receive loans only from special "capital investments" provided by the state budget.

⁶⁴ The budget of the EFEKT 2014 Programme was CZK 30 million.

⁶⁵ <https://www.mpo-efekt.cz/cz/programy-podpory/64506>

⁶⁶ It is expected that the total sum of the subsidy will be much lower as the total budget for the whole subprogramme „B” is 80 million CZK, which has to be shared by 3 subprogrammes.

EPCs are allowed to be implemented only in “allowance organisations”, which are public entities partially funded by the public purse (Valentova & Szomolanyova (2013), Department of Electrical Engineering (2014)). The EUROSTAT definition of public debt has practically stopped the possibilities for EPC implementation in governmental buildings.

Split incentives are also one of the obstacles to the implementation of EPCs in public entities. The public facility managers have limited access to bills and cannot control the energy consumption of facilities, since the bills are taken by owners of buildings as state or local authorities. Managers are therefore not very much motivated to carry out EE projects. Some of public entities can benefit from energy savings, but other cannot (Valentova & Szomolanyova, 2013).

The lack of trust in EPC and ESCOs is an important barrier to the development of energy service market in the Czech Republic. Public building decision makers are not typically ready to undertake public tenders for energy services, since they are contradictory to normal tenders in which the lowest cost is the main decision factor. Lack of trust is also one of the key barriers for industrial clients.

8.6.6 Policies and measures supporting ESCOs and EPC

State support in the form of subsidies granted to energy service providers began in 1999, where contributions from the investment framework for installed energy-saving installations were made. Following a strategy revision in 2006, subsidies were channelled to contracting authorities seeking energy service providers for the preparation of an EPC-based project and organisation of public procurement tendering procedures. In 2012, support was renewed under the EFEKT Programme in the form of subsidies to identify projects suitable for clients from the ranks of public administration (Department of Electrical Engineering, 2014).

A register of ESCO/EPC providers and facilitators has been established by the Ministry of Industry and Trade (Department of Electrical Engineering, 2014, JRC 2016).

A model contract⁶⁷ has prepared by APES in cooperation with the Ministry of Industry and Trade, which primarily serves public EPC purposes based on guaranteed savings (Department of Electrical Engineering, 2014). The document was prepared with the financial support of the State Programme EFFECT to promote energy savings and utilization of renewable energy for 2012. The model contract includes details about all EPC-related issues such as the rights and obligations of the contractual parties (clients and ESCOs), provisions for quality assurance for equipment and services provided by ESCOs, a provision that obliges ESCOs to provide a list of measures, a provision for guaranteed savings and provisions for settlement of disputes. The contract also includes a penalty provision for cases when ESCOs cannot achieve the guaranteed savings. However, pursuant to the model EPC, ESCOs can receive a premium from clients if the achieved energy savings are higher than agreed. It also mentions that in the case of disputes arising from contract implementation, an independent mediator can be engaged, which shall act as an independent expert, not as an arbiter.

There are a number of other documents related to EPC that can be found on the website of the Ministry of Industry and Trade:

- Methodology for the preparation and implementation of EPC-based projects;
- Code of Conduct for EPCs;
- The process of preparing public tendering procedure for the provision of energy services via guaranteed-savings EPC;

⁶⁷ The model contract is available on the web site of the Ministry of Industry and Trade at: <http://www.mpo.cz/dokument105425.html>.

The EPC methodology includes provision for general principles, advantages, disadvantages and risks of this type of contract, tendering and implementation in public organizations, financing of EPC, procedure for monitoring and evaluation of energy savings. It also specifies that the selection of providers of energy services with guaranteed savings for public entities shall be carried out in accordance with the Law No. 137/2006 on Public Procurement, in the form of negotiated procedure with publication. This is a public service contract because the ESCO itself proposes the concept and scope of the EPC-based project, under which the economic outcome is guaranteed. Since the complexity of the selection process including the preparation of technical and other documentation, appropriate procedures and evaluation criteria, the clients typically collaborates with professional consulting firms to undertake this task (Ministry of Industry and Trade, 2014).

8.6.6.1 Information and awareness raising measures

Information campaigns, conferences and other promotion activities have been organized in the Czech Republic for many years. The Association of Energy Service Providers (APES) has played a very important role in promoting ESCOs and EPCs. Information on energy service companies along with other information and links is available on their website www.apes.cz. Furthermore, the existence of facilitators and their input for promotion have been crucial in resolving a lot of informational barriers.

In spite of a few failed projects that have had a negative impact on the market, most of the best resulting projects have been well disseminated and followed by other authorities. The success of the public sector projects has also implied a spread over for an increasing interest by private clients.

A number of EU projects have been implemented in the last years in the Czech Republic (Transparens, EESI2020, GuarantEE, Combines, etc.), which produced registries of best practices, organised market facilitation seminars, and carried out a number of training programmes for clients and for the suppliers. The network of facilitators has been also developed.

8.6.7 Conclusions, projections and recommendations

The Czech energy service market is one of the most developed markets. In particular, EPC projects are popular and well understood, with the guarantees given a special attention. Even the amendment of the Energy Management Act (of July 2015) proposes the obligatory parts of an EPC project, with a highlight on the guarantee and with penalties introduced for failing.

APEC, the national ESCO Association is very active in promoting EPCs in the public and industrial sectors and contributes towards the process of removing existing barriers in the market. This association plays a key role in the preparation of different EPC-related documents for the Ministry of Industry and Trade such as model contracts, methodology for EPCs etc., which are expected to facilitate the implementation of new projects. APES has also organised competitions to award the best EPC projects since 2012.

The co-financing of EE projects provided from state programmes such as the EFEKT together with investments from private ESCOs has resulted in many successful EPC projects. Realised pilot projects showed very impressive results in terms of energy and economical savings. This combination of public and private funds can be one very successful factor for further development of the ESCO market in the Czech Republic. The public funds can be used to finance investments for thermo-renovations of buildings (insulation of facades, replacement of windows etc.) which are measures associated with long payback periods and thus long contracting periods (more than 10-15 years). The private ESCOs can finance measures such as improvements of heating and air condition systems, which contractual period up to 10 years.

It is expected that the ESCO, and especially the EPC market, will continue to grow. The barriers posed by the EUROSTAT definition should be removed for the governmental

sector to become more open to EPC projects, and for more regions and towns to use the EPC scheme to improve EE. The European projects will hopefully attract more private clients both from services sector and SMEs.

8.6.8 Summary

Total ESCO market status (2015)	well developed, 20 ESCOs
EPC market status (2016)	8-10 EPC providers
Total ESCO market size	€10-20 million
EPC-only market size (investment)	n/a
EPC market potential	€100-500 million (unclear whether total ESCO market or only EPC)
EPC definition	included in the Energy Management Act (July 2015)
Established sub-sector(s)	<ul style="list-style-type: none"> EPC well known and supported; most clients from the public sector
Key general barrier(s) to be removed	<ul style="list-style-type: none"> Trust in the ESCO/EPC market is the most critical, complexity of the scheme demotivates potential clients
Key barriers in the public segment	<ul style="list-style-type: none"> EUROSTAT definition
Key driver(s) to date	<ul style="list-style-type: none"> the amendment of the Energy Management Act, in particular the establishment of the registry, development and dissemination of the model contract, role of facilitators, informational work by APES
Expected development/forecast	continued slow growth
Opportunities for further development	more dissemination to reach new clients, remove EUROSTAT barrier

8.7 Denmark

8.7.1 ESCO market overview

The Danish energy services market is regarded as a relatively young market with energy contracting spreading in the last ten years. The emergence of the sector in Denmark can be mainly attributed to the public sector's overall aim to improve the energy performance of their building stock. This, accompanied with the lack of in-house expertise to realise this aim in certain municipalities pushed the public sector to involve an external party such as ESCOs (Ramboll (2014), Bertoldi, et al. (2014), JRC 2016). In addition, the development of the Danish market for energy services benefited from the neighbouring countries' (in particular Swedish and German) market experience (Jensen, et al., 2013, JRC 2016).

The energy service market in Denmark is dominated by private ESCOs, which import experience from the neighbouring countries (mostly Sweden). A large share of the Danish market (approximately 50% of all contracts) is, in fact, controlled by one specific ESCO (Jensen, et al., 2013). As of 2013, there were about 15-20 active companies offering EPC in Denmark, a number which has dropped slightly, and there are about 6-10 active EPC providers as of 2016. The size of the market in Denmark is estimated at

around €140-150 million (total investment volume) and the potential of the energy service market is expected to be around €1-7 billion (Bertoldi et al., 2014).

8.7.2 Status with Energy Performing Contracting (EPC)

The Danish EPC market has been developed in last ten years with the majority of projects realised in the public sector.

According to a report prepared for the Danish Energy Agency, the market has developed in three generations, with projects being categorised in first, second or third generation (Ramboll, 2014). The first generation of projects was based on incomplete energy consumption data for the baseline. Financing with own client equity (municipalities or other public authorities) was the most used financing form for these projects and total investments were in the range of DKK 20-30 million. Second generation projects have been larger, with longer contracting period (up to 20 years) than the preceding ones. These projects included measures with longer payback time such as insulation of building envelopes. Third generation projects, developed since 2013, mostly focused on municipalities and include traffic signal installation, street lighting and underground pipelines for water and heating beside energy saving measures (Ramboll, 2014).

As of 2016, there is a saturation phase, whereas the number of new projects has been decreasing, with about 3 projects/year for the last 3 years. On the other hand, the size of the projects has been constantly growing and the overall market size has been increasing accordingly. EPC projects have an average size of €6.7 million investment costs, however the largest projects is around €22 million (JRC 2016).

Although the standard model contract for EPC was developed in 2009, it has not been used by municipalities in Denmark. As the Danish Municipalities use their own approach, the use of contracts that are specifically tailored to meet their purposes is usually the preferred solution. This has had a positive impact on the development of the Danish market for energy services, since municipalities consider it as a precondition for contracting (Jensen, et al., 2013).

8.7.3 Status with Energy supply contracting (ESC)

Energy supply contracts have not been as popular as energy performance contracts in Denmark. Utility companies have not been active in the energy service market until 2012, when a few first ESC-bases projects have been developed. The main motivation behind these projects was the utilities' need to look for opportunities in order to diversify their offers as well as secure a better market position and market share (Bertoldi et al, 2014).

8.7.4 Demand side

8.7.4.1 Energy services in public sector

As explained above, municipalities in Denmark have been the main driving force for the implementation of energy performance contracting in Denmark. Due to budget shortages and need to undertake budget cuts in recent years, facility management has been regarded as one of the municipal sectors with potential cost savings. The pressure on municipalities became even larger after the Municipal reform in 2007, which led to merges of many smaller municipalities and creation of new, larger ones. The newly established municipalities now consist of larger building stocks and have more expenditure in terms of energy consumption with limited staff and maintenance budget (Jensen, et al., 2013). All this, together with the lack of in-house skills contributed towards the decision of ESCO involvement in energy efficiency upgrades within the municipal sector. The positive experience and tangible results gained by implemented projects based on the EPC concept in municipalities, has influenced the rest of the energy service market in Denmark.

Most municipality projects have been carried out by private ESCOs, under guaranteed savings EPC model, and financed by the municipalities themselves. The typical contractual period of these projects has been between 8 and 10 years. Projects have been chiefly focused on municipal building retrofits and the number of buildings covered by each contract has varied from 10-260. The investments in these buildings are typically in range of 22-89€/m² and the guaranteed savings are in range of 16-31% (Jensen, et al., 2013, JRC 2016). Most projects have been financed through municipality loans with low interest rates. This is due to the political agreement in 2005 which allows municipalities to take loans for renovation of buildings but not for new construction. Given that municipalities can receive loans with low interest rates, they have not been interested in third party financing provided by ESCOs. Under this arrangement, the guaranteed savings covers the mortgages on loans, and therefore the undertaken investments are of practically very low (almost neutral) costs for municipalities (Jensen, et al., 2013).

It is foreseen by local experts that the public authorities which were open for EPCs have already carried out the key investments, and therefore few public entities and municipalities will engage in new EPC projects. On the other hand, the EPC market may be driven by the healthcare sector or other private sectors in the future (JRC 2016).

In Denmark, energy service providers are responsible for the M&V procedure in EPC model. Since a commonly-used standardized model for EPC does not exist, there is sometimes a negotiation risk of baseline corrections which are asymmetrically in favour of the ESCOs.

8.7.4.2 Energy services in other sectors

While the EPC model has been widely used for the renovation of municipality buildings, this type of contracting is less popular in residential buildings, owned by private or social housing associations. This can be explained by several reasons; one being that the building owners can get access to financing that the ESCOs cannot compete with (e.g. mortgages). Moreover, projects are often too small to be subject of energy service contracts.

The Danish government allocated DKK 5 million in 2013 to develop and test a concept for energy renovation of existing as well for construction of new buildings in the residential, commercial and public sector. The Minister for Climate, Energy and Building has used the experience gained from the implementation of the ESCO concept to develop a new model to carry out energy renovation in large buildings, in order to provide building owners with more confidence that expected energy savings will be achieved. Analyses were carried out in 2013 and on this basis and were taken steps to develop a new guarantee model which will be implemented in residential (multi-apartment buildings), commercial and public buildings (Danish Government, 2014). It is not clear how this model will affect energy service companies and how they can be involved in realization of these projects.

As in the case with the plan for renovation of multi-apartment buildings, experience gained from the use of the ESCO concept in municipalities, has helped the Ministry of Housing, Urban and Rural Affairs to develop a model aimed at reducing the financial uncertainty for residents in existing social housing that results from major energy renovations. This includes allowing the housing organisations' special reserve funds to be used to provide a guarantee for energy savings in addition to a guarantee from a technical adviser or another party of the building project. The new model for renovation has been developed since the already implemented programmes⁶⁸ for energy renovation of social housing detected some barriers for renovation (Danish Government, 2014).

⁶⁸ The renovation of social housing is a major exercise. In the 'kick-start' in the autumn of 2011 and the agreements on 'Vækstplan DK' in the spring of 2013, it decided to bring forward and increase the renovation budget from the Rural Development Fund for the

8.7.5 Remaining market potential and barriers

The building sector has the biggest potential for energy services in Denmark. The main reason is that more than 70 % of the total Danish building stock and more than 80 % of the stock of detached houses were built before 1979, i.e. before the building regulations contained any serious energy requirements for new buildings. A large part of the total building stock was erected in the 1960s. Many of these buildings now require extensive energy renovations. Some energy improvements have been made in a number of old buildings, but there are still very significant opportunities to reduce energy consumption in these buildings (Danish Government, 2014).

The average net heating demand in detached houses built in the period 1931-1960 is now around 165 kWh per m², and buildings erected before 1979 use more than 80 % of the total consumption of heat. The average heat demand of all existing buildings is approx. 135 kWh per m², which is much higher than the average 37 kWh per m² consumed by the 2015 Low Energy Class buildings. This is despite the fact that efforts to reduce the energy consumption in buildings have been on-going since the mid-1970s, which has led the final energy consumption for the heating of homes to be now almost 45 % less than it was in 1975 (Danish Government, 2014).

Social housing is another sector with a significant potential for the implementation of EE measures through contracting for energy services (mainly EPC). There are around 600,000 social housing units in Denmark and around 60% of them were constructed before the tightened Building Regulations related to EE were set in 1979 (Danish Government, 2014).

A number of barriers limit further development in the Danish market.

High transaction costs related to EPCs can be a hindering factor. These transaction costs are related to the inherited complexity of energy service contracts, with more complex contracts having considerably higher transaction costs. Complex projects require more terms to negotiate, establishment of more advanced M&V systems that incorporate external factors, more sophisticated contract clauses for dispute issues etc. Disputes between energy service providers and clients may rise more often in these situations, e.g. when the clients do not accept ESCO claims on reduced performance (lower energy savings) due to external unexpected factors (Jensen, et al., 2013). To overcome the issue with the high transaction costs, ESCOs offer to increase the overall project size by bundling small projects together (e.g. consider the renovation of several buildings instead of one or two buildings) as well as to include buildings with higher energy saving potential. The high transaction costs are among the key barriers to limit the interest of a certain part of the municipalities that are more inclined to carry out their projects on their own (JRC 2016).

There is also a lack of experience among energy service providers to set a price (or fees) in order to cover the different types of risk related to projects under energy service contracts. The report prepared for the Danish Energy Agency mentions special consumer behaviour such as vandalism in public schools as one of the barriers for the promotion of EPCs in the public sector. Private ESCOs are therefore reluctant to finance renovation of public schools under EPCs, because of this kind of risk. In the private market, although the risk related to vandalism is lower than in the public sector, it may still be regarded as an impediment for the promotion of EPCs (Ramboll, 2014).

In-house expertise is still one of the existing barriers for the development of the energy service market in Denmark. Although many municipalities have been involved in several EPC projects, a number of municipalities still believe that an inside approach is more suitable for the implementation of EE measures in buildings. They may be reluctant to

period 2011–2013 to over DKK 23 billion in total. (The Ministry of Climate, Energy and Building 2014)

use ESCOs as they consider some ESCO solutions expensive (e.g. CTS technologies), and prefer to have more influence and control over the implementation of projects. To overcome the latter, catalogues with technical solutions and associated guaranteed savings per solution are typically offered by ESCOs which increase transparency and allows their clients to tailor the solutions to their needs (Jensen, et al., 2013).

Finally, split incentives have been identified as key barriers in areas where the EPC market has not set foot. There are no contractual schemes that could properly manage the mismatch in interest yet, and the large potential offered by rented sites and properties, should be tapped in the future (JRC 2016).

As an external barrier, the decrease in energy prices has impacted immensely on the interest in participating in EPC projects, and gave an additional reason for reluctant municipalities to stay away. However, as prices are expected to grow back slowly, the economics of EPC projects will be established again (JRC 2016).

8.7.6 Policies and measures supporting ESCOs

Energy services are not directly promoted by the Danish legislation. The Danish law defines "energy services", but does not specify Energy Performance Contracting following the EED definition. The energy efficiency legal framework is strong, ambitious targets and strategies are available, but ESCOs are not a preferred subject of promotion.

Therefore, the ESCO market in Denmark is demand based. There are a few support programmes, however these are not widely used. For examples – as mentioned above – a standard contract was developed, which has not been really applied. The Danish Chamber of Commerce developed a guide to public EPC tenders. The Confederation of Danish Industry established an ESCO network for ESCO providers and customers, but this is not widely known either.

8.7.6.1 Information and awareness raising measures

The Danish government has focused on disseminating information and advice for energy services. In particular, the Danish Energy Agency (www.spaerenergi.dk) plays a crucial role in promoting the energy service market. It provides advice and information to households, enterprises and municipalities including lists of available and qualified energy service providers (Danish Energy Agency, 2014). In the residential sector, the market for energy services has been promoted through the initiative Bedre Bolig (Better Homes).

8.7.7 Conclusions, projections and recommendations

The findings of the Danish Building Research Institute depict that that the net energy consumption in buildings in 2050 can be reduced by 35% compared to 2011 if certain steps are undertaken. In addition, the heat demand in 2050 can be reduced by approx. 28% compared to 2011. These goals can be achieved through the implementation of cost effective measures including energy renovation of buildings, implemented with the help of ESCOs among others. According to the Danish Energy Agency, almost 80% of the existing building stock can be renovated until 2050 (Danish Government, 2014).

EPC contracting with guaranteed savings has been widely used in Danish municipalities for the renovation of buildings for more than ten years. Experience with the implementation of EPC model in municipalities has been positive, involving number of municipalities and achieving energy savings especially in projects which include larger number of public buildings.

It is foreseen by local experts that the public authorities which were open for EPCs have already carried out the key investments, and therefore few public entities and municipalities will engage in new EPC projects. On the other hand, the EPC market may be driven by the healthcare sector

As mentioned above, the Ministry for Climate, Energy and Building has already started to develop an ESCO concept for the renovation of multi apartment, commercial and public

buildings. This concept has been based on an EPC model with guaranteed savings. The same applies for renovation projects of social housing, whereby the concept has been developed by the Ministry of Housing, Urban and Rural Affairs. By including ESCOs, both plans can support faster development of the market for energy services in building sectors.

The Danish energy efficiency obligation scheme is another important driver for stimulating the energy service market in the country.⁶⁹ Denmark decided to achieve energy saving target for 2020 (according to EED Article 7) only through the implementation of EE obligation scheme (Danish Energy Agency, 2014). The obligations are enshrined in the electricity supply, natural gas supply and heat supply acts for electricity grid companies, natural gas distribution companies and district heating companies. There is therefore a legal basis for imposing an annual energy efficiency obligation on these companies. These companies are obliged to engage third parties, which can be another company in the same group of companies or a private engineering company, in order to offer energy efficiency services. Private ESCOs can be involved in this kind of arrangements and benefit from them (Danish Energy Agency (2014), Tengvad (2013)).

8.7.8 Summary

Total ESCO market status (2015)	well developed, 6-10 ESCOs (a few more in ESC)
EPC market status (2016)	6-10 EPC providers
Total ESCO market size	€140-150m
EPC-only market size (investment)	almost as ESCO market: €140-150m
EPC market potential	€1-7 billion
EPC definition	law defines "energy services", but not EPC
Established sub-sector(s)	<ul style="list-style-type: none"> • EPC well known in the municipal sector; • ESC is not popular.
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • split incentives • low awareness, fear of "loss of control"
Key barriers in the public segment	<ul style="list-style-type: none"> • bad reputation from a few projects • too complex contract • in-house expertise in competition
Key driver(s) to date	<ul style="list-style-type: none"> • exemplary role of a few municipalities, which spread across a significant portion of the public sector • flexible negotiation process possible, which lead to more tailored measures and higher ambitions
Expected development/forecast	currently a small halt, with lower number of projects (but larger in size). A stagnation is expected in the public sector, and a possible extension to private sector
Opportunities for further development	more dissemination to reach new clients, disseminate standard documents, which should reflect the need for diversity or flexibility, reinstate trust

⁶⁹ The obligations are part of the energy policy agreement of March 2012 and are laid down up to 2020 through the agreement of 13 November 2012 between the Minister for Climate, Energy and Building and the grid and distribution companies (Danish Energy Agency, 2014)

8.8 Estonia

8.8.1 ESCO market overview

The ESCO market in Estonia has still not deployed. There are less than 10 companies providing different types of energy services, but only 2-3 could act as ESCOs, and even these have difficulties to offer EPC or guaranteed energy savings models. The ESCO market has been damaged significantly in the last few years as a result of the EUROSTAT definition of public debt.

8.8.2 Status with Energy Performing Contracting (EPC)

Energy performance contracting is not currently used in Estonia, in spite of the market survey carried out in 2013 by the Ministry of Economic Affairs and Communications (EBRD 2016). The study found that Estonia would need a contract scheme appropriate for public buildings, as well as potentially for large private domestic buildings. However, as a result of a number of general barriers (high transaction costs), combined with local barriers (high intensity grants availability), the model has not been able to take off.

8.8.3 Status with Energy supply contracting (ESC)

ESCOs typically offer a wide range of services, and energy audits, building management, and other simpler forms of services have formed the largest share of their portfolio. The estimated market size is in the range of EUR 5-10 million annually (Tepp, 2014).

Energy Supply Contracting is not well suited for the Nordic countries, where there is a well built-out DH system. ESC is generally oriented towards decentralized (local) power supply rather than larger centralized solutions. According to Estonian Competition Authority, the prevalence of DH in Estonia is 70%.

8.8.4 Demand side

8.8.4.1 Energy services in public sector

The energy service market is not yet developed in the public sector despite the call for the sector to have a leading role in using the ESCO concept. A programme for the reconstruction of public sector buildings has been launched in the context of EED Article 5 with the aim to modernise existing public buildings and to support construction of new public buildings. The programme is managed by Riga Kinnisvara AS. State authorities and local authorities can apply for investment support for reconstruction of buildings. Selection criteria have been based on CO₂ savings, number of beneficiaries and regional limits.

8.8.4.2 Energy services in other sectors

The Estonian government has set a priority to implement EE measures in buildings in order to achieve energy saving target by 2020. According to the third Estonian NEEAP, the residential sector, which is the largest energy consumption contributor, is estimated to consume about 33% of the final energy in 2020 (Ministry of Economic Affairs and Communications, 2014a). Several programmes have been adopted in the last years to support the thermal renovation of residential and non-residential buildings. For example, up to 50% of the costs related to energy audits of apartment buildings and design of building documentation can be covered by grants since 2008. ESCOs are involved in performing of energy audits.

The Programme for Renovation loans for apartment buildings has offered grants to apartment associations, building associations and communities of apartment owners for several years. The grant intensity depends on the achieved energy savings for heating, for example 35% of the total projects costs for thermal renovation can be covered if thermal energy savings of at least 50% are achieved.

8.8.5 Remaining market potential and barriers

Estonia has a relatively high energy intensity in the EU with 0.35 kg oil eq/USD of GDP being about three times higher than the EU28 average of 0.11 kg oil eq/USD of GDP (IEA 2012 in (EBRD 2016)).

Residential and public buildings have a significant potential for energy savings, and due to the financial constraints, there is a gap to tap by ESCOs. Most buildings (95%) were constructed before 2003. Buildings constructed in the soviet era are of very low energy performance levels prescribed under soviet building standards, which were three times lower than Western European levels (Ministry of Economic affairs and Communications, 2014b). Moreover, the average energy consumption for heating in Estonia is higher than in the neighbouring countries of similar climatic conditions, reaching 220 – 250 kWh/m². Moreover, interior climatic conditions (physical, chemical and biological) do not comply with the current standards, which should be improved radically (Ministry of Economic affairs and Communications, 2014b).

The government developed and adopted two strategies aiming to secure sustainable development of the country: (1) Sustainable Estonia 21 (SE21) and (2) "Estonia 2020". One of the sub goals of the latter is to reduce final energy consumption through implementation of measures in industry, households and transport (Ministry of Economic affairs and Communications, 2014b).

The National Plan "Estonia 2030+" is another important document that shapes the trends and principles of the Estonian housing economy. In addition, the Estonian Development Plan for Energy Sector 2030+ (ENMAK 2030+) is a strategic document for the development of the housing sector over the next few years. The Buildings Development Plan 2030+ is included in ENIMAK 203+ and also covers the energy consumption of buildings (Ministry of Economic affairs and Communications, 2014). It describes three possible scenarios for Estonian building stock: non-intervention, minimally interventional and knowledge based scenario. The non-intervention scenario will bring increase of energy consumption of 1% in 20 years. According to this scenario, 15% of the apartment buildings will be renovated with state support in the next 20 years. Small residential buildings and non-residential buildings will be renovated on a market economy based 810% in 20 years. The renovation will result with minor energy savings. The minimally interventional scenario would result with energy savings of 8% in 20 years with overall investment without new buildings of EUR 170.98 million/ year, of which contribution of the private sector amounts EUR 130.46 million and the contribution of the state amounts EUR 40.51 million/year. The knowledge-based scenario would result with energy savings of 18% in 20 years with overall investment without new buildings of EUR 353.85 million/ year, of which contribution of the private sector amounts EUR 227.68 million and the contribution of the state amounts EUR 126.17 million/year (Ministry of Economic affairs and Communications, 2014b). ESCOs as private investors can finance implementation of EE projects in buildings.

Reconstruction of 3% per year of the central government buildings is a part of minimally interventional and knowledge-based. According to the Estonian State Real Estate Agency managing public buildings of over 846,854 m², this will be the primary target for local ESCOs. The Estonian State Real Estate Agency does not, however, cover all public buildings in Estonia (Tepp, 2014). State and local authority owned buildings use real estate volume of about 9.5 million m². Realistically achievable energy savings would be about 40% which would need investments in the range of EUR 72-124 million.

The Estonian industrial sector is very energy intensive and concerns both industrial processes and industrial buildings. Three-quarters of the energy is consumed in the production of building materials, wood, paper and chemical industry. The saving potential in industry is 10% in terms of electricity and 30% in terms of heating. The ESCO model can be used in industrial plants, where there is a need for heating, steam, cooling and ventilation. Industrial processes do not have significant potential for ESCO business.

The ESCO market in Estonia faces several legal, financial and technical barriers, hampering its faster development. According to the Estonian public sector legislation, contracts for energy services are taken as debt by local administration. Local governments can make investments, which will result in increase of its indebtedness of up to 60% of its revenues. Off balance sheets investments is not allowed, although there have been exceptions with EU water management projects in the past. This means that it is difficult for the local government to undertake long-term EPCs. Moreover, the public procurement procedures and contracts are too complex, while model contracts and guidelines for EPCs do not exist.

Lack of technical understanding for energy services and ESCO contracts (EPC model) among potential clients (e.g. industrial or public enterprises) is another barrier to market growth. Private companies lack experience and knowledge of EE solutions and therefore do not undertake any energy service contracts with ESCOs. Uncertainty about future business activities of their companies, caused by the recent economic slowdown, discourages the management from entering into long-term contracts with ESCOs.

Lack of proper mechanisms for funding ESCO contracts is also one of the barriers, whereby the main issue is that ESCOs do not have their own equity to finance projects on long terms (5-10 years). Commercial banks are reluctant to fund EPC projects, partly due to the lack of understanding of benefit of projects. They perceive ESCO projects as very risky and therefore require higher collateral and interest rates. On other hand, ESCOs do not want to conclude contracts with many owners in apartment buildings, due to the possibility of investment repayment failure from the clients' side.

8.8.6 Policies and measures supporting ESCOs and EPC

In its NEEAP, Estonia notified the following implemented measures promoting energy services:

- a system of professional qualifications with the aim to create a network of qualified specialists offering energy services in Estonia;
- support to stimulate the uptake of energy audits in apartment buildings;
- analysis and projects that have been carried out to help implement better solutions for the provision of energy services in Estonia.

Transposition of EED Article 18 requirements is to be made (Ministry of Economic Affairs and Communications, 2014a).

The foundation KredEx (established in 2001 by the MoEAC) also provides a number of promotion measures for the EE and ESCO markets. The main of KredEx is to improve the financing conditions of enterprises in Estonia, and to decrease export-related credit risks. For example, KredEx includes a Housing and Energy Efficiency Division, which helps to alleviate housing -related financial problems.

8.8.6.1 Information and awareness raising measures

The foundation KredEx also has a role to play in dissemination of information about EE and ESCOs, as well as to promote business opportunities. It promotes energy efficiency in the existing housing stock in Estonia, provides information on implementation of energy efficiency measures in apartment buildings, and arranges meetings between various stakeholders involved in the further development of energy use in buildings in Estonia (EBRD 2016).

8.8.7 Conclusions, projections and recommendations

Estonia has adopted several strategies aiming to reduce energy consumption and increase EE, especially in the building sector (residential and public). ENMAK 2030+ described various scenarios on how to improve EE in buildings, which can be implemented only with the involvement of both private and public investments. ESCOs

can take both roles of private investors and implementing bodies for EE renovation of residential buildings. However, in order to avoid overlap with grants for reconstruction provided by the state, a clear co-financing scheme has to be established. For example, grants can be used for the renovation of building envelopes since it requires larger investments and longer payback periods, while ESCOs can fund reconstruction and modernisation of heating systems.

Legal conditions for public procurement have to be improved in order to get more ESCOs on board for projects in the public sector buildings. In particular, improvements in tendering procedures and creation of standardised model for EPC and methodology for implementation of EPC can attract local and international ESCOs.

Creation of EE Investment and guarantee fund can be one of the possible solutions for solving the problems related to financing of ESCOs, through which guarantees or direct funding for ESCOs can be provided.

In addition, different events shall be organised with the active involvement of international ESCOs (e.g. workshops, training and conferences) to increase the understanding about ESCO business. Awareness-raising campaign should promote ESCO business among industrial enterprises.

8.8.8 Summary

Total ESCO market status (2015)	still not deployed, 2-3 ESCOs
EPC market status (2016)	the 2-3 ESCOs have the possibility to offer EPC, but not have done so
Total ESCO market size	~0
EPC-only market size (investment)	~0
EPC market potential	€100M (total building renovation)
EPC definition	not yet, but it is planned to be introduced in the upcoming "Organisation of Energy Management Act"
Established sub-sector(s)	<ul style="list-style-type: none"> No established sectors
Key general barrier(s) to be removed	<ul style="list-style-type: none"> lack of demand based on the lack of legal framework and lack of trust; EUROSTAT definition
Key barriers in the public segment	<ul style="list-style-type: none"> lack of trust; EUROSTAT definition
Key driver(s) to date	<ul style="list-style-type: none"> IFI interest and several streams
Expected development/forecast	unsure
Opportunities for further development	based on IFI streams and national subsidy/loan schemes, the demand and knowledge could be developed, remove EUROSTAT barrier

8.9 Finland

8.9.1 ESCO market overview

The Finnish market kicked off around 2000, and is considered a relatively young, moderately developed market. Overall, the ESCO market, which is practically fully overlapping the EPC market, has not changed considerably during the period 2014-2016. There are 6-8 active ESCOs on the market, out of which 6 ESCOs are listed in Motiva Ltd register⁷⁰.

There is no ESCO association in Finland, however Motiva substitutes many of the functions of one.

8.9.2 Status with Energy Performing Contracting (EPC)

The Finnish ESCO market is composed of mainly EPC providers, who are about 6-8 in numbers. They are listed in the registry maintained by Motiva.

There have been about 12 subsidised EPC projects during the period 2014-2016, which received support from the Ministry of Employment and Economy. Between 2009 and 2015, a total of 80 projects were realised. Projects are fully focused on streetlighting and public buildings. They range between below €200 million investments for the first one, and between €500-1000 million for the latter.

A total of ca. €5.3M investment was realised for the subsidised projects in 2014-15 (JRC 2016).

The EPC market is aided by the model contracts developed by Motiva, which include the following:

- Motiva has developed a model EPC which is similar to an EPC with shared savings model based on the so-called "open book" principle. In this contract model, the ESCO acquires the investments at the beginning of the contract period and submits an offer covering all project-related costs to the client (Sinkkonen, 2013). The costs include ESCO service fees, project investment costs and costs for project monitoring. The client pays the ESCO fees at constant rate throughout the contract duration, i.e. the client's energy costs remain unchanged until the investment is fully paid or the contract expires (Kilpeläinen, et al., 2000). The difference between the Motiva EPC and traditional shared savings EPC model is that in the former case the client does not gain benefits from the beginning of the contracting period. However, if additional energy savings are achieved, they can be shared between client and ESCO and if the calculated energy savings are not achieved, the ESCO fees are reduced. The contracting period can be also extended according to the realized savings and after the investment is completely paid back, the client can benefit from the energy savings i.e. the client will pay lower energy costs (Sinkkonen, 2013).
- Motiva has prepared a modified model of EPC contract with guaranteed savings. Under this modified model, the client bears the investment costs through self-financing. During the service period energy costs stay unchanged compared to the cost before the project start. This model differs to standard EPC with guaranteed savings in terms of client financing costs, sanctions for not achieving energy savings and sharing of additional savings (Sinkkonen, 2013). In addition to the above described EPC models, Motiva has developed a third EPC type, which combines ESCO and client financing. This type of contract is used when EE is only

⁷⁰ Motiva is , a state owned company established in 1993, operates as an affiliated Government agency to provide companies, public sector and consumers with information and solutions leading to resource efficient and sustainable choices. Its ESCO register is available at: http://www.motiva.fi/toimialueet/energiakatselmustoiminta/esco-palvelu/esco-hankerekisteri/esco-yritykset_suomessa (expected to be updated in 2016)

part of the project, and energy savings are not sufficient to cover all investment costs.

ESCO fees can be, generally, based on one of the three methods (Kilpeläinen, et al., 2000):

- Deferred method, whereby the client and ESCO agree volume and value of the savings based on calculation of energy savings.
- On-time measurement, based on measurement of consumption in a particular period before the project (investment) commencement and reference period after the project implementation and calculation of resulted savings. A verification period can be renewed later, after the verification of the equipment/system operating conditions.
- Continuous measurement and monitoring, when the measurements are based on follow-up report in agreed intervals.

8.9.3 Status with Energy supply contracting (ESC)

Finland has about 6-8 active ESCO companies, which are practically the same as the EPC providers described below. Only few ESC are carried out.

The total market potential is estimated to be ca. EUR 200 million maintenance cost reduction including EUR 100 million for public sector buildings only (Bertoldi, et al., 2014).

8.9.4 Demand side

8.9.4.1 Energy services in public sector

Municipalities are the main client for ESCO services in Finland. For implementation purposes, Motiva has prepared a guidebook for public procurement. This, however, was not followed properly and some projects were stopped for investigations.

8.9.4.2 Energy services in other sectors

Other sectors are only very rare clients in Finland. The ESCO concept is used for renovations of buildings owned by the public sector and businesses, especially in production facilities. The ESCO concept has not been so far popular among housing associations, as individual housing associations generally only control a small amount of building stock. The ESCO concept could be used to promote the adoption of new technologies (Ministry of Environment, 2014).

8.9.5 Remaining market potential and barriers

Significant potential for energy services lies in residential, commercial and office buildings and projects of ESCO use to tap into this potential in the future are encouraging. The energy consumption for heating and electricity in detached and terraced houses constructed before 1980 falls in the range of 200-250 kWh/m² per year, while apartment buildings consume even more energy. The goal of the Finnish renovation strategy is to reduce the share of electricity for heating in detached houses from 45% in 2013 to 11% in 2015 and from 29% on to 7% in terraced houses. The share of oil for heating shall be reduced from 19% in 2013 on to 0% in 2050 for detached houses and from 6% on to 0% in apartment buildings. For commercial and office buildings, the plan is to reduce the share of electricity for heating from 12% in 2013 to 3% in 2050 as well as for oil from 18% in 2013 to 7% in 2050 (Ministry of Environment, 2014).

In terms of barriers, complex procurement procedures for energy services in municipalities form one of the major barriers to the development of the ESCO market with regards to the public sector. Public procurement legislation makes tendering procedures for energy services (ESCO) difficult with time consuming processes and high

transaction costs. In addition, the contractual agreements are not well recognized in public procurement procedures (Sinkkonen, 2013).

Problems in financing are mostly related to ESCO project funding calculations and investment appraisal procedures. Especially difficult is the way how funding provided by an ESCO should be compared to client's own project funding. If the client has not calculated their own financial cost, the EPC might appear too expensive compared to the situation in which the project is carried out in-house. In addition, sometimes financial institutions are not able to evaluate the true value of ESCO projects (Sinkkonen, 2013).

Generally, clients are confident with ESCOs especially with EPC with guaranteed savings. The problems with mistrust with ESCOs are mainly connected with the lack of knowledge or information about ESCO services and benefits of projects among potential clients and to the few projects that failed in the recent past. Energy consumption is often not included in core processes, and therefore companies not seen interesting and profitable investment in EE (Sinkkonen, 2013).

8.9.6 Policies and measures supporting ESCOs and EPC

The Finnish market for energy services has mainly been driven by the implementation of voluntary energy efficiency agreements for industry and municipalities. These have been implemented since the 1990s and form a central instrument for the implementation of the EED in Finland.

The Ministry of Employment and the Economy grants subsidies to businesses and non-governmental organizations for investments that promote energy conservation and for energy audits. Parties signed up to the Energy Efficiency Agreement Scheme may apply subsidies also for conventional energy saving investments (grant covers up to 20-25% of the investment cost).

The development of energy services in Finland is promoted by means of programmes coordinated by the Finnish Funding Agency for Innovation (Tekes). There are two important programmes in this context: Green Growth – Road to sustainable economy (2011-2015, EUR 80million) and Built Environment (2009-2014, EUR 75 million) (Government of Finland, 2014).

8.9.6.1 Information and awareness raising measures

The ESCO and EPC concepts are still not well understood, and especially the differences between the two concepts is not captured (JRC 2016), in particular due to the fact that the procurement process is considered too cumbersome and project as too complicated.

Motiva promotes energy services as a part of its activities in the field of EE promotion. The budget for promotional activities is approximately EUR 3.4 million. Motiva organizes dissemination of information related to ESCOs and energy services, as well as about realized projects (Government of Finland, 2014). Motiva also serves as business facilitator, connecting ESCOs and potential clients, maintaining a project registry, developing dissemination materials, including guides and model contracts.

Motiva has developed three different types of ESCO models which are mainly used for contracts with municipalities and other public entities. The clients are aware of this concept. Projects are usually turnkey projects, where financing, monitoring and verification are almost part of the projects. The typical size of the projects ranges is between EUR 0.5 million and 3 million (Bertoldi, et al., 2014).

The ESCO and ESCO project register maintained by Motiva collects information about ESCO projects, including the method of implementation and achieved energy savings.

8.9.7 Conclusions, projections and recommendations

Finland has a lot of the necessary market pre-conditions for an active ESCO business. While there is no strictly speaking EPC definition and legal framework, the overall

legislative framework is favourable and ESCOs have easy access to financial sources. The voluntary agreement scheme and other governmental subsidies for implementation of EE make ESCO investments easier and more profitable than it would be on a fully market basis, and the ESCO market can be considered as moderate, but stable in Finland. However, the size of the market is still below the EE potential. Improvement of procurement procedures is needed and future governmental policies and action plans shall be focused on the promotion of ESCO business in residential and commercial sectors, since both sectors have significant potential for energy savings and EE.

Finland's building regulations (Decree No 4/13 of the Finnish Ministry of the Environment), which entered into force in 2013, introduce stringent cost-optimal levels of minimum energy performance requirements for renovations, which can act as a driver for the penetration of ESCO activities on the market. On the other hand, the availability of renovation and energy subsidies for housing companies has been relatively limited, and they have mostly been used to revive the economy and boost employment. In order to make financial incentives more effective, they need to be longer-lasting and less changeable. Incentives could also be introduced for renovation projects that go above and beyond what is required as well as for testing new technologies and concepts. Comprehensive energy performance renovations could also be promoted (Ministry of Environment, 2014). All these create favourable conditions for the ESCO concept, which could also be used for the adoption of new technologies.

