IEA IETS
Annex XVI
Energy Efficiency in SMEs

Task IV: Energy services and business models for industrial SMEs

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Executive summary

Improved energy efficiency is a no regret measures in climate change mitigation. For individual companies, improved energy efficiency is one crucial component in order to maintain and improve competitiveness. Energy services are an often stated promising means to deliver high energy efficiency improvement impacts. Energy services has predominantly been targeted towards the building sector where often measures are similar across a large number buildings in a building stock, minimizing transaction costs in the procurement phase of an energy service contract. Less attention has been paid towards energy services in the industrial sector and even more so, for industrial SMEs. This report aims to improve knowledge about the area of energy services in industrial SMEs. The work has been carried out under the IEA IETS Implementing Agreement within Annex XVI, Energy Efficiency in SMEs, Task IV, Energy Services, where a total of five countries, Denmark, Belgium, Japan, Spain and Sweden, have made national contributions about the current status of energy services among industrial SMEs in their respective country.

The primary method has been workshops together with national literature reviews in respective country.

Some notable remarks from the results of this report can be found. One is that the creation by the federal government of Belgium of the public ESCO Fedesco has proven to have had a catalytic effect on the development of the ESCO market in Belgium. Despite so, the energy service market in Belgium is declining. The same holds for Japan. The major reason for the decline in Japan is due to a variety of barriers to wider penetration of ESCO projects in Japan. Among them, high transaction costs in the contractual process seem to be the major barrier.

Some general findings from this study is that the market for energy services seems to have started in 1990 and the major focus has been towards buildings, but a growing interest towards industrial SMEs has been seen. Major barriers to the adoption of energy services are distrust at demand side, e.g. Belgium, Japan and Sweden, together with high transaction costs. Successful policies towards an emerging energy service market is the creation of competence centers, e.g. Belgium and Denmark, or the creation of associations for knowledge exchange as found in Belgium, Japan and Spain. Also establishing a public ESCO has a catalytic effect (as observed in Belgium and Tokyo and Aomori prefectures in Japan). Further studies, not the least research-oriented studies, are suggested in the area of energy services among industrial SMEs.

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1. Introduction

Improved energy efficiency is a no regret measures in climate change mitigation. For individual companies, improved energy efficiency is one crucial component in order to maintain and improve competitiveness. Energy services are an often stated promising means to deliver high energy efficiency improvement impacts. Energy services has predominantly been targeted towards the building sector where often, measures are similar across a large number buildings in a building stock, minimizing transaction costs in the procurement phase of an energy service contract. Less attention has been paid towards energy services in the industrial sector (Thollander and Ottosson, 2011) and even more so, for industrial SMEs (Backlund and Thollander, 2011).This report aims to improve knowledge about the area of energy services in industrial SMEs. The work has been carried out under the IEA IETS Implementing Agreement within Annex XVI, Energy Efficiency in SMEs, Task IV, Energy Services, where a total of five countries, Denmark, Belgium, Japan, Spain and Sweden, have made national contributions about the current status of energy services among industrial SMEs in their respective country.

The primary method has been workshops together with national literature reviews in respective country. The original taxonomy used when conducting the research was based on the work by Bleyl (2014), and slightly revised to fit the area of industrial SMEs. In table 1 below, a presentation of the different energy service categories applied in this study, can be found.

Table 1: The used categorization of various types of energy service (inspired by Bleyl, 2014).

1. Consultancy services - Audits (auditors) - HVAC[1] planning (engineers) - M&V[2] plans - Project facilitation (consultants, Energy Agencies) - Financing solutions (bankers, accountants) - Contracts (lawyers) With client.	2. Technical services for hard- or software - Commissioning (EPCs [3], construction companies) - Operation & maintenance, repair (OEMs, technology providers) - Update of EMS software
3. Performance-based services (labeled as Energy-Contracting) - Energy Supply Contracting (ESC) - Energy Performance Contracting (EPC) - Integrated Energy Contracting (IEC)	4. Energy networks A novel approach that connects energy service providers to companies

The European Standard EN 15900 was published in 2010 and specifies the definitions and minimum requirements for an energy efficiency service. The purpose of this standard is to give guidance to both customers and providers of energy efficiency services, as mentioned in

[1] Heating, Ventilation and air conditioning
[2] Measurement & Verification
[3] Energy Performance Contracting

Article 1 of Directive 2006/32/EC, and to contribute to the development of a market for energy efficiency services.

