Co-funded by the Intelligent Energy Europe Programme of the European Union

Promotion of smart and integrated NZEB renovation measures in the European renovation market (NeZeR)
Contract N°: IEE/13/763/ SI2.674877
01-03-2014 – 28-02-2017

Role of ESCOs in NZEBR

Date : 19/11/2014
Lead contractor : IVL

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1 EXECUTIVE SUMMARY

NeZeR project promotes the implementation and smart integration of Nearly Zero Energy Building Renovation (NZEBR) measures and the deployment of Renewable Energy Sources (RES) in the European renovation market. NeZeR also aims to secure the impact of the project activities and results during and beyond its duration. This will be facilitated by creating national clusters consisting of the most relevant stakeholders that can secure the long term implementation of Nearly Zero Energy Building Renovation (NZEBR) and utilization of Renewable Energy Sources (RES). The role of ESCOs in NZEBR and the ESCO market situation in each partner country has been studied and compiled briefly in this report.

An Energy Service Company (ESCO) is defined, according to Directive 2010/31/EU, as a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria.

Common for ESCO projects is that they contain the same elements, for example the following; site survey and preliminary evaluation, guarantee of the results by proper contract clauses, project financing, operation and maintenance, and other elements. There are a number of different ESCO contracts of which the most common is Energy Performance Contracting (EPC). Other contracts are Energy Supply Contracting, Chauffage, Comfort contracting, among others. The popularity of these contract types differ between countries.

The market overview of this report shows that there are both similarities and differences between countries regarding barriers and success factors for ESCOs on the market. In most of the countries the need for information and training is highlighted as a key factor to push the market development forward.

There is no clear definition of Nearly Zero Energy Building Renovation (NZEBR) in either the NeZeR project[1] or in the partner countries. Therefore the following formulation is used in this report: *"renovation with ambitions to reduce the energy use substantially"*. There are rather few examples of NZEB renovations and none of the known project have used ESCO contract. However, the role of ESCOs in NZEBR is considered as one of the ways to achieve energy savings in the existing building stock. It is seen as an essential input for reaching international as well as national goals on energy savings and CO_2 reductions (including the European 20-20-20 goals).

[1] A definition of NZEBR to be developed in NeZeR was not yet completed when this report was written.

2 INTRODUCTION

The aim of the report is to compile the current status regarding ESCOs involvement in Nearly Zero Energy Building Renovation (NZEBR) and deployment of Renewable Energy Sources (RES) within the partner countries.

The target group of the presented market overview is the project partners in NeZeR responsible for the local action plans and national roadmaps as well as actors interested in the market for NZEBR, RES and ESCOs in the participating countries such as decision makers and building owners.

The report has been compiled by IVL based on market research and input from the research partners from each country within the NeZeR project. The market overview regarding ESCOs role in NZEBR will be further used in NeZeR project in developing of guidelines for local NZEBR action plans and for creation of national NZEBR roadmaps.

3 BACKGROUND

3.1 Definitions

Term	Definition
Client	means any natural or legal person to whom an energy service company delivers energy services
Energy Efficiency Directive (EED)	means Directive 2012/27/EU of the European Parliament and of the Council of 25 October 2012 on energy efficiency
Energy efficiency improvement*	means increase in energy efficiency as a result of technological, behavioural and/or economic changes
Energy efficiency*	means the ratio of output of performance, service, goods or energy, to input of energy
Energy performance contracting* (EPC)	means a contractual arrangement between the beneficiary and the provider of an energy efficiency improvement measure, verified and monitored during the whole term of the contract, where investments (work, supply or service) in that measure are paid for in relation to a contractually agreed level of energy efficiency improvement or other agreed energy performance criterion, such as financial savings
Energy savings*	mean an amount of saved energy determined by measuring and/or estimating consumption before and after implementation of an energy efficiency improvement measure, whilst ensuring normalisation for external conditions that affect energy consumption
Energy service*	means the physical benefit, utility or good derived from a combination of energy with energy-efficient technology or with action, which may include the operations, maintenance and control necessary to deliver the service, which is delivered on the basis of a contract and in normal circumstances has proven to result in verifiable and measurable or estimable energy efficiency improvement or primary energy savings
Energy service provider*	means a natural or legal person who delivers energy services or other energy efficiency improvement measures in a final customer's facility or premises
Energy*	means all forms of energy products, combustible fuels, heat, renewable energy, electricity, or any other form of energy, as defined in Article 2(d) of Regulation (EC) No 1099/2008 of the European Parliament and of the Council of 22 October 2008 on energy statistics
EPC provider	means an energy service provider who delivers energy services in the form of Energy Performance Contracting
Energy service company (ESCO)	means that a natural or legal person that delivers energy services and/or other energy efficiency improvement measures in a user's

	facility or premises, and accepts some degree of financial risk in so doing. The payment for the services delivered is based (either wholly or in part) on the achievement of energy efficiency improvements and on the meeting of the other agreed performance criteria.
Savings	mean energy savings and/or related financial savings; the financial savings include the costs of energy provision and can also include other operational costs, such as the costs of maintenance and workforce

Notes: *Definitions according to the Energy Efficiency Directive.