8.9.8 Summary

Total ESCO market status (2015)	moderately developed, 5-8 ESCOs
EPC market status (2016)	5-7 EPC providers, 12 EPC projects during 2014-16
Total ESCO market size	n/a
EPC-only market size (investment)	ca. €5.3M investment in total for the subsidised projects in 2014-15
EPC market potential	€100-200M (of which €100M in public sector)
EPC definition	not included in legal documents
Established sub-sector(s)	<ul style="list-style-type: none"> public buildings
Key general barrier(s) to be removed	<ul style="list-style-type: none"> high transaction costs on market basis
Key barriers in the public segment	<ul style="list-style-type: none"> complexity of procurement process lack of public procurement competence;
Key driver(s) to date	<ul style="list-style-type: none"> voluntary agreement schemes with subsidies Motiva market promotion (information, business facilitation, register, guidelines, methods, etc.)
Expected development/forecast	growth in public buildings
Opportunities for further development	It is expected that the public sector will participate in increasing number of EPC projects

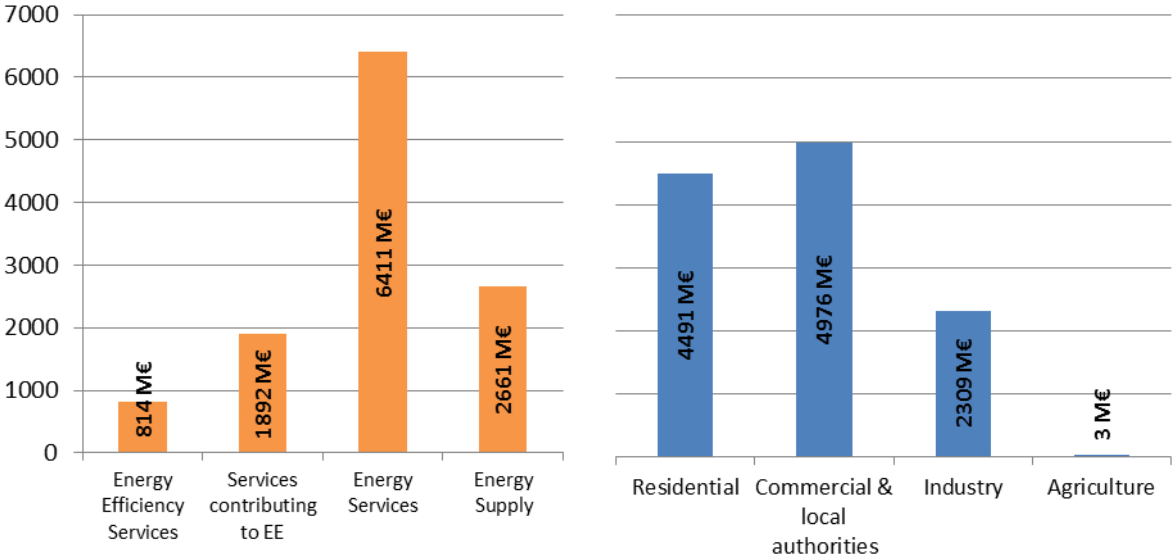
8.10 France

8.10.1 ESCO market overview

The French ESCO market is known to be large and growing at a considerable rate (Bertoldi, et al., 2014). Energy services in France – in the form of outsourcing public services in France dates back into the 19th century (Dupont and Adnot 2004). The success of these and other “delegated management” services (waste and water management, transport, telecommunication) financially strengthened the private companies involved in these businesses, thus creating the basis of the French ESCO model (Dupont and Adnot 2004). As such, France is considered to be the cradle of these so called “operators” or “managers” for energy services (Dupont and Adnot 2004).

As of 2016, it features great diversity and heterogeneity. The energy efficiency services market was estimated at €7.2 billion and energy supply market at around €2.6 billion in 2013 (see Figure 17). The value of the energy and energy efficiency services largely outweigh that of the engineering and consulting services and of the real estate analysis services, estimated at €1.5 billion and €362 million, respectively (ADEME-CODA STRATEGIES, 2014).

Figure 17 - The size of the energy and energy efficiency service market in France in the year 2013



Source: ADEME-CODA STRATEGIES (2014)

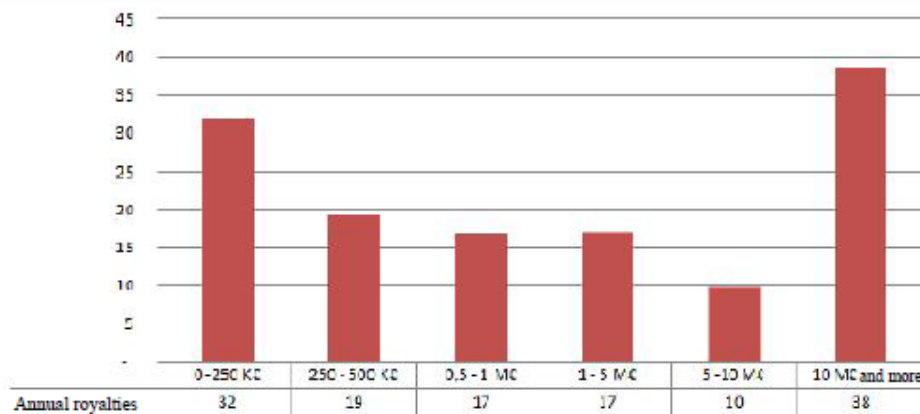
The total number of ESCO-type companies in France is around 350, with only around 10 ESCOs offering guaranteed agreements (JRC 2016)). French ESCOs are typically large international and national companies, which carry out these services in addition to other activities such as facility management, energy production and equipment installation. It should be noted that Duplessis, et al. (2012) stressed that the number of ESCO companies and the volume of ESCO projects in France are underestimated by international analysts due to the market specificities, e.g. due to the significant volume of management projects often including minor clauses for guaranteed energy savings or comfort supply.

8.10.2 Status with Energy Performing Contracting (EPC)

In France, Energy Performance Contracting has gained popularity from 2009. According to the French NEEAP 2014, EPCs have experienced a significant rise over the past few years (Ministry of Ecology, Sustainable Development and Energy, 2014). For the year 2013, the study surveying the French market of energy efficiency services estimated that

in 2013 the corresponding market was €133 million in 2013 to which one must add €56 million relative to the EPCs completed within the scope of the PPP for public lighting (ADEME-CODA STRATEGIES, 2014). The distribution of the market according to the amounts invested shows that the extreme segments are those that generate greater revenue (see Figure 18).

Figure 18 - State of progress and analysis of the French market of energy efficiency services



Source: (ADEME-CODA STRATEGIES, 2014)

In 2016, experts guess that there are around 10 companies that can offer EPC, of which 4 are actually energy suppliers and 6 others.

EPC – as per the EED – has not been defined in national or local legislation.

The Laws, referred to as Grenelle 1 and 2 include a definition, but this does not fully correspond to the EED definition, because French regulation forbids the payment for the investments from the savings when the customer is a public customer. The only way to use savings to pay investments is a PFI project (PPP in France) but there are only few projects each year.

On the other hand, it was identified in the so-called "Ortega Report" (published in 2011). The report separated 3 types of EPC, which are:

- "Supplies and services EPC" for contracts mainly relying on maintenance and equipment provisions;
- "Works and services EPC" for contracts targeting buildings refurbishment works (insulation, tightness, windows)
- "Global EPC" for contracts dealing both with works and provisions.

Moreover, "Energy Efficiency Services" are in the panorama of EPC and their definition strictly rely on EN 15 900. Finally in the French NEEAP, EPC is described as a "transversal contractual form of the Energy Efficiency Services value chain" (see p.72 of French 2014 NEEAP).

While these definitions are close to the one suggested by EED, the differences remain.

There have been around 40 projects completed using the EPC scheme and the EPC market has not grown much lately. Projects were

EPC size varies a lot from one project to another, from hundred thousand € for "Supplies and services EPC" to tens of millions for "global EPC". The length of the projects also varies much, depending on the EPC type, between 5 to 20-25 years. The average duration (i.e. main EPC market) seems to be around 8 years which is the typical time horizon for equipment amortization.

Mostly projects are financed from the clients' own resources. SVEs or SVPs are regularly established for larger PPP projects.

8.10.3 Status with Energy supply contracting (ESC)

France has been historically known for its "chauffage" contracts, which have been in use for more than 60 years. Under this type of contract, an ESCO takes the operation and maintenance of the client's equipment and sells the output (e.g. heating, cooling or lighting) to the client at an agreed price. Large providers of chauffage contracts (e.g. EDF and GDF-Suez) in France traditionally used their large cash flows and balance sheets to finance projects, as well as start or acquire operations in new markets, although this is becoming more difficult for them (Fawkes, 2015). The success of the chauffage contract in France lies with the strict standardization of the contracts in the framework of public procurement, which leaves little room for negotiation but ensures a reliable and accountable service as well as compensation on the side of the client (Duplessis, et al., 2012). In particular, four standardized alternative chauffage contracts (namely P1, P2, P3 and P4) have been developed to account for variations in prices, VAT rates, invoice distribution between owners and tenants or occupants, contract length, share of costs between ESCO and client, and level of guarantee (Duplessis, et al., 2012). These are (ADEME, 2014):

- P1 contracts cover the supply of energy or fuel without explicit obligation for energy savings and guarantees;
- P2 contracts cover operation and minor maintenance services;
- P3 contracts incorporate full maintenance, including major repairs and supply of materials, where an energy efficiency improvement comes from the prompt replacement of malfunctioning equipment;
- P4 is a comprehensive energy efficiency improvement contract, with a focus on major renovation and purchase of new equipment.

Due to the public accounting rules that revolve around a yearly expenditure rate and the separation of investment and operation budgets, P4 contracts have been prohibited in the public sector. However, these limitations have been resolved through the Grenelle laws and the possibility of public-private-partnerships for building renovation, which is probably the most important change in France regarding ESCO contracts in the period 2010-2013 (Bertoldi, et al., 2014).

8.10.4 Demand side

8.10.4.1 Energy services in public sector

The traditional target sector of ESCOs in France has been the public building sector. There are several available possibilities for public authorities to implement EPCs:

- via a public energy efficiency market;

Since Decree No 2011-1000 of 25 August 2011 that amended article 73 of the Public Procurement Code, the market can be global involving the realisation, exploitation, maintenance as well as design-realisation of work, exploitation and maintenance contracts

- via a partnership contract

Moreover, the White Certificates scheme (Energy efficiency certification system) also encourages the development of EPCs. Two specific standard operating sheets, for the residential and tertiary sectors, enable the application of low-interest rates to energy saving actions carried out within the context of an EPC.

Article 5 of the Decree No2009-967 of 3 August 2009 has amended the law regulating public procurement in order to enable the implementation of EPCs. In March 2010, the

Mission Supporting Public-Private Partnerships (MAPPP) published within the context of the renovation of public buildings, a contract model adapting the EPC to the partnership agreement modalities. In July 2010, the Ministry of Energy published a guide to energy performance contracts relative to public works in order to provide guidance to public bodies wishing to use EPCs to achieve energy savings.

8.10.4.2 Energy services in other sectors

Energy contracting is limited in the French industry due to the fact that industrial partners do not represent a long-term reliable client (Joint Research Centre, 2012). Energy services in combination with O&M and regular energy supply are common for this sector. Some very large companies (e.g. car manufacturers or large retail firms) engage in long-term contracts (5-10 years) which involve energy improvement strategies in the framework of rewarding strategies (Joint Research Centre, 2012). Energy services related to the use of industrial cogeneration units generate a market of EUR235 million (Ministry of Ecology, Sustainable Development and Energy, 2014).

With regards to the residential sector, EPC-based projects have been implemented in certain social housing cases (Bullier & Lefevre, 2011). Social housing landlords, involved in the heavy renovation of their building stock, are important clients for energy services including energy performance certificates, audits and performance measurement. The obligation of energy audits in multi-tenant buildings is also expected to drive demand for energy services (ADEME-CODA STRATEGIES, 2014).

8.10.5 Remaining market potential and barriers

The additional market open to EES until 2020 in France has been estimated to be in the range of € 196.3-464.2 million per year, representing one of the highest figures in Europe (Duplessis, 2010). According to the aforementioned study commissioned by ADEME, the "energy efficiency service" accounts today for only a limited part of this market and it is therefore essential to support a value transfer from energy services towards energy efficiency services (see Figure 17). For the building sector, the French government has pledged to reduce by 38% the energy consumption in existing buildings by 2020, while for condominium buildings equipped with collective heating or cooling it has placed the obligation to ask for a plan of works or an energy performance contract following the issuance of an energy performance certificate or energy audit.

A number of barriers continue to hamper the expansion of the energy efficiency services market in France. The French NEEAP 2014 makes reference to the following hindering factors (Ministry of Ecology, Sustainable Development and Energy, 2014):

Users, clients and investors are faced with the complexity of certain markets or contracts;

The short-term return on investment in certain cases, in particular for extensive investments and associated services is difficult to demonstrate.

Clarifications on the conditions of energy performance guarantees are also required to support the uptake of EPCs on the market (ADEME-CODA STRATEGIES, 2014). The development of the EPC market is negatively impacted by the difficulty that public authorities encounter in dealing with the juridical terms of such contracts, as well as by the general asymmetry of information and technical competencies between contractors and services providers. This, in turn, makes the contracted performance agreements difficult to control (ADEME-CODA STRATEGIES, 2014).

8.10.6 Policies and measures supporting ESCOs

Driven by the transposition of European directives as well as ambition and willingness of public authorities, a number of key regulations have had a significant contribution to the development of the energy services market in the French context. These include the thermal regulations (Grenelle I and II laws) and the future Energy Transition Law. These

regulations have led to the emergence of new businesses such as the market of energy performance diagnostics, offers of Energy Performance contract and acceleration of other interrelated services such as energy audits. Regulations governing public procurement have also evolved to allow central and local administrations access EPCs and thus derogate to the obligation of allotment (ADEME-CODA STRATEGIES, 2014).

The energy saving certification system has also had a particular influence, both in creating and multiplying the business of energy services as well as improving a turn-around in demand and monetising energy efficiency (Ministry of Ecology, Sustainable Development and Energy, 2014). The energy saving certification system was introduced in 2005, placing energy saving obligations on energy suppliers which must carry out energy saving operations or develop renewable energy in certain cases. Subject to certain conditions, these obligations translated in terms of certificates (each corresponding to 1 kWh of energy saved) are attributed by the Ministry of Energy to eligible suppliers but also other legally established companies, open to third party financing.

8.10.6.1 Information and awareness raising

To boost implementation of energy performance contracts, various actions have been taken to ensure better knowledge and dissemination of the practice of EPCs. Various model contracts have now been available by the French authorities⁷¹. In terms of the residential sector, article 7 of the Decree No2010-788 of 12 July 2010 has introduced the obligation for private co-owners to study a EPC (or an energy saving work plan) following a mandatory audit (Ministry of Ecology, Sustainable Development and Energy , 2014). For the public sector, the Ministry of Energy has created an EPC guide in 2010, supporting public bodies which intend to use EPCs to achieve energy savings in their premises.

8.10.7 Conclusions, projections and recommendations

The dynamic French energy service market has been on an expansionary trajectory in the last years. Support provided by public authorities, incentives, increased awareness and new innovative offers are all contributing factors (ADEME-CODA STRATEGIES, 2014). Regulatory provisions have also notably changed the perception of users, investors and providers on the market. The view that the real estate value is devalued if energy performance upgrades are not undertaken is another important driver.

Despite favourable conditions, certain barriers such as contract complexities, perceived low-profitability, and lack of juridical and technical skills among ESCOs still remain. The study commissioned by the French energy agency ADEME makes a number of recommendations. These include simplification of certain contracts, experience sharing, promotion of best practices, development of ESCO training mechanism, and facilitation of a dialogue among market professionals. In addition, adjustments to the regulatory mechanisms can guarantee the compliance with existing provisions, stimulate quality improvement, but also push the market players towards the most virtuous forms of service provision. The level of market competition must be also examined in order to ensure that all new players have the right means and accessibility to enter the market. Finally, recognizing the possible plurality of the service provision is without a doubt an important factor in allowing SMEs to access the market (ADEME-CODA STRATEGIES, 2014).

Experts in the survey carried out by the JRC in 2016 (JRC 2016) foresee the potential for development of the EPC scheme in the near future. In the residential sector, there is an obligation for large co-owner buildings to undergo an energy audit and to study the opportunity to launch an EPC. However, implementation has been limited, except for demonstration purposes dependent on public grants (national, regional and municipality

⁷¹<http://www.developpement-durable.gouv.fr/document126820>
http://www.economie.gouv.fr/files/directions_services/ppp/cpe_clausier_type.pdf

grants). Although the decision rules have been simplified (changed from the need for absolute majority of co-owners in voting, to a relative majority needed), the financing and the duration of such EPC is still a major barrier for a strong dissemination of EPC.

In the public sector, state owned buildings have been all audited, and as a consequence a large scale plan of state-owned buildings and is expected in the following decades. ESCO financing (probably ESC) is expected to be the most used tool for financing and realising these refurbishments.

In the industry sector, a recent decree (décret n° 2016-141 du 11 février 2016) for electro intensive consumers (more than 10 GWh/y) gives an interesting rebate (between 30% to 90%) on tariffs for networks access if these consumers reach an energy performance improvement within 5 years. This energy performance shall be certified in the framework of EN ISO 50001. This new measure suggests a development of EPC market in that specific sector.

8.10.8 Summary

Total ESCO market status (2015)	very well developed, 300 or more ESCOs and ESPCs
EPC market status (2016)	ca.10 companies that can provide EPC, ca. 40 EPC projects during 2014-16
Total ESCO market size	€2.6-3.2 billion/yr. (2013)
EPC-only market size (investment)	€150-200 million
EPC market potential	€5 billion (ESCO), of which €250-500 million EPC (2013)
EPC definition	yes provided in law, but different from EED
Established sub-sector(s)	<ul style="list-style-type: none"> EPC in public buildings, street lighting, swimming pools, industrial sites Chauffage (ESC) is very well established
Key general barrier(s) to be removed	<ul style="list-style-type: none"> low energy price furthermore no major barriers, but: contract complexities, perceived low-profitability, lack of juridical and technical skills among ESCOs
Key barriers in the public segment	<ul style="list-style-type: none"> EPC understanding and rules on public financing public sector is mostly limited by the EPC definition in France: investments are prohibited to be paid by savings according to the public procurement code.
Key driver(s) to date	<ul style="list-style-type: none"> incentives increased awareness new, innovative offers
Expected development/forecast	growth is expected, but it is dependent on a number of factors, therefore it is rather unsure
Opportunities for further development	some of the recently adopted legal changes and obligations suggest a possible growth

8.11 Germany

8.11.1 ESCO market overview

The German market for energy services is considered as the biggest and most developed market in Europe, with a tradition spanning more than 20 years.

There are around 500 companies offering contract-based energy services of various sizes offering different types of services and contracts. The majority of companies (and contracts) are engaged in providing services based on energy supply contracts: approx. 55-60% of companies are energy supply companies (incl. public companies), around 30-35% are energy service providers (ESCOs) and 10% are "others" (Offermann, Duscha, Irrek, & Seegeld (2013), Government of Germany (2014)). In Germany, two thirds of ESCO companies are SMEs with fewer than 250 employees. Energy service contracting constitutes the core business for a quarter of energy services providers. Energy services account for more than 30% of their revenue. For 60-70% of companies energy services account for no more than 5% of their revenue. Regarding the number and size of contracts, around half of the companies earn less than EUR 0.5 million a year, while only a few larger ESCOs earn ten or even hundreds of million per year from energy service contracting (Government of Germany, 2014).

The annual revenue of the entire contracting market for energy services is estimated at approx. EUR 3 to 4 billion and the market volume in 2010 was in the range of EUR 1.6 to 2 billion. According to the Association of Heating Suppliers, ESCs represented 86% of all contracts for energy services in 2012, 9% EPCs, 2% financing contracting and 3% energy management contracting (Government of Germany, 2014).

In Germany, ESCOs and energy supply companies are organized in several associations, such as: Association of Heat Suppliers (VfW-Verband für Wärmelieferung), ESCO Forum in ZVEI (Zentral Elektronik- und Elektronikindustrie e.V.), Arbeitsgemeinschaft für sparsame Energie- und Wasserverwendung (ASEW), Energieeffizienzverband für Wärme, Kälte und KWK e.V. (AGFW) and Bundesverband Kraft-Wärme-Kopplung e.V. (B.KWK). These represent interest of energy suppliers and energy service companies.

8.11.2 Status with Energy Performing Contracting (EPC)

Although the German market for energy services is one of the most developed in Europe, the share of EPCs⁷² is about 15% of the total contracts for energy services. Most contracts are realised in the public sector, and more specifically in the central and local government (Busch & Lagunes Diaz, 2013).

It is expected that the EPC market will grow 7% annually on average. In particular, the market for EPC in the public sector as well as the market in hospitals is expected to grow by 10% annually, while the growth for industry and SMEs is expected at about 5% per year. The growth rate for tertiary (commercial) sector is assumed to reach not more than 2% annually (Busch & Lagunes Diaz, 2013).

In Germany, several guidelines and model contracts for EPC have been used for many years. The Energy Agency of Berlin (Berliner Energieagentur GmbH) on behalf of the Hessian Ministry for Environment, Rural Development and Consumer Protection has developed guidelines for EPC in Public Proprieties for the Federal State of Hessen as well as a model contract for EPC with guaranteed savings. The first edition of the "Guidelines for energy performance contracting (EPC) in public buildings" for State of Hessen, issued in 1998, laid down detailed standards for the practical implementation of energy service contracting for the first time. The amended 2003 version takes account of the changed legal regulatory framework in particular, including the new public procurement law, and reflects the latest court decisions in the model contract. This contracting guideline has been used as a standard reference for EPC in public properties in Germany. (Ministry for Environment, Energy, Agriculture and Consumer Protection 2012) In the Federal State of Hessen alone, more than 24 projects have been implemented in state owned buildings using EPC since 2001. The resulting savings of EUR 4 million equals to energy savings of 28%.⁷³

⁷² In Germany is often used ESC (Energiespar Contracting) as the abbreviation for EPC

⁷³ Source: European energy savings initiative 2020 www.eesi2020.eu

The "Guidelines for energy performance contracting in public buildings" of the Federal State of Hessen have been prepared on the basis of the German legislation related to energy efficiency and international and national quality standards for EPC, such as: DIN EN 15900 and VDMA 24198⁷⁴. The guidelines provide descriptions of all EPC implementation phases, including preparation and carrying out of tender for public buildings, evaluation of bidders, project implementation and calculation methods.

In practice, two options are used for EPC with the public sector in Germany: (1) single-stage EPC and (2) two-stage EPC. In the single-stage EPC, the client receives binding warranty bonds from the potential contractor (ESCO) immediately after the realisation of a preliminary energy analysis and determination of the energy saving potential. The client then concludes standard EPC with the best bidder for the implementation of EE measures. This model contract is simpler and easier to implement, but is riskier for the contractor (ESCO) since the energy saving guarantees are based on preliminary data (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

In the two-stage model, after EPC is signed by the client and the best bidder, the contractor carries out a separate detailed energy analysis for the verification of contract conditions. In the case of the detailed analysis which does not confirm conditions from the offer/contract, the client can cancel the project/contract without having to pay for the detailed analysis. In other cases, if the offer/contract conditions are confirmed, the project can continue with stage 2, which includes energy measure implementation. The two-stage EPC model has been implemented for complex projects such as hospitals (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

This model contract includes several documents (templates), whose aim is to describe and simplify the process. The attached documents include: list with planned and agreed energy saving measures that should be implemented by the contractor, structure of investment and list of products (equipment), methods for the calculation of the baseline energy consumption and energy costs, annual energy savings value and payment of service fees⁷⁵ (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

The baseline energy consumption can be calculated in three ways:

Baseline energy consumption calculated using a flat rate base (not depending on climate and calculating period).

Baseline energy consumption calculated on pro rate base (depending on calculating (invoicing) period). The calculation is based on the measurement of energy consumption throughout the observation period (year) and does not depend on the climatic conditions (heating degrees days are not taken into consideration). Examples include low voltage electricity consumption.

Baseline energy consumption calculated on basis of measured consumption, which depends on climate conditions. This model is used for the calculation of energy consumption and related costs of gas and oil for heating and district or local heating.

In addition, there are several other contract models (based on EPC) such as:

- EPC Plus (ESC Plus in Germany)
- EPC Light (ESC light in Germany)
- Technology specific EPC (Technologiespezifisches ESC) and
- Green EPC (Grünes ESC in Germany) (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012)

⁷⁴ VDMA 24198 gives the concrete definition and services under EPC , describes phases and process development of EPC and provide market actors with criteria for evaluation of projects realized under EPCs.

⁷⁵ Water consumption and water costs are taken in account In all calculation for base line consumption and energy savings

The EPC Plus model has been developed due to the fact that energy savings resulting from the implementation of standard EPCs are in general not sufficient to cover the costs of renovation of building envelopes and requires much longer contracting period. This model contract includes construction works for the renovation of whole buildings or parts of buildings for achievement of higher energy savings in public buildings. When building envelope measures are deemed as obligatory measures by the client, the client provides an additional payment (annually or only once) to the contractor in order to compensate for the longer payback period. It depends on scope of renovation works (share of the sum related to renovation (construction) works as part of the total investment). The Central element is similar to standard EPC, namely the contractor provides an energy saving guarantee and assumes the performance risk (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

A model contract for EPC Plus has been included in the "Guidelines for EPC for Public Properties" for the State of Hessen.⁷⁶ Besides additional payments for construction works for building renovation, this model contract also includes a special regulation for ownership and insurance of equipment and installations, taking into account the performance risk and obligation for maintenance of installed equipment (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

Low or zero investment related energy savings measures can be carried out through the EPC light model. In this case, the contractor offers the implementation of external energy management system with guaranteed savings. The contracting period is shorter by 2-3 years, since no requirements related to pay back are foreseen. The contractor takes over guarantee (performance) for achievable energy savings through optimisation of equipment and processes as well as through the implementation of an energy management system. The payment of the contractor fees by the client is on the basis of achieved results (energy savings). This type of contract is appropriate for clients, who do not have own capacity for sustainable energy management as well as for buildings for which standard EPC is not suitable (e.g. they are too small, with low investment requirements) (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

Technology-specific EPC (Technologiespezifisches ESC) was developed for the implementation of projects focusing on the improvement and renovation of lighting systems in industrial buildings, administration buildings, SMEs and commercial buildings as well as street lighting given that these systems neither correspond to state of the art nor meet the new standards and regulations. This type of contract has been used in practice for the renovation of street lighting systems (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

The model contract for Green EPC was developed by the Berlin Energy Agency in 2010. This contract is also based on EPC with significant incorporation of renewables. Green EPC has been implemented as a pilot project in municipalities. After the evaluation of results of pilot projects, it is expected that it will be implemented in other municipalities. The implementation of this type of contract has been supported by the Federal Ministry for Environment, Nature Conservation, Construction and Nuclear Safety (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

In addition, there are several other EPC guidelines for in public sector such as (Busch & Lagunes Diaz, 2013):

- Energy Performance Contracting as a contribution to climate protection and cost reduction –Guide to EPC in public buildings,

⁷⁶ Model Contract for EPC Plus and additional documents to it can be found on : <http://www.energieland.hessen.de/energiespar-contracting>

- Contracting for municipal sport facilities – strategies for climate change and reduction costs-Guideline) Federal Environmental Agency(2000)
- Guidelines for EPC – Instruction for preparation and implementation of EPC in State owned properties, German Energy Agency –DENA (2003)
- Contracting Plot for Municipalities (2008)
- Contracting Guide book “Contracting for local authorities-and it works!” Energy Agency of North Rhine Westphalia (2001)

8.11.3 Status with Energy supply contracting (ESC)

Energy supply contracting (ESC) is considered as the most widely implemented type of contracting for energy services. With a market share of 86%, ESCs are regarded as the most important contract for energy services. Projects based on ESC have been implemented by ESCOs or energy supply companies mostly in the public sector, followed by the private residential and commercial sectors. The private residential buildings are also a segment of the sector whereby an increased number of ESCs are reported. Energy service providers (ESCO and energy suppliers) invest and realise projects related to renovation or installation of new central heating or cooling systems for individual buildings as well as for pool of buildings. In Germany, only 13% of the residential buildings (mainly in East Germany) are connected to district heating systems heating systems (as opposed to Sweden where this represents 50%). Heating systems are more decentralized (local or individual) and therefore more suited for ESC model, since they do not require large investments and are not sensitive to economic aspects. Installation of CHP (combined heat and power) plants is becoming a widespread solution recently as it has been very much promoted by the central and local governments (Wargert, 2011). The main trend for ESC projects is that ESCOs most commonly own the heating or cooling facilities during the contracting period. Around 70% of the heating or cooling systems are owned by ESCOs (Wargert, 2011).

A template for ESC was prepared by the Association of Heat Suppliers (Verband für Wärmelieferung) and can be found on the webpage ([www. http://www.bfee-online.de](http://www.bfee-online.de)) of the Federal Department for Energy Efficiency (Bundesstelle für Energieeffizienz). This ESC model has been developed for heat supply in residential multi-family buildings. According to this model, the contractor (heat supplier or ESCO) concludes a contract with the client for heat supply for defined period of time based on a pre-calculated price. The contractor is obliged to install and maintain the equipment as well as measure the heat consumption in buildings. As the equipment does not belong to the client, the contractor shall remove it at the end of contract. The Model contract includes guidelines on how to calculate the fees for the installation and maintenance of the equipment, supplied heat energy and measurement of consumed heat.

8.11.4 Demand side

8.11.4.1 Energy services in public sector

The public sector is the main client for energy services, especially for the implementation of EE projects based on energy performance contracting (EPC). Around 75% of all EPCs have been realized in public buildings, most of which have been implemented in administrative buildings (federal and municipality buildings), schools, hospitals and medical facilities (Busch & Lagunes Diaz, 2013). Energy agencies and related institutions in close connection to the public administration have constantly pushed the market for energy services in public buildings. The minimum energy cost baseline for EPC has been set at approx. EUR 200 000 and small, individual public buildings are therefore not considered suitable for EPC projects unless they are taken in account only in a pool of larger public buildings.

A programme for the reconstruction of public buildings "Energy Savings Partnerships in Berlin" is a good example for cooperation between the public sector and energy service providers (ESCOs). This programme was developed by the Energy Agency of Berlin and Berlin's Senate Department for Urban Development. Since 1996, the Energy Agency of Berlin has launched and accompanied 25 energy savings partnerships (projects) in 1,300 public buildings and more than 500 public properties in Berlin, based on the EPC model. This contract model has already proven to be a success in Leipzig and Vienna (Berliner Energieagentur, 2015).

The General Administrative Regulation on the procurement of energy-efficient products and services (AVV-EnEff) obliges all Federal Government departments to carry out an energy-related analysis, evaluate their energy consumption and examine the aspects of the most EE solutions (Government of Germany, 2014). Fundamental rules and basic principles of public procurement are given in Art.97 of the Act against restraints of Competition (GWB). Two of the important basic principles related to ESCOs from Art.97 of GWB are: consideration of SMEs and tenderer's right of ensuring compliance with public procurement.

- The procurement procedures for different sectors are addressed in the following regulations:
- Public Tendering Regulation or Regulation on the Award of Public Contracts (Vergabeverordnung, VgV)
- Regulation amending the Rules on Awarding Contracts in Transport, Drinking Water Supply and Energy Supply (SektVO)
- Public Procurement Regulation Defence and Security (VSVgV)

The Regulation on Contract Awards for Public Supplies and Services (VOL part A and B) more precisely regulated VgV and is applicable for awarding of contracts for energy services (particularly for EPC) although energy services are not listed separately in the Annex I part A of VOL/A. Federal Ministry of Economics and Technology and DVAL⁷⁷ are the legislative powers for VOL. The VOL does not apply for contracts of construction works and freelance services. The VOB⁷⁸ applies for public works contracts (the execution and/or the design of construction) and the VOF⁷⁹ (Regulation on awarding of contracts for freelance services) applies for procurement of freelance services.

In the VOL part A (General rules for procurement) it is stated that: "the award must be granted to the most economically advantageous tender with due consideration of all circumstances. The lowest tender price alone is not the sole decisive criterion". Special account shall be taken to consider the interests of small and medium-sized enterprises when awarding public contracts. Contracts shall be subdivided into partial lots and by type or trade (technical lots). Several partial or technical lots may be awarded together if required on economic or technical grounds. In addition, depending on the type, scope and purpose of the service to be rendered, the enterprise can provide evidence of its professional and technical capabilities (Federal Ministry of Justice, 2009).

Three types of awarding procedures are used for public procurement (Federal Ministry of Justice, 2009):

- Public invitations to tender, procedures in which an unrestricted number of enterprises are publicly requested to submit tenders;
- Restricted invitations to tender, when enterprises are publicly invited to take part on the bid (a call for competition) and a limited number from the group of candidates is then requested to submit proposals;

⁷⁷ Deutscher Vergabe- und Vertragsausschuss für Lieferungen und Dienstleistungen – German Committee for Supplies and Services Tendering and Contract Regulations

⁷⁸ VOB is the Regulation for Public works contracts-Construction tendering and Contract Regulation

⁷⁹ VOF is the Regulation on awarding of contracts for freelance services

- Single tendering, a procedure in which the contracting authorities, with or without a call for competition, generally approach several selected enterprises to negotiate with one or more on the contractual terms and conditions.

In restricted invitations to tender and single tendering procedures, several – never less than three – candidates must be requested to submit a tender. Contracts are awarded in a public invitation to tender. A restricted invitation to tender or a single tendering procedure is permissible in duly justified exceptional cases (Federal Ministry of Justice, 2009).

If the amount for public procurement is above EU thresholds⁸⁰, tenders should be published in the Supplement to the Official Journal of the EU. Since 2005 Germany has published altogether 85 public calls of tender for EPC projects which have been European wide Calls of Tender. The published energy costs base line for 75 projects was about EUR 69.5 million (Busch & Lagunes Diaz, 2013).

Public procurement and contracting in Transport, Drinking Water Supply and Energy Supply Awarding Contracts is regulated by the Regulation amending the Rules on Awarding Contracts in Transport, Drinking Water Supply and Energy Supply (SektVO). This act generally regulates procurement of goods and services under ESC.

In order to standardize and simplify public procurement of energy services, several public institutions and professional associations have developed guidelines, manuals and standard procedures for public procurement of energy services. Some of the most used documents are:

- "Guidelines for the procurement of energy supply contracting" issued by Association of Heat Suppliers (Verband für Wärmelieferung)
- "Guidelines for procurement of energy supply contracting" issued by German Energy Agency (DENA)
- "Guidelines for energy performance contracting in public buildings" issued by Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection (see chapter for EPC)

In the German public sector, EPC has been mostly used for financing EE measures for building energy renovation. In most past cases (but also nowadays) one of requirements in the call for tenders has been for ESCOs to provide financing for EPC-related projects. ESCOs can therefore fund projects either through their own equity (very difficult especially for smaller ESCOs), or through loans from financial institutions. In Germany, credit with forfeiting is the most commonly used model for financing of EPC projects by ESCOs. In this arrangement, ESCOs sell one part of their future receivables (from client) to financial or credit institutions. A template (developed by the Energy Agency of Berlin) for contract for forfeiting of necessary "waiver of defence" of clients in favour of credit institutions can be found as attachment to the "Guideline for EPC in Public Buildings" published by the Federal State of Hessen.⁸¹ According to this guideline, in the case of forfeiting, the amount of security that ESCO has to provide to the client will be increased on 10% of the total savings guaranteed over the contract period to be backed by a bank guarantee instead of 5% which is normal practice (Hessian Ministry for Environment, Energy, Agriculture and Consumer Protection, 2012).

Financing of energy services through credit lines has become burdensome especially for smaller ESCOs with several projects at an initial phase. Credit liabilities burden balance sheets and reach their credit limits. It can be observed that in many EPC cases, ESCOs provide upfront investment costs placed on the asset side of their balance sheets, as financial fixed assets. This influences credit rating of ESCOs and limits their capacity for realization of new projects (Busch & Lagunes Diaz, 2013).

⁸⁰ Threshold for public supply/service contracts since 01.01.2014 (regulated in Art.2 of VgV) is EUR 207,000

⁸¹ <http://www.energieland.hessen.de/energiespar-contracting>

8.11.4.2 Energy services in other sectors

In general, ESCs are very often implemented in the residential, commercial and industrial sector in Germany. In the residential sector almost all projects has been implemented on the basis of ESC. EPC is not common for the residential sector, since there is not supportive legislation in place. ESCOs need to conclude an agreement with each tenant to implement EE measures. In order to reach the economic benefits of an EPC, the ESCO shall conclude a minimum number of separate agreements (Busch & Lagunes Diaz, 2013). The EPC is not widely used in the commercial sector either is compatible with the residential sector. Some barriers include the fact that most units are rented by different clients, and relatively short tenancy length. According to ESCOs estimates, the potential for this market segment is about EUR 10million per year (Busch & Lagunes Diaz, 2013).

8.11.5 Remaining market potential and barriers

The public sector in Germany is associated with a significant energy savings potential in public buildings through EPC and ESC models. Pursuant to the Study "Contracting-Potenzial in öffentlichen Liegenschaften. Market Potenzialbewertung in Liegenschaften des Bundes, der Länder und Kommunen" prepared by the German Energy Agency (DENA) in 2007, the Federal Government, Federal states and municipalities in Germany can reduce their energy costs (in 2005 about EUR 3.58 billion per year) through implementation of EPCs in their buildings (real estates) by up to EUR 300 million annually by 2016 with the support of energy service providers including ESCOs. This figure is related to energy savings of about 30% of the total energy cost in around 20,000 public buildings, including schools, administration buildings, courts, etc. Additionally, 18 000 public buildings can be renovated using the EPC model. The total number of real estates owned by municipalities is 176 000. The energy savings potential in hospitals and other public buildings has been not taken into account in the calculation of the energy savings potential (Dena, 2015).

In terms of the residential sector in Germany, there are around 18 million of buildings and 4 million companies. Both sectors together with the public sector consume around of 3,160PJ for heat and hot water in terms of final energy plus 510TWh for electricity. Estimations of the market potential shows that the 16% residential buildings are appropriate for energy efficiency contracting, and 1% are preferentially suited (Offermann, et al., 2013).

Although the German market is considered as well developed, there are barriers that hamper its development. The legislative framework is incomplete and inadequately supportive, especially for the EPC model. For example, in the existing public procurement regulation (VOL) energy services are not directly addressed as other types of services. This causes different interpretation of energy services and EPC.

Public procurement rules and procedures are very extensive, detailed and, somewhat, not flexible for EPCs. There is also lack of secondary and tertiary legislation. In some federal states, accounting rules, especially in terms of operational and financial lease are not in favour for EPCs.

In terms of remaining barriers, there is lack of or limited information regarding technical, economic and financial aspects among potential clients for energy services results in low awareness about benefits of implemented projects. Decision makers in companies cannot see the benefits of EE service outsourcing. Investment and financing of EE are considered as risky and complicated by policy decision makers. In some cases, monetary- and energy-related savings resulting from the implementation of EPCs do not meet the expectations of potential customers.

In terms of financing, there is problem, from the customer's viewpoint, of relatively long payback period (10-15 years) and low internal rate of return of EPCs. EPC are in competition with core business investments with shorter payback time (3-5 years). Investment assessments are often based only on investment cost and do not take in account operational and maintenance costs. Small ESCOs with less collateral acceptable

to banks have larger overall capital costs, thus bear increased overall project costs. In some cases, generated savings are not always acknowledged as cash flows and collateral (Busch & Lagunes Diaz, 2013).

For many commercial banks, projects with an investment volume below EUR 3 million are too small to provide good credit condition.

8.11.6 Policies and measures supporting ESCOs and EPC

The Directives ESD and EED are implemented by the Law EDL-G (Gesetz über Energiedienstleistungen und andere Energieeffizienzmaßnahmen (EDL-G)). This law does not include an EPC definition because it was set prior to EED (around the year of 2002) according to German standard: DIN 8930 Teil 5. Furthermore, a definition already existed before given in the "Contracting Guideline for the State of Hesse (1998) (JRC 2016). There are also a number of model contracts, subsidy schemes and guidelines that help the stakeholders to understand and follow better what EPC is⁸².

8.11.6.1 Information and awareness raising measures

The German Energy Agency (dena) and other energy local agencies such as BEA (Berliner Energieagentur) promote energy efficiency services in the framework of national and European programmes and initiatives. They organize information campaigns and other events for the promotion of EE and use of RE as well as information on energy services.

The Berlin Energy Agency (BEA) coordinates the project "European Energy Service Initiative Towards the EU 2020 Energy Saving Targets" (EESI 2020). The project supports the use of energy performance contracting (EPC) for the realization of the energy savings potential in nine big cities and metropolitan regions in Europe. BEA was also a partner on the project Buy Smart+⁸³, funded by the European program "Intelligent Energy Europe", providing free consultation and information material on green procurement.

The aforementioned associations of energy service providers including energy suppliers and ESCOs are very active in terms of promoting of ESC and EPC. They organize events such as seminars, training programmes and workshop for the promotion of energy services. For example, VfW plans to organise training programme for development of EPC in September 2015. This programme has been recognized by BAFA (Bundesamt für Wirtschaft und Ausfuhrkontrolle) and is especially designed for engineers interested in the EPC concept.

BAFA also supports municipalities, enterprises owned by municipalities and SMEs through small grants (max. 2,000 EUR) which can be used to provide consulting services through energy experts. These experts evaluate public buildings in order to estimate the energy saving potential and advise municipalities on the use of the EPC model for the implementation of identified EE measures. As a next step, they are also expected to give professional support for the implementation of EPC projects and, if this model is deemed not suitable, to support municipalities in procurement process for other contract models (BAFA, 2015). Finally, several ESCOs in the VfW are organized in a working group for EPCs which meets regularly to discuss several issues related to these contracts.

8.11.7 Conclusions, projections and recommendations

The growth of the German market for energy services in the last few years and initiatives taken by federal and local (states) governments demonstrate the energy contracting's role as an important mechanism for implementation of EE projects in the public sector, but also in other sectors. ESC is the widespread model for energy service contracting,

⁸² see http://www.bafa.de/bafa/de/energie/contracting_beratungen/index.html?fold=true

⁸³ The central strategic objective of the project is to increase the share of energy efficient procurement in Europe. This will lead to a higher market impact and therefore support the production and use of energy efficient goods and services.

and EPC is common model for implementation of EE projects in the public sector, which is still the leading segment on the German market for energy services. Energy renovation of the building stock is set as one of the priorities of the government's energy efficiency policy, due to the significant potential in the public and residential building stock. Housing-related legislation has been already amended e.g. Tenancy Law Amendment Act of 2013 in order to create a regulatory framework in favour of building renovation and EE contracting. The Federal programmes such as e.g. CO2 building renovation programme, along with KfW programmes for EE construction and renovation of residential buildings, which provide loans and grant, is a high investment volume financial instrument in Germany. As part of these programmes, around 3.5 million homes has been already renovated or newly constructed. The investment volume initiated by KfW reached EUR 162 billion between 2006 and 2014. In 2014, EUR 1.8 billion (commitment appropriations) were to be made available for grants and soft loans to support the CO2 building renovation programme. The government recognize that ESCOs can facilitate the implementation of these programmes, since they can provide necessary know-how in the preparation and implementation of projects under EPC and ESC models. BAFA (Bundesamt für Wirtschaft und Ausfuhrkontrolle) has therefore initiated a national programme to support advisory services for EPC.

Energy Agencies and associations of energy suppliers and ESCOs play an important role in the promotion of energy services on the market. They are involved in preparation of guidelines and standardized procedures for public procurement of energy services. Based on EU and national regulations and standards⁸⁴ all stages of project development are explained and criteria for assessment of EPC services are stipulated. In addition, these documents are a very important tool for building trust especially for EPC, which are sometimes considered as a very risky business.

The German market as a leading European market for energy services can be the driving force for whole EU market. More than 80 Europe-wide calls for EPC organized by German public sector took place in the period 2005-2012, and gave opportunities to European ESCOs to participate in public calls and learn from the German experience.