The standard may be used as a reference document for appropriate qualification, accreditation and/or certification schemes for providers of energy efficiency services, as mentioned in Article 8 of Directive 2006/32/EC.

The process steps may be performed by different parties although the responsibility for the energy efficiency improvement is generally taken by one single party. The service provider and the customer should strive to implement a continuous improvement in energy efficiency.

2. Country specific reports

2.1 Sweden

i. Current ESCO market

The ESCO-market in Sweden is growing. Energy services in Sweden have traditionally been used by the public sector and in particular regarding modernization of buildings (SEA, 2010b). This despite the fact that research has shown that the energy savings potential for the adoption of energy services among Swedish small- and medium-sized industrial companies is significant, approximately 600 GWh/year as a low estimate (Thollander et al. 2010). Other figures related to the potential for improved energy efficiency by means of energy services has been estimated at as much as 15% of the Swedish energy demand (Geissler et al. 2006). Research on energy services in industry is still a minor area of research in Sweden. Backlund and Eidenskog (2013), Backlund and Thollander (2011), Lindgren Soroye and Nilsson (2010), Thollander, et al. (2010) and Bergmasth and Stridh (2004) are a few exceptions to this.

Consultancy services

Many technical consultancy bureaus are today offering energy audits in their business portfolio. Together with offering indirect energy services, some consultancy bureaus are also offering financial solutions in addition to audits.

Apart from technical consultants, some energy utilities are also offering energy audits to their customers, but up until today only to a limited extent.

The technology suppliers as well as ESCOs are also offering energy audits in their business offers.

As regards the other related energy consultancy services, the market for such is not well known, but estimated to be moderate to low among Swedish small- and medium-sized industrial companies.

Technical services for hard- or software

A large number of companies, including technical consultant bureaus are offering commissioning. As regards other types of technical services, operation and maintenance is the by far largest. However, the magnitude of services offered among Swedish industrial small- and medium sized companies is not known. As regards EnMS softwares, there are only two software available to the author's awareness, free-wares, where a less complicated version of a certified EnMS is offered.

Performance-based services (labeled as Energy-Contracting)

A number of actors are providing performance-based services towards industrial small- and medium-sized companies. Even though with a high potential (see e.g. Geissler et al. (2006)),

the adoption among small- and medium-sized industrial companies is not perceived as high, and moreover, is faced by a distrust of the energy service providers (Trygg et al., 2010).

Energy networks

A little more than 30 energy efficiency networks towards small- and medium-sized industrial companies are under operation or have been under operation in Sweden the past years (Paramonova et al., 2014). In addition, four other networks, either sector specific, or expert networks are also under operation for industry (Ivner et al., 2014).

ii. Policies to stimulate ESCO market

Since April 2010 to December 2014, a national energy audit program has been running under the administration of the Swedish Energy Agency. About 980 energy audits were conducted. This has been the only national policy to stimulate the energy service market in Sweden. For a more thorough presentation of the Swedish energy audit program, please see Backlund (2014).

In addition, some of the spotted energy efficiency networks have also been shown to be partly financed by the Swedish Energy Agency, but then only project based.

2.2 Denmark

i. Current ESCO market

ESCO – Energy Service Companies is often used in relation to Energy efficiency services in the municipalities in Denmark. In these cases it is an Energy Service Company that is responsible for the projects and the economic aspects related to the work. The payment for the activity is the saving that the municipality achieves in relation to the project.

This type of project could also be a possibility for industrial companies, eventually organized through a network of small and medium sizes enterprises. Some consultants give guidance on how to upstart this type of projects, but there is only limited experiences related to Energy efficiency services in the Danish industry.

ii. Policies to stimulate ESCO market

The Danish Energy Agency has in the fall of 2014 created a Secretariat for Energy savings in private enterprises called “Secretariat for Energy savings”.