3.2 Policies that steer the development

In Europe approximately 40% of the energy is used by the building sector. In order to reach the European Union's 2020 20% headline target on energy efficiency it is important to reduce the energy use in buildings. The EU Energy Policy steers the activities in the EU regarding energy efficiency of the building sector. One of the main Directives is the Energy Performance of Buildings Directive (EPBD, 2010/31/EU) that has affected the redevelopment of building regulations in EU countries. Another important Directive is the Energy Efficiency Directive (EED, 2012/27/EU).

The EPBD states that all new buildings in the EU should from the latest 2021 be built as nearly zero energy buildings (with exception for public buildings where the deadline is 2019).

The Energy Efficiency Directive establishes a common framework of measures for the promotion of energy efficiency within the EU. It contains a number of measures designed to deliver energy savings across all sectors, from national energy efficiency targets to the setting of energy efficiency obligations on energy companies. The Energy Efficiency Directive includes a requirement for member states to develop long term renovation strategies for their national building stocks. According to Article 18 of the Energy Efficiency Directive there is an explicit requirement on member states to promote the energy services market and to support its proper functioning, by, for example, providing information to final consumers.

3.3 Definition of Energy Service Company, ESCO

The term 'energy service' may be used to describe different types of services. It may be one single service or several services and measurements implemented at the same time.

The definition of an energy service according to the Energy Efficiency Directive (2012/27/EU) is:

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

Joint Research Centre (2014a) gives examples of different types of energy services:

- *energy analysis and audits,*
- *energy management,*
- *project design and implementation,*

- *maintenance and operation,*
- *monitoring and evaluation of savings,*
- *property/facility management,*
- *energy and/or equipment supply,*
- *provision of service (space heating, lighting, etc.)*

The Energy Efficiency Directive defines an 'energy service provider' as:

'a natural or legal person who delivers energy services or other energy efficiency improvement measures in a final customer's facility or premises'.

The term 'Energy Service Company, ESCO' used in this report is based on the definition of an ESCO as defined in the market surveys performed by Joint Research Centre (Bertoldi et al, 2014):

'An ESCO is a company that offers energy services which should include implementing energy-efficiency projects (and other sustainable energy projects). Many ESCOs work on a turn-key basis'.

The three main characteristics of an ESCO are according to Bertoldi et al (2014):

- *ESCOs guarantee energy savings and/or provision of the same level of energy service at lower cost. This is referred to as a performance guarantee, which can take several forms. It can revolve around the actual flow of energy savings from a project, can stipulate that the energy savings will be sufficient to repay monthly debt service costs, or that the same level of energy service is provided for less money.*
- *The remuneration of ESCOs is directly tied to the energy savings achieved;*
- *ESCOs can finance, or assist in arranging financing for the operation of an energy system by providing a savings guarantee.*

According to Bertoldi et al (2014) ESCOs accept some degree of risk for the achievement of improved energy efficiency in a user's facility and have their payment for the services delivered based (either in whole or at least in part) on the achievement of those energy efficiency improvements.

Typically ESCOs are profit-oriented private organisations (Bertoldi et al, 2014). Sometimes ESCOs may be public organisations. In the UK there is an example of a non-profit so called "Community ESCO" replacing a traditional energy supplier.

3.3.1 ESCO project elements

According to Joint Research Centre (2014a) a typical Energy Service Company project includes the following elements:

- *Site survey and preliminary evaluation;*
- *Investment grade energy audit;*
- *Identification of possible energy saving and efficiency improving actions;*
- *Financial presentation and client decision;*
- *Guarantee of the results by proper contract clauses;*
- *Project financing;*
- *Comprehensive engineering and project design and specifications;*
- *Procurement and installation of equipment; final design and construction;*
- *Project management, commissioning and acceptance;*
- *Facility and equipment operation & maintenance for the contract period;*
- *Purchase of fuel & electricity (to provide heat, comfort, light, etc.);*
- *Measurement and verifications of the savings results;*

- *Operation and maintenance.*

3.4 ESCO contracts

There are several types of ESCO contracts available. According to Bertoldi et al (2014) the ESCOs conclude energy performance contracts (EPC) with clients, the core of which is a performance guarantee. There are different models for Energy Performance Contracting being used. ESCOs may also offer other versions of energy service contracts. The different contracts are shortly presented below based on the information in Bertoldi et al. (2014) and IEA (2011).