8.11.8 Summary

Total ESCO market status (2015)	excellent level, 500+ ESCOs
EPC market status (2016)	excellent level of development, ca.10 EPC providers
Total ESCO market size	€3.5-5 billion/yr. (mainly ESC)
EPC-only market (investment) size	€150 million (estimates vary widely)
EPC market potential	€20-30 billion/yr. (total revenue from energy services, incl. energy costs) (2012)
EPC definition	provided in a number of places, originating from before EED (first in Contracting Guidelines for Hessa (1998), currently relevant is the standard DIN 8930-5 (2002))
Established sub-sector(s)	<ul style="list-style-type: none"> • EPC in public sector (educational buildings, hospitals, street lighting) • EPC in offices, public pools • some EPC in multifamily buildings • industrial sites

⁸⁴ For example, Norms for Energy efficiency services (DIN EN 15900) and VDMA 24198 (Terms and services for Energy Performance Contracting)

Key general barrier(s) to be removed	<ul style="list-style-type: none"> • lack of readiness and awareness • EPC seen as too complex • reluctance to use facilitators • bad reputation of a few failed projects • legal and tax ownership of the project is not clear
Key barriers in the public segment	<ul style="list-style-type: none"> • contracts and projects are too complex for administration • restrictions on third party financing (ESA 2010 related limitations) • long projects • possibility to choose an EPC solution is neglected in tendering
Key driver(s) to date	<ul style="list-style-type: none"> • Contracting Competence Center • standard documents, guidelines • good practice examples • funding schemes for EPC facilitation • bank guarantees for EPCs with SMS
Expected development/forecast	slow growth continued for EPC and ESC
Opportunities for further development	most important is to simplify the contracts, prepare easy to understand standard contracts and disseminate, furthermore increase the access to facilitators and competence centers

8.12 Greece

8.12.1 ESCO market overview

The ESCO market in Greece remains to be negligible. In recent years, various policy developments have been put in place, addressing some important barriers. These include recent regulations (Law 3855/2010 on the institutional framework for the provision of energy services and Ministerial Decision D6/13280/07.06.2011 on Operation, Register, Code of Conduct and related provisions for energy service providers) and new financial support measures promoting the use of ESCOs. Despite these developments, the Greek ESCO market remains stagnant, with very few projects implemented.

An ESCO registry⁸⁵ has now been created at www.escoregistry.gr, managed by the Directorate of Energy Policy and Energy Efficiency of the Ministry of Environment, Energy and Climate Change. The registry contains data for 47 ESCOs, which are classified as natural or legal persons. For legal persons, three sub-categories exist: a) ESCOs which have implemented or in progress of implementation projects with total budget of at least €300,000 over the last five years, b) ESCOs which have implemented or are in progress with projects with total budget of at least €1,000,000 over the last five years, c) all other ESCO companies. It should be noted that several ESCOs have begun to show interest in implementing interventions for improving energy efficiency through EPCs and 101 businesses have submitted their application forms, while 209 have begun the process of submission without having their applications completed (CRES, 2014).

In order to boost the market, pilot projects are planned and the involvement of JESSICA is foreseen. Support and monitoring of these projects will be provided in order to standardize procedures and remove regulatory barriers to the implementation of energy efficiency measures in public sector buildings through energy performance contracting (EPC).

8.12.2 Status with Energy Performing Contracting (EPC)

Templates of EPCs, based on guaranteed savings and shared savings, are now published at www.escoregistry.gr. So far only one ESCO has implemented EPCs, with a budget of less than €300,000 (CRES, 2014). It should be noted that other ESCOs are active in the

⁸⁵ Participation is voluntary and the reported activity is not verified

market, mainly in the private industrial and tertiary sector, even if these are also very few.

8.12.3 Status with Energy supply contracting (ESC)

There are now 47 ESCOs registered at the voluntary, but official registry, at www.escoregistry.gr. These companies offer a broad variety of energy services, from audits, energy management, etc.; therefore it is unclear, which of them are actually active ESCOs.

8.12.4 Demand side

8.12.4.1 Energy services in public sector

Best practice sharing together with streamlined and standardized tendering procedures can help the promotion and acceleration of the use of ESCOs. As the public sector can play an exemplary role by actively engaging in ESCO activities, in 2012 the Ministry of Environment, Energy & Climate Change launched a pilot programme targeting the implementation of 5 ESCO projects in public sector buildings based on the EPC model. The total budget sums to € 589,713 (funded by the Business Programme Environment & Sustainable Development 2007-2013), with an estimated investment budget of € 3.4 million. The Centre for Renewable Energy Sources and Saving (CRES) had the role of facilitator (between ESCOs and public bodies), helping them to overcome possible administrative barriers, providing technical consulting when needed and acting as a liaison and monitoring body throughout the implementation of the projects. It has been estimated that the implementation of proposed energy saving interventions would result in annual final energy savings of 5.184 MWh, total saving rate of 23% with average payback period of 5.1 year, jobs created equivalent to 38 man years and annual economic benefit of public bodies of €674,000. The programme, ended in 2015.

As of 2016, there is one EPC provider that has succeeded to carry through a few projects (not more than 10, but the exact number and volume are not known) in the municipal street lighting sector and in public hospitals. The size of the projects was very small, below €200,000, making up a market volume of less than few million EUR.

8.12.4.2 Energy services in other sectors

In the private sector, ESCO projects typically include the installation, operation and maintenance of active systems for energy production, heating or cooling of various technologies (alone or in combination of gas, solar thermal, geothermal), energy saving systems or a combination of these two categories through long-term leasing. The end users of these applications range from hotels, industries to companies and apartment buildings.

A programme focusing on energy performance improvements of services buildings through ESCOs has been presented as a new NEEAP measure in Greece. The programme is expected to run in the period 2015-2020 and 3000 buildings are to be renovated through the participation of ESCOs. The total energy savings in the period 2014-2020 are estimated to be 50.8 ktoe. Eligible actions include energy efficiency improvements of high consumption facilities (such as industrial facilities, hospitals, large office buildings, swimming pools, warehouses), degraded areas, construction of energy efficient buildings etc.

8.12.5 Remaining market potential and barriers

The market for energy services is associated with a significant growth potential. The removal of regulatory barriers with regards to implementation of EPCs should enable the implementation of energy efficiency interventions in public sector buildings, while several projects are expected to be realised in the services sector through the new programme

mentioned above. The Green Fund is also expected to provide funding to ESCOs to implement projects to improve energy efficiency (CRES, 2014).

A number of barriers to the development of the Greek ESCO market have been cited in the literature. These include the lack of knowledge and experience of ESCOs in Greece as well as awareness and confidence issues among end users with regards to the economic and other benefits of energy efficiency projects and energy service providers. Previous projects mainly focused the installation of solar thermal systems, which were sometimes combined with other energy efficiency interventions. The mechanisms of design, construction and investment of large-scale, complex projects are not yet well defined and understood.

The regulatory barriers concerning rules for the establishment of ESCOs and standard contracts are expected to be lifted with the recent implementation of ESCO regulations and the adoption of the new Law on Public-Private Partnerships (PPPs). The latter addresses the obstacle regarding the installation, operation, maintenance and management of energy-related equipment in the form of long-term leases (Law 3389/2005). Despite these regulatory improvements, the market remains largely immature. This can be largely attributed to financial-related obstacles constitute one of the most important hurdles in the Greek context. The financial crisis has severely impacted the financial capacity of banks, prospective clients and ESCOs. Potential clients are hesitant to allocate resources for investments on energy efficiency projects, while most ESCOs have a small capital base and have difficulties accessing project funding from commercial financial institutions (Konstantinou & Atzamidis, 2013). The need to cut expenses has also severed the ability of the public and private sectors to get actively involved and the overall market uncertainty prevents the realisation of large-scale investments.

8.12.6 Policies and measures supporting ESCOs and EPC

Law 3855/2010 established the institutional framework for the provision of energy services. More specifically, Article 10 introduced the requirement to establish an ESCO Registry for the registration of ESCOs providing energy services and other measures to improve energy efficiency. Together with the details on the operation of the ESCO Registry, the Ministerial Decision D6/13280/07.06.2011 covers the registration procedure, criteria for inclusion and supporting documents for registration, issues related to the handling and use of its entries, definition of ESCO categories, conditions of establishment and operation of ESCOs, energy services provided, criteria for the proper performance of their duties, code of ethics etc. In 2015, Law 4342 / FEK143A/9-11-2015 introduced the definition of EPC, which is part of the EED transposition.

The Centre for Renewable Energy Sources and Saving (CRES) is implemented a project entitled 'Supporting and monitoring of the pilot implementation of energy efficiency improvement projects in public buildings by Energy Service Companies (ESCOs)', which is funded by the Operational Programme 'Environment & Sustainable Development' for the period 2007-2013 (Priority Axis: 1). Through pilot applications, the project aims to standardise procedures and remove regulatory barriers by identifying technical, procedural and regulatory parameters and conditions for the implementation of EPC-based projects.

8.12.6.1 Information and awareness raising measures

In addition to the registry of ESCO companies, the dedicated website recently created (<http://www.escoregistry.gr/>) contains information about the relevant legislation, registration process and models of energy performance contracts. No other awareness raising or information dissemination activities have been identified.

8.12.7 Conclusions, projections and recommendations

The financial uncertainty in Greece has created unfavourable conditions for the growth of the ESCO market in the country, and for energy efficiency in general. Despite expressed interest and recent legislative improvements, the market remains undeveloped with limited experience. Some pilot programmes in the public sector and support measures for the services sector are expected to provide a push. Increasing the dissemination of information about energy-efficiency projects and services offered by ESCOs will also advance the understanding of the way ESCOs offer their services and the benefits arising from EPCs.

8.12.8 Summary

Total ESCO market status (2015)	poorly developed, unclear number of active ESCOs
EPC market status (2016)	probably only 1 EPC provider, with a few (max. 10) projects
Total ESCO market size	~0
EPC-only market size (investment)	~0
EPC market potential	€5 million
EPC definition	in Law 4342 / FEK143A/9-11-2015 includes the definition, which is part of the EED transposition.
Established sub-sector(s)	<ul style="list-style-type: none"> • none
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • political focus on other priorities • lack of good experience; • high transaction costs on market basis, and financial institutions are not interested in EPC financing.
Key barriers in the public segment	<ul style="list-style-type: none"> • as above
Key driver(s) to date	<ul style="list-style-type: none"> • Energy Efficiency Fund (on hold) • EPC registry
Expected development/forecast	no changes are foreseen in the current circumstances
Opportunities for further development	In the current circumstances and with the available tools, the ESCO market does not seem to be able to kick-off

8.13 Hungary

8.13.1 ESCO market overview

The Hungarian ESCO market has gone through significant fluctuations between 2000 and 2015, and after experiencing a very steady decline after 2010, the market was expected to find a new growth route again for the last 1-2 years (JRC 2015). However, respondents to the JRC interview in 2016 indicate a complete halt of the ESCO, including the EPC markets.

Currently, the market is not competitive. The small number of ESCOs have to promote the model themselves, and they often have to fight against bad reputation due to earlier failed projects by bankrupt ESCOs and a general mistrust from (especially the public sector) clients. The ESCO sector is often demonised and the win-win offer is suspicious.

There is no ESCO association yet, but ESCO companies expressed interest to establish one, at a workshop in September 2015⁸⁶. The European EPC Code of Conduct is adapted and it is managed by the Hungarian Energy Efficiency Institute⁸⁷.

8.13.2 Status with Energy Performance Contracting (EPC)

ESCO companies in Hungary usually tailor the contracts to the needs and requirements of the clients based on long bilateral preparatory discussions, and the resulting contracts more and more often tend towards Energy Performance Contracting, i.e. include a guarantee element. Therefore, while EPC was not as widely used as the various forms of Energy Supply Contracting during the "golden age" of the Hungarian ESCO market (1990's-2005), today it seems to be more preferred. Still when strictly speaking, EPC is less common than ESC.

Due to the overwhelming and large number of barriers, the total number of running EPCs per year is very low, estimated to be around 5-10 with 1-2 new projects (JRC 2015), and has even decreased by 2016 (JRC 2016). Due to the very low number of projects in total it is difficult to estimate the number of companies that are actually involved in Energy Performance Contracting in Hungary as of 2016 because many more would be interested to sell energy services than the number that actually can. In 2013 around 6-7 companies were identified that were able to offer EPC (Boza-Kiss & Vadovics, 2013), and this has not changed significantly, but their success rate has started growing. One of them is the sister company of a large international ESCO, 1-2 are subsidiaries of smaller, but transnational ESCOs, and there are about 3-4 local engineering, equipment installers or energy manager companies. Most have a long history in the Hungarian ESCO market.

Projects that are running have a contract length of an average of 5-10 years, sometimes reaching up to 15 years, even though the investments are small, up to maximum €500.000 per project (Benigna Boza-Kiss and Kristof Vadovics 2013, JRC 2016)

8.13.3 Status with Energy supply contracting (ESC)

The number of active ESC companies was rather high and constant until 2010, reaching up to 30 active companies, which was drastically reduced to about 7-10 by 2013. All of the EPC companies mentioned above also offer ESC. As of 2015, there are a few new entrants. These are usually companies that start to offer energy services besides their core businesses (construction companies, energy suppliers, facility managers) realising the currently unpopulated niche segment. Most of the large international ESCOs used to have sister companies in Hungary, but were forced to close their energy service interests during the market decline, and supply the few interested clients from neighbouring countries.

An estimate about the size of the market is not available.

While the early 1990s could be characterised by simple, "cherry picking" and engineering based projects, by the end of 1990s the ESCOs were almost only seen as alternative financing institutions. During the early 2000s, the ESCO concept started to gain more popularity, especially in the public sector and wide-scale projects, sometimes bundled, were carried out, as well as small-sized ones. Following the 2010-2013 decline of the ESCO market, reputation has to be newly built. As of 2015, ESCOs promote their offer as a turn-key service with guarantees, however offers often include a fix fee, too. Once again potential clients often see ESCOs as alternative banks and not as mediums of complex solutions.

The central financing tools for building renovation projects ran out, the public institutions were building up huge debts and thus lost their credibility and creditworthiness, furthermore a number of failing ESCO projects undermined the trust towards such investments, not to mention the fact that a number of ESCO companies had been washed

⁸⁶ <http://www.transparens.eu/hu/news/zaro-szakmai-tanacsado-testuleti-ules>

⁸⁷ available at: <http://www.transparens.eu/hu/>

away by the crisis of the building industry. The government stopped promotion and support activities for ESCOs, targeted programmes or incentives (Boza-Kiss, 2015). Finally, at the beginning of 2015, ESCO companies were experiencing a newly growing interest (JRC 2015).

Projects are spread across sectors, and ESCOs are typically specialised to a given sector (residential buildings, industrial units, office buildings, public sites, etc.). Competition is very low.

8.13.4 Demand side

8.13.4.1 Energy services in public sector

Hungary is stuck with a very large energy savings potential in its public buildings, still mostly untapped. According to the National Building Energy Performance Strategy (ÉMI Non-Profit LLC for Quality Control and Innovation in Buildings, 2015), practically all public buildings fall in energy performance category D or worse, with health facilities performing worst with 300-350 kWh/m²/a and with the best performing educational buildings consuming 130-230 kWh/m²/a.

Until 2010, the municipal sector was considered as the best target of ESCOs, because of the available grants, the trustfulness, reliability and long-standing of these clients. Furthermore the inescapable general refurbishment need of public buildings underlined by the huge energy saving potentials was promising (Bertoldi, et al., 2014). However, from 2010 a rapid decrease in renovation projects and thus in ESCO projects was experienced. Municipalities had serious liquidity problems during the years 2010-2013, many of them facing bankruptcy due to erroneous decisions and a financial crisis generated loan-problem. Many municipalities had EURO or CHF-based loans, and their related costs were increasing dramatically due to the changes in the exchange rate, while the value of the buildings or other properties dropped as a result of the construction sector problems, causing a large negative gap between the actual value of the property and the value of the loan. A bridging solution was that the Government took over the management of municipal buildings and carried out a loan consolidation. ESCO projects were largely stopped or were going into a failure due to the unsure circumstances and delays in payments. As of 2014, local governments were unable or hesitant to take EPC/ESCO models into consideration. The central government even demonised the ESCO model, suggesting that ESCO companies dwell on the benefits of the public clients, and short-term thinking put an end to energy performance contracting in the public sector (JRC 2015).

In 2014-2015, some local governments and facilitators were reinventing the energy services opportunity. A major drawback is the expectations for grants. The government stopped energy renovation grants in 2011, which had been often combined with ESCO solutions before. Then, the promise for new grants was constantly open, but the dates were postponed many times. According to the 2015 (3rd) National Energy Efficiency Action Plan (NEEAP), the government still plans to offer grants (Ministry of National Development of Hungary, 2015) for the public sector that can be used in combination with an ESCO project. Thus the expectations are high, and ESCO projects are prepared, but only rarely realised at the moment. With the growing availability of the new grants, and clear requirements, it is possible that the ESCO solution can be combined again.

Another barrier is that procurement of an ESCO project is very difficult. The client is suspicious, comparison of offers, but even the formulation of a tender documentation is not backed up with in-house expertise, and then the bookkeeping is complicated or ambiguous. To overcome some of these problems, the partners explore "tricks", such as free audits offered, bookkeeping the ESCO offer as a service or the opposite as purchase of equipment, or selling the service not as a package but in separate pieces, etc. (JRC 2015). However, these solutions all increase the overall and transaction costs, give rise to possible corruption, and reduce transparency and trust.

8.13.4.2 Energy services in other sectors

The few projects that have been carried out in the past few years are mostly done in the industrial and private tertiary sectors (mainly hotels, sports facilities, manufacturing sites, offices, etc.), and a few public buildings (kindergartens, schools, hospitals). Payback times are around 5-10 years, and the size of the projects was generally below €200,000 (Boza-Kiss, 2015).

Residential EPC projects were also done in Hungary, in 3 locations. One of these projects is still on-going, but it is unclear whether they will continue. The ESCO that was doing it before (and other interested companies) based their offer on a combination with grants and/or guarantee from the public sector. There is some interest from clients to start new projects even on purely market basis; however these are still in the pipeline.

8.13.5 Remaining market potential and barriers

The remaining potential for building and site renovation is huge in Hungary. On average, 70% of the heating energy in buildings could be saved in a cost effective way (Korytarova & Urge-Vorsatz, 2012). The announced plans by the Hungarian government repeatedly include a strong focus on ESCOs. The first and second National Energy Efficiency Action Plans both indicated a significant role for the ESCO market (Marino, Bertoldi, Rezessy, & Boza-Kiss, 2010)⁸⁸, nevertheless so far the implementing or secondary legislation are missing or unclear. The third NEEAP (Ministry of National Development of Hungary, 2015) indicates that the usefulness and applicability of the ESCO solution is being investigated by studies currently, however details (e.g. expected publication date, content, responsible body of such an impact assessment) are not found. At the same time, the market is still expecting a political commitment, considering that completing the EED and EPBD requirements will need contribution from the private sector, e.g. the ESCO market.

Interestingly, the 3rd NEEAP states that there are no barriers to the ESCO market in Hungary (Ministry of National Development of Hungary, 2015). On the other hand, in reality, barriers on the ESCO market have grown significantly in the years from 2006 (Boza-Kiss, 2015; Boza-Kiss & Vadovics, 2013).

After 2011, the government stopped promotion and support activities for ESCOs, targeted programmes or incentives. At the moment, there is no legislative framework in place that could effectively aid ESCOs and EPC. As of 2015, a few legislative measures, including the Energy Efficiency Law, have been put in place as part of the transposition of the Energy Efficiency Directive (27/2012/EU), however these are seen very weak, and still do not affect the ESCO market.

According to the second NEEAP, a public ESCO was planned to be established. This was repeatedly announced and postponed, when in 2014 a public green bank was created, with 51% governmental ownership. Details are not known about this public company (National Energy Management Company), but supposedly it will function partially as an ESCO and will be responsible also for the renovation obligation of governmental buildings (JRC 2015).

Procurement is complicated and is still usually based on first-costs (Boza-Kiss, 2015), in spite of the fact that with the Governmental Decree 1849/2014. (XII. 30.) central governmental bodies and other bodies with a national scope are required to purchase the most efficient appliances and products, services and buildings. The purchases are monitored through a reporting system by Hungarian Energy and Public Utility Regulatory Authority (HEA) (Ministry of National Development of Hungary, 2015). Documents and guides are available to help tenderers to find the most appropriate products (Ministry of

⁸⁸ The first NEEAP of Hungary placed the ESCO solution amongst the priority axis for increasing energy efficiency of the Environmental and Energy Operative Programme (KEOP), as part of the New Hungary Development Plan (2007-2015) (Ministry of Economy and Transport 2008). Close to 50% of the tertiary sector savings targets for 2016 was planned to be achieved through ESCO and/or third-party financing projects in NEEAP 1 (Marino et al. 2010). This has not been reflected in the third NEEAP, though.

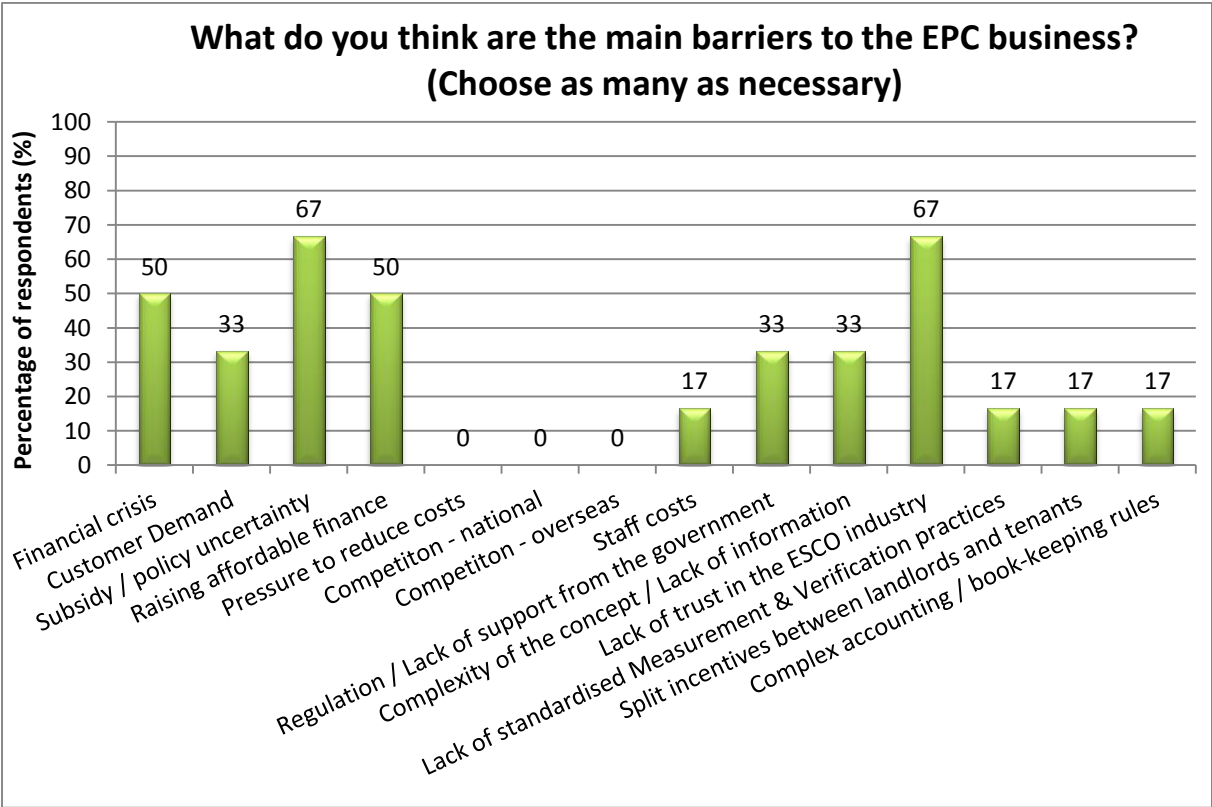
National Development of Hungary, 2015). In addition, public procurement is too much affected by corruption, and that makes the ESCO sector to be a secondary solution, because due to the precise monitoring, it is more difficult to be corrupted. EPC is complicated and few municipalities have trained staff that can be engaged responsibly in taking a decision or prepare a tender. ESCOs often offer free audits, which are a great benefit for the client and can help municipal staff in making decisions on the selection of possible measures and in writing the tender, however, this can causes contradiction and a risk of loss of invested time from the ESCO side.

Furthermore, political commitment to energy efficiency is limited too because other problems (social, employment, healthcare, etc.) are considered more important and receive more political and public interest. Decisions are influenced by the election cycles, and decisions may be redone after a change in leadership.

There are also barriers at the clients' side. ESCOs have to select from clients, in order to avoid non-payment, or disagreements during the contract phase. It has been reported that some clients become suspicious when the project saves more than guaranteed, and even though the client and the ESCO share the profits, they blame the ESCO for making profit "from them". The concept of win-win is little understood. As a solution, some ESCOs offer an opt-out option after 3-5 years of the project.

Figure 19 shows the relative importance of different barriers in the Hungarian ESCO market.

Figure 19 - Key barriers of the EPC sector in Hungary according to a market survey in Transparence project (financed by Intelligent Energy Europe).



Source: (Boza-Kiss & Vadovics, 2013).

8.13.6 Policies and measures supporting ESCOs and EPC

The legislative framework both for energy efficiency in general and for ESCOs/EPC are seen very weak in Hungary at the moment. Some steps have been taken during the last 1-2 years to improve the legislative and financial frameworks for energy efficiency as part of the transposition of the EED and EPBD, however the key legislative element, the Energy Efficiency Law is seen as weak and not up-to-date. Above all, there is no political support for the ESCO market, rather the opposite, it is being demonised.

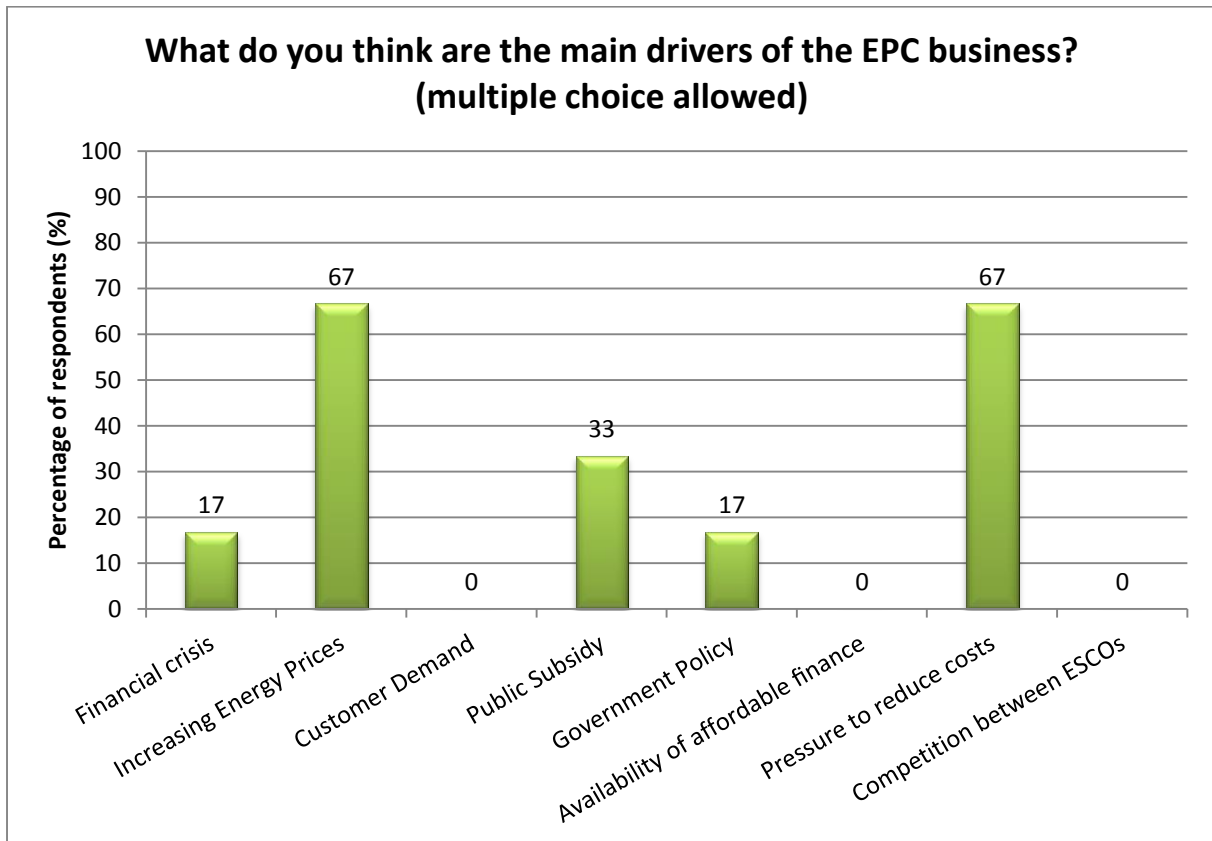
According to the 3rd NEEAP, a general awareness raising website will be created and maintained by the Hungarian Energy and Public Utility Regulatory Authority (HEA), which (among many other information) will contain provisions for the obligatory content of an energy performance contract in the public sector and it will offer also a model contract (Ministry of National Development of Hungary, 2015). It is also planned to substitute the "contact points" for energy services provided for by Art. 18. (2) a).

The government proposed the idea of a public ESCO at several occasions. For example, it has been calculated that the EPBD obligation of 3% renovation rate per year of governmental buildings will translate into the refurbishment need of approximately 360 buildings per year, of which 100 buildings could be revamped with the help of the planned public ESCO (Bencsik, 2013). The idea was to attach to it a financial mechanism in the form of preferential loan, as well as a guarantee fund, which would allow the public ESCO (and other ESCOs) to work with EPC, and thus guarantee the savings to make projects more successful and clients more interested because of the lower risk involved. With the establishment of a green bank (see above), this could function as a public ESCO and guarantee fund, but details are not available.

There used to be plans to reinstate the Panel Programme and other grants for energy efficiency and climate protection, and both the residential and public sector have been postponing its projects hoping for (partial) grant component. Finally at the end of summer 2015, grants were announced, but the residential sector was left out.

Ironically, the ESCO market may be pushed by this action, because building owners will realise that they will have to finance investments by themselves, opening a large market niche for the waiting ESCO market. Figure 20 indicates the success factors that market players named as drivers of the Hungarian ESCO market.

Figure 20 - Key success factors of the EPC sector in Hungary according to a market survey in Transparens project (financed by Intelligent Energy Europe).



Source: (Boza-Kiss & Vadovics, 2013).

8.13.7 Conclusions, projections and recommendations

The future of the Hungarian ESCO market is unclear at the moment. The market is clearly supply driven, there are about 10 active ESCOs, and at least 5-10 more companies that are interested to enter into this market. Demand is very low, due to the limited trust and because the ESCOs have to promote the concept themselves, which makes transaction costs high, too.

Hungarian ESCOs offer their services also outside the country mostly successfully.

The government seemed to be supportive of the ESCO market in its strategies, even considering the installation of a public ESCO, however, legislation currently is more a hindrance, as well as financial sources also exclude ESCOs. The earlier common combination of ESCO solution with public grants does not work anymore. Procurement is difficult, mostly based on first costs, and ESCO/EPC procurement is very difficult. Corruption is high and means a significant barrier to the ESCO market.

The ESCO market functions largely on a market basis now, and demand was slowly growing for 1-2 years, but the growth stopped completely again by 2016.

The key recommendations that could help to boost the EPC market in Hungary are:

- Centralising energy efficiency goals in secondary legislation, i.e. going beyond announcement towards actual actions;
- Promotion of building refurbishment, including adaptation of green public procurement in the public sector;
- More ambitious transposition of relevant EU directives, going beyond the minimum effort;

- Improvement of trust in policy-making, reducing erratic policy changes;
- Improvement of business partnerships through code of conducts, establishment of a representative body/association,
- Independent information dissemination, standardized documents;
- Development and promotion of financial products that are previously discussed with potentially interested clients;
- Improvement of creditability of clients and ESCOs, or dedicated treatment of EPC clients in the case of ESCO products of banks;
- Establishment of a guarantee fund to use public funds more effectively.

In conclusion, the Hungarian ESCO market is starting to revive again. There are more projects and increasing interest on the supply side. The demand or interest from the clients' side is also slowly growing.

The government is falling behind expectations, and sends out messages that decrease the value of energy efficiency improvement (e.g. focus on supply strengthening by extending the nuclear power plant). The finally available announcements that financial support will not be provided for certain segments (e.g. residential buildings), in spite of the strategies (e.g. the 3rd NEEAP), may be a useful kick-off for the ESCO market. At the same time, the public sector clients are still expecting the financial grants, and these may be combined by ESCO projects. The next few years might be decisive in the ESCO life in Hungary.

8.13.8 Summary

Total ESCO market status (2015)	preliminary, 7-10 ESCOs
EPC market status (2016)	halted, ca. 4 companies, with hardly any new projects
Total ESCO market size	n/a
EPC-only market size (investment)	n/a
EPC market potential	n/a
EPC definition	not available
Established sub-sector(s)	<ul style="list-style-type: none"> • public buildings and multifamily buildings – but they are halted • office buildings, shopping malls • ESC in industry
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • destructive legal framework, no definition, demonization • regulatory instability • financial liquidity of the clients and of the ESCOs
Key barriers in the public segment	<ul style="list-style-type: none"> • unclear future of national grants for EE • public procurement is perceived problematic
Key driver(s) to date	<ul style="list-style-type: none"> • promotion by the supply side • business partnerships can develop trust
Expected development/forecast	unsure
Opportunities for further development	The key issue to be overcome is the political and regulatory instability, no possibilities to predict

8.14 Ireland

8.14.1 ESCO market overview

The market for Energy Services Companies (ESCOs) in Ireland is still rather preliminary, however there are growing trends seen. The government, and in particular the Sustainable Energy Authority of Ireland (SEAI), has carried out a number of key measures to stimulate market growth in recent years. These actions include the government's commitment to secure €35 million as seed capital for investments in the Energy Efficiency Fund, which should help establish a fund of over €70 million when matched with private sector investments. The fund is expected to enhance the level of finance available in the market and allow players to materialise opportunities that exist in the public and commercial sectors. Following extensive consultations, the National Energy Services Framework was established in 2013 to foster market development and reduce the barriers to entry in the energy efficiency market in the non-domestic sector throughout Ireland.

A study carried out by the Sustainable Energy Authority of Ireland in 2005 estimated that the market value was somewhere in the region of €100 million (SEI, 2005). However, it is believed that this figure is too low, with more recent studies showing that €1 billion could be spent in retrofit activities in the public sector alone (O'Connor, 2012). The number of ESCOs in the country is not currently known and no ESCO registry has been created by the Irish authorities at the time of writing of this report. Previous studies suggested that the ESCO business was embodied by 13-15 small local energy service supplier companies but this figure is likely to be now outdated (Bertoldi, et al. (2007), Marino, et al. (2010)). Most of the larger ESCOs that provide full EPC solutions are large multinationals but there are also a good number of small and medium energy supply companies, typically providing biomass heat supply contracts and co-generation contracts (Bertoldi, et al., 2014). While an ESCO association has not been set up in Ireland; the Sustainable Energy Authority of Ireland (SEAI) has taken the role of representing ESCOs interests and developing promotional material.

8.14.2 Status with Energy Performing Contracting (EPC)

It is currently unknown the extent to which EPCs are currently used on the market. Energy performance contracting has been identified as a potential means for enabling energy efficiency projects and has, thus, been chosen as the key initiative to drive the public and commercial energy efficient market. To develop and support the uptake of energy performance contracting in Ireland, the Irish authorities developed its National Energy Services Framework in 2013, a three-pronged approach to deliver energy performance contracting. Focusing on the non-domestic sector through the country, the Framework aims to (Confrey, 2014):

- Enable new contracting and project development processes at scale
- Standardise project development processes, which have buy-in from the market, to build capacity and reduce transaction costs
- Ensure that energy performance criteria form part of every energy project, along with robust measurement & verification

Grant schemes run in the period 2006 – 2012 promoted, inter-alia, EPC, M&V and financing. Under the National Energy Services Framework, the Exemplar programme is developing 21 demonstration projects to test and provide feedback on the Framework documentation/process, tools and structures, and offers examples of projects in action – 11 in the public sector and 10 in the private sector (SEAI, 2015). In addition, technical assistance is available for organisations and projects to help determine the best route for project development and to procure projects on the basis of energy contracting including EPCs. For EPCs, technical assistance is available up to 75% of eligible costs to a

maximum of €15,000 (€20,000 total costs) for Product, Service or Works Identification & Viability.

8.14.3 Status with Energy supply contracting (ESC)

In addition to EPCs, the National Energy Services Framework provides guidance and support for energy supply contracts. Guidance on how to develop local energy supply contracts focuses on the local supply of sustainable energy such as wind, solar, biomass or CHP projects and/or retrofitting plant or equipment for the use of a renewable form of fuel (e.g. switch from oil-fuelled to biomass fuelled heating plant). SEAI are currently developing a local ESC contract tailored for CHP but a number of supporting and guidance documents are available for interested parties. These include an overview of local ESCs, a preliminary feasibility assessment template, a draft contract etc. (SEAI, 2015).

8.14.4 Demand side

8.14.4.1 Energy services in public sector

The actions taken to promote ESCs and EPCs primarily address the public sector (see previous sections on ESC and EPCs). With the implementation of the exemplar programme, 11 energy contracting projects are currently implemented in the public sector. At the time of writing of this report, no updates have been found on the progress made with regards to the implementation of these projects. Their implementation is under way and results will be made available on the SEAI website.

8.14.4.2 Energy services in other sectors

No information exists on the use of energy contracting in the residential sector. Government efforts have so far focused on the penetration of energy contracting in the public and commercial sectors. The exemplar programme run by the government also includes the implementation of 10 projects in private sector. These actions are expected to raise awareness among the commercial sector on the benefits of energy contracting and standardised processes developed by the government. Through previous governmental support programmes, over 2000 SMEs participated, through which measures that result in an average saving of 11% of their annual energy costs within 1 year (up to 30% savings potential identified on a regular basis) were identified and implemented (Confrey, 2012).

8.14.5 Remaining market potential and barriers

Substantial energy savings can be achieved in the public and private sectors in Ireland. The annual cost of energy to the Exchequer of public sector energy consumption is around €600m to 800m and experience shows that typical realisable savings are in the range of 25-35% for buildings, 25-50% for water services and 15-30% for public lighting (SEAI, 2013). Within the public sector, energy savings of the order of € 120 million per year within 5 years can be achieved through large-scale retrofitting, delivered through the use of proven, value-for-money EPC principles and innovative financing arrangements.

According to the Sustainable Energy Authority of Ireland, a key barrier to energy efficiency investments and deployment of EPCs is the quantum and structure of funding/finance available in the market (SEAI, 2015).

8.14.6 Policies and measures supporting ESCOs and EPC

The Irish Government has been actively engaged in supporting the development of an ESCO market in the country for the last few years through an active campaign of conferences, workshops and guidance material. The National Energy Services Framework is the focal point under which the government provides support and guidance on routes

to project development, sources of finance and establishment of energy contracting (EPC or ESC based) projects in the public and commercial sector.

With the introduction of the National Energy Services Framework, the approach to ESCO procurement is expected to be standardised. A number of dissemination activities have been prepared in the period 2013-2014 with the aim to provide best practice guidance to public and private sector client organisations when procuring energy services. This include a general guidance tool to support developing projects suitable energy performance contracting (Energy Performance Contracts Handbook), an Energy Performance-Related Payments Handbook, Guidance on Obtaining Finance for Energy Efficiency Projects, and handbooks for local energy supply contracts and EPCs for public lighting. In addition, the National energy Services Framework includes standardised forms of contract, project processes, tools and templates. An EPC model contract was published in January 2014.

With the publication of the Framework, the focus is now shifted on managing the exemplar projects which are underway (Department of Communications, Energy and Natural Resources, 2014). The programme hosts 21 demonstration projects with the aim to test and provide feedback on the Framework documentation/process, tools and structures. Its importance lies in the fact that it offers practical examples of projects in action in both the public and private sectors (SEAI, 2015).

8.14.7 Conclusions, projections and recommendations

While the ESCO market in Ireland is in its infancy, there have been significant market developments over the past few years that should help transform the environment for the development of the ESCO market. In addition to the establishment of the National Energy Services Framework, the exemplar projects run as part of the government's efforts are expected to reach fruition, and encourage the wider sector to engage in energy contracting projects. Some small ESCOs are also now emerging and looking for opportunities of a suitable scale in the promising ESCO market (Bertoldi, et al., 2014).

8.14.8 Summary

Total ESCO market status (2015)	preliminary, ca. 10 ESCOs
EPC market status (2016)	getting off the ground
Total ESCO market size	n/a
EPC-only market size (investment)	n/a
EPC market potential	ca. €1 billion
EPC definition	provided in National Energy Services Framework
Established sub-sector(s)	<ul style="list-style-type: none"> • pilot projects
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • lack of examples • lack of suppliers
Key barriers in the public segment	<ul style="list-style-type: none"> • complexity • lack of awareness • financial liquidity problems
Key driver(s) to date	<ul style="list-style-type: none"> • National Energy Services Framework: standard reference material on procurement, model contracts, technical support • Exemplar projects 'road-testing' the principles • Energy Efficiency Fund

Expected development/forecast

unsure

Opportunities development

for further

The key issue to be overcome is the political and regulatory instability, no possibilities to predict

8.15 Italy

8.15.1 ESCO market overview

The ESCO market in Italy is still considered to be among the biggest and most developed ones in Europe. ESCO projects, including EPC, have been present in the country for decades, although the market has been developing in an uneven pattern (Mattedi, 2015). The EPC market has been on a rise in the period 2014-16 (JRC 2016), although the development of the whole ESCO sector is less evident and experienced a rather stagnant period. There is room for further expansion both in terms of possible projects and sectors (ESCO Europe, 2015).

There are a large number of associations and industry groups that serve the ESCO market in one way or the other. These include the independent associations, such as AssoEsco and FederEsco, and representatives of utility suppliers and technology providers involved in CONFINDUSTRIA (Federation of Industrial Enterprises): AGESI, Associazione Imprese Facility Management ed Energia; ANIMA-ITALCOGEN (Associazione Costruttori e Distributori Impianti Cogenerazione, cogeneration plant installers and distributors); ANIE (Associazione Imprese Elettrotecniche, electrotechnical companies); ASSOELETRICA (association of electrical energy producers); ASSOGAS (association of gas producers and related services); FEDERUTILITY (utilities' producer association); and COGENA (Associazione Italiana per la Promozione della Cogenerazione), which is part of CONFCOMMERCIO (federation of commercial enterprises). Due to the exclusively large number of associations that are related to ESCOs, finally the representation is not unified enough.

8.15.2 Status with Energy Performing Contracting (EPC)

Only a limited number of companies have the technical and financial capabilities to provide and sustain a long-term EPC contract (Piantoni, ESCO activities and current characteristics - Italy, 2014), nevertheless Italy has seen a growth in the number of EPC projects between 2010 and 2015 (Mattedi, 2015). This fact is also underlined by the reported increase of the number of new projects in the period of 2014-16 (Mattedi, 2015, JRC 2016), with the majority of the interviewed EPC providers starting 1-3 new EPC projects per year, and around 20% of the respondents entering 5-10 new projects per year (Mattedi, 2015).

EPC supply companies are mostly small or micro sized (0-10 employees), a few SMEs (up to 50 employees), with a split between these and the few large energy supply and facility management companies (Mattedi, 2015).

EPC is carried out in both the private and public sectors, and 32% of the Transparense survey respondents have clients also outside Italy (Mattedi, 2015). EPC projects in Italy focus on energy efficiency improvement, but often involve additional (e.g. quality improvement) measures.