The purpose of the Secretariat for Energy savings is to support the identification and dissemination of different Energy saving activities in private enterprises. The purpose is also to promote the realization of energy savings in private enterprises with special focus on small and medium sizes enterprises and larger companies outside other Energy saving regulation activities from 2014 to 2017.

The secretariat shall support that initiatives for energy savings in the industry, with a significant greenhouse effect, is identified and communicated for the advantage of competitiveness in the industry. This will be done in collaboration with trade associations and

focus on, e.g. , increased dissemination of knowledge, advice and guidance on energy saving projects.

The Secretariat will in close dialogue with stakeholders in the area support the existing schemes update and supplement with relevant analyzes of the Danish commercial energy consumption, experience with energy savings and the identified barriers in relation to implementation of energy savings.

The Secretariat is currently in the initial analysis phase and further information will be available when the framework for the work of the Secretariat is ready.

2.3 Belgium

i. Current ESCO market

In 1990, the ESCO business in Belgium started to develop under the impetus of initiatives taken by the federal and Brussels regional governments to promote the concept of third party investment (Vanstaelen, 2012).

Large companies were the first to offer services in the ESCO business, mainly facility and building management in the public sector, while new entrants started offering third party financing for buildings or specialized in relighting projects.

ESCO companies mainly targeted the public sector, especially sports halls and schools; the industrial sector was also targeted in particular for supply contracts but to a lesser extent. The main motivation to opt for an ESCO service by the consumers was to have energy efficiency investments off their balance sheets. Energy Performance Contracting with performance guarantees did not really develop.

Activity in the Belgian ESCO services market remained limited over time. In 2005, a boost was given by the creation by the federal government of Fedesco, a public ESCO focused on energy saving projects in federal public buildings. It applied third party financing with financial resources it received from the Kyoto Fund. Since 2007, Fedesco even had the exclusive right to offer third party financing to federal buildings; in 2008 it expanded its activities with Energy Performance Contracting. (Vanstraelen, 2012)

The activities of Fedesco resulted in a growing interest in Third Party Financing and Energy Performance Contracting. Both multinational companies in building automation and control and large multinational companies offering facility and building management started to offer EPC. Also banks started to develop specific third party financing services.

In order to stimulate the further development of the ESCO market, Fedesco was asked in 2008 to create a federal competence center for third party financing and energy services and to establish a Belgian ESCO Association (BELESCO) with other market players. The tasks of the association is to represent the Belgian ESCO industry, to disseminate information to and train public and private customers, to build a database of EPC projects, an accreditation programme and to develop a model contract and tendering procedure for the public sector.

The list of members of BELESCO offers a snapshot of the current ESCO market in Belgium, see Table 2 (Belesco, 2015). About half of the companies are categorized as private ESCO companies, a quarter are engineering companies. About one third of these companies offer energy consultancy services; only one quarter indicate that they offer ESCO services. Comparison of these numbers to the number of companies reported in 2010 indicates that the number of companies active in the Belgian ESCO market have declined, see Figure 2 (Belesco, 2015; Coolen & Vanstraelen, 2011).

The Belgian ESCO market mainly targets the public and commercial building sector. Projects include replacement of boilers and chillers, cogeneration, relighting, upgrading the building envelope and other technical measures. The industrial sector is hardly addressed by the ESCO market, although some projects in industry are reported. One of the barriers, reported by industrial parties, are the uncertainties they have about the future of the ESCO company. The industry has for instance questions about their solvability, questions if the company will keep its production-plant on the location, etc. In the built environment, these questions/uncertainties about the company are less important as in case of for instance bankruptcy of the owner or tenant of a building, the building and its energy saving measures can be quite easily sold/rented to another company. (Vanstraelen, 2012; Coolen & Vanstraelen, 2011).

Table 2. Snapshot of the ESCO-companies that are members of the Belgian ESCO-association, 2015.