3.4.1 EPC models

Two types of models are common for Energy Performance Contracting; the 'shared savings model' and the 'guaranteed savings model'. The distinction between the two models reflects the different distributions of investments, savings and risks between the client and the ESCO (Bertoldi et al., 2014). In the shared savings model the ESCO takes a loan from the investor and assumes the clients credit risk (IEA, 2011). The cost savings are shared according to the contract between the ESCO and the client for a certain period of time. The ESCO will recover its implementation costs and receive a return on its investments. This alternative provides off balance sheet financing for the client. In the guaranteed savings model the client takes a loan from the investor and pays the ESCO (IEA, 2011). The ESCO gives the client a guarantee of certain performance parameters and receives it payments once these parameters have been confirmed.

3.4.2 Other ESCO contracts

Another type of ESCO contract is called 'delivery contracting' (DC, also known as Supply Contracting or Energy Supply Contracting (ESC)) (Bertoldi et al., 2014). The delivery contracting is a form of energy management outsourcing (for example heating, lighting, motive power). 'Chauffage' is a type of delivery contracting where the ESCO takes over the operation and maintenance of an energy using equipment in the client's building and sells the output energy to the client to a fixed price for a longer period of time. The client normally owns the equipment.

In some Nordic countries there are a kind of delivery contracting called 'comfort contracting', where the ESCO is responsible for a certain level of comfort or level of service (Bertoldi et al., 2014).

When using a 'BOOT model' the ESCO designs, builds, finances, owns and operates the equipment for a defined period of time and then transfers this ownership across to the client (Bertoldi et al., 2014).

3.5 Definition of Nearly Zero Energy Building renovation

The Energy Performance of Buildings Directive (EPBD, 2010/31/EU) states that all new buildings in the EU should from year 2021 onwards be built as nearly zero energy buildings (with exception for public buildings where the deadline is 2019).

The member states in the EU are currently working on their national definitions of a Nearly Zero Energy Building (Swedish Energy Agency, 2014). In Sweden the Swedish Energy Agency and the National Board of Housing, Building and Planning have been given the task to develop a proposal of the Swedish definition of a Nearly Zero Energy Building. Their work will be presented in June 2015.

There is no clear definition of Near Zero Energy Building Renovation (NZEBR) in any of the partner countries. In NeZeR a common definition of NZEBR will be developed based on the input from partners. However, the NZEBR definition was not formulated when this report was written. In this document the following formulation is being used: *"renovation with ambitions to reduce the energy use substantially"*.

4 ENERGY SERVICE MARKETS

The Energy service market overview presented in this chapter is based primarily on the *ESCO Market Report 2013* (Bertoldi et al., 2014) and its background reports, the responses on the ESCO questionnaire from research partners, and an interview with the CEO of the Swedish ESCO industry organisation (Energieffektiviseringsföretagen, EEF).

4.1 Finland

The Finnish ESCO market started up around the year of 2000 (Bertoldi et al, 2014). Bertoldi et al (2014) describes the ESCO market in Finland (2013) as relatively stable, though small.

According to Bertoldi et al (2014) there are approximately 5-6 ESCOs that are active in the Finnish market, the companies Enespa, Retermia and Inesco are mentioned. In the JRC ESCO database three companies can be found when searching for companies in Finland; Johnson controls, Schneider Electric Buildings and Siemens Building Technologies (JRC, 2014b). The companies are building and control manufacturers, and consultants. Both national and international companies are acting in the Finnish market

There is not an official estimate of the market size in Finland, but in 2011 the market was estimated to have €10 million annual turnover (Bertoldi et al, 2014). EC JRC (2012) has estimated the Finnish market potential to a maximum of annual €200 million maintenance cost reduction including €100 million per year in public buildings.

In Finland the government agency Motiva works actively in supporting the energy service markets (Bertoldi, 2014). Focus is information dissemination, providing demonstration projects, and supporting ESCO project development.

ESCO Projects

In Finland the industry has been the main client group for ESCOs (Bertoldi et al, 2014). Municipalities have done some ESCO projects (sports facilities, schools and kindergartens). There have been some successful projects but also some problems due to public procurement regulations not being followed properly. A guide book has been prepared by the national agency Motiva in order to address this problem. There have not been many ESCO projects with private property owners in Finland.

In early ESCO projects for industrial buildings mainly one single technology was used, e.g. heat recovery (Bertoldi et al., 2014). Now the ESCO projects are becoming more complex and more adapted to the needs of the client. Today the ESCOs improve mainly the HVAC systems, pumps, automation and lighting.

So far there have been no ESCO cases for NZEBR in Finland and no renovations of apartment buildings have used ESCO services.

In Finland the main type of ESCO contracts are Energy Performance Contracting (Bertoldi et al, 2014). The EPC model guaranteed savings are the most common type of contract. According to Bertoldi et al (2014) the typical size of an EPC project is between €0.5 million and 3 million.