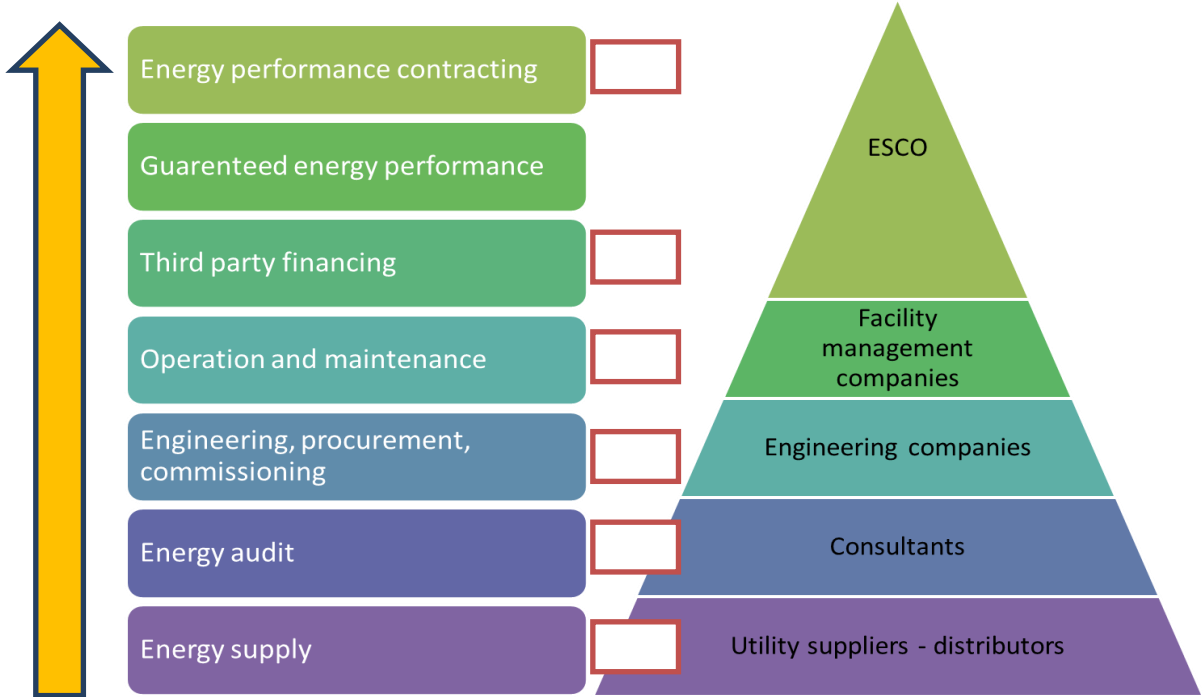
Typical energy savings are below 30% of the baseline energy consumption (mostly between 5 and 15%). The most common overall investment value is between €200,000 and €500,000, but can be also much higher (up to €1 million), and occasionally lower (below €200,000). Apparently, the length and the size of the projects have increased when compared to the status from 5-10 years ago. (Mattedi, 2015)

8.15.3 Status with Energy supply contracting (ESC)

Energy service companies with ESC offers started to operate in Italy in the late 1980s-early 1990s (Mattedi, 2015) (Piantoni, ESCO activities and current characteristics - Italy, 2014) (Bertoldi, et al., 2014). Today, the composition of the ESCO market is varied in Italy. The “utility market” carries the largest potential since all final users have the same need for reducing energy costs while meeting other agreed performance criteria (comfort) (Piantoni, 2014).

Figure 21 describes the types of companies that serve different segments of the Italian energy services market. In addition to the below, there are several special purpose vehicles (SPVs) that are created particularly for a specific project.

Figure 21 - Market composition of the Italian energy services market.



Source: (Piantoni, ESCO activities and current characteristics - Italy, 2014)

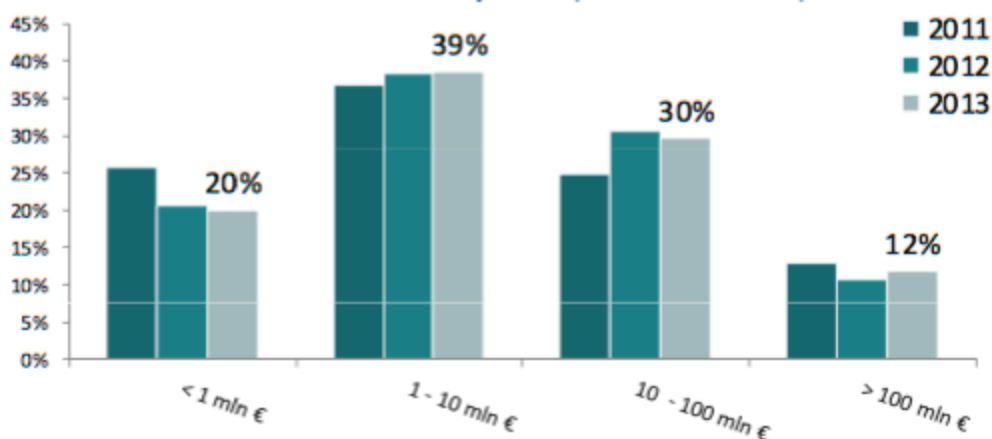
The Italian ESCO market is particular in being supported by a relatively strong legislative background and standards. While the UNI CEI standards related to energy services have been present since 2009, and have been used to identify ESCOs (Di Santo, 2015), there is still some ambiguity about which of the registered companies actually perform energy service contracts. In 2009, an estimate based on the information from associations implied the existence of 100-150 ESCOs, but in 2013 there were around 2000-3000 companies registered as Energy Services Enterprises (SSE) at AEEG, the Italian Regulatory Authority for Electricity and Gas (Bertoldi, et al., 2014). As of 2015, this registry already includes ca. 4500 companies, of which 1000 companies are suspected to be active (Di Santo, 2015). Many of the SSEs describe themselves as ESCOs (usually among other business orientations), however only a fraction can be actually considered as active ESCOs. At the same time around 200 companies are listed under the UNI CEI 11352/2014, where only companies that have done at least one EPC can be qualified (JRC 2016).

All in all, as of 2016, it is realistic that a few 100 ESCOs have actually carried out ESCs and have ESCO offers in their business profile. The 3rd NEEAP estimates that there are 390 ESCOs (Italian Government, 2014). A few of these are subsidiaries or departments of large international companies and the majority are small and medium-sized

enterprises, mainly local, with a very limited number of projects (Piantoni, 2014; Di Santo, 2015).

The revenues of the ESCO companies spread along a wide scale. The majority of the ESCOs have revenues between €1-10 million. For further data see Figure 22.

Figure 22 - The size of revenues shared among the ESCO companies.



Source: (Di Santo, 2015).

The so called "heat supply contracts" (or "Servizio Calore" in Italian), which are equivalent to "chauffage", are the most common contract types in Italy, and the "Energy Service Plus contracts" ("servizio energia plus") are somewhat stricter, more modern versions, which also include a commitment by the provider to reduce the consumption of primary energy for winter heating by at least 10% with respect to what is indicated in the building certificate. Furthermore, in the latter contracts, the ESCO commits to the installation of a temperature control system.

Not many ESCOs couple energy services with other business offers, still about 50% of ESCOs provide additional services, such as repair, installation and rental (Italian Government, 2014).

8.15.4 Demand side

8.15.4.1 Energy services in public sector

The first ESCO projects were primarily aimed at setting up cogeneration plants in hospitals, whereas the suppliers performed technological improvements and managed the systems. These projects were using third party financing. The public sector in Italy is less open and less capable to engage in ESCO contracts than in other countries, because this sector is characterised by a lot of barriers.

8.15.4.2 Energy services in other sectors

The Italian ESCO market is mostly focused on the industrial sector (ESCO Europe, 2015; Di Santo, 2015), due to the difficulties related to public sector projects and to the high yields delivered by the White Certificates programme when applied to medium/large size energy recovery projects in manufacturing plants (ESCO Europe, 2015). Cogeneration and RES are the most supplied solutions. 84% of the ESCOs don't offer an integrated service (Di Santo, 2015).

The residential sector is not attractive for ESCOs, mainly due to the high transaction costs and the small sized projects, nevertheless there have been a few pilot projects, e.g. in the context of a European project, FRESH⁸⁹ (Milin, 2012).

8.15.5 Remaining market potential and barriers

While the Italian ESCO market is amongst the biggest ones in Europe (Bertoldi, et al., 2014), the remaining potential is large (ESCO Europe, 2015). The Italian ESCO market is valued at around €500 million including all energy efficiency services costs, with a potential evaluated at €1-10 billion a year. Other sources estimated this market in the range of €5-6 billion/yr. (PAEE report 2011 in (Piantoni, 2014))

Market players indicate institutional barriers as the most crucial ones (Mattedi, 2015), and they are very unsatisfied with the government policy supporting EPC, while disappointment is not so high (only half of the interviewees) about energy efficiency policies in general. One of the key barriers seems to be political uncertainty, which has also an effect on the energy regulation, with a negative impact on energy efficiency in general and particularly on ESCOs. However, it is expected that this will change and the drivers will be stronger to enhance the ESCO sector (ESCO Europe, 2015).

There are a number of other barriers. The most important ones relate to financial matters, such as late payments by clients and insufficient capitalisation – typical of the public sector, where internal procedures and/or high bureaucracy cause delayed payments. If an ESCO has several or many projects in parallel, this increases the problems of liquidity significantly. This is topped with the ongoing lack of involvement of the financial sector, because banks still do not have the technical capacities and knowledge to participate in ESCO projects, and the risks are not well defined for them. Therefore, access to loans with commercially viable terms and rates of interest is very difficult. TPF is used by one third of the enterprises (Di Santo, 2015).

It appears that the understanding of the concept has improved from previous years (only one fourth of the interviewed market players indicated this as a problem), however it still hinders some projects, especially in less traditional sectors, such as the tertiary and residential. As a result of the ambiguity that still lies in the standards and thus in ESCO definition, a number of ESCO projects ended with unsatisfied customers and has left a question of trust in the concept.

Organisational difficulties also hinder the market. Some interventions are too complicated because of bureaucratic obstacles (such as authorizations to construct and operate, connections to the energy networks, etc.). This increases transaction costs and limit the size of the projects. Furthermore, measurements, monitoring and verification are not standardised, and constitutes a basis for misunderstanding. The definition and establishment of a baseline further increases the transaction costs.

The scope of an ESCO project can be limited by the fact that Italian final customers cannot ask their energy suppliers to disclose their billing data to a third-party service provider (e.g. an ESCO) designated by the final customer, unless the supply contract is made in the service provider's name (Italian Government, 2014), thus an ESCO cannot provide the full range of service provision.

For the municipal sector, financing is a less critical barrier (project financing is available), however the lack of technical background needed for understanding an ESCO project may pose difficulties (ESCO Europe, 2015). Moreover Italian municipalities often face problems in terms of cash flows and delayed payments (ESCO Europe, 2015). All in all, a strong political support or will is necessary to engage in an ESCO project in the public sector, the lack of which can obstruct projects at the start due to ineffective decision making by the leaders of some potential clients. Often, the ESCO is expected to take too much of the financial risk.

⁸⁹ <http://www.fresh-project.eu/project/>

Problems in the industrial sector arise when investments are limited anyway due to decreasing core activities or sales, and this was particularly typical during the credit crunch in the economic crisis, resulting in difficulty in reaching financing (ESCO Europe, 2015) (Bertoldi, et al., 2014).

Furthermore, public building clients are limited due to the lack of proper technical and financial expertise in-house to manage ESCO projects (Rose, 2015). Besides, financial institutions are still not technically prepared to finance EPC and ESCO projects (ESCO Europe, 2015).

8.15.6 Policies and measures supporting ESCOs and EPC

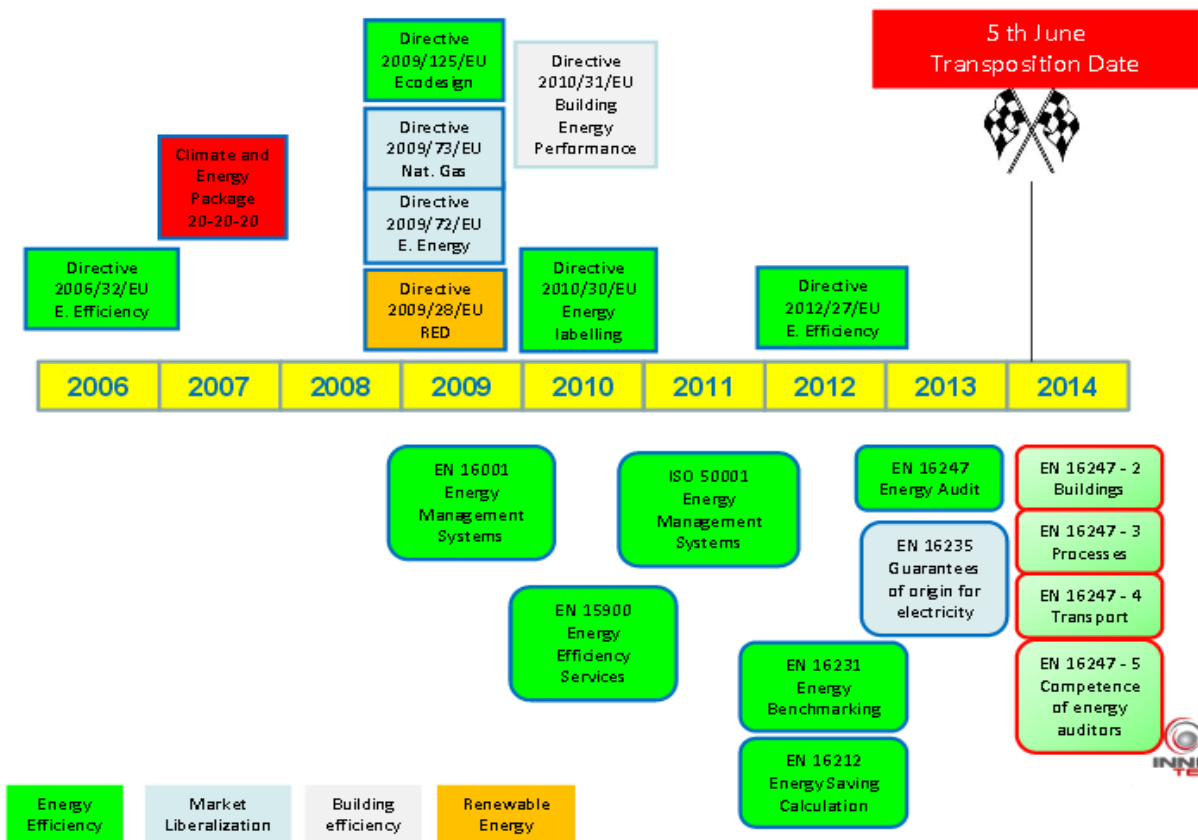
Regulations have a great impact on the profitability of energy efficiency services and therefore on the ESCO business in Italy (Piantoni, 2014). Italian energy services were introduced with Law no. 10, 1991, which applied the term energy services contracts (Contratto Servizio Energia). These were traditionally used by fuel suppliers, in order to move up in the value chain by securing the sale of primary heat energy by including in the selling price operations and maintenance (O&M) costs of energy equipment. In case of investments in new equipment, the contract duration was pluriannual with a yearly reimbursement of the cost of capital (Rose, 2015).

Then, the first definition of Energy Service Company was given in the Legislative Decree 115/2008 (Implementation of Directive 2006/32 / EC on end-use efficiency and energy services). This decree also introduced the concept of "Energy Performance Contracting", specifying that payments for investments are paid upon demonstration of that measure.

The subsequent adoption of technical standard UNI CEI 11352: 2010 (Energy Management Companies providing energy services (ESCO) - General requirements and checklist for their assessment), provided the basis for the certification procedure for voluntary ESCOs. This standard described the minimum requirements for energy efficiency services and capabilities (organizational, diagnostics, design, management, economic and financial) that an ESCO must possess in order to be certified. That standard has been replaced by UNI CEI 11352: 2014 version, which contains more stringent criteria for the verification and validation of the requirements necessary to achieve certification, including the presentation of at least one case study of EPC and TPF (Di Santo, 2015). The 2014 standard requires ESCOs to provide contractual guarantees of energy efficiency improvements, with the assumption of the risks associated with the failure to meet agreed targets. Any part of the risks (technical and financial) not assumed by the ESCO must be contractually defined. The provider must link the remuneration of the activities and services provided to the improvement of energy efficiency and the achievement of the minimum performance established by contract. The customer must be guaranteed access to the measurement data measured during the service.

From July 19, Decree 102/2014 requires ESCO statements in the form of energy audits for large companies and governmental buildings and imposes Energy Efficiency Certificates (or white certificates). These certificates for buildings will have to be issued by organisations that, themselves are certified according to UNI CEI 11352: 2014, or that have in their staff an EGE (Expert in Energy Management) certified according to UNI CEI 1133. Decree 102/2014 also defines the minimum requirements to be included in energy performance contracts signed with the government (and the private sector is also requested to set these requirements).

Figure 23: Applicable Italian and European legislation and standards.



Source: (Piantoni & Panvini, 2014)

As described above already, the key factor that kicked-off the ESCO market in Italy was the White Certificates scheme, which helped ESCOs to increase their market (especially through increasing the revenues from projects), and assisted new entrants to succeed as ESCOs (Di Santo, 2015; Mattedi, 2015). The scheme was introduced on April 24th, 2001 via a ministerial decree, whereby a number of gas and electricity distributors were obliged to achieve a certain level of energy savings every year. This ministerial decree was later repealed and replaced in July 2004 with two decrees (called "twin-decrees") that requires reaching end-user energy saving targets through the issue of Energy Efficiency Certificates (Certificati Bianchi) to entities that perform energy saving projects. Currently, this mechanism is still in place and it is one of the main energy policy instruments that help the Italian EES market to spread. (Mattedi, 2015) However, to continue the stride, it will be necessary to overcome some remaining barriers, including the culture of undervaluation of energy efficiency in the residential, tertiary and industrial sectors (ESCO Europe, 2015).

Additionally, the Decree of December 28, 2012 set national targets for the years 2013-2016 in terms of energy savings for electric and gas distribution's companies (with more than 50 thousand customers). This Decree could represent a driver to stimulate the market and the ESCO diffusion, as well as a contribution to the achievement of energy efficiency targets for 2020, and it will serve also as a driver for the application of technologies developed by the domestic industries that, in terms of energy efficiency, occupies a leading position on the international scene. (Mattedi, 2015)

The energy saving estimates also underline the success of the White Certificate system. Based on data from Odyssee-Mure project, 0.27-0.80 Mtoe of annual energy savings were achieved between 2010-2012, while 1.7-2.0 Mtoe annual savings can be linked to

white certificates for industrial projects between 2013-2014. Almost 96% of the proposals in 2014 were presented by ESCOs. (Di Santo, 2015).

The Italian government intends to make available a specific national fund of €800 million for energy efficiency to promote energy efficiency in public administrations, companies and families. This incentive is expected to contribute to a further growth of the ESCO market and a dissemination of the ESCO concept (Rose, 2015).

8.15.6.1 Information and awareness raising measures

There is not much done currently in order to raise awareness and disseminate information about the ESCO market. It is partly due to the fact that much was done before, and lack of information is not among the main barriers.

It has been demonstrated in several projects that the coordination between the client, the operation and management personnel, and ESCOs could actually reduce overall costs by streamlining the process. But this coordination could arise only from mutual trust and deep knowledge of EPC process: the EPC process success passes through the promotion of awareness and communication initiatives aimed to increase the awareness of citizens and businesses about the opportunities resulting from energy efficiency. It is important that ESCO and/or Energy associations in Italy communicate to public sector (local and regional administrations) and to private companies/citizens (SMEs, Real Estates, etc.).

According to the NEEAP, public authorities will have a duty to set an example not only in the delivery of services, in investment and in the maintenance of technical systems/buildings, where they should opt for the practices delivering savings and higher efficiency, but also in the choice of contractor, by selecting those bidders that offer the best guarantees of delivering the results. This way, the ESCO model used in the public sector can be transferred to the private sector. However, in the end, the NEEAP does not include specific measures to ensure this. On the other hand, the NEEAP lists a few regional programmes, where energy efficiency (but not directly EPC) was promoted for building renovation.

The Transparense project proposed an important next step for the Italian ESCO market in the form of an Italian Observatory on EPC projects. This source of data would allow tracking the amount, size, nature, scope and results of EPC projects in Italy. This could represent a unique database to collect information and to inform market players, banks, ESCOs, building owners, public agencies, policy makers, and other relevant stakeholders (Mattedi, 2015).

8.15.7 Conclusions, projections and recommendations

The Italian ESCO market is successful, well developed and relatively large. Nevertheless, there is still room for significant growth, and there are some remaining barriers that hinder even the most developed sectors. Industrial projects are most common, where the White Certificates scheme has proven to be a strong push. On the other hand, the public sector experiences difficult barriers that could be overcome in the next years.

In Italy there is a need for regulatory stability and financial support to help ESCOs planning long term investments and EPC. Market growth could be enhanced through (adapted and extended from (Piantoni, 2014)):

- A stable legislative, fiscal and regulatory framework, with few changes over the years;
- An effective communication program to create knowledge about energy management standards and the ESCO business model to enhance long-term competitiveness;
- Unified representation of the ESCO sector;
- Strengthening M&V protocols, disseminating easy, but spread standards, like IPMVP can help;

- EPC project Observatory to collect data and information, development of benchmarks;
- Enhancing facilitators, either through training or promotion, because they could more successfully arrange projects for clients with lower trust and help them through the tendering process. This could substitute or assist the in-house energy managers that are currently not aware of or not prepared for ESCO projects.
- Enhancing financing structures, e.g. third party financing, revolving funds, guarantee funds, and rethinking risk-sharing in ESCO projects.

These actions should allow a more comprehensive understanding of the ESCO concept, could ensure successful financing terms, allow financial institutions to shorten the TPF evaluation time and develop a financial structure (tenor, grace period, repayment schedule) around EPC.

8.15.8 Summary

Total ESCO market status (2015)	well developed, few 100 ESCOs, which offer various contracts
EPC market status (2016)	ca. 20 of the ESCOs can offer EPC, but around 4-5 of them were active during 2015-16, ca. 50 projects during the period 2014-16
Total ESCO market size	€1 billion
EPC-only market size (investment)	€300 million
EPC market potential	€7.5-100 billion (wide range, not sure what is incorporated, probably ESC and EPC)
EPC definition	in Law 102/2014/07/04 and standard UNI CEI 11352/2014
Established sub-sector(s)	<ul style="list-style-type: none"> • EPC for public buildings and streetlighting; • Servizio Calore (kind of Chauffage contract) is more widespread, even for public sector clients; • Industrial sites and processes; • a few residential projects
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • low level of trust in the model and between partners • ambiguity about risk allocation (no standard documents) • regulatory instability
Key barriers in the public segment	<ul style="list-style-type: none"> • timely payment/payment risk by clients • low demand
Key driver(s) to date	<ul style="list-style-type: none"> • Energy Efficiency Certificates scheme and the Renewable Energy for Heating & Cooling Support Scheme • ESCO/EPC definitions, standard rules, guidelines • Revolving funds to cover for client default
Expected development/forecast	continued slow growth, depending on the removal of barriers
Opportunities for further development	As several of the barriers are external (low energy prices, EU EE targets) or more structural (clearer rules, predictable legal framework), these should change to move the sector ahead

8.16 Latvia

8.16.1 ESCO market overview

The ESCO market in Latvia is still preliminary and dependent on subsidies. There are around 50-60 companies active in the energy services supply, but only a few offer EPC (Rochas and Zvaigznītis 2015). The EPC providers are small private companies mostly active in the residential sector. For most of them, energy services do not constitute their core business. As of 2016, there is a halt in the EPC market as result of the end of the financing mechanism, and the delay in starting the new period.

The ESCO market kicked-off in 2000-2001 (Government of Latvia 2014; Bertoldi, Boza-Kiss, and Rezessy 2007), delivering professional street lighting services in the first years. However, the successful fulfilment of the contracts was encumbered due to certain difficulties, mostly of a legal nature.

8.16.2 Status with Energy Performing Contracting (EPC)

EPC is the most common ESCO scheme in Latvia. Renesco⁹⁰ first implemented EPC-based projects in the residential sector in 2008, and have already realized EPC-based projects for more than 15 multi-apartment buildings (JRC 2016). EU Structural Funds and Green Investments Scheme benefits were used to perform deep renovation of the buildings. The projects covered measures such as insulation of building envelopes, installation of new hot water networks, new heating installations, new ventilation systems with heat recovery and installation of geo-thermal heat pumps. The level of payment for heating has remained unchanged after the completion of the renovation. The renovation costs to be taken on by the users/owners were in average 150 €/m² (or 1/7 of the price of new buildings) (Berman 2014). The energy consumption (for heating and hot water preparation) in the buildings was reduced from 200-240 kWh/m² to 70-80 kWh/m² per year and the living conditions significantly improved. After the termination of the contracts, the projects are expected to bring future financial benefits for tenants (energy costs are expected to drop by 50%) and owners (the value of apartments will increase by 10-20%) (Berman 2014). In 97% cases the apartment owners fulfil their financial obligation on time. In this case, the ESCO is obliged to provide maintenance of installed equipment during the contracting period (Berman, 2014).

State Joint Stock Company «State Real Estate» started an EPC type project in two state-owned buildings in 2015. Earlier projects for energy efficient street lighting were also completed.

8.16.3 Status with Energy supply contracting (ESC)

There are 50-60 companies that offer various energy services in Latvia, however there is no information about existing offers/projects in the field of ESC.

8.16.4 Demand side

8.16.4.1 Energy services in public sector

ESCO projects are very rare in the public sector in Latvia (see the two public building projects started in 2015). Energy services in municipalities are provided by municipal house management authorities (PEKO⁹¹) public enterprises owned by local governments. PEKO can deal with the maintenance and renovation of public and residential buildings owned by local governments (Government of Latvia, 2014).

⁹⁰ SIA Renesco - detailed information can be found on <http://www.renesco.lv>

⁹¹ The abbreviation "PEKO" is used to refer to these entities in the Latvian language. For simplicity reasons, the abbreviation PEKO is used hereafter.

A large-scale street lighting improvement project was implemented in the Municipality of Tukums using the EPC model in the early 2000s. The project was co-financed by the Municipality of Tukums (loan provided by the Nordic Investment Bank) and an ESCO company (including the use of a loan from the Latvian Environmental Investment Fund (LEIF) and Latvian Hipotek Bank⁹²). The project was saving 630 000 kWh per year, representing CO₂ emissions savings of 365 tonnes per year, with an investment of 395,000 € spread over 10 years⁹³. The project served as an example on how EE projects can be co-financed by municipality and private ESCOs in the form of third party financing through loans provided by the State Fund, IFIs and private commercial banks.

8.16.4.2 Energy services in other sectors

As explained previously, most of EPC projects in Latvia have been focused on the residential sector. Between 2009 and 2015, the ERDF (European Regional Development Funds) provided €89 million for implementation of the programme "Improvement of heat insulation of multi-dwellings buildings" and € 6.9 million "Improvement of heat insulation of social residential buildings" in Latvia. Although the implemented projects achieved an average energy savings of 30-57% during the contractual period and significantly improved indoor comfort conditions, some problems were encountered during the implementation. For this reason, the "Long-Term Strategy for Building Renovation"⁹⁴ mentioned that ESCOs can offer high quality solutions, ensure smooth decision-making process, develop project documentation, manage complex construction work (e.g. building envelope renovation) and closely monitor the implementation of projects. In addition, ESCOs can provide some services that can improve the implementation of projects financed by ERDF such as: co-financing of projects from the programme "Improvement of heat insulation of multi-dwellings buildings"⁹⁵ and cost reduction for the development of project documentation and administration.

8.16.5 Remaining market potential and barriers

The statistical data provided by the Long-Term Strategy for Building Renovation of Latvia, shows that residential and non-residential sectors in Latvia, have very high potential for energy savings. ESCO is mentioned as one of the possible financing mechanism for implementation of EE projects in these sectors (Government of Latvia, 2014b).

The residential sector is the largest energy consumer in Latvia, responsible for 35.5% of the total final energy consumption in 2010. Approximately 85% of the energy in households is used for heating and domestic hot water. Around 60% of the total residential floor area is situated in multi-apartment buildings and around 30% of the total floor area of multi-apartment buildings was built in the period from 1961 -1979 having poor energy performance levels. These buildings - constructed during soviet era⁹⁶ - have

⁹² Taken over by Altum, which was established in 2013 (see more information about Altum below at Chapter 8.16.6.)

⁹³ Source: <http://www.managenergy.net/download/nr22.pdf> and <http://www.ubcwheel.eu/ajax.php/gpdb:gpdb?action=pa%3Aarticle&aid=558>

⁹⁴ Ministry of Economics of the Republic of Latvia. Long-term Strategy for Building Renovation for 2014-2020. Riga, 2014. Available: https://ec.europa.eu/energy/sites/ener/files/documents/2014_article4_lv_latvia.pdf

⁹⁵ Since the funding from commercial banks must be ensured and commercial banks set specific requirements for loans to multi-apartment buildings, some clients have difficulties with receiving loans and cannot be included in the programme. The process for the assessment of credit-worthiness of these clients can be avoided if project co-financing is provided by ESCOs.

⁹⁶ The standards related to thermal insulation of buildings in Soviet Union were two times lower than in Germany and the UK, and five times lower than in Sweden. In addition, the heat resistance of typical housing was even worse because of the low quality construction materials that were used and construction errors that were made. This resulted in condensation and building of mould on walls, as well as drafts, depreciation etc. (Freedom and Solidarity Foundation, 2014).

particularly bad thermal characteristics and are associated with a significant energy savings potential together with the need to improve indoor comfort conditions. On the other hand, buildings (around 3%) constructed after 2003 are in line with the "Thermal Engineering of Building Envelopes" regulation and thereby are of improved energy performance characteristics (Government of Latvia, 2014).

The non-residential buildings are the second largest potential client for energy services. According to the Long-Term Strategy for Building Renovation⁹⁷, there are 34,300 non-residential buildings with 27 million m² of floor area⁹⁸. The largest percentage of non-residential buildings consists of office buildings built before 1941 (1,799 buildings with floor area of 1.6 million m²) and in terms of floor area education and science buildings built in the period 1961-1980 (1127 buildings with 2,069,065 m²). In total, there are 7,141 public buildings including 2,174 state and 4,967 local government owned buildings, most of which were constructed in the soviet era and are of low energy performance levels (Government of Latvia, 2014).

Barriers for the development of the ESCO market in Latvia are mostly related to implementation of projects in the residential and public sector. Among the identified barriers, insufficient awareness of energy efficiency related benefits is crucial, which is combined with the lack of knowledge about financial instruments for building renovation, including the ESCO model and EPC. Trust issues with regards to ESCOs caused by previous unsuccessful experiences are still seen as a limiting factor (Government of Latvia, 2014).

In the public sector barriers are related to public procurement and tendering procedures. The selection process for the projects in the framework of the "Improvement of heat insulation of social residential buildings" did not include energy savings against investments made during the Financing Programme 2007-2013. Other observed issue was the low quality of technical project documentation and issues related to ensuring appropriate procurement procedures (Government of Latvia, 2014).

Commercial banks are very reluctant to finance or co-finance energy services, largely because of the perceived risks and the availability of devoted products to energy renovations. Energy efficiency investments are perceived as complicated and risky with high transaction costs. The implemented projects through more experienced private ESCOs have helped change this attitude but work is still needed in this area.

8.16.6 Policies and measures supporting ESCOs and EPC

Legal issues pertaining specifically to service contracts, such as ownership of the installed equipment have been major barriers to the further uptake of EPC in Latvia. A number of positive changes took place to resolve these barriers, also in relation to the transposition of the EED.

The "Energy Efficiency Law" entered into force on March 29 2016. Amendments to several other laws (Energy Law, Law on Energy Performance of Buildings, Energy Law) were adopted to transpose the requirements of the EED and some other amendments are in the process of adoption (Public Procurement Law, Electricity market Law).

As a follow up of the 2nd NEEAP in 2014, Latvia introduced specific legal provisions for energy services in the framework of the Energy Efficiency Law, under its Art. 14. The Ministry of the Economy is required to publish information about available energy service contracts and clauses that should be included in such contracts, as well as model contracts and information about energy service providers and best practices (Government of Latvia, 2014, Rochas pers. com. 2017).

⁹⁷ Available:

https://ec.europa.eu/energy/sites/ener/files/documents/2014_article4_lv_latvia.pdf

⁹⁸ information as of 2014

A possible market gap for ESCOs was seen by the NEEAP of Latvia (Government of Latvia 2014) through the implementation of a national Energy Efficiency Obligation scheme (EEOS), however finally Latvia chosen to reach the EED Article 7 savings requirement only partly through the implementation of the EEOS and therefore the role for ESCOs is rather limited.

As of 2016, the project "SUNShINE"⁹⁹ is developing a financing mechanism based on forfeiting, which will purchase receivables from future energy savings from the EPC providers to release their balance sheets and allow them to carry out more EPCs. A stakeholder platform will be developed to standardize the process and reduce transaction costs. The total expected investment is €30 million. This combination of transparent standardized financing mechanism is expected to attract private sector financing. The Latvian Baltic Energy Efficiency Facility (LABEEF) was established and a loan signed with EBRD in December 2016. The first transaction was agreed in April 2017, and the ESCO has forfeited the cash flows from 6 buildings (Rochas, pers. com. 2017).

Furthermore, the Altum finance institution¹⁰⁰ was assigned to provide financial and technical support for the energy renovation of multiapartment buildings. Altum can provide technical assistance in preparations, can support the project with grants or guarantees, which can be combined with an EPC.

8.16.6.1 Information and awareness raising measures

Energy services and ESCOs are still in the initial stages of implementation, although some awareness raising campaigns have been launched to the general public to promote EE in the residential sector, such as the campaign "Let's Live Warmer" which has been implemented since 2010 aiming to inform owners of multi-apartment buildings about opportunities available through the EU financing programme "Improvement of heat insulation of multi-dwellings buildings" (2007-2013). In the framework of this campaign, more than 186 events took place. In addition, a number of EE Centres operate in Latvia (e.g. EE Centre of JSC "Latvenergo" and EE Information Centre of the Riga Energy Agency (REA)) which can provide information as well as organize campaigns for the promotion of energy services, ESCOs and EPCs. The above described SUNShINE project also organises training meetings during the years 2016-2017.

8.16.7 Conclusions, projections and recommendations

The ESCO market is still at its infancy state. While some successful projects in the residential sector have been carried out, ESCO activities in the wider economy have not yet developed to an operational level. Several improvement actions have been identified including through the legislative framework and information awareness activities.

According to the experts interviewed, the Latvian ESCO sector can have a window of opening in building renovations. The expected introduction of EEOs was seen as promising before, but finally, its extent seems to be limited. ESCOs through the implementation of EE projects based on the EPC model can provide the necessary know-how and investments for projects in the residential sector, where high potential has been identified. Private ESCOs and/or PEKO can also implement EPC-based projects in public buildings. In such cases, PEKO have to carry out projects based on achieved energy savings.

Latvia is planning to establish a rotating EE Fund as a long term financial instrument through which financing for EE projects with lower interest rate can be offered. It is planned that the Fund will be financed through payback of funds, as well as from energy suppliers that cannot fulfil their obligation under the EEOS. ESCOs could also access necessary funding (loans or collateral) through the rotating EE Fund. In the case of multi-apartment buildings, the recipient of a loan granted by the Fund may be apartment

⁹⁹ www.sharex.lv

¹⁰⁰ <https://www.altum.lv/en/services/energy-efficiency/energy-efficiency-in-multi-apartment-buildings/about-the-programme/>

owners that will use loans to cover their co-financing share on building renovation while the ESCO or PEKO will implement renovation projects.

Efficient immovable property tax policy, could promote reconstruction and renovation of buildings, and also foster income tax from commercial activities. In accordance with the immovable property tax regulation, the cadastral value of a building increases if the building is renovated. In some cases the immovable property rate also increases. Pursuant to the Law on "Immovable Property Tax", the local governments may grant abatements to certain categories of immovable property tax payers by adopting building regulation. In municipality sector, PEKO act as ESCOs, but to be treated as real ESCOs they have to operate at a market level.

8.16.8 Summary

Total ESCO market status (2015)	preliminary, 50-60 companies interested, but no ESC offers known
EPC market status (2016)	max. 6-8 EPC providers, of which 2 are most active, however no projects since 2015
Total ESCO market size	€5-10 million (ESC is not common)
EPC-only market size (investment)	€5-10 million (ESC is not common)
EPC market potential	€100-150 million (2013 estimate) and €8 billion (2016 estimate)
EPC definition	in Energy Efficiency Law, Art.14
Established sub-sector(s)	<ul style="list-style-type: none"> • EPC is used (ESC not) • domestic multifamily buildings • street-lighting
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • low level of trust and lack of awareness, resulting in lack of demand • financial issues, such as long payback time and high initial costs
Key barriers in the public segment	<ul style="list-style-type: none"> • difficulties in tendering arising from the public procurement law • lack of guidelines, methods • EUROSTAT definition or otherwise liquidity issues
Key driver(s) to date	<ul style="list-style-type: none"> • national grants and subsidies • ERDF support
Expected development/forecast	due to the foreseen support a slow growth and sectoral expansion are expected
Opportunities for further development	the implementing provisions of the Energy Efficiency Law can provide a basis for more standardised (thus trustful and cheaper) projects. The revival of grants schemes will kick-off the pipeline projects, and alternative financing methods can expand the EPC market to new client sectors.

8.17 Lithuania

8.17.1 ESCO market overview

The Lithuania energy services market is still in early stage, with only a few ESCOs active on the market. There are around 6 companies operating as ESCOs on the Lithuanian market, some of which have been active for more than 15-16 years. Energy supply contracting is the main type of energy contracting in use. The main scope of ESCOs

activities in Lithuania is generation and supply of heating in buildings. Some ESCOs lease district heating systems and provide end users with heating (Ministry for Energy, 2014). It is estimated that there are about 4-5 EPC providers in 2016, with a maximum of total 5 projects started in the last few years.

8.17.2 Status with Energy Performing Contracting (EPC)

Energy performance contracts (EPC) are not common in Lithuania, and EPC projects are only in the pilot phase as of 2016. Three EPC pilot projects are undergoing public procurement phase and received 3 to 4 tender applications. Based on this and other estimates, there may be around 4-5 companies that have the potential to act as EPC providers in Lithuania.

Accordingly, the Lithuanian EPC market has improved slightly, not in terms of providers or projects, but in the market possibilities. As of 2014-2016 Lithuania has adopted several legal acts, necessary for EPC, including the Program for Improvement of Energy Efficiency in Public Buildings and standard procurement documents.

The average size of EPC projects that were positively evaluated and approved by the Public Investment Development Agency that issues preferential loans for EPC projects varies between 200 000€ - 500 000€. The length of the contracts is unknown as they are under preparation.

The overall size of the EPC market is around €3 million, which is estimated using the anticipated values of the contracts of EPC projects, which were positively evaluated and approved by Public Investment Development Agency.

EPC projects are financed primarily from grants and subsidized loans. The Energy Efficiency Fund established on 18th of February, 2015 by the Ministries of Finance and Energy and managed by Public Investment Development Agency offers preferential loans. Since a loan from the Energy Efficiency Fund covers only up to 80% of a project's eligible expenditure, so ESCO's financial contribution (equity or debt financing) will have to be not less than 20%.

8.17.3 Status with Energy supply contracting (ESC)

Energy supply contracting, and in particular "chauffage contracts", are commonly used in Lithuania. The Lithuanian NEEAP 2014 refers to various examples of ESCO companies in this field. An example is UAB Litesko, which has been active since in 1998 and currently holds the lease of district heating systems for at least 15 years in cities. Another example is UAB E energija, which generate and provide district heating and hot water to the population, establishments and organisations in various cities and regions in Lithuania as well as towns in Latvia and Ukraine. UAB Vilniaus energija and UAB Naujoji šiluma are also mentioned together with AB City Service which provides energy services in the buildings sector.

8.17.4 Demand side

8.17.4.1 Energy services in public sector

The implementation of the measure "Renovation of heated and/or cooled buildings owned by the state and used by public authorities and bodies that are public administration entities" is expected to involve ESCOs. This measure is implemented in order to meet the requirement of the EED Article 5 with regards to the renovation of at least 3% of total useful area of all public buildings owned by the central government. In order to meet this requirement, a total central government floor area of 466,924 m² shall be renovated until 2020 with funds from the State, EU Structural Funds as well as private actors (ESCOs) (Ministry for Energy, 2014).

The Special Climate Change Programme, started in 2010 in Lithuania, aims to decrease the energy consumption and GHG emissions in all sectors, including the residential and

public sectors. The approved budget for 2014 was LTL 435.49 million (around € 126.22 million) including LTL 71 million (around € 20.6 million) for renovation of public and residential buildings. It is not clear what the role of ESCOs will be in this programme (Ministry for Energy, 2014).

8.17.4.2 Energy services in other sectors

The ESCO concept is currently applied in the so called "Ener Vizija" programme for energy renovation of multi-apartment buildings. An ESCO methodology consisting of several steps has been specifically developed for the implementation of this programme. Municipalities can select multi-apartment buildings as candidates for energy renovation based on heat consumption criteria. Following energy audits and cost-benefit analyses provided by professional engineering companies, the preparation of the renovation projects is made. Standardized packages of EE measures are used and financing is provided from existing national programmes for building renovation such as soft loans from JESSICA, state budget subsidies of up to 15% and additional subsidies provided by the Climate Change programme. The loans are taken by the building administration company, and repaid by apartment owners through monthly fees. Compared to the previous financial arrangement in JESICCA financing, where the owners directly borrowed money, there is minimal administrative burden as it is not necessary to assess the creditworthiness of each owner. Procurement of all construction works and services is carried out in line with the Public Procurement Law. The Central Purchasing Organisation has concluded framework agreements for standard packages of building renovation works. Energy savings of 40% or even 50% can be achieved in the selected buildings and the ESCO model is used to repay costs, where the repayment period varies from 10 to 20 years depending on the renovation measures. The Housing Energy Saving Agency (HESA) and Central Project Management Agency (CPMA) are responsible for monitoring the overall programme implementation (Syrvidis, 2014).

The Law on Social Assistance for Poor Families and Single Residents of 16 May 2013 addresses one of the main issues for which low income households were not motivated in investments in energy efficiency renovation of apartments, namely subsidised energy prices. Under this act, low income persons, who do not participate in the renovation of multi-apartment buildings, could risk losing 50-100% of subsidies for energy costs for a period of three years.

Business entities have used services provided by professional energy service providers for years, but have not realised EE projects on the basis of energy contracts. Instead, they often use one-off provision of services.

8.17.5 Remaining market potential and barriers

As explained above, ESCOs have primarily targeted the district heating sector in Lithuania. District heating covers 63% of the total heated area in Lithuanian cities. Municipalities own 57 % of the district heating companies, while the remaining 43% are operated as PPP arrangements. Tariffs for district heating do not cover all the costs, and increasing fuel costs are not passed to the end users. Therefore the district heating companies are not financially viable. In contrast to gas and electricity prices, the price for heating in Lithuania is lower than other EU countries, because it is a subject of local authorities. The local governments attempt to keep the heating tariffs low and therefore create additional cost for public sector and government (Syrvidis, 2014). District heating projects therefore constitute a business opportunity for ESCOs.

The residential and non-residential sectors are associated with a significant potential for energy services. The average yearly energy consumption in the residential buildings was 187kWh/m² in 2008, 160-180 kWh/m² for houses constructed before 1993, while in the non-residential sector it is estimated at 244 kWh/m². Most buildings are in very poor condition in terms of EE and are linked with a substantial energy savings potential. The poor insulation and low efficient windows, obsolete heating systems and lack of

equipment for regulations are some of the main problems found in these buildings (Syrvidis, 2014).