Member	Activity						Service offered							
	Bank	Private ESCO	Public ESCO	Engineering	Consultancy	Project facilitation	ESCO services	Maintenance services	Project facilitation	Consultancy	Third party financing	Legal services	M&V services	Other services
1	X										X			
2		X												
3				X	X					X				
4		X			X	X				X	X	X		
5		X												
6				X										
7				X				X	X					
8				X			X			X			X	
9			X											
10		X			X		X							
11					X	X	X	X	X	X		X	X	X
12		X			X	X	X			X			X	
13			X			X								
14		X					X	X	X	X			X	
15		X		X										
16			X											
17		X												

18		X												
19		X												
20		X								X				
21				X	X									
22		X												
23				X			X	X	X					

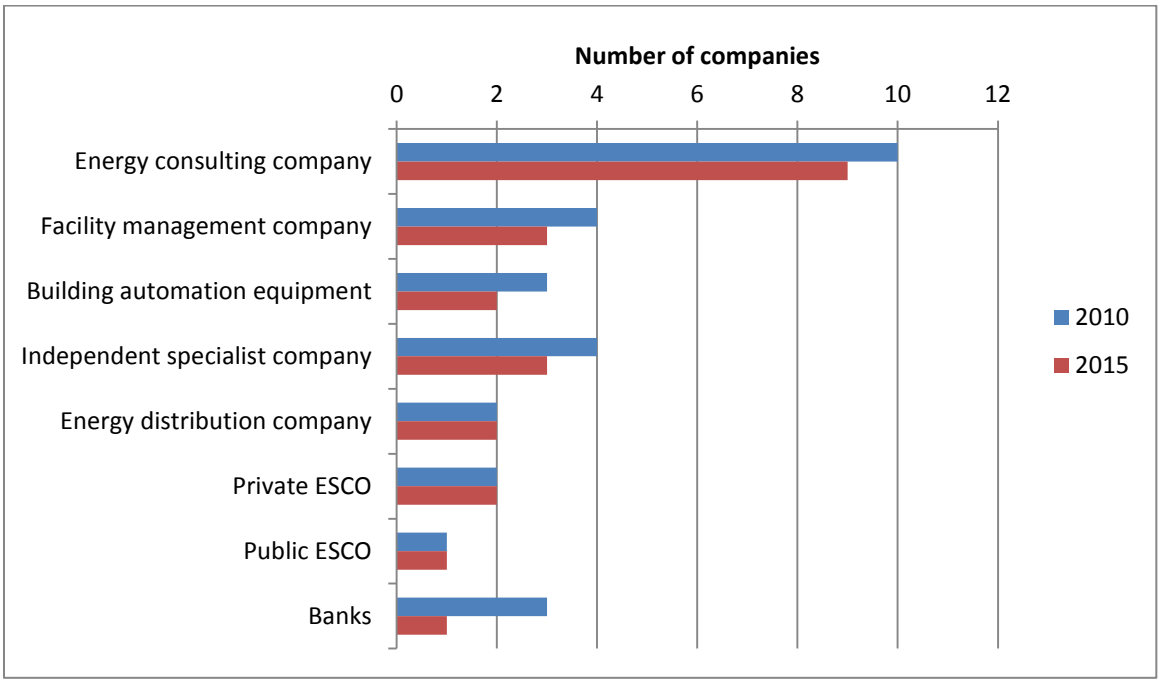

Figure 2. Number of Belgian ESCO companies in 2010 and in 2015.

ii. Policies to stimulate ESCO market

The creation by the federal government of Belgium of the public ESCO Fedesco, as described above, has proven to have had a catalytic effect on the development of the ESCO market in Belgium.

Energy efficiency is mainly the competence of the different regions in Belgium; they as well have implemented some measures to stimulate the ESCO market. The regional authorities instructed the distribution grid operators [4] to develop ESCO services, targeting public buildings mainly.

Most actions were taken by the Flemish Government. Flanders followed the example of the federal government and created in 2012 its own public ESCO, the VEB[5]. (Belgian Federal Government, 2011). This company provides energy services in the field of energy contracting, energy efficiency and renewable energy efficiency exclusively to the public services linked to the Flemish Government.

[4] Targeted grid operators are: Infrax and Eandis in Flanders; Igretec and Tecteo in Wallonia
[5] VEB stands for the 'Vlaams Energiebedrijf', which translates as the Flemish Energy Company

In 2013, the Flemish Government decided to launch an initiative to stimulate the ESCO market specifically targeting SMEs. This initiative consists of five elements (Flemish Government, 2014):

- The organization of a stakeholder platform to gather information on barriers faced by the ESCO markets and to suggest solutions to overcome these barriers
- The assessment and amendment of current legislation applicable to ESCOs
- Demonstration projects (3 to 5) with a particular focus to develop feasible ESCO business models targeting SMEs
- Benchmarking with other countries
- Recommendation on how to stimulate the ESCO market in Flanders

The Flemish Government will consider the implementation of additional measures based on the results of these initiatives.