There are some state subsidies for ESCO projects in Finland (Bertoldi et al, 2014). In 2013 EPC projects that are implemented according the official definition may be eligible for a financial grant of up to 20-25% of investment costs related to energy efficiency improvement.

Energy audits are also subsidized in all major sectors if they follow the guidelines and rules of Motiva and the Ministry of Employment and the Economy.

According to Bertoldi et al (2014) the main barrier in Finland for further ESCO development is the existence of competing alternative solutions. Municipal buildings are often managed by large organization that has the skills and economic resources to carry out the energy efficiency projects themselves. The public procurement rules in Finland are also considered as a major problem for ESCOs (Bertoldi et al, 2014).

4.2 Romania

The Romanian ESCO market started to grow during the period 2007-2010 (Bertoldi et al., 2014). According to Bertoldi et al (2014) approximately 15-20 ESCOs were active in the Romanian market in 2013, mostly local and national companies. In the JRC ECSO database five ESCOs can be found when searching for companies in Romania; Johnson Controls, EnergoBit ESCO, Energy Serv, Sc Energy-serv and Tai (JRC, 2014b). Some of the ESCOs are joint ventures of local and foreign stakeholders. The companies offering energy services are consulting and engineering firms, equipment producers, manufacturers and retailers, facility managers and energy suppliers. Only a few of the companies may offer financing to their clients.

Bertoldi et al (2014) states that the growth of the ESCO market in Romania is a result of the implementation of the Energy Efficiency Directive and the facilitation mediated by 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.

There are no publicly available estimates of the size of the Romanian ESCO market and potential (Bertoldi et al., 2014).

ESCO Projects

The main type of ESCO projects in Romania is delivery contracting projects, for example using the BOOT model (Bertoldi et al., 2014). EPC projects are not common in Romania, mainly because of the reluctance from the potential clients, primarily the public sector. Most of the ESCO projects in Romania have been ordered by the industry, with a focus on boiler installations, substitution and maintenance. There have also been renewable energy projects like wind farms and solar installations. According to Bertoldi et al. (2014) there have been some public lightning projects but building renovations have not been common. There are some examples of ESCO projects for healthcare facilities, hotels, offices, and retail in Romania.

The European Bank for Reconstruction and Development, EBRD; have launched a project in Romania in 2013 with the goal to increase the interest for Energy Performance Contracting (Bertoldi et al., 2014).

According to Bertoldi et al. (2014) there are several international financing institutions (EBRD, USAID, World Bank/GEF and UNDP/GEF) that are active in Romania supporting general energy performance improvement and ESCO projects in particular. Examples of programmes 2013 were Energy Efficiency Finance Facility (EEFF) that offers loans for banks; the EBRD Energy Efficiency Finance Facility (RoSEFF) that provides loans to energy efficiency investment projects, and the SME Sustainable Energy Financing Facility (Bertoldi et al, 2014). There are challenges in Romania to finance energy efficiency projects but these programmes makes it possible for banks to offer clients loans for these types of projects.

In Romania the ESCO market development is slow and difficult due to several constraints (Bertoldi et al., 2014). Some of the main barriers identified are lack of trust and awareness of the ESCO concept, difficulties to obtain financing for ESCO projects and the complex procurement process.

4.3 Spain

The ESCO market in Spain had a slow growth during 2005-2010 and was driven by large national programmes (Bertoldi et al., 2014). The Spanish market has expanded fast during 2011-2013 driven mainly by rising energy prices according to Bertoldi et al (2014). The primary focus of the ESCO projects have been public lighting and public buildings, with some attention on private non-residential buildings and industries involving cogeneration, audits and HVAC control systems (Bertoldi et al., 2014).

According to Bertoldi et al. (2014) there were approximately 20-60 ESCOs in Spain in 2013. In the JRC ECSO database fifteen ESCOs can be found when searching for companies in Spain (JRC, 2014b). The majority of the companies are local and national, but approximately a third of all companies an international and they have diverse backgrounds (Bertoldi et al., 2014).

The size of the Spanish ESCO market is estimated to be €400-500 million annually, and the market potential is estimated to over €5000 million/year (Bertoldi et al, 2014).

ESCO Projects

The most common type of ESCO projects in Spain is public lighting which represents about 90% of all public projects (Bertoldi et al., 2014). Other types of projects with public authorities focus on public buildings (municipal offices and health care facilities) and water supply renovations. ESCO projects in the private sector have been carried out for hotels, corporate buildings, sports facilities, heating systems in apartment buildings, and big industries (Bertoldi et al., 2014).

In Spain, the most common ESCO contract is Public-Private Cooperation Agreement, but EPC is growing in the private sector (Bertoldi et al., 2014).