Various barriers to the ESCO market development identified in the Lithuanian NEEAP 2014. These include (Ministry for Energy, 2014):

- Lack of substantiated and reliable information about possible energy savings and cost effective solutions for the service and industrial sectors.
- Lack of competence needed to identify cost-effective energy savings opportunities.
- Practice of upgrading public buildings (owned by municipalities or the state) through funding received from the EU Structural Funds which suppressing the development of energy services in this sector.
- Savings attributable to energy efficiency improvement measures in the public sector do not remain with the body or organisation but are returned to the state budget.
- Complex public procurement procedures.
- High risks in the residential sector due to time-consuming ways condominiums decisions are adopted.
- Subsidized prices for heating.

In addition, Syrvidis (2014) has referred to the lack of heat consumption metering in multi-apartment buildings as a barrier for ESCOs and EPCs in the residential sector. In most of these buildings, consumption is only metered at the building level¹⁰¹ and owners of apartments are not motivated to save energy as their energy bills are estimates based on the floor area they occupy. Moreover, the general lack of established homeowners associations¹⁰² renders potential multi-apartment building projects less attractive to commercial banks. Concluding contracts with each owner separately is associated with higher repayment risks and higher costs for credit-worthiness assessments. Homeowners associations are therefore perceived by banks as a more reliable contractual partner for multi-apartment building renovation loans.

8.17.6 Policies and measures supporting ESCOs and EPC

While the legal framework in the Republic of Lithuania does not create obstacles to the market in energy services, the draft Law on Energy Efficiency – an important legislative measure for achieving the energy efficiency targets of 2020 – is set to create more favourable conditions for the development of the market in energy services. In addition, the legal framework for the provision of energy services in the country is set by the Civil Code regulating the conclusion of transactions as well as the Law on the heating sector stipulating the responsibility of heating and hot water system supervisors (Ministry for Energy, 2014).

While there is no official and legally binding EPC definition, the NEEAP talks about ESCOs, and the Program for Improvement of Energy Efficiency in Public Buildings defines ESCOs as companies that provide energy efficiency services in the public sector – which is a definition bended for the purposes, and may confuse the market.

A template for an energy efficiency contract was approved by the Minister of Economy with the Order No. 4-511 of 27 October 2008 (Ministry for Energy, 2014).

In May 2011, the Government of Lithuania approved a grant scheme for the residents of multifamily building, who intend to refurbish their buildings until the end of 2013 by using JESSICA financial instrument. Residents that renovate their multi-apartment

¹⁰¹ In these buildings the metering of heat consumption is typically not possible per apartment without installation of heat allocators on radiators due to the vertical circuit connection of radiators.

¹⁰² Only 17% of buildings currently have homeowners associations in Lithuania

buildings and by this achieve the D class (according to Energy Performance Certification classification) as well as 40% lower heating energy consumption; the state gives an additional grant up to 15%. Altogether, the state finances up to 30% of all costs for energy efficiency measures. The Lithuanian government also will provide a support of 100% for low income families. (Škėma 2013).

8.17.6.1 Information and awareness raising measures

The Joint information centre under the National Control Commission for Prices and Energy will have to provide consumers with information on the conditions and procedure for the provision of energy services, energy service providers and other information relating to the provision of energy services (Ministry for Energy, 2014).

As explained above through the Law of Energy Efficiency, the institution authorised by the Government is expected publish information on energy service contracts concluded and recommendations on terms and conditions of energy services contracts ensuring energy savings and interests of final customers as well as information about incentive programmes and other measures to support EE projects. It will also publish and regularly update a list with energy ESCOs and create conditions for customer to learn about services provided by ESCOs. The template for EE contracts and information of best practices resulted from EPC in public sector will be also published by this institution (Ministry for Energy, 2014). It is not clear at what stage these plans are.

8.17.7 Conclusions, projections and recommendations

The Lithuanian market of energy services is not well developed and the majority of ESCOs on the Lithuanian market act in the district heating sector through ESC-based contracts.

The energy renovation projects carried out under “Ener Vizija” programme have demonstrated that the ESCO model can be successfully implemented in residential buildings in Lithuania. For these cases, financing has been derived from different sources: loans provided by JESSICA, state grants and subsidies from Climate Change programme. Involvement of municipality administrations as well as homeowners associations has crucial impact on project results. Disbursement of financial benefits resulted from energy savings, has created benefit for all involvement project stakeholders including ESCOs and owners of apartments. This model can be implemented in similar way to other residential and non-residential buildings.

The Lithuanian public sector can assume a leading role in the promotion of ESCO services. The implementation of the measure “Renovation of heated and/or cooled buildings owned by the state and used by public authorities and bodies that are public administration entities” is expected to foster development in the energy service market. However, strategic and systematic approach will be needed in order to be ensured an EPC model to be implemented.

Finally, the creation of a national energy efficiency fund to support national energy efficiency programmes is necessary. This fund will be incorporated, managed and administrated by the Government or an authorised institution and incentives for further development of the energy service market should be included.

8.17.8 Summary

Total ESCO market status (2015)	6 ESCOs, ESC is the most common so far
EPC market status (2016)	ca. 4-5 potential EPC providers, three pilot projects under tendering procedure
Total ESCO market size	n/a

EPC-only (investment)	market size	>€3million
EPC market potential		n/a
EPC definition		ESCO (not EPC) definition in the NEEAP and the Program for Improvement of Energy Efficiency in Public Buildings, but interpreted as focused on public sector
Established sub-sector(s)		<ul style="list-style-type: none"> EPC is being tried out, ESC is used
Key general barrier(s) to be removed		<ul style="list-style-type: none"> Lack of legal frameworks and public support schemes for EPC in private sector Banking sector not well informed and familiar with the EPC
Key barriers in the public segment		<ul style="list-style-type: none"> Limited procurement capacities Too long project periods (15-20 years) Lack of legal framework and public support schemes for EPC in municipalities' buildings sector (vs. central government for Energy Efficiency Fund). Managers of public buildings are used to grants, reluctant to use "alternatives"
Key driver(s) to date		<ul style="list-style-type: none"> Part of the legal framework is established (but a lot is expected) Public sector pilots Energy Efficiency Fund for central government buildings
Expected development/forecast		moderate increase if the first projects are successful, especially in public sector
Opportunities for further development		The renovation obligation of central government may be able to lead to an expansion of the model

8.18 Luxembourg

8.18.1 ESCO market overview

The ESCO market is generally assumed to be at its developmental phase although each segment within the ESCO market has developed differently in recent years.

According to the Luxembourgish NEEAP, a consolidated list of providers of such contracts is being prepared and will be made public as soon as possible. It is, however, estimated that have nearly a dozen enterprises based in Luxembourg possess the necessary qualifications and prerequisites to offer energy savings contracts (NEEAP, 2014). Previous indications pointed to 4-5 ESCOs (Hansen, et al., 2009) (Bertoldi, et al., 2014).

An international assessment of the market potential of energy efficiency services showed that Luxemburg has one of the lowest potential with an additional €5.1-6-2 million of yearly market open to energy efficiency services by 2020 compared to 2010 (Duplessis, 2010). Despite this, the development potential for the energy services market within the country is regarded as significant (NEEAP, 2014).

8.18.2 Status with Energy Performing Contracting (EPC)

A model EPC¹⁰³ for the building sector has been developed on behalf of the Ministry of the Economy and in cooperation with the public advisory and information body myenergy.

¹⁰³The model contract is aimed primarily at public buildings and may be downloaded from <http://promotiondusecteur.myenergy.lu/>, although should be used with care, as it is not fully adopted to local context (it is the model contract developed by the Berlin Energy Agency)

The first pilot EPC-based projects were carried out in mid-2014 in government buildings (NEEAP, 2014). In cooperation with the Public Buildings Administration, myenergy is supporting the pilot projects in order to use the experience gained to further develop the energy services market.

Luxembourgish municipalities have so far been reluctant to use EPCs, which could be in part explained by their often small size, as the economic benefits of EPCs can be generally only achieved above a certain energy cost threshold. In order to stimulate the use of EPCs by this segment of the public sector, the Climate Pact financial aid and Environmental Protection Fund are made available to them.

8.18.3 Status with Energy supply contracting (ESC)

In Luxembourg, the market for ESCs began to develop in the 1990s. Based on a large number of projects and the presence of multiple experienced suppliers, this market may be characterised as mature. During the last 20 years, cogeneration plants and district heating networks – linked to energy supply contracting – have been installed in many municipalities, larger buildings and industrial enterprises.

8.18.4 Demand side

8.18.4.1 Energy services in public sector

As explained above, EPCs are only used at a pilot level in some governmental buildings while for municipalities EPCs have been largely proven an unattractive model without financial support. On the other hand, ESCs (e.g. for the installation of cogeneration plants and district heating networks) has been popular in municipalities. With the publication of the model contract for EPCs, it is expected that more interest in this type of model will be materialised.

8.18.4.2 Energy services in other sectors

There is insufficient data on the use of EPCs in the private sector. It may, however, be assumed that these services are currently still being underutilised.

8.18.5 Remaining market potential and barriers

Overall, the potential for development of the energy services market is considered to be high. The energy savings obligation scheme is expected to exploit some of the potential. In particular all electricity and gas suppliers are obligated to generate energy savings at the end user level under the scheme, thus encouraging them to integrate energy services within their business model either through offers managed directly by them or third parties (NEEAP, 2014).

A review of the barriers limiting ESCO development in the Luxembourgish context has not been found. With a view to accelerate energy renovations within their building stock, the Luxembourgish authorities have identified the following barriers in their long-term strategy for mobilising investment in the renovation of their national building stock:

- Lack of motivation, information and understanding of benefits of energy efficiency upgrades among building owners
- Large upfront costs of energy efficiency projects
- Further training needs for service providers in the field of energy renovation
- Municipal building regulations, which may pose an obstacle to the implementation of renovation measures on the building envelope

8.18.6 Policies and measures supporting ESCOs and EPC

It is not known whether there are any specific legislations or regulations put in place to lift barriers to the market entry and conditions for ESCOs and implementation of EPCs. Together with the on-going pilot projects in the public sector, the new energy efficiency obligation scheme is expected to be a driving force for market growth.

8.18.6.1 Information and awareness raising

Information about EPCs including a model contract is now enacted on the website of the national advisory body myenergy. The website of myenergy generally serves as the main information tool for informing and supporting households, enterprises, municipalities and professionals with regard to energy savings, the use of renewable and sustainable energy and the development of sustainable residential construction. However, no other specific measures or actions raising awareness among clients, financiers etc. on the benefits of ESCO concepts have been identified.

8.18.7 Conclusions, projections and recommendations

The ESCO market in Luxembourg is not yet developed and only a small number of ESCO companies operate on the market. In terms of EPCs, a few pilot projects are now being implemented, while the market for ESCs is considered to be much more mature. A few positive developments (e.g. the establishment of an energy efficiency obligation and publication of an EPC model) are expected to contribute to more ESCO activities and dissemination of their benefits on the market.

8.18.8 Summary

Total ESCO market status (2015)	rather mature for the ESC part, 4-5 ESCOs with large experience
EPC market status (2016)	almost non-existent, in its developmental phase; first pilot EPC-based projects carried out in mid-2014 in government buildings
Total ESCO market size	n/a
EPC-only market size (investment)	almost 0 (only 1 pilot)
EPC market potential	€5.1-6.2 million (total ESCO market, estimate in 2013)
EPC definition	unclear, probably non-existent
Established sub-sector(s)	<ul style="list-style-type: none"> • ESC is common, but EPC is not established
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • Mainly for EPC: lack of legal context • Lack of motivation, information and understanding of benefits of energy efficiency upgrades among building owners • Large upfront costs of energy efficiency projects • small clients (small public authorities)
Key barriers in the public segment	
Key driver(s) to date	<ul style="list-style-type: none"> • Readiness to outsource the management of cogeneration plants and district heating networks has been a driver for ESC • pilot projects in EPC may prove to establish a market interest
Expected	The development of EPC seems to be not interesting

Opportunities for further development The development of EPC seems to be not interesting

8.19 Malta

8.19.1 ESCO market overview

Information about the establishment of ESCOs in Malta is very scarce. Available sources indicate that there are neither ESCOs nor energy contracts established in the country (Bertoldi, et al. (2007), Joint Research Centre (2012) ManagEnergy (2013)). This is also confirmed by the Maltese NEEAP 2014 which states that the establishment of energy service companies, as understood in Directive 2009/32/EC, would run contrary to previous derogations granted to Malta (Maltese Authorities, 2014). These include derogations from Chapter IV, Article 20(1) and Article 21(1) of Directive 2003/54/EC in Decision 2006/859/EC, and Articles 26, 32 and 33 of Directive 2009/72/EC. Enemalta Corporation is the only entity that is licensed to distribute and supply electricity in Malta and it is argued that the expected benefits resulting from the internal market in electricity in terms of efficiency gains and price reductions will not be achieved or passed on to consumers in Malta access to the distribution network would be granted to other suppliers under the present circumstances. The establishment of an ESCO market is therefore believed to erode the benefits currently accrued from the derogation acquired under the electricity directive Malta (Maltese Authorities, 2014).

8.19.2 Status with Energy Performing Contracting (EPC)

The concept of EPCs has not yet been introduced in the country.

8.19.3 Status with Energy supply contracting (ESC)

The concept of ESCs has not yet been introduced in the country.

8.19.4 Demand side

8.19.4.1 Energy services in public sector

While energy contracting has not been applied in Malta, some companies are providing building management and some examples of successful energy efficiency investments can be found in governmental buildings (ManagEnergy, 2013).

8.19.4.2 Energy services in other sectors

No information could be found.

8.19.5 Remaining market potential and barriers

The potential of the energy efficiency services market is the smallest in Europe, estimated at €1.6-1.8 million annually (Duplessis, 2010). No information could be found on barriers but it is expected that typical obstacles associated with a young market will be faced if Malta decides to foster market growth.

8.19.6 Policies and measures supporting ESCOs

The government could take several actions to facilitate the ESCO market such as introduction of legislations, financial incentives, information campaigns and other measures. It is understood that legislative measures associated with ESCOs as part of the implementation of the ESD and EED have not been transposed into the Maltese law.

8.19.6.1 Information and awareness raising

The ESCO concept and its benefits have not been disseminated in Malta. According to the latest Maltese NEEAP, the Energy Agency within the Ministry of Energy will examine the feasibility of EPCs in the country and organise a wide consultation process between stakeholders in the energy sector designed to come up with the EPC model best applicable to the Maltese context, if shown to be beneficial. The model will then be publicised in order to inform and incentivise stakeholders to adopt it.

8.19.7 Conclusions, projections and recommendations

The ESCO concept is non-existent in Malta, and there is political reluctance to establish it due to the derogations established before. According to the Maltese NEEAP 2014, a consultation process will take place in the energy sector to design an EPC model, if proven to be beneficial (Maltese Authorities, 2014). Awareness-raising campaigns, complementary governance, regulations and other support measures would all be necessary in order to develop the market.

8.19.8 Summary

Total ESCO market status (2015)	non-existent
EPC market status (2016)	non-existent
Total ESCO market size	0
EPC-only market size (investment)	0
EPC market potential	0
EPC definition	none
Established sub-sector(s)	<ul style="list-style-type: none">• none
Key general barrier(s) to be removed	<ul style="list-style-type: none">•
Key barriers in the public segment	<ul style="list-style-type: none">• Main barrier is the political reluctance
Key driver(s) to date	<ul style="list-style-type: none">• No driver
Expected development/forecast	no change expected
Opportunities for further development	The development of EPC/ESCO seems to be not interesting

8.20 The Netherlands

8.20.1 ESCO market overview

The energy service market in the Netherlands is of moderate size and has seen significant growth in the last few years. Although the typical barriers to the ESCO market were removed in time in the Netherlands, there had not been significant growth and develop before 2013 (Bertoldi, et al., 2014).

As of 2016, there are around 50-100 companies that provide some type of energy services, and it is estimated that about 25-30 of these offer EPC. There are also a good number of facilitators, who seem to be crucial for the ESCO market boom.

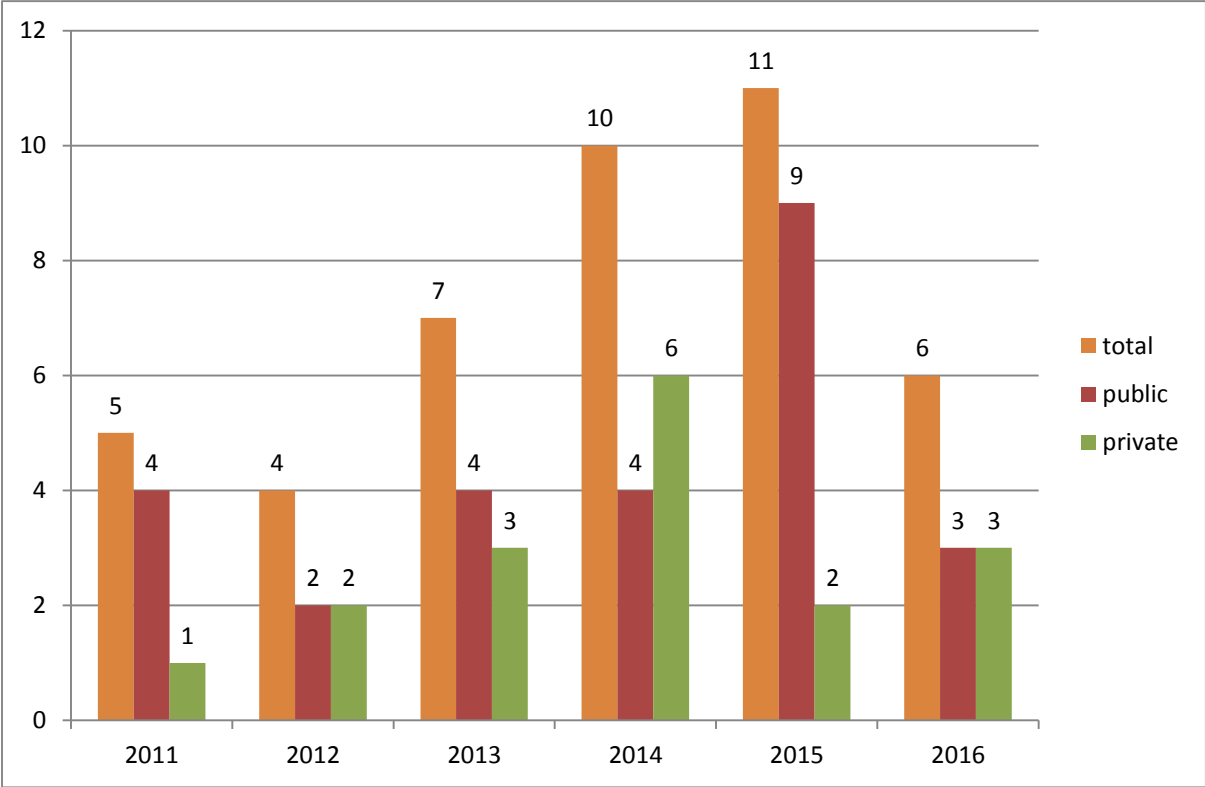
The ESCONetwerk functions as an association in practice, even if they do not consider themselves as full-fledged association, because they do not perform some of the classic activities, e.g. lobbying.

8.20.2 Status with Energy Performing Contracting (EPC)

The market for EPC has gone through a significant growth between 2013 and 2016. There are over 25 EPC providers (Selina et al. 2016), and the market is further strengthened by a large number (ca. 12-14) of EPC facilitators and interested financial institutions.

The number of projects increased drastically. Compared to 16 projects during 2011-2013, there have been 27 projects identified between 2014 and early 2016 (Roskam, Piessens, and Thijssen 2016) (see Figure 24), and there are over 57 projects in the database of Netherland Entrepreneur Agency (RVO).

Figure 24 - The number of EPC projects initiated in each year between 2011 and 2016 (2016 is incomplete).



Source: (Roskam, Piessens, and Thijssen 2016)

EPC is popular among public clients, such as municipalities.

Gemeente Rotterdam is a front runner with 3 EPC projects done (swimming pools, Kunsthal and municipal buildings). The national government used EPC contracting for the renovation of the Van Gogh Museum. A school project has been also launched in 2016 in Eindhoven.

Several other projects have been implemented by ESCOs under EPCs in schools (e.g. renovation of 8 elementary schools in Velhoven), care centre facilities, public swimming pool, and commercial buildings. The primary goals of the projects are energy savings,

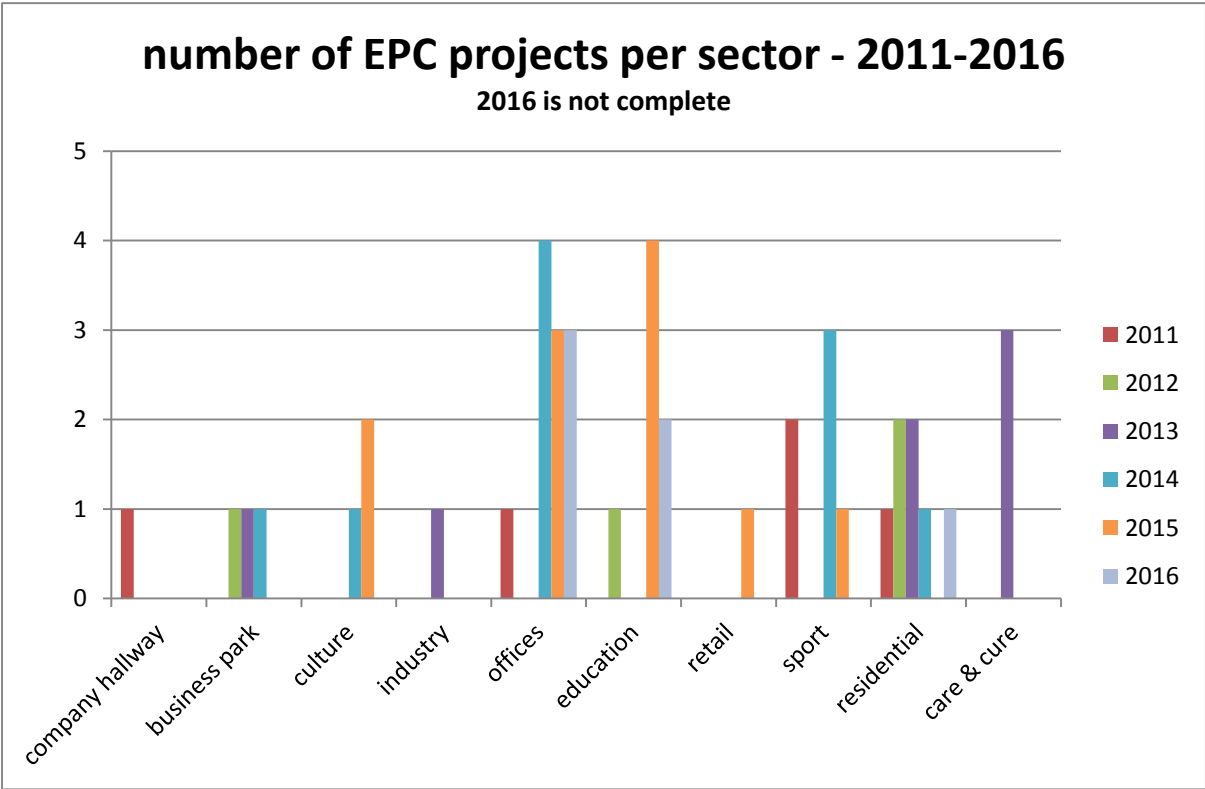
but also the improvement of quality of indoor air conditions in public buildings and facilities is important selling factor. The total number of public clients is growing rapidly.

Private parties are more and more willing to outsource their energy services, confidence by this sector has increased much in the last years. For example, the maintenance of WTC Schiphol is based on an EPC project, where CBRE and Engie are working together to achieve 15% energy savings. Out of the top 25 deep energy retrofit projects which are collected by the Netherland Entrepreneur Agency (RVO), 25% are done by an ESCO and there is an EPC underlying. Also for new buildings, such as The Edge, energy performance is laid down in a contract. The total number of private clients in utility buildings is 29 and it's growing.

EPC contracts are very often combined with other types of contracts such as construction work and building maintenance.

The distribution of clients' sectors is shown in Figure 25.

Figure 25 - Number of EPC projects per sector in 2011-early 2016.



Source: (Roskam, Piessens, and Thijssen 2016)

In most cases, contracts are concluded for 7-10 years (the shortest duration is 5 years and the longest is 30 years), and they are small (up to €200,000 investment volume), but when bundled, the project size grows to many-fold. The average contract value has been growing from € 2,447,750 in 2011-2013, to € 5,167,308 in 2014-2016.

Financing from own equity of the EPC provider or the client in the private sector is most common. Small projects are often managed from own budgets and/or supplier arrangements.

In the public sector the BNG bank is a financial service provider to provide initial costs for the implemented measures.

For bigger projects external financing is mostly used, either via supplier, or via own credit lines (like BNG in the public sector). The most common way to finance is debt financing, and mostly on-balance.

Occasionally and SPV is established to carry out the project.

8.20.3 Status with Energy supply contracting (ESC)

Large Dutch ESCOs carry out projects for energy supply based on a contract model similar to ESC in residential and commercial buildings. They are involved in project design, finance and implementation in new and existing buildings. In most cases, ESCOs install heat pumps for low temperature heating and high temperature cooling and/or photovoltaic or solar collectors for hot water preparation. The contracts are concluded after a period of 30-40 years. During the contractual period the energy costs paid by the clients (owners) of apartments are not higher than before contracts, while the indoor conditions improve substantially compared to before.

Sometimes ESCOs participate in the tendering of works as a part of consortiums or as subcontractors, created from engineering and construction companies, architect and planner offices. For example, for the renovation of Alliander buildings, an ESCO participated as a subcontractor for the design, installation and maintenance of equipment in the building. The main contractor guaranteed fixed price for electricity and water to the client (Alliander) in the next 15 years. Alliander has financed the projects and installation in its property. The ESCO concluded an ESC with the main contractor for 15 years.

8.20.4 Demand side

8.20.4.1 Energy services in public sector

The Central Government Real Estate Agency (RGD) represents the largest property manager of the Netherlands. It develops, builds and manages public property in cooperation with commercial parties such as building firms and architects, and invites tenders for construction and real estate projects on TenderNed¹⁰⁴. TenderNed is the Netherlands' online marketplace for government agencies that wish to contract projects and commercial enterprises. The Central Government Real Estate Agency follows pre-determined procedures and uses model documents when inviting tenders and awarding assignments. The assignments are subject to standard terms and contract conditions. RGD uses various types of contract in such cases, depending on the nature and scope of the agreement concerned (Central Government Real Estate Agency, 2015).

The Central Government Real Estate Agency has been increasingly working with integrated contracts. The most common integrated contract awarded by the Central Government Real Estate Agency is the DBFMO contract type. DBFMO stands for "Design, Build, Finance, Maintain and Operate". In other words, RGD contracts out all of these tasks to a single private party. However, energy service contracts are not taken in account, although energy services (including maintenance of buildings) have been tendered in the last years. For example, a call for an energy performance contract (including maintenance) was published in January 2014 for different buildings in municipalities of Rotterdam, Vlaardingen and Schiedam. The contract is an integrated maintenance and energy performance contract, in which there are two contracts per plot by two different clients. The bidders have to fulfil requirements (core competencies) in order to participate in the tender such as design and analysis of energy-saving measures for non-residential buildings (possibly also newly built residential buildings that will still be in use), with a total gross floor area of at least 9,000 m² or to have, the responsibility

¹⁰⁴ TenderNed (<http://www.tenderned.nl/tenderned-english>) is the Dutch government's online tendering system. All Dutch authorities are obliged to publish their national and European tenders on TenderNed's announcement platform, so businesses can access all public publications from a single webpage.

for carrying out energy-saving measures for non-residential buildings, over the last five years before the date of registration, with the investment value of the energy saving measures of at least €200,000. The contract duration is on average 6 months (TenderNed, 2015).

A general purchasing framework is developed to strength sustainable purchasing which takes into account EE in the central government buildings. This framework is used for the purchasing process for the central government but can be also used by other public bodies. It is placed on the website of PIANOO¹⁰⁵ (the Dutch Public Procurement Expertise Centre) to allow other public authorities to use it (Government of the Netherlands, 2014).

8.20.4.2 Energy services in other sectors

Energy services on contractual basis (under EPCs or ESCs) are implemented in the industrial and commercial sectors. Although the potential is high the number of realized projects is low. In the commercial sector ESCOs finance installation of heat pumps for heating and cooling, as well as photovoltaic for production of electricity in office buildings. The client then pay to ESCOs fixed amount for energy supply. The government has already signed an agreement with social housing sector to improve all social houses to an average energy label B. It will require a lot of investments in renovation of buildings in this sector. However, the government has introduced a landlord charge to get income from the social housing sector that limits the budget for investment. Nevertheless, ESCOs could be involved in the implementation of these projects (Menkveld, 2014). There is also a need to organise training sessions for financial sector (banks) in order to provide them with know-how to respond to EPC providers or customers (Menkveld, 2014).

8.20.5 Remaining potential and barriers

The Energy Research Centre of the Netherlands, ECN, estimates The Netherland's economical potential for the Energy Efficiency Service market to be in the range of EUR 35 – 165 Million. The larger parts come from the services sector (EUR 21 – 65 million) and the housing sector (EUR 12 – 62 Million) (van Barneveld, 2011).

According to other authors¹⁰⁶, offices in commercial buildings have the highest potential for energy services (0.23PJ) with a potential market share of 35%. These estimates are based on a bottom-up approach which uses a gross floor area database – containing data for most non-residential buildings – to determine the measures that could be offered as an energy service by factoring in the maximum achievable penetration. Offices in commercial buildings are followed by offices in governmental (public) buildings with 17% of the potential market share, educational buildings with 16% and buildings for health care with 13% (van Barneveld, 2011).

The environment is rather beneficial for the ESCO market in the Netherlands as of 2016, still there are various barriers that slow down the market. Legislation for ESCO is not completed, although it does not pose obstacles for the implementation of energy services on the market. There is a need for changes in administrative and legal rules, so that ESCOs can use tax facilities like balancing VAT of investments and can take the deduction of energy investments on the profit tax for energy investments (Menkveld, 2014).

Companies in the industry sector do not consider EE as a priority and the view that EE should come from the top level (government) and not from bottom-up often prevails. Lack of trust is still present in this sector. The EPC Code of conduct that was signed by 33 ESCOs in March 2015 is, however, expected to build more trust to the EPC concept.

In addition, lack of standardized contract for energy services (especially for EPC) and lack of M&V protocols increase the risks as well as transaction costs, although non-official model contracts are available.

¹⁰⁵ <https://www.pianoo.nl/about-pianoo>

¹⁰⁶ Schneider and Steenbergen

Split incentives are the problem which constrains EE investments and use of energy services in the residential sector. While, housing associations¹⁰⁷ managing multi residential buildings can theoretically enter into contracts for building renovation with ESCOs, the lower energy bills will benefit tenants, and apartment owners are therefore not incentivised to improve the EE of their rented buildings.¹⁰⁸

Competition with other instruments is also one barrier for energy services. PPP as an instrument is often used for buildings renovation. Moreover, energy services are often tendered with other services as maintenance of buildings, even with renovation or construction of new buildings, which makes the projects more complex. ESCOs typically take part in the tender as subcontractors and in such cases they conclude contracts (ESC) with the main contractor, who wins the tender.

8.20.6 Policies and measures supporting ESCOs and EPC

The political framework of the Netherlands in regards energy efficiency and ESCOs is very supportive. Already in 2013, it was acknowledged that one of the key driving factors for the ESCO market was the lack of legal barriers (Bertoldi et al. 2014). As of 2016, the policy framework is considered as one that can stimulate the ESCO market.

The Energy Agreement¹⁰⁹ of September 2013 includes targets for building renovation, which can be a good stimulation for the increase of demand for ESCO offers. The involved targets for energy efficiency and use of renewable energy in buildings are in line with the requirements of the EPBD, including 1) an average energy efficiency saving of 1.5% per year (adding up to a reduction of 100 PJ by 2020). 2) 14% share of renewable energy in the Netherlands' total consumption of energy by 2020, and 16% by 2023 (increased from 4.5% in 2013). Market players were also called to use ESCOs and Green lease contracts actively from 2014 in this context, however, there is no clear target on this point, and has been largely omitted so far. Thus, further policy means are called for by market stakeholders to increase the effect and to reach the goals of the Energy Agreement. (Selina et al. 2016).

The Energy Agreement includes a voluntary agreement for industries and services sectors with a high energy use, in the form of Long Term Agreements on energy efficiency to stimulate energy savings. This agreement ends in 2020. Parties should save 2% energy per year. (JRC 2016)

In the scope of the climate agenda, there are further measures and legal pieces that are supportive. The Environmental Law is also a baseline for investments in energy efficiency with a short payback time (Selina et al. 2016). Within the, so called, Activities Decree, part of Environmental Management Act (Activiteitenbesluit, Wet Milieubeheer) companies are obliged to implement energy-saving measures with a cost recovery period of five years or less. Companies should make an energy plan and follow up by taking the measures. An alternative approach is to take the specific approved measures which are listed.

In summary, some of these Laws have not been properly implemented yet, and ambitions are not very high, therefore the impact has been so far limited. In addition, the various elements of energy efficiency related legislation are not fully matched and geared, therefore more coordination would be needed.

¹⁰⁷ Approximately 75% of the 3 million rental homes in the Netherlands belong to housing associations. These associations are responsible among other things for letting social housing, defined as homes for which the monthly rent is under € 710,68. The housing associations are annually required to let 90% of their vacant social housing to people in this income category. The associations may let 10% of their social housing to households with higher incomes.

¹⁰⁸ According the existing rules the tenant pays for minor repairs and the landlord for major repairs and maintenance;

¹⁰⁹ Energie Akkoord, <http://www.energieakkoordser.nl/doen/engels.aspx>

The Dutch Guide for Procurement of EPC was launched during the national energy performance contracting ESCO Congress held on 31.03.2015 (ESCO Network, 2015). This document has been prepared by Netherland Entrepreneur Agency (RVO.nl) in the framework of the programme for energy savings in the buildings of the Ministry of the Interior and Kingdom relations. It will be used mainly for public procurement of energy services (Netherland Entrepreneur Agency, 2015).

The guideline prescribes that all necessary steps for the preparation and implementation of an EPC-based project in the public sector including the organisation of a tender for energy services. According to the guidelines, the process has to include the following steps: project identification, initial analysis, tendering, project implementation and project exploitation. Project identification includes identifying an energy saving project and collecting necessary data. Information about technique-equipment and financing also must be included. In the initial analysis, technical and economic feasibility of the project shall be examined, including setting the energy consumption (energy costs) baseline. In addition, this phase includes the preparation of procurement conditions and description of the tendering phase. The EU directives (three) for Public procurement shall be transposed in National legislation until 18.04.2016 and EU thresholds for public tendering should also be applied (Netherland Entrepreneur Agency, 2015).

An EPC with an ESCO according to the guidelines can be concluded for:

- management/monitoring (Light ESCO)
- only for one specific measure (product ESCO)
- more radical energy saving measures, such design and supply of installation of equipment (installation ESCO)
- more comprehensive measures in building envelope including construction works, renovation and installation of equipment (building ESCo9 AD)
- pool of buildings in one area (area ESCO)

Requirements related to technical and professional capacity of bidder shall be set for the tender. In addition, certification requirements for bidders (ESCOs) should also apply. These include the provision of valid certificates for: environmental management system (ISO 14001), safety management system, and/or quality management system according to the ISO 9001:2008 issued by Dutch Accreditation Authority. Quantitative awarding criteria also have to be set for the tender such as: net present value (NPV) of the project, guaranteed lowest energy consumption and percentage of applied RE. Qualitative awarding criteria also apply: plan of action (energy plan), quality of the offered measures, maintenance and management plan, qualification and experience of team, quality of monitoring and control systems, application of innovative technologies in project etc. (Netherland Entrepreneur Agency, 2015).

There are also policies to increase profitability of EE or ESCO projects, these include:

- RES energy is tax-free
- Reduction of profit tax for energy investments in the private sector (called EIA)
- The "Heat Vision" (Warmtevisie), part of the Energy Agreement is to support (subsidize) sustainable heat, such as solar boilers, heat pumps and biomass.

For residential there is a revolving fund, the National Energy Savings Fund¹¹⁰ (although it is underused). Provincial revolving funds are also available for ESCO investments, although one ESCO has so far participated (Selina et al. 2016). Similarly, some cities have their local fund to promote EE and RES.

¹¹⁰ www.ikinvesteerslim.nl

8.20.6.1 Information and awareness raising measures

The ESCO/EPC market has been aided by the recently strengthened EPC registry, model contracts and guidelines, which can increase confidence in market players. The EPC registry ('EPC gedragscode')¹¹¹ collects EPC providers and other facilitators. These are maintained by the ESCONetwerk, which is a group, close to an ESCO association, but does not perform some of the normal activities, e.g. lobbying.

Useful information about EE, EPCs, energy services and ESCOs is provided at the web pages of the ESCONetwerk¹¹². To further stimulate the Dutch ESCO market, the Ministry of the Interior and Kingdom relations of Netherlands, the Dutch ESCO association, and the Netherland Entrepreneur Agency (RVO.nl) organized the National ESCO Congress 2015 in the Amsterdam RAI on 31 March 2015.¹¹³

The primary scope of the platform is to enhance the knowledge of public and private sector on energy services and its role is to build bridges between various stakeholder groups: clients and contractors, but also public and private parties. The platform also manages the registry of signatories of the EPC code of conduct¹¹⁴, which sets a number of principles describing best practices from EPC providers (primarily) and customers (secondly) for the preparation and implementation of successful EPC projects, maximizing the energy and cost saving resulting from the EPC.

- Information days organised by ESCONetwerk.nl (www.esconetwerk.nl) en Rijksdienst voor Ondernemend NL (www.rvo.nl/escos)
- Training / workshops on EPC / ESCo by organisations not linked to the government: Instituut voor Vastgoed en Duurzaamheid (www.ivvd.nl) and Energiemedia (www.energieopleidingen.nl)

In addition, ESCO service info points have been set up in some regions of Holland such as the Province of Noord Holland. These provide municipalities and housing association with information about energy services and ESCOs, advisory services and support to preparation of feasibility studies for EPC-based projects in their buildings (Menkveld, 2014).

8.20.7 Conclusions, projections and recommendations

The market for energy services in Netherland has gone through major changes during 2014-2016. There is both an EE framework and climate legislation, some of which are not fully in line with each other. There is not much governmental support for ESCOs (part of the governmental strategy is to implement article 18 of the EED), even if the legal framework is not impeding the market either.

It is proposed by market stakeholders that a more ambitious EE framework be developed, whereas EPC is indicated as a possible means to improve the systems. If a more ambitious EE legislation is put in place, the Dutch EPC market is expected to develop rapidly in the coming 4-5 years. Otherwise, with the current circumstances, it is expected that the Dutch EPC market develops at a marginal pace in the coming years. A better Enforcement of the Dutch Environmental Protection Act by local governments is

¹¹¹ <http://www.esconetwerk.nl/gedragscode>

¹¹² <http://www.rvo.nl/onderwerpen/duurzaam-ondernemen/gebouwen/utiliteitsbouw/financiering-en-outsourcing/escos>

¹¹³ The ESCO Congress is part of a three-day event on the Future Building Holland 2015. This initiative by Amsterdam RAI and knowledge platform Sustainable Built aims to link the construction and real estate sectors.

¹¹⁴ The Code is a voluntary commitment but acts in violation of the EPC Code of Conduct may cause damage to the EPC providers' and/or customers' reputation. It is also an indicator of the quality requirements for new EPC providers entering the EPC market. The EPC Code of Conduct provides an insight into what EPC providers and customers believe the EPC excellence is, and how customers and EPC providers can expect to be treated as a result (Menkveld, 2014)

also expected to encourage industrial companies to look at the benefits of energy services.

Besides the legal framework, the practical framework of the Dutch ESCO market has improved during the last few years. The Dutch government through its bodies (such as Netherland Entrepreneur Agency (RVO.nl)) has undertaken different actions to stimulate the market for energy services. The guidelines for Procurement of EPC has been prepared and publicised. The Netherland Entrepreneur Agency (RVO.nl) and the ESCONetwerk are expected to play the key role in promotion of energy services, ESCOs and EPC. Organisation of special events such as the ESCO conference in 2015 can increase exchange of experiences and information about realised projects under EPCs. The Code of Conduct shall increase the trust for EPCs especially in the industrial sector, which is still very reluctant to the concept of energy services.

8.20.8 Summary

Total ESCO market status (2015)	moderately developed, ca. 100 ESCOs (all types of services)
EPC market status (2016)	moderately developed, ca. 25 EPC providers after a major increase. Boom of projects
Total ESCO market size	n/a
EPC-only market size (investment)	n/a
EPC market potential	n/a
EPC definition	only in guidelines
Established sub-sector(s)	<ul style="list-style-type: none"> public buildings, schools, educational sites, public hospitals, street lighting, commercial buildings, offices, sports facilities, domestic multiapartment buildings
Key general barrier(s) to be removed	<ul style="list-style-type: none"> Lack of ambition of the EE and climate framework No promotion of EPC solution within legal and official documents, procedures
Key barriers in the public segment	<ul style="list-style-type: none"> split incentives competing other solutions dilemma of out-sourcing
Key driver(s) to date	<ul style="list-style-type: none"> No legal barriers Awareness and trust raising activities ESCONetwerk activities, dissemination webpage Success examples available
Expected development/forecast	with current circumstances, minor growth continued
Opportunities for further development	Strengthening the ambition of the legal framework is expected to boost the market

8.21 Poland

8.21.1 ESCO market overview

The energy services market in Poland continues to struggle to tap the opportunity lying in the very large energy saving potential in almost all end-use sectors, and in spite of the repeated efforts nationally and from IFIs, the market remains poorly developed. With rising trends in energy prices for industrial and residential consumers in the last years

and the difficult financial situation, companies are forced to reduce their energy expenditures. The Government of Poland considers energy services and third party financing as one of the fastest and simplest ways to achieve sustainable energy budgets as expressed in the NEEAP (Ministry of Economy, 2014), nevertheless policies and measures are missing

There is no ESCO association established in Poland.

8.21.2 Status with Energy Performing Contracting (EPC)

The energy performance contracting is not common in Poland. Only a few (up to 10-20) EPC-related projects have been undertaken since 2013, although the spread has slightly increased. EPC providers often use their own equity to finance projects, or pull down bank loans or lease equipment (JRC 2016).

A few large international ESCOs offer services based on the EPC model. In the public sector, EPCs have been undertaken in few municipalities for EE improvements in street lighting, e.g. in the scope of the project "Streetlight-EPC" co-founded by the EU's Intelligent Energy Europe programme. The aim of this project was to create demand and supply for EPC projects by setting up regional EPC facilitation services in 9 regions in Europe including the Pomeranian Region in Poland. These facilitation services provided comprehensive support to municipalities, SMEs as well as potential ESCOs.

Between 2014-16, clients from other sectors have been involved, too, such as public buildings, schools, hospitals, and even residential buildings (JRC 2016). EPC projects run in the size of €200,000 to €1,000,000. The duration of contracts run around 4-5 years for industrial projects and an average of 10 years for public clients. (JRC 2016).

8.21.3 Status with Energy supply contracting (ESC)

According to the Environmental Economic Institute, the turnover volume of the Polish energy services market was in the range of around PLN 40-100 million in 2011 (Ministry of Economy, 2014), and €10-25 million/year in 2012 (Bertoldi et al. 2014), which is now reported to be around €30 million (JRC 2016). There are around 30 companies providing all types of energy services in Poland. The list of these companies can be found in the study "Time to save energy"¹¹⁵ on the web page of the Ministry of Economy. The scope of services provided by these companies in Poland can vary: energy audits and consulting, heating and cooling systems, lighting, cogeneration CHP, generation and distribution of energy. However, only some ESCOs can offer full range of services. (Ministry of Economy, 2014).