The Flemish Agency for Entrepreneurship was appointed as responsible agency to manage this initiative. Four demonstration projects were started indeed in four different areas in Flanders. The projects consist of different phases. First are the participating SMEs monitored and audited. An energy action plan is then drafted based on the detected energy saving measures. If the energy saving potential is substantial enough, an ESCO contract is negotiated then. The projects target SMEs with an annual energy cost between € 20,000 and € 250,000. These projects are still ongoing at the time of drafting this report, no results are available yet.

2.4 Japan

i. Current ESCO market

The concept of ESCOs was first introduced in Japan in the mid 1990's. In 1996 the government started feasibility study on ESCO market in Japan. Following First ESCO Co. Ltd., an ESCO that started ESCO business for the first time in Japan, companies from various industries, such as energy, engineering, manufacturing, and facility management, joined the market. Japanese Association of Energy Service Companies (JAESCO), an industry organization for ESCO was established in 1999 and is now joined by 83 ESCOs (JAESCO 2015).

The ESCO market in Japan grew for the first few years from its inception, and after that the market size has been staying at around 300 million US$ (at 2005 price and exchange rate, hereinafter the same) with about 200 contracts (Figure 1). It should be noted that a half of the sales in recent years is by energy service providers (ESPs) and on-site power generation, which is relatively a new form of ESCO service and which purpose is sometimes not improved energy efficiency but power reliability and business continuity. If we exclude ESPs and on-site power generation, the remaining sales is in a trend of gradual decline, although the number of ESCO projects remains the same level at around 150 to 200 per year (Figure 3). This implies the average size of projects is becoming smaller.

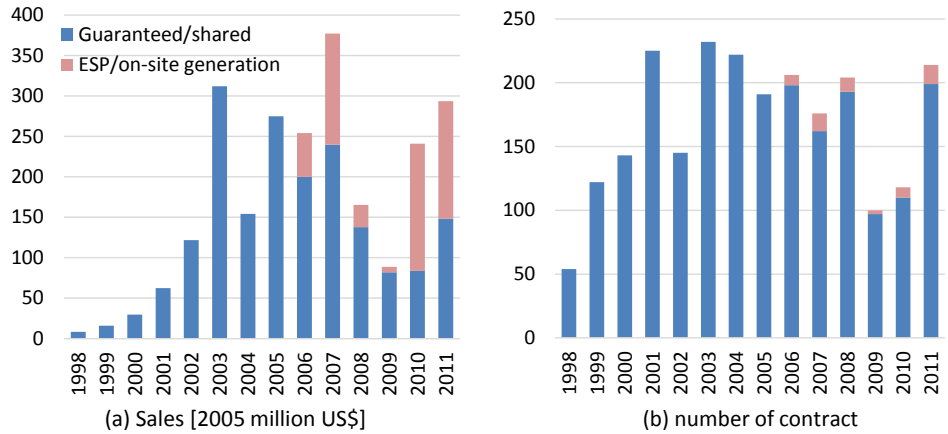

Figure 3. Japanese ESCO market: sales and number of projects. Source: JAESCO (2013)

Industrial and commercial sectors have roughly the same market size. Figure 4 and 5 show industrial and commercial ESCO market status respectively. Concerning the industrial sector, shared contracts has been much more popular than guaranteed contracts. Industrial ESCO market in recent years is almost dominated by ESPs and on-site power generation, and shared/guarantee contracts are only 2 billion JPY sales. Active industries in industrial ESCO projects include automobiles (20%), foods (18%), commercial machine manufacturing (15%), and chemicals (13%). Concerning commercial sector, guaranteed contracts are also popular as the same as shared contracts do, while the market share of ESPs and on-site power generation is not high. Majority of the commercial ESCO projects are in department stores and super-markets (27%), office buildings (22%), hospitals (15%), and hotels and accommodations (9%). Of the 256 ESCO projects included in the project database of JAESCO (2015), 187 projects (73%) are in private sector i.e. industrial plants or commercial buildings. The high share of private projects and the low uptake of ESCO projects in public sector should be noted as one characteristic of the Japanese ESCO market.