According to Bertoldi et al. (2014) all types of ESCO financing can be found in Spain. There are state subsidies available in Spain for ESCO projects. As an example Bertoldi et al. (2014) mentions the F.I.D.A.E that was launched in 2013 with almost €123 million from the JESSICA Fund. The objective of the programme is to finance sustainable urban projects of energy efficiency developed by ESCOs.

There are a number of positive factors that have been made in Spain to strengthen the Spanish ESCO market, but still many ESCOs see the need for more dissemination and a more clearly political ambition regarding energy efficiency (Bertoldi et al., 2014). Difficulties to obtain financing are considered to be a main barrier for ESCO projects in Spain.

Spain is considered to be an intermediate market with regards to Energy Performance Contracting in the European Transparense project (Garnier, 2013).

4.4 Sweden

The Swedish ESCO market experienced a market boom in 2004-2005 but the growth has been more slow since 2009 (Bertoldi et al., 2014). The Swedish market for EPC can be considered to be well developed. In the European Transparense project Sweden is considered to be an

advanced EPC market. The EPC model has been known in Sweden for decades but the market regularly struggles with a weak demand (Gode, 2013).

There are approximately 5-6 companies in Sweden offering EPC (Gode, 2013). The ESCO companies in Sweden are mostly building and control manufacturers, which operate ESCO services as supplementary to other business activities (Bertoldi et al., 2014). In the JRC ECSO database three ESCOs can be found when searching for companies in Sweden (JRC, 2014b). A typical EPC project in Sweden lasts 5-10 years and results in typical annual energy saving of 16-30%. The value of the contract is between 1 and 5M Euros (Gode, 2013). According to Bertoldi et al (2014) the market size was estimated at €60-80 million in 2010.

In Sweden there is an association "EnergiEffektiviseringsFöretagen" (EEF, Energy Efficiency Companies) which is a platform of companies that profile themselves as suppliers of the most energy efficient products and services, and therefore also represents many ESCOs (Bertoldi et al., 2014). In Sweden consultants, universities, research organisations, the national energy authority (Swedish Energy Agency, SEA120), and the ESCOs promote market development, including the organization of trainings, workshops, and seminars, as well as the implementation and promotion of demonstration projects (Bertoldi et al., 2014).

ESCO Projects

In Sweden many of the ESCO projects take place in municipal buildings, such as schools, hospitals, administrative buildings (Bertoldi et al., 2014). ESCO projects are less common within the private sector, but there are some examples such as hotels, retail estates, office buildings, and even some residential buildings (Bertoldi et al., 2014). In Sweden ESCO projects typically include the renovation of complex building systems, lighting, envelope, HVAC, operation and education among others. Lately there are examples of construction and installation that have become part of energy services.

Most of the ESCO projects in Sweden use the EPC guaranteed savings model (Bertoldi et al., 2014). Municipal energy companies have started to use "comfort contracting", a type of chauffage contract.

According to Bertoldi et al (2014) a number of regulatory factors contribute to the Swedish ESCO market development; a combination of EU-driven policies and locally tailored ones, including energy certificates for buildings, a subsidy scheme for public buildings such as KLIMP and OffROT, and market instrument such as CO_2 taxes, green certificates, and electricity tax for energy intensive companies. These activities increased significantly the profitability of energy efficiency measures and strengthened the market for EPC. The Transparense project presents some barriers for the Swedish EPC market; uncertainty about the public procurement act, lack of knowledge of the EPC model and discontinuation of public grants (Gode, 2013). There are procurement guidelines for EPC issued by the Swedish Environmental Management Council in 2009 in addition to procurement models produced by the Swedish Energy Agency but these are not widely used (Bertoldi et al., 2014). Some identified factors to boost the market is more information and increased competence among the actors, new business models and cooperation among actors (Gode, 2013).

In Sweden financing ESCO projects is not the most crucial problem as opposed to many other markets, usually clients (public clients and industry) can either finance projects from their own budgets or take commercial loans (Bertoldi et al., 2014).

4.5 The Netherlands

In the Netherlands there has been a political will to establish an ESCO market since the 1990s but little has happened because energy efficiency has been moving ahead through other types of projects (Bertoldi et al., 2014). In the European project Transparense the Netherlands participate as a beginners market for Energy Performance Contracting (Garnier, 2013). The Dutch ESCO market is slowly increasing. According to Bertoldi et al. (2014) there are approximately 50 ESCOs in the Netherlands out of which 20 take financial risks. Some examples of Dutch companies active in this are a.o. BAM, Cofely, Strukton (non-residential), Volker Wessels, Eneco, local solar energy associations and KiesZon. KiesZon develops solar projects and operates as an ESCO. In the JRC ECSO database two ESCOs can be found when searching for companies in the Netherlands (JRC, 2014b). The potential of the Dutch market is estimated to be €30 million, including energy and construction costs, mainly in the scope of retrofitting projects. There is an established ESCO association in the Netherlands, the ESCoNetwerk.nl which was established in 2012.