8.21.4 Demand side

8.21.4.1 Energy services in public sector

The public sector is the most important client of ESCOs, accounting for 40-50% of the market turnover (Gula, et al., 2012). Modernisation of street lighting (replacement of inefficient street lighting with more efficient ones) constitutes an important segment of the ESCO market. This is attractive for ESCOs since it is associated with shorter payback period for investments.

Thermal renovations including building envelope insulation and replacement of heating and air condition systems in public buildings realised through ESCOs on the basis of EPCs are not common in Poland. These projects have been instead financed or co-financed through subsidies (grants) received from EU Cohesion funds or State budget and managed by the National Fund for Environmental Protection and Water Management

¹¹⁵ Source: www.mq.gov.pl/files/upload/10722/Podrecznik-Sektor_publiczny_OSTATECZNY.pdf

(NFEP&WM)¹¹⁶. It is currently not possible to combine the subsidies with third party financing and ESCOs.

The Operational Programme Infrastructure and Environment 2014-2020 "Supporting energy efficiency, intelligent energy management and promotion of RES for public infrastructure, including public buildings, and in the housing sector" will co-finance EE projects including comprehensive energy modernisation of public buildings. The overall budget of this programme is EUR 180.7 million provided by the EU Cohesion fund for period 2015-2023. Suppliers of energy services within the meaning of Directive 2012/27/EU are listed together with state budget institution as beneficiaries of this programme.

Two public sector projects based on the ESCO concept are presented in the Polish NEEAP: the first one concerns public lighting upgrades in the municipality of Jaworno, and the second one targets the thermal renovation of an educational building in the municipality of Radzionkow (Ministry of Economy, 2014). The contract of the second project was concluded between the municipality of Radzionkow and a private ESCO for the period of 10 years (2010-2020). This contract is considered as a Public Private Partnership (PPP), but has EPC-related elements since the ESCO has provided an energy savings guarantee. The private ESCO was selected on public tender organized by municipality. The total volume for the project is PLN 8,977,574 (€ 2.23 million). The project resulted with energy savings of 54% for heating and 40% for electricity, compare to the base line consumption.

8.21.4.2 Energy services in other sectors

A wide scope of ESCO services and relatively short payback times make industry another potential client for ESCOs. However, the potential of this sector is far from being utilised and only a small number of projects have been realised in last years. As in the case of public buildings, EE projects in large industrial enterprises are co-financed through subsidies provided by the state budget and/or EU Cohesion Funds. Small CHP installations in industrial enterprises are for now the most frequently implemented project by ESCOs (Gula, et al., 2012, JRC 2016).

With regards to the services sector, ESCO projects are not common. The key problem here is the split incentive dilemma, because owners of commercial buildings are not interested to invest in EE as they do not have direct benefits from the resulting energy cost savings, while tenants are reluctant to invest in properties which do not belong to them. Despite these difficulties, a few ESCOs have realised EPC-based projects in commercial buildings (Gula, et al. (2012), Bertoldi, et al., 2014)).

The heating sector is yet another sector of interest for ESCOs. Some ESCOs have already undertaken measures, offering services for the modernisation and improvement of heating systems in order to reduce energy consumption.

8.21.5 Remaining market potential and barriers

A large potential for EE improvements through energy services exists in the public sector, chiefly due to their very poor performance levels and subsequent need for comprehensive renovations. The calculations presented in the Polish NEEAP 2014, show that only the buildings owned by the Polish central government (172 buildings with a total floor area of 855637 m²) have an energy saving potential of about 70738 MWh/year (Ministry of Economy, 2014).

¹¹⁶ Programmes which provide co-financing for EE projects implemented by the NFEP&WM in public facilities are: (1) the Operational Programme (PL04) "Energy Savings and Promotion of renewable Energy Sources" for the period 2013 -2016, (2) Energy Efficiency improvement .Part 2 –LEMUR "Energy Efficiency Public Utility Facilities" for the period 2014-2023, (3) "Green Investment Scheme –Part 5-Energy management in the facilities of selected public finance sector entities" operational since 2010 and (4) "Efficient energy use Part 6 –SOWA-EE Street lighting" (Ministry of Economy, 2014).

Residential buildings also have a significant potential in terms of energy and economic savings and therefore can be considered as potential ESCOs clients. A study prepared by the Urban Development Institute demonstrated that comprehensive, major renovations are carried out only in a very small segment of the Polish housing stock, covering less than 1% of the total number of multi-apartment buildings countrywide. The "renovation gap" (referring to the share of the building stock in need of renovation which has not been yet renovated) in the cooperative building stock is about 50%, while for municipal housing stock this is almost 70%. The worst situation is found in privately-owned rented apartments, where the renovation gap is around 75% (Ministry of Economy, 2014).

The limited ESCO activity on the Polish market can be explained by a variety of reasons. Some of the barriers identified by the experts in Poland are:

- Legal issues related to ESCO contracts: There is a need to improve very complex public procurement procedures, which exclusively focus on economic (lowest price) criteria and not on energy savings. Furthermore, there is no commonly accepted definition or standard procedures.
- Regulatory instability limits the interest in long-term contracts. In particular, tax laws have been changing with major impacts on running projects, sacrificing the profits of EPC projects.
- Public debt and ESCO contracts: ESCO contracts have so far been considered as public debt accumulated by local authorities.
- Collision of interest with state funded programmes: The co-financing provided in the form of grants by the state budget and/or from EU Cohesion Funds through the NFEF&WM Fund for the public and industrial sectors is in a collision with third party financing and does not stimulate companies to carry out EE projects through ESCOs. It is not clear what will happen after the completion of these state programmes and funds, and how the ESCO market will be affected.
- Lack of understanding of the ESCO concept: The potential clients of ESCOs such as the industrial, residential and commercial sectors are not well informed about energy services and the associated benefits of the ESCO concepts.
- Lack of interest for energy services on the market: The Polish market can be recognized as a non-demand driven market. There is generally a lack of knowledge of EE investments and low visibility of ESCO services.
- Insufficient promotion of ESCO activities: There is no ESCO association which can play the role of organiser of promotional activities, information campaigns and awareness raising events. The association can also represent ESCO interests in front of different stakeholders.

8.21.6 Policies and measures supporting ESCOs and EPC

As explained previously many on-going financial incentives provided by the State with the support of EU funds inhibit the use of third party financing and use of ESCOs. The only programme under which suppliers of energy services within the meaning of Directive 2012/27/EU¹¹⁷ are listed together with others as beneficiaries is the Operational Programme Infrastructure and Environment 2014-2020 "Supporting energy efficiency, intelligent energy management and promotion of RES for public infrastructure, including public buildings, and in the housing sector".

To stimulate the ESCO market, the Act on Energy Efficiency has introduced provisions under which such entities may enter tenders to obtain energy efficiency certificates (white certificates) and ESCOs may be beneficiaries of the white certificates scheme. ESCOs can enter tenders on behalf of other entities and aggregate energy savings from

¹¹⁷ The meaning of energy service providers under the Directive 2012/27/EU is of broader sense and includes any professional that delivers energy services and/or other energy efficiency improvement measures in a final customer's facility or premises

energy efficiency improving investments they carry out, achieving in total energy savings of at least 10 toe. Moreover, public sector entities, obliged to use energy efficiency improvement measures under the Act, may conclude agreements on the implementation and financing of investments for improving energy efficiency with such entities as ESCO energy saving companies (Ministry of Economy, 2014).

8.21.6.1 Information and awareness raising measures

Due to the lack of an ESCO association or dedicated representative body, promotional events for energy services, EPCs and ESCOs have so far been rare. An Information and educational campaign, run in the period 2012-2016 and managed by the Ministry of Economy, aims to increase the social awareness regarding energy efficiency as well as funding through ESCOs and the White Certificates scheme. A much more serious effort would be needed to raise awareness.

8.21.7 Conclusions, projections and recommendations

The Polish market has significant potential for energy services in all sectors. More efforts are needed by the government and the stakeholders to involve ESCOs in the realisation of EE projects in all the sectors. The white certificate scheme, which has been accepted by the government as one of the key measures to help achieve its 2020 EE target, together with the new Operational Programme Infrastructure and Environment 2014-2020, shall give an essential impulse to the ESCO market. These opportunities can help ESCOs acquire more experience and enable the ESCO model to be taken as an implementation mechanism more widely.

A more systematic and strategic approach from public bodies is also necessary, especially in co-financing and granting of projects. The successful implementation model of other EU countries through co-financing of measures with combination of grants and energy services based on EPC can be used. Renovation of building envelopes, which are linked with large investments and long payback periods, can be financed by grants or loans, but improvement of heating and air condition systems can be implemented through ESCOs. Projects in the public sector can also be used as demonstration projects for better promotion of energy services and ESCOs.

Finally improvements in the ESCO and public procurement legislations are critical for further strengthening of the ESCO market countrywide. Model contract for EPC and a list of ESCOs shall also be prepared and published on web pages of the responsible ministry.

8.21.8 Summary

Total ESCO market status (2015)	poorly developed
EPC market status (2016)	preliminary
Total ESCO market size	€10-25 million (annual turnover, 2012 – by now probably less)
EPC-only market size (investment)	n/a
EPC market potential	€25-75million (estimate in 2013)
EPC definition	no
Established sub-sector(s)	<ul style="list-style-type: none"> • ESC: street lighting, industrial sites, processes • EPC pilots: street lighting, public buildings
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • Introducing EPC concept in legislation • Establishment of registry, certification, model contracts • Development of trust and confidence

Key barriers in the public segment	<ul style="list-style-type: none"> • Removal of competition with the grants schemes
Key driver(s) to date	<ul style="list-style-type: none"> •
Expected development/forecast	It is possible that after the subsidy programmes dry out, ESCOs will have a market space to enter
Opportunities for further development	It is expected that when the grant schemes are less available, the ESCO market can grow. However, in that moment, other market factors may become crucial, such as the lack of definition, certification, awareness, etc.

8.22 Portugal

8.22.1 ESCO market overview

The ESCO sector in Portugal went through a slow, but solid growth since 2010, in spite of the struggle of the real estate and the industrial sectors (the latter being the key client of ESCO projects) as a result of the financial crisis, which struck the country very heavily, bringing it on the verge of bankruptcy (Bertoldi, et al., 2014). The challenge currently is the overarching drag on the economy due to the weight of debt. The combined total of public, corporate and household debt represents more than 370% of GDP, one of the heaviest debt burdens in Europe. Companies, households and the government have been focusing on repaying the debts, which slows down the pace of final recovery.

In this context, the ESCO market is still underdeveloped and small, although with a few decades of experience, and important successes since 2005-2008. The market for EPC is getting off the ground recently (Fonseca, Patrao, Fong, & de Almeida, 2015), providing some pilot projects (Government of Portugal, 2013) besides a few very successful market-based companies with a steadily growing investment rate (Ponte pers.com.). The growing trend is sustained by a strong political commitment to energy efficiency and ESCOs in particular, by supportive legislative framework and governmental actions, as well as a well-established self-representation of the suppliers. (Fonseca, Patrao, Fong, & de Almeida, 2015; Rodrigues, 2015)

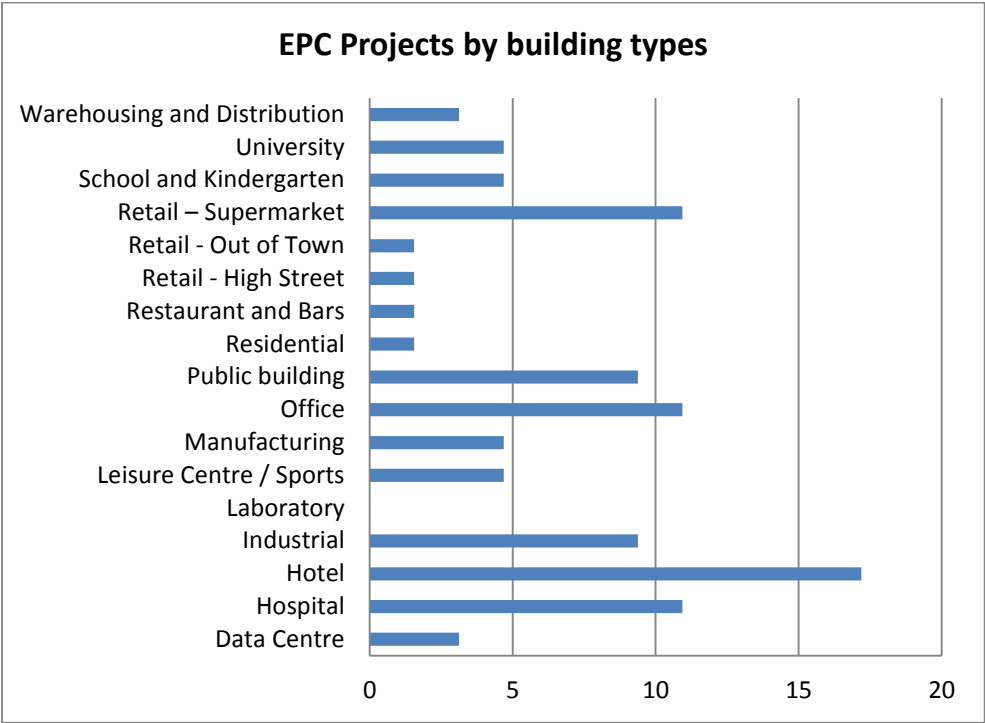
There is one ESCO association, APES Energia, which – with its 10 members – represents more than 70% of the total ESCO business carried out in recent years (Fonseca, Patrao, Fong, & de Almeida, 2015).

8.22.2 Status with Energy Performing Contracting (EPC)

The market for EPCs, i.e. projects with guaranteed energy savings, is emerging now, with a continuous, although very slow increase (Fonseca, Patrao, Fong, & de Almeida, 2015). It is unknown, how many of the ESCOs can and will supply EPCs, nevertheless interest is rather high due to the possibility to enter the public building sector market as part of the ECO.AP programme. Around 5-10 EPC projects are implemented in a year with a value of between €100,000 and €500,000 each) (Fonseca, Patrao, Fong, & de Almeida, 2015), however these can be considered as pilot projects generally. Therefore, experience is building up now.

As a consequence of political support and efforts by the supply side, implementing EPCs is gaining popularity, and projects can be found in hotels, hospitals, leisure centre sports, schools and public buildings, and occasionally with industry. In particular, the NEEAP expects that the rigorous improvement of energy efficiency of governmental buildings and public lighting will be implemented and financed by ESCOs using EPC (Government of Portugal, 2013). For more details, see Figure 26.

Figure 26 - The number of EPC projects by building types between 2010-2013.



Source: (Fonseca, Patrao, Fong, & de Almeida, 2015)

Both the shared savings model and the guaranteed savings model are used (Fonseca, Patrao, Fong, & de Almeida, 2015). Based on the Transparence project’s survey (2013), the investment outlay of EPCs projects established in the last 3 years is roughly between €10 million (Fonseca, Patrao, Fong, & de Almeida, 2015) – €30 million (Ponte pers.com.)

8.22.3 Status with Energy supply contracting (ESC)

The ESC market has seen a slight growth in recent years. The market is small, both the supply and the demand sides.

More than 100 potential ESCO contractors registered in the official database established by the Directorate General of Energy in 2011, and this number remains largely constant as of 2016. Registered companies include utilities, suppliers, and consulting companies (including several SMEs), with the expectation of participating in the public procurement of energy services, in the scope of the ECO.AP programme (Fonseca, Patrao, Fong, & de Almeida, 2015). Although, a qualification framework was introduced with financial and technical benchmarking, and ESCOs can be registered at two levels, but all accredited ESCOs have the technical and financial capacities to make long term energy performance contracts. The appropriate sum of qualified ESCOs is around 40. Moreover, the number of ESCOs that actually are operating in the market is even lower, around 15-20 (Fonseca, Patrao, Fong, & de Almeida, 2015), but others estimate no more than 3-4 ESCOs (Ponte pers.com.).

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. (Fonseca, Patrao, Fong, & de Almeida, 2015)

The ECO.AP programme estimated that the programme could be able to generate investments of about €13,000 million until 2020, but it is unclear whether this can be realistically achieved (Fonseca, Patrao, Fong, & de Almeida, 2015). Furthermore, it is

calculated that the private sector has probably around €50 million in actual (industrial) contracts (ManageEnergy, 2013).

8.22.4 Demand side

8.22.4.1 Energy services in public sector

The ESCO market for public buildings runs on a very low scale. While it is expected to be enhanced by governmental programmes, such as the ECO.AP and the combined ELENA assistance, some market actors remain very doubtful. In addition, further national funds have been put in place to contribute to the development of the ESCO market (Rodrigues, 2015).

8.22.4.2 Energy services in other sectors

ESCOs are more successful in the private sector than in the public sector in Portugal (ManageEnergy, 2013). In particular the industrial sector is most developed, particularly co-generation projects in large industries. ESCO projects can also be found in hotels and large shopping centres. 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 (Fonseca, Patrao, Fong, & de Almeida, 2015).

8.22.5 Remaining market potential and barriers

Traditionally, barriers to energy services development used to be the lack of information, lack of trust in suppliers, lack of harmonized procedures (M&V, certification/accreditation), the lack of government support and regulation, complex and inadequate procurement procedures, the difficulty in accessing credit, among others.

Several of the above conditions for ESCOs have largely improved. The legal framework conditions have been established, the idea of the ECO.AP programme is promising, although seriously delayed and designed with a few significant shortcomings, procurement frameworks have been worked out in order to engage ESCOs in the ECO.AP project, and internal capacities of public clients have been improved with the obligation of employing energy managers.

Therefore, the main reason for the ESCO sector to remain still dormant is the lack of availability of financing. On one side the national banks lack funds and do not have the technical expertise and interest to engage in ESCO projects, while international banks are not interested to be associated to the Portuguese risk (Fonseca, Patrao, Fong, & de Almeida, 2015). In this financial environment there is a surplus of projects with very good finance indicators and based in known technologies (ManageEnergy, 2013).

Besides simple financing sources, alternative financial support would be also appreciated by the supply side, such as insurance schemes, combination of loans and fiscal measures, or a guarantee fund.

In spite of the high expectations related to the ECO.AP programme, there are a number of design elements that appear as serious barriers to its kick-off. Besides the traditional complexity of the public tendering procedures, establishing EPCs in the public sector brings additional concerns like lack of experience and lack of ready prepared or more appropriate procurement frameworks, financing, guaranties and sharing of risks among others. The ESCOs are expected to take on board too much risk, among them 100% financing and overall risks, which reduces the attractiveness of the programme significantly (Fonseca, Patrao, Fong, & de Almeida, 2015), (Ponte pers.com.).

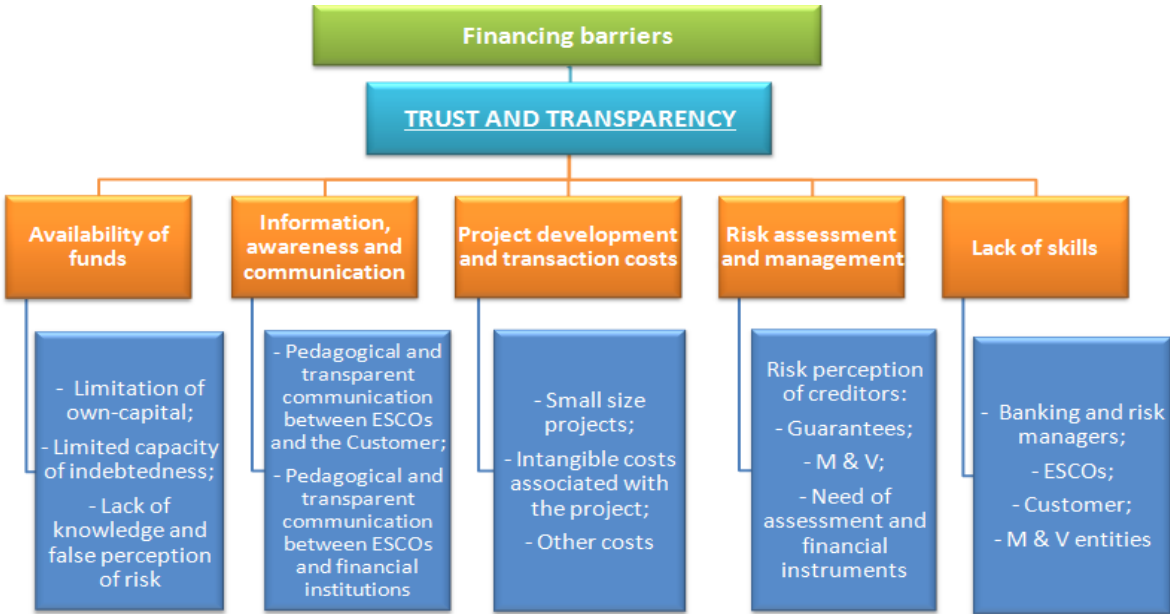
Until recently, potential financial support from EU funds, including JESSICA and ELENA have not been utilized. Moreover, the promise of the Operational Programmes also created high hopes, and while their final introduction may open the door in front of

ESCOs, programme implementation is not yet clear for ESCOs (Fonseca, Patrao, Fong, & de Almeida, 2015).

Finally the demand is still low, even within the ECO.AP programme, as a result of lack of trust and low level of knowledge and clarity about ESCOs paralleled with too much expectation from the supply side.

The key risks in Portugal have been collected by (de Jesus Ferreira, 2015) and presented in Figure 27.

Figure 27 - Overview of main barriers in Portugal as of 2015.



Source: de Jesus Ferreira, 2015

8.22.6 Policies and measures supporting ESCOs and EPC

Although there are many barriers that remain, at the same time, a lot of effort has been done to use the potentials of ESCO opportunities. Even if the success of governmental efforts has been questioned by market actors (e.g. Ponte pers.com. 2015, JRC 2016), new laws and the ECO.AP programme have surely formed the market lately.

Portugal introduced strong national legislation related to energy efficiency and energy services, based partially on European directives like EED, ESD, EPBD and Renewable Directives, and international commitments (Fonseca, Patrao, Fong, & de Almeida, 2015). The Portuguese Energy Efficiency Action Plan (NEEAP) contributed to the deployment of energy services market, whereas the public sector was announced to lead this process as a role model on energy savings and efficiency measures (Fonseca, Patrao, Fong, & de Almeida, 2015). This was then translated to implementing measures (e.g. ECO.AP), but impact is not yet evident.

The EED was transposed into national legislation by Decree Law No. 68-A of 30 April 2015. This Decree Law defines EPC as a contractual form used in the public sector, which is not in line with the EED provisions.

The structure for a new public contracting scheme was created (DL 29/2011) and the architecture of the process was defined (RCM 67/2012). In early 2013, the tender specification was finally published including the clauses to be included in the contract to be established with public institutions (Portaria 60/2013). In the public sector, Portugal

has provided a strong regulatory framework for ESCO development¹¹⁸. However, although the efforts, the EPC market in Portugal is underdeveloped, far from its promised potential, and is facing several constraints that are hindering the diffusion of Energy Services Contracts.

As of summer 2015, there was one tender procedure running for public lighting, three tender procedures prepared (ministerial buildings), and several others in the pipeline (Rodrigues, 2015). For the first one the ELENA technical assistance was granted (EIB, 2013).

Two main activities are comprised in the ECO.AP programme that are expected to help boost the ESCO market. In 2011 a diploma establishing the juridical regime on Energy Performance Contracts for the public sector was published. This regime establishes the rules of the contracts to be established between ESCOs and public administration aiming for the implementation of energy efficiency measures in public buildings and equipment. Public entities representing at least 20% of a single ministry energy consumption and that individually or grouped have consumptions higher than 100 MWh/year must implement EPC through the use of ESCOs. (Government of Portugal, 2013). Although the direct success of the programme has been limited so far, ESCOs have been strengthened, and the requirements and accreditation increase trust in the ESCO sector.

The establishment of an obligation to employ Local Energy Managers can also be expected to drive the ESCO market. All services and organisations responding directly or indirectly to the State, as well public companies, universities and public foundations have to nominate a local energy manager who is responsible for the accompaniment of the implementation of the energy efficiency measures. The local energy managers are technicians nominated by the State bodies and responsible to implement the ECO.AP in their organizations. This will help to overcome the lack of technical knowledge in-house to enter into ESCO projects. (Government of Portugal, 2013)

The Fund for Energy Efficiency was launched in 2010 to support the implementation of measures in the NEEAP, including the leveraging the ESCO investments under the ECO.AP. However, the Fund has not been fully fledged and local experts suggest that a combination of various financing sources would be preferable, ranging from non-refundable grants to preferential loans, revolving funds, etc. (Fonseca, Patrao, Fong, & de Almeida, 2015). At the moment there are a number of announced grants, where ESCOs are also eligible, including the Fund for Energy Efficiency (Tender 5: Energy audits in public buildings/equipment, to support tender procedures for EPCs (€250.000)), the Innovation Support Fund (EPCs in private sector: offices, hotels and hospitals (€1,050,000)), Cohesion Funds (for energy efficiency in central government administration), European Regional Development Fund (IP.4.2 –Energy efficiency in private sector (non-residential) and IP.4.3 –Energy efficiency in regional and local government) (Rodrigues, 2015).

8.22.6.1 Information and awareness raising measures

The Energy Efficiency Barometer for the Public Administration will be a tool to compare and publicly divulge the energetic performance of the entities entering the ECO.AP programme (Government of Portugal, 2013).

Trainings are organised and information is regularly disseminated by national and European projects. An organised central programme is not provided.

¹¹⁸ The Portuguese Government launched in 2011, a program named Energy Efficiency in Public Administration Program (ECO.AP) aiming to promote energy efficiency in public administration buildings through the establishment of EPC contracts. This program objective is the promotion of energy efficiency, in particular through measures to reduce the consumption and the promotion of changing behaviour by means of reducing energy consumption in public buildings. Although there are some incentive programmes available, at the moment there are no successful financing models being applied, neither any EPC established in the public sector in Portugal. The economic crisis and the need to cut expenses are still avoiding investments to be carried out.

8.22.7 Conclusions, projections and recommendations

Undoubtedly, the Portuguese government has assumed a strong commitment in supporting renewable energy and energy efficiency in order to position Portugal as a leading country of the energy revolution. The legislation behind the ECO.AP programme launched the basis to establish EPC contracts, since it created a structure for new public contracting scheme, defined the architecture of the process and the contract template to be followed by all public institutions. In addition, in order 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 that ESCOs should fulfil. This accreditation system comprises two different layers of projects, with different requisites to accommodate small and larger ESCOs, but all must have the technical and financial structure to make long term energy performance contracts.

While expectations were very high related to the ECO.AP programme, and these were not yet met, new efforts are being invested, and the programme may be redesigned in an effective way. There are some important design elements that need to be re-established (Ponte pers.com.). In addition, the requirements, the changes in the legal system, in procurement frameworks, accreditation, etc. has had a positive impact on the market indirectly.

There are some exemplary projects with good finance indicators and based in known technologies from industrial projects to building refurbishments, installation of energy efficiency measures and renewables in hospitals, schools, universities, supermarkets and others. Hotel Corinthia in Lisbon is the first example of a large EPC in a hotel for an energetic refurbishment. Several improvements have been carried out, in particular, lighting system, the motors and equipment, the HVAC system, as well as promotion of energy saving practices among employees and guests. In this contract model, the ESCO provides all the funding needed for the project implementation, which will be fully paid by the energy savings verification process, defined in the EPC. Other successful examples could be indicated, in areas like hospitals, hotels, Universities, etc.

8.22.8 Summary

Total ESCO market status (2015)	not well developed, about 5 active
EPC market status (2016)	not more than 5 active
Total ESCO market size	€10-30 million (data from 2013)
EPC-only market size (investment)	n/a
EPC market potential	n/a
EPC definition	no (linked to public contracts only)
Established sub-sector(s)	<ul style="list-style-type: none"> • ESC: street lighting, industrial sites, processes • EPC pilots: street lighting, public buildings
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • Introducing EPC concept in legislation • Establishment of registry, certification, model contracts • Development of trust and confidence
Key barriers in the public segment	<ul style="list-style-type: none"> • Removal of competition with the grants schemes
Key driver(s) to date	<ul style="list-style-type: none"> • Possibility to use in White Certificate scheme
Expected development/forecast	It is possible that after the subsidy programmes dry out, ESCOs will have a market space to enter

Opportunities for further development

It is expected that when the grant schemes are less available, the ESCO market can grow. However, in that moment, other market factors may become crucial, such as the lack of definition, certification, awareness, etc.

8.23 Romania

8.23.1 ESCO market overview

According to the Romanian National Energy Efficiency Action Plan (NEEAP) (Government of Romania, 2015) "the Romanian energy services market, currently underdeveloped, needs active and constant stimulation from local and central State authorities. Efficient support to energy services companies involves overcoming the relatively sceptical attitude of consumers towards energy efficiency and access to such services". The NEEAP also states that the energy service market should play a greater role in the future.

On average, and in particular the EPC market, is stagnant, and with the current conditions, no major changes can be expected. While the basic legislation and a number of measures have been put in place to promote the ESCO market, these changes have not been enough to kick-start the market, and there are further major barriers that need to be addressed before a growth can be expected (especially that of the EUROSTAT definition of EPC under public debt).

As a key step in market development, the EED was transposed into Romanian legal framework with the Law No. 121/2014 on Energy Efficiency. This legislation includes the definition of EPC. The Romanian Association of ESCO companies, ESCOROM¹¹⁹ is involved in the dialogues with authorities on major issues regarding the regulatory framework related to EPC contracting (Dragostin pers.com.)

8.23.2 Status with Energy Performing Contracting (EPC)

The number of EPC providers in Romania cannot be estimated with confidence. The number of companies that could be able to offer EPC is below 10. Nine EPC providers are listed in the newly established EPC registry in the framework of the Transparense project. However, linking payment to performance over time is not fully applied even in EPC-like projects, because there is reluctance - even on the private market - regarding data sharing and monitoring, and variable instalments. There have been 10-15 performance-linked ESCO projects that are remunerated only if a certain economy is achieved over a short period of time especially in public lighting and industrial processes (JRC 2016).

At the same time, there would be interest in real EPC on the clients' side. There are clients that are well aware of the EPC concept and the benefits compared to simple EE investments or even the more popular ESC format, and therefore technically they would prefer EPC. But when it comes to the financial terms, EPC is too complicated to administer, thus, finally, it is easier to have equal instalments to pay by the client.

8.23.3 Status with Energy supply contracting (ESC)

As of 2016, it is estimated that close to 20 ESCOs operate in Romania, but only 7 have been certified by ESCOROM, the ESCO Association. Most of them are small companies (up to 50 employees) and only a few are medium and large ones. ESCOs are mostly local (Romanian) firms (including one of the oldest ESCOs in the Romanian market) with subsidiaries and joint ventures of international companies entering the market in recent years (Bertoldi, et al., 2014).

The volume of actually running ESCO activity is limited. Companies are consulting and engineering firms, equipment producers, manufacturers and retailers, facility managers and energy suppliers. There are only privately owned companies.

¹¹⁹ www.escorom.ro

ESCO offers are focused on the planning, implementation and operation phases, while financing is offered by only few companies. ESCOs use the BOOT or the Energy Supply Contracting. The BOOT contract proved its feasibility both in implementing and operating cogeneration based ESCO projects. The ESCOs are mainly involved in the industrial and co-generation sectors, but also in a few street-lighting projects.

8.23.4 Demand side

8.23.4.1 Energy services in public sector

Energy savings potentials in public buildings are still largely untapped. Local governments are not able to take EPC/ESCO models into consideration, even when there would be an interest to implement one.

Galati became the first Romanian local authority to launch a public procurement procedure to contract energy efficiency services for public buildings in May 2015 (Transparense project, 2015; Craiova City, 2015). The project serves as pilot program of the European Bank for Reconstruction and Development (EBRD), funded by the Global Environment Facility (GEF). The EBRD program aimed to rehabilitate a number of public buildings matching the financing with energy performance contracting by ESCOs. The buildings related to this program are Galati's Emergency Hospital for Children "Sf. Ioan", and a group of 5 schools of primary education. EBRD provides free technical assistance to municipalities to prepare energy efficiency projects in public buildings (kindergartens, schools, hospitals). Three more projects were involved in the programme, and following the pilot phase, the program was expected to be extended to other interested municipalities to implement energy efficiency projects in public buildings (Craiova City, 2015). (Dragostin pers.com.) However, for the moment, implementation has been delayed (see later). (JRC 2016).

The size of EPC projects would revolve in the lower volume segment (up to €200.000 or €500.000), with very short contract periods of 2-3 years. Normally, the average contract period would be around 10 years, however projects with longer turnover are usually reduced to a shorter financing period and the instalments are delinked of the performance of the project. (JRC 2016)

Financing of EPC projects has been based on IFI streams. So far a number of programmes have been used, such as EBRD co-financing, UNDP grants, EU financing programmes, , specific investment funds (BAF - Balkan Accession Fund), which were then combined with the clients' own sources or EPC providers' own sources.

8.23.4.2 Energy services in other sectors

ESCO projects in Romania run in the industrial sector primarily. Furthermore, ESCO projects in the residential sector are planned to be supported by financial measures in the future (Regulatory Authority for Energy, 2015)

8.23.5 Remaining market potential and barriers

The remaining theoretical saving potential via ESCOs is very large, because of the obsolete state of the buildings and facilities, of which not much has been tapped yet. The Romanian Government projects energy savings of ca. 0.641 million toe between 2018 and 2020, as a result of legislative clarifications to stimulate ESCO activities in 2016 (Government of Romania, 2015). The JRC survey respondents in 2016 estimated a total of around €780 million/year investment potential for the whole ESCO market (in public and private segments). However, the technical saving potential is almost zero due to a number of key barriers that fully block the market. There are a large number of barriers that act against the market in spite of the successes lately in e.g. legal implementation of an EPC definition, awareness raising, informational measures, EBRD example projects, etc.

Even though, the concept is present on the private market for about 20 years, knowledge of the standard characteristics is a barrier. Probably the most difficult aspect to understand is the fact that transfer of risks means increase of costs. The "ESCO" label could be adopted by either the regular construction companies proposing mainly thermal rehabilitation services, as well as by the equipment producers. A solution could be the certification scheme for ESCOs by the responsible bodies, which is under way by ESCOROM. In the same line, clients may be problematic, and ESCO contracts are challenged by the payment behaviour of some public authorities.

Although the EPC definition was introduced, the legal landscape remains vague in the moment of practical implementation. The definition is not reflected in other legal acts, e.g. PPP Law, Fiscal Code, and Concession Law.

For example, the public acquisition laws published recently (L98, L99, L100, L101/2016) do not take into account EPC possibility, only in a covert manner where an EPC can be considered as a best cost - benefit solution.

Local Public Administration Finance Law (no. 273/2006, as updated) – doesn't include provisions on investments made by Public Authority under EPC (whether they should be considered on or off-balance sheet).

The Civil Code suggests that the transfer of ownership (art. 577 par. 2) starts in the moment when work starts and completes when works are finalized, which is not applicable for EPCs.

Government Decision no. 264/2003 sets strict limits of the actions and expenditure categories, criteria, procedures and limits for payments in advance of public funds which do not leave room for EPC specific provisions. Services to be provided by ESCOs in the implementation phase of energy efficiency projects could be only considered advance payments, as contribution of Public Authority to the project.

The legal and procedural frameworks – including a model contract template – are missing. Model contracts could guide the partners through in ambiguous questions, such as changes in assets' destination/ownership and changes in end-consumers behaviour, which may affect the ESCO's cash flows from savings. Also, it would be crucial to help the partners settle the risk distribution between client and ESCO in a well-balanced way.

On top of this, the electronic system for public acquisitions (SEAP) is not yet adapted for complex contracts as EPC.

So far, the ESCO market was dependent on IFI grants. However, commercial banks are reluctant to assist ESCOs since they have no experience in associated risks management. At the same time, availability and cost of long-term debt to match EPCs with long repayment profiles might be very high, affecting ESCOs cash flows.

There are sometimes problems with the payment behaviour of the beneficiaries, and payment guarantees are not well developed. Project preparation is difficult, if not impossible, due to the insufficient and unclear data (especially baseline for consumption). There is a general distrust in different types of solutions (financial, technical, legal) that have not been implemented in Romania. The Operational Programmes could be used as a source of co-financing, provision of guarantees, or other risk-sharing mechanisms, as in other countries, but for the moment, ESCOs are not eligible to participate in these structures. (Dragostin pers.com.) There is a lack of coherence between the procedures of the different institutions (ANRE, ANRSC, ANAF, and others).

Although some improvement has been made over the past years, the procurement process is still too complex, ambiguous and time consuming for the local ESCOs. EPC is not regulated in public procurement contracts which make bids for energy rehabilitation of buildings and / or public street lighting systems non-accountable. Public sector projects are risky due to unsecure decision-making and due to the lack of trust between client and ESCO (and the bank if third-party financing would be considered). A recommendation from local ESCOs suggested that EPC contracts should be conducted

using competitive dialogues. It is also a problem that the national and local public authorities lack of expertise to go through a tender and implementation of EPC. As a result, there is general distrust in different types of solutions (financial, technical, legal) that have not been known to the administration services.

Finally, the EUROSTAT accounting and its understanding results that EPC projects are added to the value of the government debts, which are on the other hand limited by the EU legislation (Directive 2011/85/EU on requirements for budgetary frameworks of the Member States and related regulations). This seriously limits the possibilities to engage with and support EPC at political level. At the moment there is no satisfactory solution for this, but at EU level action is needed.

8.23.6 Policies and measures supporting ESCOs and EPC

Law No. 121/2014 on Energy Efficiency entered into force on 4 August 2014, transposing the Energy Efficiency Directive. The legislation provides for a set of measures to promote energy efficiency in Romania with a view to ensuring that the indicative national target of reducing energy consumption by 19% until 2020 is met. In particular EPC is defined by the Law in Chapter I, Art. 4, para. 12., which is a word by word translation of the EED definition. However, it has become clear that a proper definition of EPC is not enough to enable the access of ESCOs on the market. Other rules, such as the Fiscal Code, the Public Procurement Law do not reflect the admissibility of ESCOs in e.g. public tenders.

Furthermore, the provisions of the Law remain general and are not appropriate to address the main barriers to market development. To counteract the problem, a working group was established to prepare the amendment of the Law 121 in the near future, with various public bodies and ESCO representatives involved in the process (JRC 2016).

Romania received assistance from international financial institutions, such as EBRD, USAID, World Bank/GEF and UNDP/GEF in the form of financial incentives, loans, technical assistance and information dissemination, although the impact has been lower than expected. For example, the EBRD launched a pilot project in 2011, titled "Opening the market for ESCOs". Between 2011-13 a total value of €10 million was used to carry out tenders for 4 projects expected to be launched by Q1 2015. Later a follow up phase was carried out to support more municipalities to prepare and tender EPCs, based on the previous experiences. However, so far only two municipalities could launch tenders in 2015 and as of mid-2016, EBRD seems to decide to postpone the next activities, until the responsible authorities clarify the requirements. (JRC 2016).

Previously implemented ESCO projects were often supported by IFI or national grants. As these have largely dried up, the market is struggling to find its market based solutions. Nevertheless, financial or fiscal support mechanisms for ESCOs are planned as part of the building renovation strategy in order to encourage the energy services sector to participate in deep renovation activities. Furthermore, the NEEAP also mentions the creation of an open fund (based on public and private funding) for the ESCO market, with a size of €50 million per year until 2020 and €25 million per year until 2030.

Draft certification of ESCOs that carry out EPC was set up in 2015 following the provisions of Law no. 121/2014. The register of EPC providers is based on the European EPC Code of Conduct developed by the Transparens project¹²⁰, and as such, it is based on basic values and basic principles of EPC projects. There were 9 companies accepted as EPC providers in 2015. ESCOROM established a certification structure, which is used to credit their members, and this ESCO list is expected to be finally used by ANRE. ESCOROM has 7 active members (JRC 2016).

8.23.6.1 Information and awareness raising measures

The Regulatory Authority for Energy (ANRE) is the hub for governmental information dissemination, consumer motivation and stimulation, as well as education and training. It

¹²⁰ <http://www.transparens.eu/eu/epc-code-of-conduct/>

can reach out to final consumers. In order to promote energy performance contracting to municipalities, ANRE held working meetings with the EBRD advisory team and the European PPP Expertise Centre (EPEC) representatives. ANRE also held an online seminar (webinar) on energy performance contracting.

Furthermore, ANRE participated in European promotion projects, such as the European Energy Service Initiative - EESI project¹²¹. Within the EESI project, ANRE could organise events and trainings (with over 120 participants, including representatives of local and central authorities, companies engaged in the energy rehabilitation of public buildings through Energy Performance Contracting (EPC)). Documents were drawn up under the project, enabling local authorities to initiate investment projects based on the performance contracting-type financial mechanism, such as definitions, auditing procedure, model contracts, baseline, tender documents, financing systems, case studies, pilot projects implemented in Romania (Government of Romania, 2015).

With the establishment of ESCOROM, the supply side can establish a stronghold and improve communication and promotion activities. ANRE is open for cooperation and coordination with the association, and they work together to improve the legal framework, too.

8.23.7 Conclusions, projections and recommendations

In summary, the Romanian ESCO market is not yet developed. The market is based on several active ESCOs, which find and implement ESC projects constantly. They are active in the industrial segment, due to the barriers that impede project development in the municipal and the residential sector. In spite of the large efforts (legal, procedural, informational and financial), the EPC markets has not taken off.

The establishment of ESCOROM and the development of a certification system, induced by the suppliers in coordination with ANRE is an important step forward to overcome informational and trust-related barriers. In addition, the government seems to be clearly committed to supporting the market by legal means, by training and education, and also by financial measures to establish an ESCO grant.

In the recent past, the Romanian ESCO market has been fired by international programmes by EBRD, USAID, World Bank/GEF and UNDP/GEF who streamlined funds for the establishment of ESCO projects, as well as by European research projects to contribute to the promotion of energy services. Market actors are split on evaluating the successes related to these programmes.

In the future, development is dependent on the removal key blocks, such as the EUROSTAT understanding of debt, the procedural ambiguities for EPC, and the lack of trust. The construction sector recovery since 2014 is an indicator of this process (FRD, 2015)

While awareness is acceptable about the general features of ESCOs, more awareness campaigns regarding the EPC concept and its benefits are needed in Romania, targeting both public and private beneficiaries, as well as the supply side. In particular the public authorities do not have the resources to assess EPC project proposals, contracts etc., which could be aided by standard documents, specific guidance materials, standards, as well as by supporting a facilitation system.

8.23.8 Summary

Total ESCO market status (2015)	poorly developed
EPC market status (2016)	preliminary

¹²¹ <http://www.european-energy-service-initiative.net/>

Total ESCO market size	€3-5million (2015)
EPC-only market size (investment)	n/a
EPC market potential	€ 780 million/yr. - ESCO potential for both public + private sectors
EPC definition	in Law No. 121/2014 on Energy Efficiency (EED translation)
Established sub-sector(s)	<ul style="list-style-type: none"> • ESC: street lighting, industrial sites, processes • EPC pilots: public buildings (hospital, schools, etc.)
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • Introducing EPC concept in tertiary legislation • Establishment of registry, certification, model contracts • development of trust and confidence
Key barriers in the public segment	<ul style="list-style-type: none"> • EUROSTAT note • Difficulties in tendering and contracting (lack of expertise, unsuitable electronic system, complex procurement, etc.) • Data sharing.
Key driver(s) to date	<ul style="list-style-type: none"> • Adoption of key legal framework • IFI grants and technical support • awareness raising activities
Expected development/forecast	without removing key barriers, no development expected
Opportunities for further development	Several key changes, including the resolution of EUROSTAT definition, development of a showcase project to demonstrate the fully-performance linked project, and updating the tertiary legislation (norms, regulations, procedures, etc.) to follow through the first intents of the main legal framework.