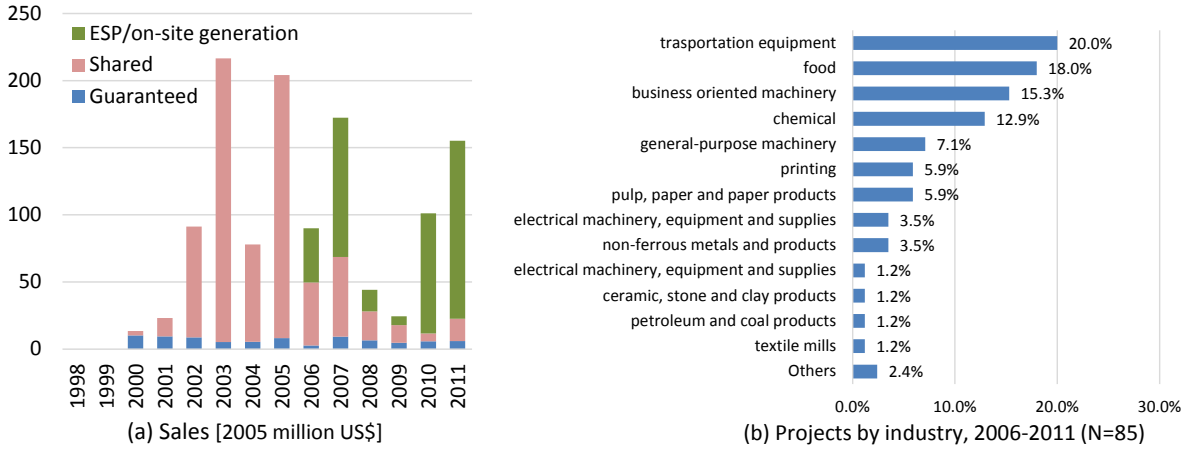

Figure 4. Industrial ESCO market in Japan. Source: JAESCO (2013)

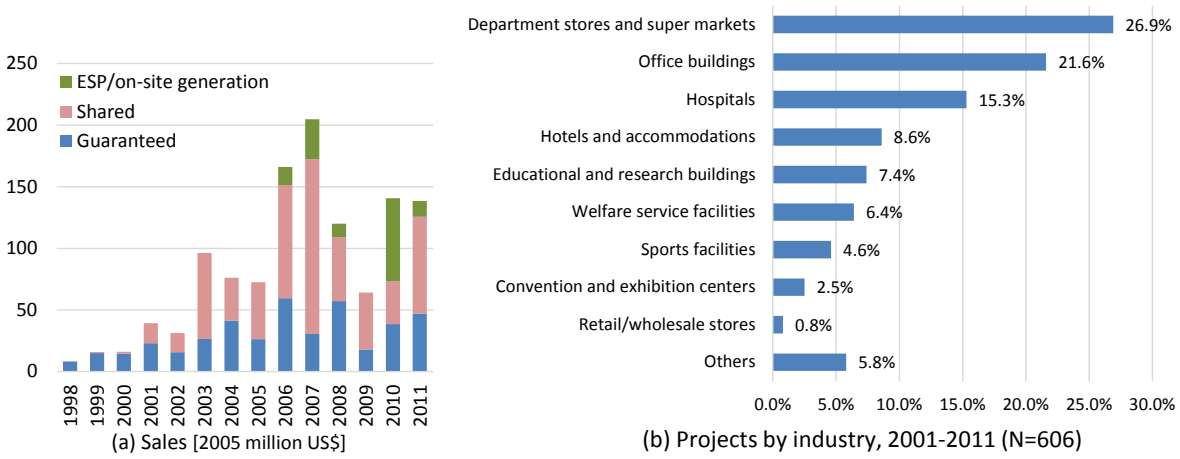

Figure 5. Commercial ESCO market in Japan. Source: JAESCO (2013)

Figure 6 and 7 present major energy efficiency technologies adopted in industrial and commercial ESCO projects respectively. Popular technologies in industrial ESCO projects includes cogeneration (27%), variable speed drives (VSDs) for pumps and fans (20%), and replacement of chillers (18%). In commercial ESCO projects, VSDs is the major technology which is adopted in almost 60% of the projects, followed by replacement of chillers (28%), inverters for lighting (24%), replacement of fluorescent lamps into high-frequency types (hf) (23%), and ventilation controllers by carbon dioxide concentration (21%).