ESCO Projects

The number of completed projects is limited in the Netherlands (Bertoldi et al., 2014). Typical ESCO projects in the Netherlands take place in new non-residential buildings and dwellings and to some extent in existing dwellings. Key clients are primarily the public sector, although there are some private clients too (Bertoldi et al., 2014). Focus of the ESCO projects are public administration buildings, health-care facilities and swimming pools. Projects with housing corporations, investors, and building managers have been rare (Bertoldi et al., 2014). The ESCO projects in the Netherlands usually involve energy efficient architectural design and equipment, CHP, heat and cooling provision, pumps, insulation, furthermore operation and maintenance (Bertoldi et al., 2014). According to the Dutch NeZeR partners most ESCO projects for buildings are in the non-residential sector. There are also a few ESCO projects which cover the heating installation or solar panels in new residential buildings. Usually the total management and maintenance of an installation is conducted by the ESCO, often on the basis of a performance-based contract. One example of a company that offers solar cells is KiesZon. The power generated by the solar system is sold to the resident per kWh. KiesZon invests and takes the risks for a period of 15 years. Also maintenance, inspections, monitoring, is carried out. There is one example of plans for renovation towards zero energy being done by the energy-cooperation Blijstroom at the location van MaanenBlok (Rotterdam). This covers the renovation of apartment buildings with 424 households and other functions (swimming-pool, companies etc.).

EPC with guaranteed savings is the most preferred ESCO contract in the Netherlands (Bertoldi et al., 2014).

There have been changes in the Dutch public procurement practices in recent years which favour ESCO projects (Bertoldi et al., 2014). Instead of focusing on initial costs the central government and local governments choose offers that produce lower life-cycle costs.

There are some financial and fiscal schemes that could provide a positive environment for ESCOs, because they are available both for the owners and the implementers (e.g. ESCOs) of the energy efficiency projects (Bertoldi et al., 2014).

According to Bertoldi et al (2014) one of the key barriers of the Dutch ESCO market is the lack of reliable information and the lack of examples. In the Netherlands, ESCO projects are considered to be complex when compared to alternatives (e.g. own investment using a grant support), and are therefore considered to be expensive.

5 THE ROLE OF ESCOS IN NZEBR

The EU Directive on the Energy Performance of Buildings has been a driver for governments to encourage development of energy services, as well as the EU Directive on energy end-use efficiency and energy services has encouraged governments' motivation for setting energy saving targets and practicing energy efficient procurement. In most of the countries, ESCO-contracting has therefore been promoted as one of the ways to achieve energy savings in the existing building stock. It is seen as an essential input for reaching international as well as national goals on energy savings and CO_2 reductions (including the European 20-20-20 goals).

As can be seen in section 4, the energy services market status summary for the partner countries, ESCO-contracting has not been used widely in renovation projects with NZEBR. Since there is no clear definition of NZEBR yet, the NeZeR project uses the following formulation; *"renovation with ambitions to reduce the energy use substantially"*.

NZEBR are performed in the partner countries in pilot scale rather than as the normal renovation procedure. Some of the possible reasons why NZEBR has not been a breakthrough on the market yet are discussed below.

The ESCO market is developing in the partner countries. There are many factors affecting the development, such as regulatory factors and financial opportunities. These factors differ between the partner countries. Residential buildings are not the focus of ESCO companies in any of the countries. In Finland and Romania many ESCO projects have been performed for the industry. In Sweden, the Netherlands, Finland and Spain the public sector is today the most important client. In Spain 90% of the public ESCO projects are related to public lighting. In Sweden and the Netherlands the projects for the public sector mainly concern administration buildings, healthcare facilities and schools. There are examples of clients from the private sector in all of the countries.

In some of the partner countries, such as Finland, the first ESCO projects were industrial projects but the focus has changed and the primary target of ESCO projects is now municipal buildings. With the changing focus towards buildings and municipal projects, ESCO services are becoming more complex. With the ESCO concepts like EPC the guaranteed savings become more complex which might be a significant obstacle to overcome. However, in the case of industrial clients ESCOs were often competing with in-house expertise but municipalities are more in need and therefore more open for an outside expert or outsourcing which might be an advantage for the ESCO models. One argument against ESCO contracting is that it is more profitable for the building owner (municipality, private real estate company, etc.) to complete the energy-efficient retrofitting themselves, as an in-house project. Many argue that if the building owner itself completes the energy-retrofitting, competences will stay in-house. On the other hand a reason for building owners to carry out energy retrofitting of their buildings as ESCO-contracting is that it would have been difficult as an in-house effort; many, especially smaller and medium-sized building owners, have reduced their staff and maintenance budgets over time, partly resulting in more outsourcing. Competing alternatives to ESCO projects is seen as a barrier for ESCO projects in many of the partner countries such as the Netherlands and Finland.