8.24 Slovakia

8.24.1 ESCO market overview

The Slovakian energy services market is has gone through some ups and downs, but mostly comprised of the same number of ESCOs on the supply side. On the other hand, the EPC market has seen important growth in the recent few years, even if it is still relatively small in total size. Although, the ESCO market emerged already in the 1990s, it was later brought to a halt due to the poor performance of ESCOs and subsequent confidence drop (Marino, et al., 2010), and a revival started in 2003. As of 2013, the ESCO market was still low-moderate in development, and there were between 20 and 50suppliers able and interested to offer services based on ESCs and EPCs, with not more than 8 that actually had projects. The volume of ESCs has been slowly growing at a promising rate, and as of 2016, the number of EPCs is following through.

During the period 2014-16 key market conditions have changed. On one hand the regulatory framework for energy services (Act No 321/2014 Coll. on energy efficiency) has been adopted, bringing through a number of implementing measures, such as definition of EPC, licencing and quality assurance of companies that are allowed to offer EPC, regular training of EPC providers, as well as a number of informational measures (website by Slovak Innovation and Energy Agency, including standard documents and descriptions of procedures, etc.).

The Association of Energy Services Providers (APES-SK) was established in 2014. APES-SK is a private initiative of the ESCOs and EPC facilitators active on the Slovak market. The Association was initiated in the framework of the H2020 funded project Transparens.

8.24.2 Status with Energy Performing Contracting (EPC)

The application of EPCs has increased considerably during the period 2014-2016. Although Slovakia had implemented a limited number (about 25) of EPC projects by 2006 as part of a programme in the public building sector (Government of Slovakia, 2014), the EPC concept lost its popularity following some cases of underperformance, and EPC projects were not implemented in Slovakia until 2011 despite the fact that several training and educational activities had been conducted regularly since 1995 (Energy Centre Bratislava, 2011). Interest was regained when an 18 year-long EPC-based project (using the guaranteed savings model) for 74 secondary schools was initiated in 2012 in the Košice region by a large ESCOs (Bertoldi, et al., 2014).

As of 2016, there are 15-20 EPC providers, which is a significant growth compared to previous times. Of these, there were about 10 companies that had running projects during the period. There were around 40-50 projects running during the period 2014-2016, which is a growth compared to the past.

On the clients' side, the basic principles of ESCO projects and the benefits of energy efficiency investments are understood quite well, however there is a lack of knowledge about the details of contracts and their preparation, which forms a key barrier in trusting ESCO projects. The potential clients do not distinct among different types of ESCO services. A recent survey performed with industrial clients highlighted that only 20% of clients have a clear understanding of the EPC concept.

It is difficult to identify the most typical sector of EPC projects. Before 2015, EPC projects were focused almost exclusively on the public sector, and most of the projects were done in street lighting, others in public buildings, schools, educational sites. However, with the appearance (or even with the promise) of grant financing for reconstructions of street lighting systems in 2015, the development and realization of EPC projects in this sector were stopped, in order to move the potential and already prepared projects for participation in the grants scheme. Similar situation was seen in the case of public buildings – announcement of grant support within this segment significantly slowed down preparation of new projects.

As a result EPC providers shifted their focus to the private sector and several projects in industries and commercial buildings (including privately owned hospitals) have been implemented (or preparation started).

The size of projects varies between rather small (up to €200,000) and mid-sized (€500,000 - €1,000,000), with contract lengths of 10 years in public sector, 3 years in private sector (JRC 2016). The total size of the EPC market is €5 million per year¹²².

The most common combination of financing of EPC projects comprises of the own resources of the EPC provider and resources from financial institution (loan taken by the EPC provider). Occasionally, financing also involves the own resources of the client.

8.24.3 Status with Energy supply contracting (ESC)

ESCs have a more developed tradition in the Slovak market and have been on a rising trajectory. Typical ESC-based projects target heat management and supply, and provide energy services at a lower cost than the cost of the heat before the project (Lauko & Nicz (2013), Joint Research Centre (2012)). The private sector (industry) and the public sector are the main targets of these ESCO projects.

8.24.4 Demand side

8.24.4.1 Energy services in public sector

Public sector was the key client of both EPC and ESC projects during 2014-16 (JRC 2016). However, with the appearance of national grants, the attraction of EPC solution

¹²² based on the estimate of average annual investment volume of EPC projects between 2014-16

drastically dropped, as explained above. Already the availability of grants for this purpose demotivates potential clients from using commercial ways of financing, despite the low chance for obtaining the grant. This fact combined with quite generous funding for all types of measures crowds out the private investments into public infrastructure.

8.24.4.2 Energy services in other sectors

ESC is traditionally more common in the private sectors, mostly in industry and sometimes in commercial buildings. Although public sector projects were also known before. On the other hand, EPC projects were rare in the private sector, and a market growth happened, in the process of EPC providers searching for new niches, after the public clients were taken away by the announcement of public grants.

8.24.5 Remaining market potential and barriers

The energy consumption of the Slovak building sector accounts for almost 40% of the total final energy consumption in Slovakia. In particular, public buildings are responsible for about 12% of the total final energy consumption of the building sector. In financial terms, this puts a burden of €300 million per year on the public budgets (Energy Centre Bratislava, 2011). Previous analysis based on energy audits of selected public buildings show that the largest energy saving potential within the public building sector lies with health and educational buildings. Financial savings from energy consumption reduction through the implementation of EPC-based projects is of the order of 60 million per year with the need to invest about 200 million EUR. The current state of public finances cannot allow for the whole investment needs to be met through public funds.

There have been a number of very positive changes in Slovakia to remove previous barriers. Therefore, the remaining problems do not totally hinder implementation of EPC projects, but some bottlenecks slowing down the market development still prevail. These include:

- Low awareness about the benefits and limitations of the EPC concept among potential clients;
- Lack of experiences with EPC projects development on the side of clients combined with reluctance to engage an EPC facilitator for this purpose;
- Lack of specific banking products aiming at supporting the EPC / ESCO market;
- Lack of accounting rules aimed at favouring EPC contracts vs. other types (mainly related to indebtedness).

At the same time, the appearance of ESIFs in 2015 created a new market framework, where EPC is not attractive in the public segment. Already the availability of, or the promise of grants for renovation demotivates potential clients from using commercial ways of financing, despite the low chance for obtaining the grant. This fact combined with quite generous funding for all types of measures halted the implementation of EPC projects in street lighting and public buildings.

The obsolete technical state of public buildings means that there is a need for comprehensive refurbishment including construction measures. As a result, the standard EPC focusing mostly on building technologies represents only minor part of the solution and thus dissolves the financial benefits.

Finally, the public sector suffers from the rule to include EPC investments into public debt based on the EUROSTAT note. This is visible especially in case of preparation support schemes or financing instruments with high expected volume of investments.

8.24.6 Policies and measures supporting ESCOs

The policy changes in terms of EPOC support is exemplary in the period 2014-16 in Slovakia.

The Slovak NEEAP 2014 already laid out plans to publish a list of energy service providers to be maintained on the website of the Ministry of Economy (Government of Slovakia, 2014). It also specified that other information such as procedures in the provision of energy services, contracting procedures, model contracts etc., should be published (Government of Slovakia, 2014).

These changes were realised after the approval of the regulatory framework for energy services (Act No 321/2014 Coll. On energy efficiency). The key changes include the following:

- The creation of the Association of Energy Services Providers (APES-SK) – a private initiative of the ESCOs and EPC facilitators active on the Slovak market. The Association is active since 2014. Its members actively participated on the development of the regulatory framework for energy services. Furthermore, APES-SK prepares standard documents (contract + tender documentation) for EPC projects, communicates with relevant national authorities on elimination of existing barriers and promotes EPC utilisation.
- Adoption of the European Code of Conduct for EPC – prepared within the H2020 funded Transparence project. Approximately 80% of the stakeholders from the EPC supply side signed the Code of Conduct and are committed to deliver services in line with it. Implementation of the Code of Conduct started in 2015.
- Quality assurance of energy services providers – EPC projects may be provided only by holders of a licence on specialized skills for providing Guaranteed Energy Services or an energy auditor. Obtaining of the license is subject to passing an exam. All holders of the license are obliged to take courses every three years. This measure is in place since 2015.
- Awareness on energy services and energy efficiency –

8.24.6.1 Information and awareness raising

The Slovak Innovation and Energy Agency (SIEA) maintain dedicated web pages to provide information on topics related to EPC implementation (process of project development, standard documents, financial instruments, etc.). Implementation of this measure started in 2015, but it is not fully implemented yet. The Energy Centre Bratislava also provides initial consulting services to public administration entities as potential clients, and to ESCO companies to help initiate and prepare EPC projects.

8.24.7 Conclusions, projections and recommendations

The Slovakian ESCO market has overpassed a minimum developmental level, and can be considered as almost moderate. As part of it, the ECP market is generally in its early stage of development, with promising growth rate in recent years. It is expected that the overall ESCO market and also the EPC market will remain at least at the current level, while a growth is foreseen for the EPC sector for private clients. The key barriers have been largely removed, and the awareness has grown significantly, information measures are in place, as much as, licencing and registering ESCOs/EPC providers, many of which signed the Code of Conduct, and thus the general trust has increased.

However, the announcement of very generous financial grants suddenly halted the EPC projects in the public sector, because clients were eager to try to get hold of the subsidised opportunity as opposed to a market based solution. Even the promise and expectation of the grants can stop the whole market. This negative effect should be taken into account in order to implement renovations in a cost-effective way, and avoid financing project from public budgets that would take place even on a market basis.

The accounting rules, based on EUROSTAT note also cause a significant barrier to public sector projects, which is worsened with the overall liquidity of both the clients and the ESCOs in the lack of proper banking products. Overcoming these obstacles could help

tap into the significant energy savings potential of the public sector, which is estimated at volume of 5 PJ (or 60 Mio EUR) annually.

8.24.8 Summary

Total ESCO market status (2015)	low-moderate, 8 ESCOs with projects (of the about 20-50 potential ESCOs)
EPC market status (2016)	growing, 10 EPC providers (of the 15-20 potential ones), with around 40-50 projects during 2014-16
Total ESCO market size	€60million (public sector only, 2015)
EPC-only market size (investment)	€5 million/yr.
EPC market potential	€20 million
EPC definition	included in Act No 321/2014 Coll. on energy efficiency and amendment of other laws (paragraphs No 17 and 18)
Established sub-sector(s)	<ul style="list-style-type: none"> • street-lighting • public buildings • private buildings office buildings, shopping malls and private hospitals • industrial sites
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • low awareness on benefits and limitations of the EPC concept among potential clients • lack of experiences with EPC projects development on the side of clients combined with reluctance to engage an EPC facilitator for this purpose • lack of specific banking products available for EPC / ESCO projects • lack of accounting rules to resolve financial liquidity problems of the clients and of the ESCOs
Key barriers in the public segment	<ul style="list-style-type: none"> • competition by ESIF • obsolete technical state of public buildings – substantial part of the public buildings requires comprehensive refurbishment • inclusion of the EPC's into public debt (EUROSTAT accounting)
Key driver(s) to date	<ul style="list-style-type: none"> • Act No 321/2014 Coll. On energy efficiency, • registry (licencing and quality assurance) of providers • dissemination activities, including energy efficiency website, which makes available a number of EPC related information, such as standard documents (contract + tender documentation)
Expected development/forecast	EPC volume to remain at the current level (with a possibility of slight growth – mostly in private sector)
Opportunities for further development	The key barrier of competing ESIF should be resolved

8.25 Slovenia

8.25.1 ESCO market overview

The Slovenian ESCO market kicked-off in 2001 (Staničič, 2013), and was growing steadily, with EPC projects entering the market in 2007 (Staničič, 2013), however – as of 2015 – it is still poorly developed and has immense space for further growth (Ministry of Infrastructure of Slovenia, 2015). There are around 4-6 national ESCOs in Slovenia,

which is an expansion compared to the period until 2011-2013, in parallel to an increase in market activity. In spite of the growth, the size of the supply side of the ESCO market is below expectations and competition is not very vivid.

Recent legislative changes - mostly as a consequence of EU legislation - have contributed to the above described growth, as well as the removal of some barriers. The key driving factor is the established legal framework, definitions, registry, standard documents and guidelines, awareness raising activities, and the public sector tenders that are in the pipeline, topped with a large financing programme (JRC 2016).

The size of the Slovenian market was estimated in 2013 to be at €3 million/year (Staničič, 2013), as opposed to an estimate of €3-5million in 2016 only for the EPC market (JRC 2016).

An ESCO association has not been established yet.

8.25.2 Status with Energy Performing Contracting (EPC)

The National Energy Efficiency Action Plan of Slovenia (NEEAP) does not provide a list of either the energy service or the EPC providers (Ministry of Infrastructure of Slovenia, 2015), nevertheless, Staničič identified 3 EPC providers with long EPC track record (Staničič, 2013), which are still in operation as of 2015 (Staničič, 2015), and there is a new company with interest to enter the residential sector, however the results are not known yet (Staničič pers.com.). As of 2016, there is an EPC provider register, and it is concluded that there are between 4 and 6 EPC providers in the country.

The number of projects has risen sharply, from an average of two new projects per year to more than 15 in 2013 (Staničič, 2015), which continues in a similar way in 2016 (JRC 2016). This is also reflected in a change in the market structure. While the value of EPC projects represented around 10% of the total market activity before 2013, with the introduction of the energy efficiency obligation scheme (EEO), it has increased to 40% (Staničič, 2015). However, the scheme was changed (see below), (Staničič pers.com.), but the market operation was kept based on the improved regulatory and soft measures. The expected financing leverage is foreseen from the Operational Programmes that could continue the support for the EPC market.

The dominating EPC model is the guaranteed savings scheme.

8.25.3 Status with Energy supply contracting (ESC)

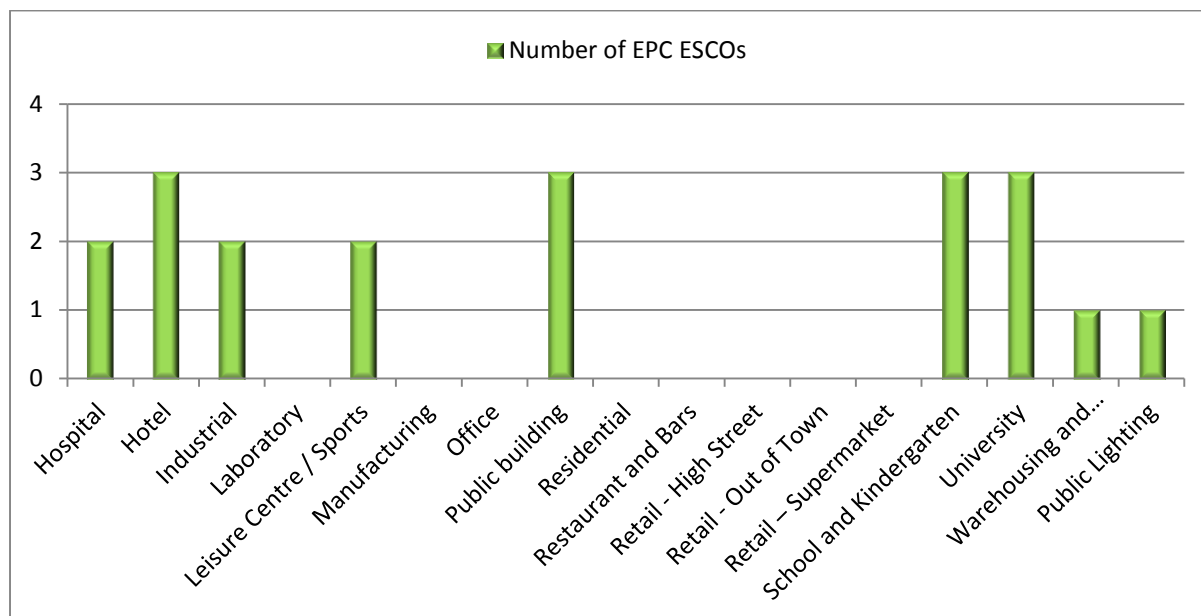
ESC has a longer tradition than EPC in the Slovenian market, dating back to 2001. In addition to the three EPC suppliers above, there are 4 purely ESC companies (Staničič, 2013). They have been dwelling lately on the feed-in tariff scheme, which was closed for the last two years with plans to be tendered again next year (Staničič pers.com.).

8.25.4 Demand side

8.25.4.1 Energy services in public sector

The first ESC projects took place in the public sector (in 2001) and the ESCO market is progressing in this area the most. The known EPC projects are distributed among sub-sectors as shown in Figure 28.

Figure 28 - Distribution of EPC projects.



Source: (Staničić, 2013)

The average duration of a project is 10-15 years, with moderate sizes of €200 000-€500 000.

The projects are financed from the EPC providers' own resources, which can be eased by the past and future national grants. The investments remain on-balance sheet (JRC 2016).

It is expected that further market growth will be seen and this will be mainly linked to the renovation of public buildings, where some of the tenders are already announced and projects are in the pipeline. The basis for intervention in public buildings lies with the fact that this sector experiences under-investment in particular in heating, lighting, ventilation and air-conditioning, leaving a niche for EPC projects. This is combined with the obligatory yearly renovation rate of governmental buildings, which translates to 1.8 million m² of useful area in the public sector to be refurbished by the end of 2023 (Staničić pers.com.). In order to achieve this target, EU funds will be allocated to leverage private funds and EPC (see more below).

Some local energy agencies act as EPC/ESCO facilitators and assist municipalities in preparing projects, conduct public procurement for EPC services and monitor EPC projects implementation and results. Furthermore, they disseminate information and develop documents.

8.25.4.2 Energy services in other sectors

The highest economical energy saving potential till the year 2020 exists within the residential sector (2 TWh) and industry (2.5 TWh), both with no or low level of implemented ESCO projects. While, the public sector is the main ESCO client there are some projects in the commercial sector related to – among others – lighting, SHP, and heat pumps in commercial sector.

According to the NEEAP, energy performance contracting will play a key role to fulfil public sector obligations (such as the obligatory buildings renovation rate), but in addition ESCOs will be supported to employ energy services projects occasionally in multi-apartment buildings and commerce (Ministry of Infrastructure of Slovenia, 2015).

8.25.5 Remaining market potential and barriers

The Slovenian ESCO market has been able to overcome a few critical barriers and to place EPC in the light of governmental policies, too. However, many problems still remain, and some of the barriers reduced only temporarily, and were not removed systematically, thus their reappearance is possible (Staničič, 2015), including the financial capacity of the market (in particular that of small ESCOs), and high transaction costs.

The most crucial barrier currently is related to high risk perception, according to the Transparens survey. Market actors fear the changing environment linked to legislative changes, lack of information, lack of trust, and complex accounting/booking rules (Staničič, 2015), as a result of which they tend to evaluate the risks to be higher than in general investment projects. Furthermore, while there is a relatively well functioning and supportive legislative framework, there are issues with interpretation, which leaves space for misunderstandings. This is somewhat mitigated by local energy agencies acting as EPC projects facilitators, but a more systematic resolution of this problem is needed.

EPC projects in the public sector are performed in the framework of the Public Private Partnership Act and in line with Public Procurement Act, both introducing additional complexity into an already complex EPC implementation process (baseline, auditing, tendering, guarantees, monitoring and verification of savings) and consequently increasing costs. (Staničič, 2015).

A big market push is expected as a result of the significant funds that will be available from the Operational Programme for the Implementation of the EU Cohesion Policy in the period 2014-2020 (OP ECP) for building renovation, opening a working field for ESCOs (Staničič pers.com.). However, these projects will face problem with the lack of in-house technical knowledge for designing and implementing energy efficiency investments and EPCs in public buildings.

Public authorities are also limited due to the existing indebtedness or caps on new public debt. The assets underlying an EPC contract to provide energy efficiency services on the basis of dedicated assets are often considered to be on the public sector balance sheet and not on the private sector balance sheet (Staničič, 2015). In effect, ESCO projects contribute to the public debt level, according to the interpretation of Eurostat, and therefore there is a limitation to the size of running projects.

After the financial crisis in Slovenia, local financing institutions remain very rigid about the potential risks of EPC projects. A lack of access to funds at LFIs and constantly increasing demand for EPC debt financing indicate a need for introduction of EPC dedicated credit line by a public entity (such as an Eco fund), in order to provide low-interest loans, even for smaller projects or pipeline of smaller projects aggregated by an EPC project facilitator, for example at regional level. The introduction of financial mechanisms (see below) from Structural Funds, will postpone this problem, nonetheless financial institution need to be more involved in third-party-financing for a long-term solution.

The supply side of the ESCO market is still very small, and this limits the size of the market. The economic and technical risk are still too high in relation to the determination, monitoring and verification of energy performance guarantees in public buildings for both the ESCO and public building owner, and this is a major barrier to the broader expansion of ESCO model uptake (Vajdić & Gluščević, 2015).

8.25.6 Policies and measures supporting ESCOs and EPC

The government of Slovenia gives due recognition of the contribution that the ESCO market could provide to the energy efficiency market and to complying with EU obligations. The measures introduced for ESCOs are complementary to other energy efficiency actions, and ESCOs are eligible to funds as other entities. Even though, it is

recognised that more could be done and some actions were missed from previous NEEAPs, energy performance contracting forms part of the NEEAP.

A list of ESCO/EPC relevant legislative measures was compiled by Staničić (2015):

- Energy Act (Energetski zakon /EZ-1/, Ur. l. RS, št.17/2014): This Act lays down the principles of energy policy, and describes the general rules and conditions for the key areas of energy management, including the role and conditions for renewable and energy efficiency. It transposes a number of EC Directives, including Directive 2012/27/EU.
- Public Private Partnership Act (Zakon o javno-zasebnem partnerstvu /ZJZP/, Ur. l. RS, št. 127/2006): main legal framework for the implementation of EPC in public sector
- Public Procurement Act (Zakon o javnem naročanju /ZJN-2/, Ur. l. RS, št. [12/13](#) – uradno prečiščeno besedilo, [19/14](#) in [90/14](#) – ZDU-1I)
- Guidelines for Implementation of Energy Efficiency Measures in Public Buildings through Energy Performance Contracting (Smernice za izvajanje ukrepov izboljšanja energetske učinkovitosti v stavbah javnega sektorja po principu energetskega pogodbeništva, Ministrstvo za infrastrukturo, december 2014, http://www.energetika-portal.si/fileadmin/dokumenti/podrocja/energetika/javne_stavbe/smernice_za_energetsko_pogodbenistvo-web.pdf)
- Decree on energy savings (Uredba o zagotavljanju prihrankov energije, Ur. l. RS, št. [96/14](#)): energy efficiency saving obligation scheme in line with EED Article 7
- Rules on methodology of energy savings calculation (Pravilnik o metodah za določanje prihrankov energije (Ur. l. RS, št. [67/15](#)))
- Decree on support to electricity produced from renewable energy sources (Uredba o podporah električni energiji, proizvedeni iz obnovljivih virov energije, Ur. l. RS, št. 37/2009, 53/2009, 68/2009, 76/2009, 17/2010, 94/2010, 43/2011, 105/2011, 43/2012, 90/2012, [17/14](#) – EZ-1): priority for feeding-in electricity from RES into the grid; guaranteed feed-in tariffs or premium over the period of 15 years, to be transferred into premium tender
- Decree on support to electricity produced in highly efficient combined heat and power (Uredba o podporah električni energiji, proizvedeni v soproizvodnji toplote in električne energije z visokim izkoristkom, Ur. l. RS, št. 37/2009, 53/2009, 68/2009, 76/2009, 17/2010, 81/2010, 17/14 – EZ-1): priority for feeding-in electricity from CHP into the grid; guaranteed feed-in tariffs or premium over the period of 10 years, to be transferred into premium tender
- Rules on efficient use of energy in buildings (Pravilnik o učinkoviti rabi energije v stavbah; Ur. l. št. RS, 93/2008, 47/2009, 52/2010, [17/14](#) – EZ-1): heating, ventilation, cooling, air-conditioning, preparation of hot water and lighting
- Technical Guideline Efficient Use of Energy (Tehnična smernica TSG-1-004:2010 Učinkovita raba energije): requirements for efficient use of energy in new and existing buildings going through major renovation, calculation methodology, http://www.arhiv.mop.gov.si/fileadmin/mop.gov.si/pageuploads/zakonodaja/prostor/graditev/TSG-01-004_2010.pdf
- Rules on feasibility study of alternative energy systems for energy supply in buildings (Pravilnik o metodologiji izdelave in vsebini študije izvedljivosti alternativnih sistemov za oskrbo stavb z energijo, Ur.l. RS, št. 35/2008, [17/14](#) – EZ-1): obligation to analyse possible use of RES, CHP, heat pumps and district heating for energy supply of new or refurbished buildings with a total useful floor area over 1000 m²

- Regulation of methodology and obligatory contents of local energy concepts at the municipality level (Pravilnik o metodologiji in obveznih vsebinah lokalnih energetskega konceptov; Ur. l. RS, št. 74/2009, 3/2011, [17/14](#) - EZ-1)

The key legislative pieces include the energy efficiency obligation scheme, the feed-in tariff scheme and the financial programmes.

In the Operational Programme for the Implementation of the EU Cohesion Policy in the period 2014-2020 (OP ECP), the Republic of Slovenia has adopted a decision, in line with the Energy Efficiency Directive, that by the end of the programming period, in the year 2023, 1.8 million m² of useful area in the public sector will undergo energy renovation. To fulfil the target set, yearly investment needs in the period 2016-2023 are at the level between EUR 51 million and EUR 53 million, resulting in the total investment of EUR 415 million in the period (Staničič pers.com.). The financing will support projects where ESCO funds and public funds can ensure that measures with long pay-back periods that are not interesting for ESCOs are involved in renovation projects, going forward to deeper renovations.

In the frame of OP ECP, under the priority investment named Sustainable Energy, it is planned to ensure exemplary role of public bodies' buildings and to accelerate take-off of the EPC as a key mechanism by provision of €115 million of grants, €50 million of EU funds in a guarantee scheme, and EUR 20.3 million out from the central government budget. In total, €185.3 million of financial support will be available for energy renovation in the public sector. (Staničič pers.com.).

The Long Term Strategy for Mobilising Investments in the Energy Renovation of the National Building Stock in Slovenia, adopted in October 2015¹²³, complements the above mentioned OP ECP and foresees the development of a comprehensive supportive environment for the ESCOs in Slovenia. A set of activities are planned, including projects implementation unit at the national level, with focus on energy efficiency projects in buildings owned and occupied by central government, demonstration projects, trainings and other activities (Staničič pers.com.).

The importance of the international standard ISO 50001:2011 – Energy Management System - Requirements with guidance for use (04/2012) for the quality implementation of EPC projects and faster development of the national EPC market is also high (Staničič, 2015).

8.25.6.1 Information and awareness raising measures

Information, training, and know-how transfer has been regular in Slovenia during 2014-16, and was often in the framework of EU IEE/HORIZON 2020 EPC projects (EESI2020, Transparence, EPC+, GarantEE, etc.) (JRC 2016).

The Ministry responsible for energy has prepared "Guidelines for Implementation of Energy Efficiency Measures in Public Buildings through Energy Performance Contracting" in order to assist in the correct interpretation of legislative background in the accounting of investments in energy performance contracting in line with the accounting standards; in regards to borrowing by municipalities, when the repayment of investments from savings made in energy costs; and also to help the interpretation of the Public Procurement Act and the Public-Private Partnership Act in relation to energy performance contract projects.

In the framework of the IEE EESI project (running between 2009 and 2012), a national set of standardised EPC legal documents, including manuals, guidelines and tendering documentation was prepared¹²⁴. Furthermore, the EPC registry is to be set up by the Ministry of Infrastructure.

¹²³ http://www.energetika-portal.si/fileadmin/dokumenti/publikacije/dseps/dseps_final_okt2015.pdf

¹²⁴ <http://www.european-energy-service-initiative.net/si/standardni-dokumenti.html>

Local energy agencies are also involved in supporting the Government or the relevant Ministries by developing background documents and for example the EPC program designed in the second NEEAP which had required for intensified comprehensive refurbishment of the public buildings using advanced forms of energy efficiency services, such as integrated EPC + ESC combining ESCO and public/EU funding (Staničić, 2015).

8.25.7 Conclusions, projections and recommendations

As described above, Slovenia has seen a steadily growing ESCO market, especially in the EPC sector. The major driver has been the established legal framework, clear legally binding renovations, standards, guidelines, etc. In addition, the new financial schemes are expected to contribute significantly to the use of EPC.

Furthermore, the Slovenian government takes the role of ESCOs into consideration in many ways. The ESCO sector is expected to grow further and contribute to the energy efficiency targets according to the NEEAP.

The Transparens project has collected the most crucial actions to be done in order to facilitate the ESCO sector to continue its stride. These are collected in Figure 29.

Figure 29 - Barriers and their possible resolution based and adapted from (Staničić, 2015)

Barrier to be overcome	Recommended actions
Legislative and administrative	<ul style="list-style-type: none"> Strengthen the role of EPC in the National Energy Efficiency and Renewable Energy Action Plans Prepare Deep Renovation Roadmap Confirm regulatory and legal framework for implementing EPC Procurement with new philosophy Adaptation of the housing law Economically feasible first and mandatory in procurement Implement obligatory energy management in public bodies buildings Implement obligatory energy audit in public bodies buildings
Information	<ul style="list-style-type: none"> Prepare and approve standardized EPC toolbox Use public buildings deep renovation EPC projects as pilots and best practice Support training in EPC
Financial	<ul style="list-style-type: none"> Reduce the cost of capital by reducing risks, or sharing risks through financial mechanisms, such as a guarantee fund, facilitation of pooling, etc. Establish an EPC-Fund and allow EPC projects to be financed from it Investment subsidies to be continued for buildings deep renovation projects
Development of the EPC market	<ul style="list-style-type: none"> Establish EPC Implementation Unit Support EPC Project Facilitators Introduce the EPC Code of Conduct

8.25.8 Summary

Total ESCO market status (2015)	poor, 6-8 ESCOs
EPC market status (2016)	steadily growing, 4-5 EPC providers
Total ESCO market size	€15 million (based on EEO scheme, 2013)
EPC-only market size (investment)	€3-5 million/yr. (average 2014-2015)
EPC market potential	€51-53million/yr. (estimated in 2016, but the ratio of EPC is probably overestimated)
EPC definition	included in the amended Energy Act EZ-1
Established sub-sector(s)	<ul style="list-style-type: none"> public buildings, schools, educational sites, sports facilities, street lighting, hotels
Key general barrier(s) to be removed	<ul style="list-style-type: none"> Low number of EPC Providers (small market) Low energy prices Lack of available information and expertise
Key barriers in the public segment	<ul style="list-style-type: none"> ESA 2010 definition of public debt related to EPC Lack of training expertise in house, but reluctance to use facilitators lack of trust and fear towards the actual applicability and effectiveness of the EPC mechanism
Key driver(s) to date	<ul style="list-style-type: none"> amended of the Energy Act EZ-1 EPC provider registry pressure from target renovation rates
Expected development/forecast	steady growth building on the renovation obligations by the central governmental owners.
Opportunities for further development	The financial basis from the dedicated streams of the Structural Funds are expected to boost the market, in line with the obligatory renovation rates of the central government

8.26 Spain

8.26.1 ESCO market overview

The Spanish energy services market has been long awaited to boom, based on the previously introduced, later stopped complex set of governmental support measures. While it is difficult to establish a precise turnover figure, ESCO activities have increased in both public administrations and new private sector business niches. These cover high energy performance equipment, new district heating infrastructures, use of biomass etc. According to the Spanish NEEAP, the sector may be worth almost €1 billion per year and the focus still remains mostly on the public sector as the traditional private sector is considered too mature for the application of energy services (Ministry of Industry, Energy and Tourism, 2014).

A nearly threefold growth in the number of registered ESCOs has been noted since 2011, where 968 companies were registered as energy service providers (IDAE, 2014). These companies are typically engineering, installation or assembly companies, some of which are associated with building heating system maintenance companies and subsidiaries of

building companies and electricity suppliers. According to data published by IDAE¹²⁵, 93% of these companies are SMEs, with fewer than 250 employees and annual revenue of less than €50 million, while the remaining 7% are represented by large enterprises.

The penetration of ESCOs in the market is mainly driven by the on-going promotion and support of ESCO businesses (Ministry of Industry, Energy and Tourism, 2014). The support measures include the creation of energy service companies representing the professional interests of their members and promotional material including dissemination of models of energy service agreements. The government's push for the ESCO market stimulation is most likely to be a result of the sharp decline in the national construction market due to the on-going financial crisis which pushed construction and maintenance companies towards diversification of their activities and engagement in ESCO services for renovation projects (Bobbino, Galván, & González-Eguino, 2013). The most common types of ESCO projects in Spain include public lighting, public buildings (municipal offices and health care facilities) and water supply renovations. ESCO projects in the private sector have been carried out in hotels, corporate buildings, sports facilities, heating systems in apartment buildings, and big industries (Bertoldi et al., 2014).

8.26.2 Status with Energy Performing Contracting (EPC)

No precise information was found about the extent to which EPC is used in Spain. It is generally known that EPC-based projects are mainly used in the private sector and that the shared savings model is preferred to the guaranteed savings one (IDAE 2011; EC JRC 2012). In recent years, more ESCO projects offer EPCs based on the shared guarantees model in most of the new public contracts with the local authorities.

8.26.3 Status with Energy supply contracting (ESC)

Most ESC-based projects are realised in the public sector. Various agreement models have been developed which are compatible with the two types of procurement allowed for this activity under the Public Sector Contract Law: namely the combined supply and services agreement and the public-private collaboration agreement (Ministry of Industry, Energy and Tourism, 2014). Until recently, chauffage-type projects were common, but due to the current legal framework, this trend has changed (Bertoldi et. al, 2014).

8.26.4 Demand side

8.26.4.1 Energy services in public sector

In Spain, the measures to stimulate the energy services market imposed by Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 were primarily aimed at the public sector, serving their call to demonstrate an exemplary role in the application of energy efficiency measures and procurement of energy services. With the approval of the Energy efficiency incentive plan in buildings of the general state administration (AGE) in 2009, 330 energy consumer centres were targeted through the implementation of energy saving and efficiency measures by energy service companies. To promote the activity of energy service providers among public administrations, the government extended the approved plan for 330 energy consumer centres in the AGE to all other regional public administrations with approval of the Energy Service Procurement Incentive Plan, known as Plan 2000 ESE, targeting 2 000 energy consumer centres: 1 000 pertaining to the autonomous and local administration and a further 1 000 to the general state administration. Potential targets under this plan included buildings with a surface area exceeding 30 000 m² and energy and maintenance expenses in excess of € 400 000/year.

In the area of public procurement, ESCOs are heavily involved in the management of municipal lighting systems, with the preferred approach largely being to entrust full management to the ESCO, which not only handles the operation and maintenance of the

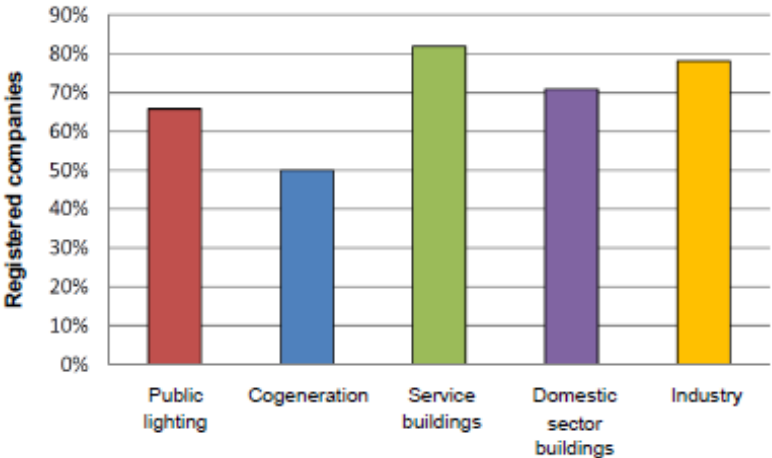
¹²⁵ IDAE is Spain's national energy agency

installations but also supplies their electricity. This activity, in council outdoor lighting systems, is rapidly driving the growth of ESCO activity in Spain, and is backed by the publication of the Regulation on Energy Efficiency in Outdoor Lighting Installations (REEIAE) (RD 1890/2008) and by the influx of LED technology as a new lighting source.

8.26.4.2 Energy services in other sectors

ESCO activity in the private sector is growing especially in the residential, hotel, commercial and office building sectors. The severe energy cost increase (electricity, natural gas and diesel) experienced in Spain during the last several years is fuelling more and more interest from private customers. In the private sector, the EPC contract model is preferred over other alternatives.

Figure 30 - Activities declared by registered ESCOs



Source: IDAE

8.26.5 Remaining market potential and barriers

The ESCO model could act as an important vehicle to reduce Spain’s high dependence on oil and natural gas imports.

Although the ESCO model has the potential of unlocking Spain's considerable energy saving potential, various hurdles impede the market growth. These include legislative barriers due to the general inability to comply with EU and Spanish legislation. Bobbino, Galván, & González-Eguino (2013) have identified the following barriers for the Spanish context:

Administrative: Overall, local governments in Spain are composed of inefficient decision-making structures that are extremely difficult to change; the public procurement process is lengthy and inefficient and; administrative accounting systems are not set up to efficiently realize energy cost savings.

Technical: There are no standard and enforced M&V protocols and; there lacks a neutral third-party institution that certifies the accountability of a particular ESCO.

Financial: There are no suitable financing schemes for the development of ESCOs and ESCO projects. Before the economic crisis, most ESCOs dealt with commercial banks for financing. However, now this source of financing has virtually disappeared. Currently, many ESCOs are financing projects with their own money which is unsustainable. High transaction costs decrease interest for both the client and the ESCO. ESCOs cannot justify the administrative costs to carry out small projects.

Informational: Citizens have limited awareness of energy efficient technologies; high perceived technical and financial risk and aversion to long payback periods. Split

incentives: a renter pays the energy bill while the owner is responsible for any renovations. Thus, the owner has no incentive to invest in an ECE installation since the savings are captured by the renter. Likewise, the renter is not sure if she will live in the property long enough to recuperate the ECE investment.

Market-related: Each autonomous community has their own legislation and hierarchy related to energy generation and conservation. This represents an obstacle for ESCOs to expand into several regions and therefore reach a critical mass.

8.26.6 Policies and measures supporting ESCOs and EPC

The primary legislation addressing energy service market matters in Spain was the "Sustainable Economy Law", Royal Decree Law 6/2010, which included a section dedicated to the promotion of the ESCO market, which outlined measures consistent with the ESD (Bobbino, Galván, & González-Eguino, 2013). With the approval of the 2008–2012 Energy Saving and Efficiency Action Plan, governmental support measures to energy efficiency have included energy service companies as potential beneficiaries, with the aim of encouraging this type of procurement.

Information and awareness raising measures

In Spain only few information, dissemination and education measures focused on the market of energy efficiency services at governmental level, while measures about EPCs are hardly ever done (ESCAN, 2013).

IDAE has promoted working groups within various associations of energy service companies in order to analyse and discuss the implementation of ESCO activities on the market and mechanisms for penetration. Conferences and seminars have been held to promote energy service companies, along with a training plan offering courses through the School of Industrial Organisation (EOI). A dedicated section on its website provides basic information on energy services, including a database of energy service companies which contains their contact information, services provided and geographic coverage area.

As a result of on-going work since 2007, various agreement models have been developed which are compatible with the two types of procurement allowed for this activity under the Public Sector Contract Law, namely the combined supply and services agreement and the public-private collaboration agreement. The purpose of these models is to serve as a reference point in negotiations between parties and to reflect the scope of the service and the commitments, rights and obligations assumed so that, from the moment they are created, these long-term agreements will cater for any unforeseen circumstances and contingencies. In both cases, the agreement term is to be agreed for a specified period based on the time needed to amortise the investments made by the energy service company or the lines of financing provided, and the payment of services rendered is based (wholly or in part) on the energy savings obtained through the improvement in the building's energy efficiency. Procurement models are available to the public on the IDAE website

8.26.7 Conclusions, projections and recommendations

The energy services market in Spain is relatively small. Enhanced ESCO activities have been noted in recent years and the number of registered companies in the ESCO list kept by IDAE has risen significantly. However, several barriers need to be overcome to ensure further penetration of ESCOs in the market and realisation of EPC activities on the market. Bobbino, Galván, & González-Eguino (2013) have noted the need for an ESCO certification scheme due to the discrepancy between the number of ESCO companies estimated by IDEA (968) and the European Institute for Environment and Sustainability (around 15). The Transparence project stresses the need to overcome main legislative and administrative barriers as well as to set a governmental strategy oriented towards energy efficiency services and raise awareness of EPCs (ESCAN, 2013).

8.26.8 Summary

Total ESCO market status (2015)	Still small, although 968 companies were registered as energy service providers in 2015, but only a very small fraction actually work as an ESCO. Nevertheless, this is also a growth in real terms.
EPC market status (2016)	No reliable information, but the ratio of EPC offers is growing. It is estimated that 20-30 companies can offer EPC
Total ESCO market size	n/a
EPC-only market size (investment)	n/a
EPC market potential	n/a
EPC definition	yes
Established sub-sector(s)	<ul style="list-style-type: none"> • Public lighting primarily • Public buildings, public hospitals, schools/educational buildings, industrial sites, commercial buildings, shopping malls
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • Lack of trust • Lack of information • Financing
Key barriers in the public segment	<ul style="list-style-type: none"> • Financial constraints, coupled by problems with creditworthiness and accounting-related restrictions • ESA 2010 related restrictions
Key driver(s) to date	<ul style="list-style-type: none"> • Strong set of measures for energy efficiency, providing a solid basis for EPC • EU projects • Definition of Standard Agreements by the Spanish Government
Expected development/forecast	Growth is expected, dependent on the changes of legal pressures
Opportunities for further development	It is expected that government support (legal and financial) are initiated in order to impulse the market.

8.27 Sweden

8.27.1 ESCO market overview

The energy services market in Sweden can be described as moderately sized or even preliminary in terms of energy performance contracting, dropping from a rather well developed status. Around 2000 there was practically no ESCO activity in Sweden after two upsurges in the 1980s and the early 1990s that proved to be unsuccessful in establishing the ESCO concept on the long run. Lack of trust¹²⁶ set back the entrance of ESCOs into the energy efficiency market even in times when energy services thrived in some other European countries.

Market boom around 2004-2005 was due to a complex package of success factors including successful promotion, channelled policy strategy, and increasing public concern for climate change ((Forsberg, Lopes, and Öfverholm 2007; Gottberg, Axelsson, and

¹²⁶ Problems originated from the difficulties related to proving the success (or failure) of ESCO projects, because data collection was difficult then. It was much harder to establish baselines and to follow savings related to the services than in 2005-2006 (Forsberg, Lopes, and Öfverholm 2007).

Gode 2009; Bertoldi, Boza-Kiss, and Rezessy 2007), and driven primarily by a strong demand from the public sector (Wargert 2011). The demand boom was paralleled with the development of information and communication technology (Stenqvist and Nilsson 2009a). In contrast, while energy supply contracting and chauffage (or “comfort contracting”) are in a development phase, the volume of implemented projects based on these two types of contracts has recently grown.