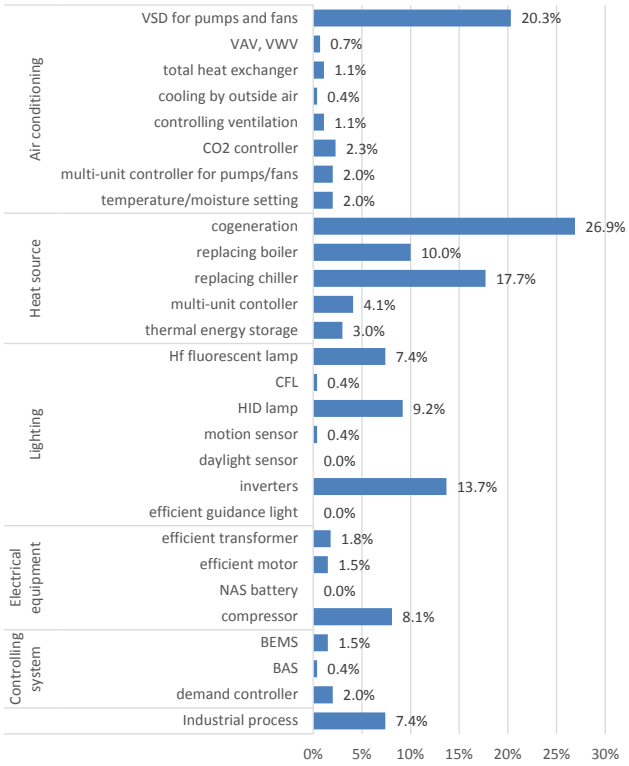

Figure 6. Energy efficiency technologies adopted in industrial ESCO projects in 2001-2010. Source: JAESCO (2012)

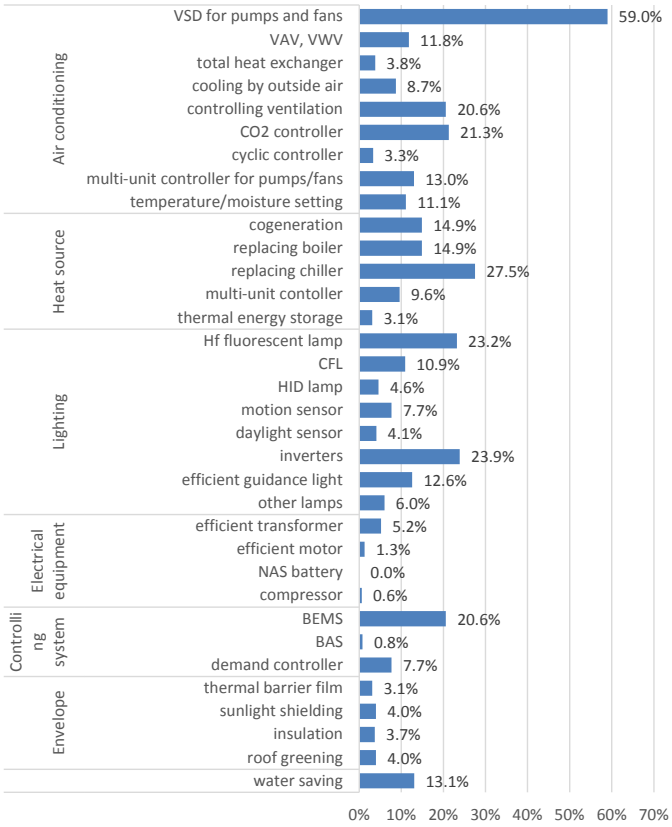

Figure 7. Energy efficiency technologies adopted in commercial ESCO projects in 2001-2010. Source: JAESCO (2012)