Another of the challenges regarding ESCOs role in NZEBR is that ESCO services in the form of EPC etc. with guaranteed savings in many cases have, in Sweden and probably in other countries as well, been about picking the low-hanging fruits such as automatic control, adjustments of ventilation, etc., which might give savings of 15-30% with relatively small and inexpensive measures (Bångens, 2014). In order to achieve nearly zero in energy use it often

requires more extensive renovation measures such as insulation of the building envelope, replacement of windows, management of thermal bridges, renewable energy, etc. These types of actions are often related to higher costs and longer payback time while the outcome doesn't always reach the calculated performance. To guarantee savings on these types of projects is more risky for the ESCO. Possibly the business models must be modified to better fit the market demand. This is something that EEF (EnergiEffektiviseringsFöretagen) is trying to find out by performing interviews with clients and by having an ongoing dialogue with the energy service companies (Bångens, 2014).

Municipalities that purchase ESCO services often have a contract that includes several buildings with varying savings opportunities. This more comprehensive approach means that more profitable measures can pay for less profitable measures and the result is profitability for the whole project. This approach is more difficult to apply to smaller real estate companies, housing associations etc. Private entrants also often have a shorter time horizon regarding payback time. There is a specific mismatch between the long-term features of an ESCO project and the volatile nature of companies that own offices and retail buildings that can be a barrier for conducting these NZEBR projects in the private real estate sector.

There are differences between countries regarding legislation but the procurement rules within EU are similar. In several countries the procurement rules are mentioned as a problem for ESCO projects. The process and the rules are considered complex. The bidding process is time consuming and ambiguous. In both Finland and Sweden projects have been halted because of suspicions that the project did not follow the procurement rules. This has resulted in a lack of trust of the ESCO concept and a widespread skepticism towards the concept amongst many stakeholders on the market. In many of the partner countries it is mentioned that the possible solution to the skepticism would be independent and correct information. In most markets there is still a need for more information, education and dissemination regarding ESCO concepts. Another problem related to the lack of trust is that in some markets many providers are new and inexperienced, which has resulted in projects with disappointed customers, therefore the model is expected to be changed and adapted to the needs.

One advantage with ESCO-contracts is that in contrast to traditional client-supplier relations in the building sector, ESCO-contracts have a long-term perspective, integrating implementation of energy efficiency measures in the building phase with the operation phase of the buildings. Traditionally, contractors implementing retrofitting are in practice not responsible for the expected goals actually are being met in the operation phase, which has been a concurring frustration for many building owners.

6 THE TRANSPARENSE PROJECT

The Transparense project is about increasing the transparency of energy markets within the European Union (Transparense, 2014). In the project much effort has been put to increase trustworthiness of the Energy Performance Contracting (EPC) markets throughout Europe. One of its main outputs is the European Code of Conduct for EPC defining the basic values and principles fundamental for the successful preparation and implementation of EPC projects within European countries.

Compliance with the Code of Conduct serves as a guarantee of the quality of EPC projects implemented. High share of EPC providers, which is energy service companies (ESCOs), that will be ready to adhere to the principles of the Code of Conduct is expected to raise confidence in using EPC by the potential clients. Code of Conduct will be directly tested on specific pilot projects in all participating countries, at the same time contributing to the promotion of good practice principles both on the side of ESCOs and clients. Some of the pilot projects are;

- Renovating the Hanzehal (sports hall) in the Netherlands
- Street lighting in Spain
- Energy saving in buildings in Greece

Within Transparense, ESCOs are being offered high-quality training programs and materials. The training programme developed is consisting of 5 training modules:

- I. EPC Basics
- II. EPC Process - from Project Identification to Procurement
- III. EPC Process - from Contract to Guaranteed Savings
- IV. EPC Financing
- V. EPC Support Strategy

Gradually increased demand for EPC and emergence of new ESCOs is expected to be further supported by the new EU directive on energy efficiency, which defines the requirements for making use of energy services by public institutions.

The Transparense project started in April 2013 and will be completed in September 2015. The project brings together 20 European partners and is financed by Intelligent Energy Europe Programme of the European Union with co-funding from the project partners.

The project partners include actors from the following countries: Czech Republic, United Kingdom, Slovenia, Germany, Sweden, Belgium, Austria, Bulgaria, Italy, Lithuania, Netherlands, Poland, Portugal, Slovakia, Spain, Greece, Hungary, Latvia, Denmark and Norway.

7 DISCUSSION

The compilation of information regarding the situation in the partner countries shows similarities, and differences, between the countries when it comes to the current status regarding ESCOs involved in NZEBR.