A total of 27 energy service providers operated in Sweden in 2009, including some large international ESCOs with operations in several countries (Stenqvist & Nilsson, 2009). Around 6 EPC providers were active in 2013 (Gode (2013), Bertoldi, et al. (2014)). In addition, 3-4 suppliers of heat and/or electricity are specialised in chauffage-type contracts (or “comfort contracts”) and several others offer ESCs (Wargert, 2011). As of 2016, only 3 EPC providers are active, with 2-3 more ready for EPC projects.

There is no registered ESCO association in Sweden. However, as the association “EnergiEffektiviseringsFöretagen”¹²⁷ includes many ESCOs in its member list, the ESCO interests on the Swedish market are largely covered by this association.

8.27.2 Status with Energy Performing Contracting (EPC)

The EPC market has grown in the early 2000s as a result of the supportive political framework, climate change focus, increased energy prices and supportive programmes for financing EE such as the OFFROT programme (2005 to early 2009) and KLIMP programme (2003-2008). The EPC market matured in the period 2006-2011 and EPCs became one of the most well-known concepts for the implementation of energy efficiency services in Sweden (Wargert (2011), Gode (2013)). In the past few years, the market has been fluctuating, and lately decreasing steadily (Gode, 2013, JRC 2016).

EPCs have been transformed from a technology-focused solution to a cost-based model. The number of newly implemented EPC projects has been around 5-8 during the period 2014-2016, whereas the total number of concluded EPCs was around 100 in the early 2000s (Swedish authorities, 2014). There is no standard contract model for EPCs in Sweden and each ESCO offers a slightly varied type of contract (Gode, 2013). The number of projects has been decreasing for some years, and there have been a few projects that had to be terminated before completion, and these raise bad reputation for the sector.

The majority of EPCs on the Swedish market are mostly covered by three out of the 5-6 ESCOs implementing EPCs. The main client for EPCs is the public sector including administrative office buildings, schools, hospitals and healthcare centres. Only two ESCOs provide services in the industrial sector. EPCs last on average between 5-10 years and yield energy savings of around 16-30%. The value of the undertaken EPCs is estimated to be around EUR 1-5 million per contract (Gode, 2013, JRC 2016). The most used model is a combination of guaranteed savings and the two-step model. The latter assumes a smaller risk for the ESCOs compared to one-step model (Wargert, 2011). Most implemented measures through EPCs are building energy management systems, improvement of heating, ventilation and air conditioning systems and lighting controls. Up until 2011, some 16 million m² of building surface were subject to EPCs, with the public-sector buildings being the main target group (Swedish authorities, 2014).

EPCs in Sweden often do not include the supply side, because of the well-built district heating systems countrywide and do not cover improvements of heat or electricity generation and distribution. Clients are responsible for operation and maintenance of energy production plants. Exemptions are the EPCs that include replacement of heat boilers fired by fossil fuels with more environmental friendly technologies. This trend shall continue with installation of renewable energy plants as wind and solar parks and ESCOs will therefore have opportunities to devote business models which incorporate supply side (Wargert, 2011).

¹²⁷ <http://www.eef.se/>

8.27.3 Status with Energy supply contracting (ESC)

ESCs are not considered a common concept for the implementation of energy services in Sweden. The need for ESCs is much lower than in other countries due to the advanced Swedish district heating systems. The term used for ESCs in Sweden is "farding varme" ("useful heat"). ESCOs started to offer their services based on the ESC concept in industrial enterprises. For example, one ESCO installed heat boilers in industrial companies (sawmills) and took the responsibility of running and operation. ESCOs have also started to implement ESCs in the residential sector. In addition some ESCOs implement electricity-based ESC for so called "useful electricity" or "useful lighting". ESCOs install, operate and maintain electricity installations for periods of around 5-10 years (Wargert, 2011).

Common ESC projects offered by ESCOs typically target service and maintenance of equipment in industrial enterprises. These contracts do not usually cover planning, installation and operation of equipment. However, ESCOs could include maintenance and service in their ESC-based projects as they can benefit from potential energy savings (Wargert, 2011).

District heating companies (private or public) have a monopoly in the district heating services, leading to higher prices for heating in some areas. This can be another opportunity for ESCOs to tap into as ESCOs can offer lower prices for the customers in these areas. In fact, some ESCOs have already begun offering services based on lower prices than the prices offered by utility companies. In addition, there are opportunities to implement ESCs in areas where buildings are not connected to district heating networks, or in areas with new constructed buildings. For these cases, ESCOs can provide more environmentally friendly solutions by replacing existing boilers fired with fossil fuels, installing efficient heat pumps etc. In residential areas which mostly rely on electricity, biomass and oil boilers for heating due to the lack district heating networks, ESCOs can also offer small ESCs for building local district heating systems.

The chauffage model was introduced in Sweden by Goteborg Energi (utility company of the municipality of Goteborg) in the 1990s and is now a growing business model. The business model of Goteborg Energi¹²⁸ has been accepted by other municipal energy companies. In 2011, there were 3 energy companies offering their energy services which were not solely based on the chauffage model but also had district heating and electricity production as a core business activity (Wargert, 2011). The municipalities have to pay market price (not subsidised) to municipal energy companies for heat and electricity, as a result of current municipal regulation. Interest for implementation of chauffage-based models is expressed by many municipal utility companies since they put greater attention on energy services than large energy companies. Many clients of companies offering chauffage contracts can also stem from the commercial sector.

The interest for chauffage contracts has risen in recent years and became a more popular model than EPC due to a number of reasons. One reason is that the chauffage contracts are less complex, easier to understand and are associated with fewer commitments on both the ESCO and client sides. In addition, chauffage contracts can be relatively short consisting only of a few pages as opposed to long EPCs which can be more than 30-40 pages long. The contract period is also more flexible compared to EPCs and can be as short as a couple of years or more. For energy companies, this business is preferred since they can conclude contracts with fixed prices for energy usage for longer periods, e.g. due to the fact that energy demand growth and increasing production costs in colder than normal winter periods can be levelled by other business activities. A significant advantage of energy companies offering chauffage compared to pure ESCOs is arguably that the former have already on-going business relations with consumers sometimes with already-implemented projects in customer facilities (Wargert, 2011).

¹²⁸ Goteborg Energi had 70 employees in energy service sector and turnover of EUR 20 million in 2010 (Wargert, 2011).

8.27.4 Demand side

8.27.4.1 Energy services in public sector

The volume of energy services in the public sector has been more than trebled over the period 2006-2011. In this period energy services with an amount of SEK 410 million per year have been undertaken (Swedish authorities, 2014).

As previously explained, most EE projects based on EPCs, ESCs or “comfort contracts” in Sweden are carried out in the public building sector, especially in buildings owned by municipalities. Municipalities in Sweden have good credit worthiness and therefore can finance EE projects by themselves. Since municipalities can receive loans with lower interest rates, there is no need for energy service providers (ESCOs or energy supplier companies) to secure funding (Wargert, 2011).

EPCs are procured according to the Public Procurement Law. Public procurement rules has been considered as complex and detailed. In the past, these rules created various difficulties with the implementation of energy contracts. For example, an EPC project with the Municipality of Stockholm was cancelled in 2009 due to the fact that some legal experts claimed that the public procurement procedure for EPCs was not in line with the Public Procurement Law (Wargert (2011), Gode (2013)). For this reason, the Swedish Energy Agency prepared procurement models including procurement guidelines for EPCs issued by the Swedish Environmental Management Council in 2009. However, these models and guidelines are not widely used in Sweden (Bertoldi, et al., 2014).

One of EPC characteristics specific to the public sector is that it often does not include service and equipment maintenance operations in their contracts as larger public institutions have their own service and maintenance units or contracts with companies that provide this kind of services. Including service and maintenance in EPCs can, however, create higher energy savings for ESCOs and the clients due to better optimisation of these activities. Nevertheless, ESCOs can be involved in educational and monitoring activities for the organisation of service and maintenance but only few ESCOs have capacities to provide this type of service to clients (Wargert, 2011).

8.27.4.2 Energy services in other sectors

A few EPC-based projects have been realized in the hotel and hospitality sector. In the commercial sector, some projects using different energy service providers (ESCOs and energy supply companies) have also been undertaken. The number of realized EE projects based on energy contracting is also small compared to its market potential in the industrial sector. These projects have been implemented in less energy intensity industry and SMEs and have been financed mostly by customers. It is estimated that industrial projects constitute about 10% of the total energy service market (Stenqvist & Nilsson, 2009).

The Swedish residential sector is not well covered by energy services. Single family houses are not included in any projects carried out by energy service providers. A few projects are implemented in private multi-apartment buildings and residential buildings owned by municipal companies (Stenqvist & Nilsson, 2009). As in the case of industry, energy service projects in the residential sector have been financed mostly by customers, but in some cases also through ESCOs. A reason behind the low ESCO activity in the residential sector could be the long-standing Swedish energy taxes which can offer an important financial incentive for households, among others, to use energy efficiently. It should be noted that Sweden also applies a tax incentive for fulfilling the requirements laid down in Article 12(1) of the EED.

8.27.5 Remaining market potential and barriers

The investment potential of the energy services market in Sweden has been estimated at €300 million per year with payback period of 5 years, taking into account construction

costs excluding energy supply costs (Bertoldi, et al., 2014). In terms of the energy saving potential (only from implementation of EPCs), the calculations indicate a potential in the range of 4-1 TWh for the year 2016 (Wargert, 2011). The energy savings potential in the residential (household) and service sectors has been estimated at 22.8 TWh or 45% of the total expected annual energy savings to 2016, according to the Swedish NEEAP 2014 (Swedish authorities, 2014).

Opportunities for energy services in the building sector are vast. Three-quarters of the heated area of the Swedish building stock¹²⁹ is more than 30 years old. Multi apartment buildings built in 1941-1970 represent nearly 50% of the heated area of the total stock of multi apartment buildings and 15% of the total building stock in Sweden. The detached and semi-detached houses constructed before 1940 have the highest energy consumption (around 140 kWh/m²) which is almost at the same levels as multi-apartment buildings constructed before 1940 as well as in the period 1941-1980. It is also interesting to note that 20% of buildings for commercial premises constructed in 1961-1970 consume 230 kWh/m² or more for heating (Swedish authorities, 2014). With a long-term perspective that assumes a series of measures are taken to facilitate market growth, it is estimated that 17% of multi-dwelling residential buildings and 42% of non-residential buildings could implement energy service projects between 2020 and 2050. This would generate annual energy savings of 3.6TWh. The corresponding total annual project value is about € 260 million (Stenqvist & Nilsson, 2009).

In terms of the public sector, the average annual energy performance of buildings owned by state authorities has been estimated at 172 kWh/m² which is 60% higher than the average energy performance had they met the requirements for new buildings. This means that, by the end of 2020, the National Property Board of Sweden and the Swedish Fortifications Agency must implement measures that reduce the buildings' energy consumption by at least 21 GWh (Swedish authorities, 2014). Energy services could play a key role in achieving this potential. Significant potential for energy services also lies in the district heating sector, which is responsible for the most common type of energy used in multi apartment buildings, covering 90 % of their heating requirement. In addition, nearly 80 % of commercial premises are connected to district heating network (Swedish authorities, 2014).

Finally, oil boilers will need to be replaced within the next few years as a phase-out target for fossil fuels in the building sector by 2020 exists. This could very well be an area where ESCs can play an important role. In 2011 there were about 10 000 oil boilers still in operation in Sweden in the sizes of 60-500kW. Even though the vast majority of oil boilers have already been converted in Sweden, this number can still be considered as very high (Wargert, 2011).

The past boom of EPC projects has turned into a hindrance in Sweden. Potential customers in the public sector have become sceptical against long term agreements and lock in effects with external suppliers. Some EPC projects have caused both organisational and technical problems within municipal/public sector and were followed by bad publicity, which gives reasons to doubt on such contractual arrangements.

At the same time, the public sector have become more confident that they can be in control of energy auditing and implementing energy efficiency measures by hiring staff or contractor for specific tasks.

At the same time, no legislative barriers exist regarding the implementation of energy services. Public procurement procedures were noted among the barriers for development of energy services in several studies (particularly for EPCs) as they became too complicated and detailed (Wargert (2011), Gode (2013)). However, these have been overcome lately. Lack of standardized contract models for EPCs and standardized procurement procedures sometimes result to higher transaction costs. On the other

¹²⁹ Residential, commercial and buildings with special purposes

hand, absence of standardized procedures may lead to more flexible and tailor-made models, which can be an advantage in some cases.

Market growth problems amongst the municipality-owned energy companies include the unclarified issue of whether they are allowed to offer energy services outside their municipality origin. Even though there is a customer demand to use "chauffage" services in various regions, this issue poses a restriction. While a few companies have been allowed to offer their services in whole territory of Sweden in the past few years, this barrier led to a very regional availability of the service (Wargert (2011), Bertoldi, et al. (2014)).

In addition, the shortage of qualified personnel is another barrier for the development of energy service market. The need for training and additional education of energy experts will be reinforced with the introduction of new ESCO players on the market.

Split incentives are another significant barrier in Sweden (especially with regards to "chauffage" contract models). This is very common in the Swedish commercial and private residential sectors, whereby landlords cannot include the costs for EPCs in their tenants' rent in cases where the heating costs are not included in the rent structure. Moreover, they cannot increase the rent to compensate for EE investments carried out through EPCs (Wargert, 2011). The relatively short ownership lengths also pose a problem as many property owners are very reluctant to undertake long-term investments in their buildings. This is a big problem in many aspects, not least to energy contracts such as chauffage (Wargert, 2011).

8.27.6 Policies and measures supporting ESCOs and EPC

The current portfolio of instruments for energy efficiency is very broad and includes general economic instruments, such as energy and carbon dioxide taxes and emissions trading, as well as more targeted administrative instruments such as a requirement to hold a licence for carrying out environmentally hazardous activities and an energy performance and energy labelling requirement for energy-related products and buildings (Swedish authorities, 2014).

On the other hand, specific policies targeting ESCOs are not in place and were not announced in the Swedish NEEAP 2014. EPC is not defined in legal documents. The NEEAP mentions energy services and provides an assessment, but definition of the concept is not available. The Law transposing EED also mentions "energy services" in many instances and only in general terms. In some cases "energy service agreements" are mentioned, but they are not defined, even if this is probably equivalent to EPC and similar agreements. According to the Swedish Energy Agency's statement/definition in an energy service market survey report (from 2013), "EPC is a business model that involves an energy service provider that assumes responsibility to improve energy efficiency of a real estate's, industry's, or premises' energy use, and guarantees energy savings to the customer¹³⁰". Notably the definition does not imply success dependent remuneration.

The Swedish ESCO assessment revealed that no consumer legislation measures are necessary in the field of contract law with regards to issues rising from disputes and that independent intermediaries already have great opportunities for promoting development of the market for energy services. In addition, while the barrier with regards to rules for procurement procedures and legislation has been pointed out by some enterprises in the field, it has been decided that no any additional measures are regarded as justified at this stage (Swedish authorities, 2014).

The lack of model contracts and awareness raising about risk sharing could be helpful. Furthermore, a system of allowing flexibility in contract development could potentially overcome the earlier experienced disagreements.

¹³⁰ translation kindly provided by a survey respondent

8.27.6.1 Information and awareness raising measures

The Swedish Energy Agency is currently working to promote the creation of a trade organisation for the energy-services sector. One of the duties of the newly established organisation will be to ensure that lists of all energy-service areas are compiled and published in order to fulfil the requirements of the EED Article 18(1)(c). The Swedish Energy Agency has developed a model for categorising energy services, and plans to publish an annual report describing trends in the energy services market (Swedish authorities, 2014). It also acts as a point of contact for end-users and relevant information is made available on its website.

Municipal climate and energy advice fulfils the provisions of Articles 12(1) and 17(4) on promoting energy efficiency among small energy consumers, including household customers. The Swedish Energy Agency is also working to disseminate information and raise awareness. The Swedish Government has decided to continue funding energy and climate advisers until 2017.

In addition, there are various kinds of conferences and meetings that are organised on the initiative of public-sector players, where stakeholders, including market players, are given an opportunity to provide information. Information about energy efficiency measures is also available from relevant players including the Swedish Energy Agency website, various networks of market players (BELOK, BEBO, BELIVS, HYLOK, ENIG, etc.), public sector players (the Sustainable Municipalities project, energy-efficient authorities, etc.) and municipal energy and climate advisers.

Conclusions, projections and recommendations

The energy services market in Sweden was regarded as a well-developed market in the past, which has lost momentum in recent years, and a new shift towards ESC activities. Growth of energy prices and readiness of Swedish government to reduce CO2 emissions through usage of more environmental friendly technologies and renewables, shall lead to further market expansion. ESCOs will have the leading role in the implementation of EPCs in all sectors including the public, residential and industrial sectors. For the public sector, implementation of standard contract models for EPC and ESC and procurement procedures should result to improvements in the market. In this context, the example of Germany can be used, where these kinds of contracts and procedures have been implemented for many years. A very important factor will be the creation of state programmes for EE and RE for the residential and industrial sectors, with a focus on the use of energy service providers.

The other types of contracts for energy services such as ESC and comfort-(chauffage) contract shall be better promoted especially in the residential and industrial sector in order to increase their share on the energy service market. The potential for both types of contracts lies in the heating sector, which has a significant potential in Sweden. ESCOs can apply more ESC projects in the industrial sector focusing on energy intensive industries as well as residential buildings located in areas not covered by district heating, while energy supply companies (private or owned by municipalities) can increase the volume of investments in EE in residential sector. However, in order to increase the number or projects in residential buildings, it is necessary to solve the problem with split incentives in the rental apartments so that owners of apartments are motivated and incentivised to invest in EE measures.

8.27.7 Summary

Total ESCO market status (2015)	preliminary to moderate, overall decrease, but slight increase in ESC projects
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EPC market status (2016)	: moderate, but decreasing, with around 4-5 EPC providers and only 5-8 projects in 2014-16
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Total ESCO market size	€60-80 million (in 2012)
EPC-only market size (investment)	n/a
EPC market potential	€100-400 million estimated in 2016, of which €6million realistic
EPC definition	not included in legal documents. The definition provided by the Swedish Energy Agency in 2013 does not fully correspond with the EU definition
Established sub-sector(s)	<ul style="list-style-type: none"> public buildings, schools, educational sites, sports facilities, street lighting, hotels
Key general barrier(s) to be removed	<ul style="list-style-type: none"> Lack of confidence in the concept and providers split incentives
Key barriers in the public segment	<ul style="list-style-type: none"> public sector demand complex supportive legal framework receptive client segments
Key driver(s) to date	<ul style="list-style-type: none">
Expected development/forecast	momentum lost and carried on in the EPC segment, while some growth in the ESC part
Opportunities for further development	Reestablishment of trust, further awareness raising and simpler and more flexible contracts can promote the market. Simplification and flexible EPC contracts could be useful to retain new interest.

8.28 United Kingdom

8.28.1 ESCO market overview

The UK energy services market is a growing and competitive market, largely due to the government's commitment to support its on-going development as part of the implementation of the UK Energy Efficiency Strategy. Its large experience in project financing and more innovative spirit of enterprises has also led to a flourishing ESCO industry. Financial facilities and programmes such as Salix and public programmes, such as RE:FIT and CEF in the public sector have contributed towards the positive environment within the market.

There are more than 50 active ESCOs on market in the UK (JRC 2016). The major players are subsidiaries of large international control equipment companies, oil companies, and electricity utilities. The emergence of SMEs into the energy services market has also been noted by the government (Department of Energy & Climate Change, 2014). Many small companies offering more than one service (e.g. consulting plus finance) consider themselves to be ESCOs. Around 22-25 companies are EPC providers.

ESCOs with significant capital (such as oil companies or utility-owned ESCOs) may use their own finance, but most major ESCOs use external third party financing provided by banks. Undisclosed TPF is a popular financing technique used by major ESCOs.

ESCOs are projected to realize significant revenue growth in the United Kingdom. A supportive regulatory environment and policy priorities are helping to generate growing demand for performance contracts. (Talon and Gartner 2015)

8.28.2 Status with Energy Performing Contracting (EPC)

The use of EPCs is at a rising trend in the UK with a number of successful completed EE projects in public sector organisations and more projects planned for future implementation. EPCs have been carried out across wide range of public buildings and different sectors including local authorities, the NHS, schools, further education and universities (Department of Energy & Climate Change, 2015).

It is estimated that there are between 20 and 25 companies that offer EPCs in some form and 22 were participating in the public procurement frameworks. These organisations are typically multinational companies, and not UK specific.

It is estimated that there have been around 100 new projects between 2014 and 2016. This represents a major growth of the market. The projects are mostly contracted with public buildings, schools, public hospitals, leisure facilities.

Contract lengths vary from a minimum of 3 years to a maximum of 25 years, although most are between 5 and 10 years. Energy savings are typically between 10 and 30% of baseline and typically involve capital investments of £0.5–5 million on average (ca. €0.6–6 million) (Nolden and Sorrell 2016)

A model EPC has been developed by the highly successful and award-winning Greater London Authority RE:FIT EPC programme. The framework contract used to help create this model EPC is only part of the overall RE:FIT programme and users of RE:FIT would normally be supported through the procurement and project development to ensure projects meet user requirements. The model is designed to cover measures that reduce energy consumption and/or provide energy generation (along with associated requirements to support such measures within an energy performance contract). It works by way of two specific call-off contracts for (1) the production of investment grade proposals to fully detail the proposed project and (2) for the installation and service delivery of such proposals.

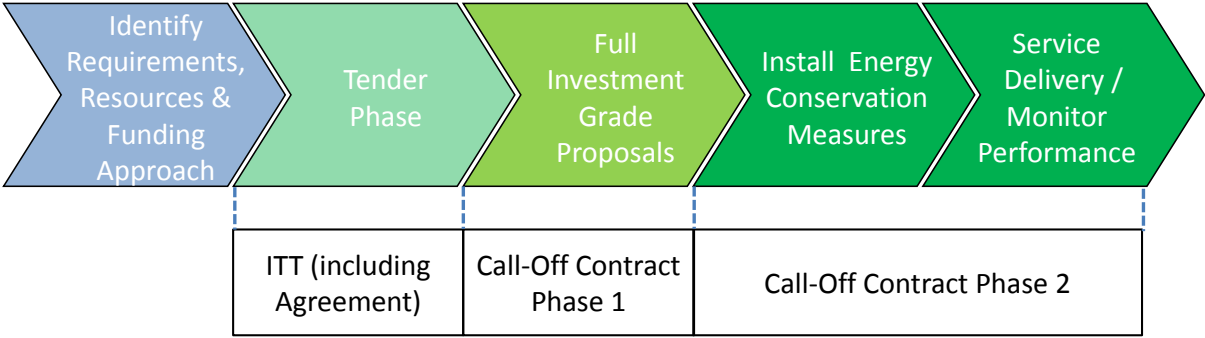
The outline of typical EPC process is presented in Figure 31. It is based on a two stage process:

Call-Off Phase 1: this is expected to be signed on selection following tender. It covers the production of the Investment Grade Proposal. Investment Grade Proposal is a document prepared by the ESCO and includes detailed information such as the EE measures to be implemented, guaranteed savings, tonnes of CO₂ to be saved each year, capital costs, maximum payback period and M&V plan;

Call-Off Phase 2: this is expected to be signed once the Authority is satisfied with the approach, measures, plan and other details contained in the Investment Grade Proposal

The model EPC structure provides the option for the contract to incorporate financing and on-going maintenance for the measures. There is also a schedule that can be used to help purchase outputs such as electricity and heat rather than purchase the measures to generate such outputs.

Figure 31 - Outline of typical EPC process



Source: (Department of Energy & Climate Change, 2015)

The savings guarantee is a core benefit of the EPC Model Contract. The RE:FIT programme has an excellent track record of savings guarantee levels being met (and frequently exceeded) and this part of the schedule is developed from the core RE:FIT contract. The guarantee covers the energy and/or water savings and is supported by an M&V protocol.

There are other public procurement frameworks such as CEF, ESSENTIA and ECOVATE.

8.28.3 Status with Energy supply contracting (ESC)

There at least 35 ESCOs with a national or international focus, of which 15–20 were relatively active. The estimates on the number of ESCOs range between 25 to 50. About third of the ESCOs (5–10) are 'large players'. In addition, there are at least six community ESCOs and at least nine local authority ESCOs engaged in supplying energy in their local areas (JRC 2016).

8.28.4 Demand side

8.28.4.1 Energy services in public sector

The public sector is leading in terms of realisation of EE projects through energy contracting. The use of EPC has grown in recent years as a result of the support by the central and local governments. In 2010, the Government introduced the Greening Government Commitments which, alongside other targets, require a 25% reduction in greenhouse gas emissions from the central government estate by 2015 (Department of Energy & Climate Change, 2014).

In order to promote EE and energy services in the public sector with a focus on ESCOs and EPCs, the UK government created special EE programmes for retrofit of public buildings. RE:FIT, a national OJEU-compliant procurement framework available to all UK public sector organisations, is one of the most successful programmes implemented in UK. The programme was pioneered by the Greater London Authority (GLA)¹³¹ to deliver EE improvements to the public sector estate, through a simplified procurement

¹³¹ In February 2011, the GLA was successful in securing funding from the European Commission under the ELENA (European Local Energy Assistance) Programme. With these funds the GLA has established the RE:FIT Programme Delivery Unit (PDU) to manage the RE:FIT Framework and facilitate the uptake by London based public sector organisations. Of the £2,671,000 funding for the PDU(Project Delivery Unit), 90% is provided by ELENA and 10% by the GLA. With ambitious targets, the PDU has to leverage its cost 25 times in investment in RE:FIT projects over the 3 years. (RE:FIT 2015)

framework under which public sector organisations are able to procure energy conservation measures implemented by ESCOs (Department of Energy & Climate Change, 2015). Together with local partners, the Government is jointly funding the initial England-wide rollout of RE:FIT to the public sector. The ESCO guarantees the level of energy savings, thus offering secure financial savings over the period of the agreement. There are 13 energy service providers appointed under the RE:FIT scheme. All of these are large companies, and some are multi-national. These energy performance contractors use a wide range of energy efficiency products and service suppliers of varying size including numerous SMEs.

Through the programme, various interventions are possible including insulation and building fabric improvements, replacement or upgrading of mechanical and electrical services equipment and the installation of bespoke energy efficiency measures such as combined heat and power (CHP) and voltage optimisation equipment (RE:FIT, 2015). Since 2008, the London RE:FIT scheme alone has seen contracts totalling nearly £27 million completed and there are contracts worth an estimated £51 million in the pipeline. The nation-wide rollout of RE:FIT should add a further £25 million by the end of 2014/15 (Department of Energy & Climate Change, 2014). A total 199 London public sector organisations are now participating in RE:FIT and over 460 of London's public sector buildings have so far been retrofitted through the programme, generating estimated CO₂ savings of 33,000 tonnes per annum from investment of £68.6 million (RE:FIT, 2015).

Salix Finance is another relevant programme which delivers 100% interest-free capital to the public sector to improve their energy efficiency and reduce their carbon emissions. It was established by the DECC's (The Department of Energy and Climate Change) predecessor department DEFRA as an independent, publicly funded company, dedicated to providing the public sector with loans for energy efficiency projects. The programme has so far funded 13,179 projects with a total value of £ 375.8 million and lifetime financial savings equivalent to £ 1.4 billion. Since 2004 DECC has provided a total of £148 million to Salix for the funding of energy efficiency loans and for the funding of its operations (Salix, 2015). In addition, the London Energy Efficiency Fund (LEEF), a £100 million Urban Development Fund procured by the European Investment Bank (EIB) on behalf of the London Green Fund, provides repayable investments aimed at energy renovations of public sector buildings. It can lend to public, private sector or joint venture entities, including ESCOs and social housing associations and can also support larger projects such as CHP, District Heating and Renewable Energy Generation¹³².

With regards to balance sheet treatments, examples of energy efficiency investments being placed both on- and off- balance sheet exist. The Department of Energy & Climate Change (2015) has identified the following parameters that need to be considered when dealing with the balance sheet question for energy efficiency:

- some public sector organisations control spending by setting limits on the capital expenditure;
- capital expenditure definitions usually follow the accounting definition;
- accounting definitions are usually based on the substance of a transaction rather than the legal form;
- this means that contracts for services or leased assets may need to be classified as assets, and consequently will count towards an organisation's capital budget;
- a judgement will need to be made on a case by case basis; which will take account of the nature of assets or services being commissioned and the nature of the legal arrangements; and

¹³² <http://www.refit.org.uk/what-refit/funding-refit-projects/leef/>

- this judgement will require technical accounting expertise and, for large transactions will require sign off from the chief accounting officer or finance director.

8.28.4.2 Energy services in other sectors

The UK's large commercial office market is less engaged in energy efficiency than other countries. While large organisations prefer to self-fund energy efficiency measures, ESCOs and EPCs can concentrate on projects sufficiently large to achieve economies of scales. For smaller organisations, financing projects outside their core business area is more challenging and they are less attractive to ESCO-type organisations (Department of Energy & Climate Change, 2014).

Energy efficiency investments in data centres are another opportunity for ESCOs. The increasing use of cloud computing means that office-based businesses are shifting electricity consumption from in-house server rooms to external data centres. As energy usage patterns in data centres tend to be steady and return on investment from energy efficiency measures very quick, more focus is now given on how to improve energy efficiency in these facilities. For manufacturing and industrial plants, the challenge lies with capital intensive process-dominated facilities, meaning that there are less self-funding opportunities and only energy efficiency measures with short payback periods (typically less than 3 years) can be supported. While ESCO/EPC deals are possible, they are rare in practice due to the challenge of agreeing a baseline to compare future performance against when production volumes are constantly changing in response to market demand. External financing of measures is possible but is typically associated with a high capital cost due to the relatively high risk of business failure and default compared to the public sector or commercial property (Department of Energy & Climate Change, 2014).

8.28.5 Remaining market potential and barriers

Research undertaken by the Building Research Establishment has estimated that the UK's ESCO market value is around £180 million. Moreover, a report ¹³³ prepared for DECC in 2011 estimated that the cost effective potential for investment in carbon abatement (mainly through energy efficiency measures) in the entire UK public sector was £1.66 billion (Department of Energy & Climate Change, 2015). Investment in energy efficiency can be highly cost effective (in some cases repaying the upfront capital in around 1-3 years through the energy saved), lowering running costs and reducing exposure to higher energy prices over time. Installing energy efficiency measures is also likely to have a beneficial impact on the local economy through supporting jobs in construction and throughout the supply chain (Department of Energy & Climate Change, 2015). It is therefore viewed that there is still a significant remaining market potential for energy services.

The UK Energy Efficiency Strategy identified the key barriers to the deployment of cost effective energy efficiency investments in the UK economy. These are complemented by barriers identified in the JRC 2016 survey process (Department of Energy & Climate Change, 2014, JRC 2016): Embryonic markets: The UK already has an energy efficiency market but it is small relative to its full potential. There are significant economic benefits to be realised from growing this market and making energy efficiency a mainstream activity.

- Lack of Information: Accessing trusted and appropriate energy efficiency information has often proven difficult. Where information is available it is usually generic and not tailored to specific circumstances; or it is focused on particular opportunities, meaning that individuals and businesses are unable to fully assess the benefits of the energy efficiency opportunity.

¹³³ Wider Public Sector Emissions Reduction Potential Research, Camco, 18 July 2011

- Split incentives: This barrier is a problem in private rented sector. Those investing in energy efficiency measures are not always the ones receiving the direct benefit. For example, the wider benefits of energy efficiency investment, such as improved security of supply and reduced carbon emissions, are not fully realised by those making the investment.
- Undervaluing energy efficiency: The long term financial and wider benefits of improved energy efficiency are often regarded as less certain, partly because of the lack of trusted information in the market. Consequently, energy efficiency has traditionally been undervalued relative to other investment options and not prioritised as it might otherwise be.
- Lack of capacity and skills to deliver EPC and to contract EPC by clients. Clients could be helped on all terms of an EPC contract, such as procurement, legal, commercial, technical and project management level.

8.28.6 Policies and measures supporting ESCOs and EPC

New regulations and support schemes that either require or incentivise organisations to engage in sustainable energy supply and demand side management solutions have helped to improve the business case of ESCOs. These policies include financial incentives (e.g. Feed-in Tariffs (FiT), Renewable Heat Incentive), capital grant schemes (e.g. Local Energy Assessment Fund), loan schemes (e.g. Green Deal, Salix Finance) and low-carbon obligations (e.g. Low-Carbon Building Regulations, CRC Energy Efficiency Scheme, CERT). One of the most important regulatory developments for ESCOs has been the introduction of financial incentives (e.g. RE: FiT) in place of many of the capital grant schemes (e.g. Low Carbon Buildings Programme) (Hannon, et al., 2013).

8.28.6.1 Information and awareness raising measures

In addition to aforementioned activities, the Department of Energy & Climate Change (DECC) published several documents in 2015 in order to better promote energy service market and access for SMEs to this market (Department of Energy & Climate Change, 2014). In particular, the Government prepared and published several documents in order to the process of undertaking EPCs. These include a model EPC contract, a Best Practice Guide to Energy Performance An updated version of its 2012 Guide to Financing Energy Efficiency in the Public Sector. While all documents are geared towards the needs of the public sector, they can be of use by the wider private sector. All documentation is made available at the web page of the DECC.¹³⁴

8.28.7 Conclusions, projections and recommendations

After the financial crisis of 2008, when the ESCO sector halted in the UK, there is a significant increase since 2012. The UK Government has been particularly supportive of the ESCO market development. As a result, an increase in the number of realised EPCs has been observed and programmes such as RE:FiT have seen great success in the past few years. The UK market is diverse in terms of type of contracts employed, actors, size of ESCOs, sectors etc. EPCs have experienced consistent growth in recent years.

While the market is dynamic, it is far from realising its full potential. For this reason, the UK Government has engaged in a number of information and awareness raising measures (such as EPC models, guidelines, list of providers etc.) It also plans to invest an additional £30 million a year over three years to build on its Salix public sector energy efficiency loan scheme and is also considering creating a toolkit to help local authorities examine investments in high efficiency street lighting (Department of Energy & Climate Change, 2014). Recognising the role of quality labels in customer's confidence and trust towards these non-traditional concepts, the Green Deal Quality Mark has been developed

¹³⁴ <https://www.gov.uk/government/organisations/department-of-energy-climate-change>

with the aim to simplify the complex landscape that has been created by the existence of a large number of quality marks (Department of Energy & Climate Change, 2014).

The newly-established UK Green Investment Bank has a mandate to invest at least 80% of its capital in three priority sectors – energy efficiency, off-shore wind and waste. To date, the Bank has committed £150 million to specialist energy efficiency funds (Department of Energy & Climate Change, 2014). In its Strategic report for the year 2014, it has stated project developers such as ESCOs and utilities as one of its three sets of targeted customers for which financing products will be developed in order to boost the UK’s energy efficiency financing market (Green Investment Bank, 2014).

8.28.8 Summary

Total ESCO market status (2015)	excellent, more than 50 ESCO companies
EPC market status (2016)	25 EPC providers, of which 22 participate in public tenders during 2014-16
Total ESCO market size	€400 million/ yr. (data in 2013)
EPC-only market size (investment)	€100 million
EPC market potential	ca. €1.8 billion potential in RE:FIT only for the next 4 years (EPC)
EPC definition	provided in the model contract (developed under RE:FIT) and in the Department of Energy and Climate Change’s Energy Strategy and guidance documentation
Established sub-sector(s)	<ul style="list-style-type: none"> • EPC is well known and has increased; • forms of other contracts are also common • EPC is popular in public buildings, schools, educational buildings, leisure facilities
Key general barrier(s) to be removed	<ul style="list-style-type: none"> • Complexity of the concept/of contracts /lack of information. • For smaller customers (SMEs) and ESCOs: raising affordable finance and undervaluing EE • split incentives
Key barriers in the public segment	<ul style="list-style-type: none"> • No major barriers • Lack of capacity and skills
Key driver(s) to date	<ul style="list-style-type: none"> • government's commitment to support its on-going development as part of the implementation of the UK Energy Efficiency Strategy • RE:FIT, CEF, ESSENTIA and ECOVATE • EE funds and financing sources, such as
Expected development/forecast	the current growth trend is expected to continue
Opportunities for further development	continue with the public segment programmes, while increase capacities, support facilitators

9 Conclusions

Their value of ESCOs in unlocking the energy saving potential in the market is recognized by various EU directives and initiatives in the European context, such as the Energy Efficiency Directive (2012/27/EU; EED), which sets explicit requirements to promote the market of energy services through its Article 18. The EED provides definitions for energy performance contracting, energy services and energy service providers and calls for Member States to take actions to strengthen the energy services market. The key role of Energy Performance Contracting (EPC) in driving energy efficiency investments is also highlighted in the "Clean Energy for All Europeans" communication. According to this communication, the role of EPC must increase, in particular in the public sector, as they offer a holistic approach to renovations, including financing, carrying out the works and energy management.

Building on the previous reports, investigating the status of the ESCO market in the EU, the Joint Research Centre (JRC) reviewed the efforts made by Member States to stimulate the market of energy services, and in particular the market for EPC, during the period 2014-2016 as well the developments of the national ESCO market. The findings show new policy and market developments since the last report published by the JRC in 2014 for the period 2010-2013.

The average ESCO market of the European Union has been on a steady rise for the last decades. Even if the financial crisis of 2008 caused a short backdrop, the ESCO markets were able to rather easily overcome the challenges, and turn the financial restrictions into an opportunity. As of 2014-2016, in general the markets are on a growth path, although this growth is not as widespread across countries as it was in the period 2010-2013. Traditionally, in Europe, energy services markets included a variety of contract types, many types of contractors (suppliers) and a few types of clients (mainly industry and public sector). As of 2016, there are still many types of contracts; however energy performance contracting is more and more regarded as a distinguished contract type, and companies started to segregate based on their offerings. In parallel both ESC and EPC are by now extended to almost all types of projects (transport being an exception), including traditionally ignored ones, such as residential and SMEs.

The total EU market was estimated at \$2.7 billion (€2.4 billion) ESCO revenue in 2015, with a forecasted growth to \$3.1 billion (€2.8 billion) in 2024 at a 1.7% compound annual growth rate (Talon and Gartner 2015).

18 of the 28 Member States reported unchanged ESCO markets, and only 7 ESCO markets have grown during the period 2014-2016, with 3 decreasing markets (AT, HU and EE) and 1 where it was unclear (IE). This compares to 9 and 18 MSs respectively during the previous period 2010-2013. Out of those markets that were growing, none of them grew significantly, as opposed to 4 of the 18 growing markets in 2013, which experienced a boom then. It should be noted that there are MSs where increase was experienced in EPC usage.

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List of abbreviations and definitions

APES - Czech Association of Energy Services Providers

APES-SK - Slovak Association of Energy Service Providers

AT - Austria

b - billion

BE - Belgium

BG - Bulgaria

CHP – Combined heat and power

CO₂ – carbon dioxide

CR - Croatia

CY - Cyprus

CZ- the Czech Republic

DE - Germany

DECA - Austrian Energy Efficiency and Performance Contractors

DK – Denmark

EBRD - European Bank for Reconstruction and Development

EC – European Commission

EE – Estonia

EE – Energy Efficiency

EED – Energy Efficiency Directive, Directive 2012/27/EU

EEO or EEOS – Energy Efficiency Obligation Scheme

EESI2020 – European Energy Service Initiative towards the EU 2020 energy saving targets

EEE-F - European Energy Efficiency Fund

EIB - European Investment Bank

ELENA - European Local Energy Assistance

ES – Spain

ESD – Energy Services Directive, Directive 2006/32/EC

EPC – Energy Performance Contract

ESC – Energy Service Contract/Energy Supply Contracting

ESCO – Energy service company

ESCOROM - Romanian Association of ESCO companies

ESP – Energy Service Provider

EU – European Union

EUROSTAT - statistical office of the European Union

EVO – Efficiency Valuation Organisation

FI - Finland

FR – France

GHG – Greenhouse gases

GR - Greece
H2020 –Horizon 2020
HU – Hungary
IE - Ireland
IT - Italy
JRC – Joint Research Center (of the European Commission)
LV - Latvia
LT - Lithuania
LU – Luxemburg
m - million
M&V – Measurement and Verification
MS – Member State
MT - Malta
NEEAP – National Energy Efficiency Action Plan
NL – the Netherlands
O&M – Operation and Maintenance
PL - Poland
PT – Portugal
RO – Romania
SEAI – Sustainable Energy Authority of Ireland
PDA – Project Development Assistance
PEKO - municipal house management authorities in Latvia
PPP – Public-private partnership
RVO - Netherland Entrepreneur Agency
SK – Slovak Republic
SI - Slovenia
SE - Sweden
UK – the United Kingdom
TPF – Third party financing
yr. - year

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Annex

Energy service providers lists and portals

The following table gives a collection of lists or portals of energy service providers. The information is based on the 3rd NEEAPs and the 2016 EPC interviews.

	Link	Description
AT	http://www.contracting-portal.at/show.php	Energy service providers with searchable options including by type of energy service contract
BE	Missing (at Federal level). Some links with lists of energy service providers are given for Flanders. None of the links concern ESCOs	
BG	n/a	
CR	Planned	
CY	http://www.mcit.gov.cy/mcit/mcit.nsf/All/5D6DEF111AE3CF55C22575C5002BFED5?OpenDocument	Ministerial registry of energy service providers
CZ	www.apes.cz	Association of Energy Service Providers
DE	n/a	
DK	http://sparenergi.dk/forbruger/vaerktoejer/haandvaerkerlisten/	Tradesman list hosted by the Danish Energy Agency
EE	not exist	the NEEAP3 foresees the establishment of a registry
EL	www.escoregistry.gr	ESCOs
ES	http://www.idae.es/index.php/mod.empresas.servicios/mem.fbusquedaEmpresas/reلمenu.168	Energy service suppliers
FI	http://www.motiva.fi/toimialueet/energiakatselmustoiminta/esco-palvelu/esco-hankerekisteri/esco-yritykset_suomessa	ESCOs
	http://www.motiva.fi/en/areas_of_operation/energy_auditing/meesupported_energy_auditing/qualified_energy_auditors	Energy auditors
	http://energiatodistus.motiva.fi/energiatodistusustenlaatijat/	Energy performance certificate issuers
FR	n/a	
HU	n/a	
IE	n/a	
IT	n/a	
LT	n/a	

	Link	Description
LU	www.energyefficient.lu	Energy performance certificate experts (res and non-res)
	www.certified.myenergy.lu/fileadmin/user_upload/certified/Liste_conseillers_myenergy_certified.pdf	Energy advisors certified by myenergy
	Planned	Energy performance contracting providers to be set up
LV	n/a	
MT	n/a	
NL	www.esconetwerk.nl	Energy service providers
PL	www.mg.gov.pl/files/upload/10722/Podrecznik-Sektor_publiczny_OSTATECZNY.pdf	Suppliers of energy services
PT	n/a	
RO	No official list, but ESCOROM maintains a registry	
SE	Planned	
SI	n/a	
SK	Planned	
UK	https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/320355/registered_energy_service_providers_list.pdf	The list includes the: (1) Green Deal Oversight and Registration Body Register, (2) England and Wales Energy Performance Certificate (EPC) Register (domestic and non-domestic), (3) Scotland EPC Register, (4) Northern Ireland EPC Register (domestic and non-domestic), (5) Energy Institute's Register of Professional Energy Consultants, (6) Institute for Environmental Management and Assessment's Environmental Auditor Register

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