In most of the partner countries ESCO services are seen as one solution for improving energy efficiency, but not as the only one. However, EPC and demand side measures face numerous barriers; for example in Spain, there is a well-established legislative background combined with promotional programmes, institutional framework and even financial credit lines, still the expected success of the ESCO solution even in the directly targeted areas (governmental buildings, public buildings) falls much behind expectations. In this case the key barriers are not clearly identified. Other markets have been more successful. The Swedish ESCO market experienced a boom a few years ago, which was seen as a good example in Europe. The rapid market growth was a result of the successful combination of economic and regulatory factors. However in 2009, the market halted due to an unsuccessful ESCO project. The ESCO market in Finland experienced a similar situation as in Sweden.

In some countries, the market is largely driven by needs other than energy efficiency improvement, for example by deferred maintenance and poor indoor air, the need for modernization and renovation of properties, etc.

In general there is a lack of trust on the market regarding ESCO model and in most of the partner countries there is an evident need for more training effort to explain the ESCO model to customers. Also a broad range of energy services should be developed that meet better the more flexible needs of the customers. Confidence between actors will also have to be developed.

One of the barriers for the ESCO market is the lack of reliable information and the lack of examples. The Transparense project may be a part of the solution as it aims to increase trustworthiness of the Energy Performance Contracting (EPC) markets throughout Europe. One of its main outputs is the European Code of Conduct for EPC defining the basic values and principles fundamental for the successful preparation and implementation of EPC projects within European countries (Transparense, 2014).

In conclusion the following aspects need to be focused on in the future:

- Integration of building refurbishment measures involving the building envelope
- Use of Renewable Energy Sources
- Current legal framework
- Experience of ESCO model in residential sector is quite limited
- Lack of understanding of ESCO concept and mistrust
- Limited financing possibilities
- Public procurement regulations
- Small size of projects

Some of the advantages and disadvantages of ESCO models are given below;

- Professional approach
- Guaranteed result
- Alternative financing
- No direct borrowing by owners
- Continuing responsibility for the result
- Possibly reduced state funds for renovation projects
- Payments based on energy savings may lead to lower level of comfort

- ESCOs are more interested in shorter term savings
- Individual approach is always necessary

8 CONCLUSIONS

The compilation of the current status of the ESCO markets in the partner countries show similarities when it comes to information, training and dissemination about the ESCO model. There are also differences regarding perceived barriers and market development.

Within the NeZeR project local action plans and roadmaps for NZEBR will be created and disseminated to many of the key stakeholders identified in the stakeholder analysis. In many cases these are the same stakeholders who can have an impact on the ESCO market development.

The establishment of the national NZEBR clusters will increase the interest for NZEBR and RES in the participating countries and strengthen the impact of the NeZeR project. There is a large potential for NZEB renovation measures in Europe and the NeZeR project will promote these technologies and concepts. The compilation of the current status of the ESCO markets in the partner countries shows important barriers and advantages with ESCO model that will be considered when performing local action plans and roadmaps for NZEBR.

The findings about the current situation of ESCO markets including barriers and success factors will be considered when developing local action plans and roadmaps for NZEBR and deployment of RES in existing buildings in NeZeR-project.

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Transparense (2014) European Research project

http://www.transparense.eu/eu/home/welcome-to-transparense-project

10 APPENDICES

Further information is described in related background documents:

Appendix 1: Role of ESCOs in NZEBR - Questionnaire

11 APPENDIX 1

This questionnaire is developed to get input from the different partner countries about "ESCOs role in NZEBR" for each specific country. For the Netherlands and Spain information can probably be obtained from national partners involved in the EU project "Transparense", http://www.transparense.eu/eu/home/welcome-to-transparense-project.

Definitions of an Energy service company (ESCO) can be found on:

http://iet.jrc.ec.europa.eu/energyefficiency/esco

Please answer the questions as thoroughly as possible and send tour contribution to daniel.holm@ivl.se no later than **2014-10-17**.

1. Are there any ESCOs working actively in your country with energy building renovation? Have they even performed NZEBR? Please name these companies.

2. What kind of services do the ESCOs offer?

3. If the answer is YES on question 1, please give examples of projects and results.

4. If the answer is YES on question 1, please mention what type of buildings that ESCOs work with. For example, in Sweden ESCOs primarily have been working with municipalities and public buildings, not so much with multi-family buildings.

5. Which are the most common measures performed by the ESCOs?

6. Does the ESCO offer any guarantees for their measures? In that case what?

7. What does the ESCOs business model look like?

8. If you have any information about advantages or disadvantages related to the ESCOs business models (related to NZEBR), please mention them.

9. Have any research been carried out in your country regarding ESCOs work, results and impact in on the building stock? Please provide links, reports etc.