Why is the ESCO market in Japan not growing, and is even shrinking? Expert comments and a survey (JYURI 2014) reveal a number of barriers to wider penetration of ESCO projects in Japan. Among them, high transaction costs in the contractual process seems to be the major barrier. For example, it requires great deal of time and effort for ESCOs only to give customers the basic understanding of ESCO (such as the concept of performance contract) and convince them of potential benefits for both parties. Analyzing energy use and finding saving opportunities also require time and effort. Each industrial/commercial site has its unique characteristics with unique equipment and usage, which requires ESCOs a great deal of experience and expertise. Some ESCOs do not market them into industrial plants because industrial processes are often much more diverse than commercial buildings and difficult to take a standardized approach. Agreeing on how to set the baseline for saving calculation is also time consuming because it directly affects the payment customers make. All those forms of transaction costs diminish the economic attractiveness of an ESCO project, making its market size smaller.

Because of the high transaction costs, there are only two attractive market segments for ESCO projects: large commercial buildings (which are not so unique as industrial plants and are large enough to cover the transaction costs), and aggregated buildings or stores that have similar equipment and usage patterns (to which standardized methods can be applied). A market assessment shows that the majority of the ESCO projects so far in the Japanese

commercial sector had 50 million JPY (~ 0.4 million EUR) or more per project in sales, were conducted in buildings with floor area of 10,000 m^2 or more, and with annual energy costs of 60 million JPY (~ 0.5 million EUR) or more (JYURI 2014). This implies that smaller buildings are not an attractive target for ESCO projects in Japan.

Lack of credibility of customers is another kind of barriers to ESCO penetration. Even if an ESCO project itself seems very beneficial from an energy saving perspective, an assumption of the assessment is that the customer continues operation for the whole period of payback, which is in reality quite uncertain especially in the case of SMEs. This makes ESCO projects by SMEs difficult to be financed from outside parties such as banks.

Public procurement rules that conflict with ESCOs, such as budgeting on a single-year basis, is another big barrier to ESCO penetration in public sector. There are some efforts to improve public procurement rules and evaluation criteria in the public tendering process as explained below, but it remains the major barrier for ESCO project development in the public sector. As a result, the number of ECSO projects by local government remains around 100 per year (MLIT 2011), which is quite a modest level compared to the huge building stock owned by local governments. ESCO projects in buildings owned by the central government is also very limited (less than 10 per year), although about 10% conduct energy audit in renovation (MoE 2012).

ii. Policies to stimulate ESCO market

The government promotes ESCO penetration by three types of policies, namely information provision, financial support (subsidies), and promotion of ESCOs in public buildings.

a) Informational provision

The government has made various kinds of supporting documents, such as brochures, manuals, guidelines, tools and model contract documents, in order to give companies and local governments basic understanding and to help them proceed contracts and implement projects. The government has also conducted a number of surveys and feasibility studies to assess the market potential, establish standardized methodologies of EM&V (evaluation, measurement and verification), and analyze barriers to and drivers for the market development. Examples of such documents include (ECCJ 2000a, b, 2004, 2006, 2008, MLIT 2006).

b) Financial support (subsidies)

There are several subsidy programs available for ESCO projects. The largest one in the industrial sector is “Subsidy for Energy Efficiency Investments”, which started in 1998 and is still in place with annual budget of about 20 billion JPY per year. The largest one in the commercial sector is “Subsidy for High-efficiency Energy Systems and Buildings”, started in 1999 and is also in place with annual budget of about 5 billion JPY per year.

There was also a subsidy program for local governments to establish their energy efficiency visions from 1998 to 2010, by which many local government conducted feasibility studies of ESCO projects in public buildings.

c) Promotion in public buildings

The central government promotes ESCO projects in buildings owned by its ministries and related agencies. Several manuals have been published, such as MLIT (2006) and ECCJ (2006). In addition, Action Plan of the Government to Reduce Greenhouse Gases Emissions was established in 2007, which has a provision on ESCO saying "conduct a feasibility study on ESCO projects and implement them as much as possible". Furthermore, Green Public Procurement Act was established on 2007. The Act enables the government and related agencies to make a long-term contract as long as 10 years, instead of 5 years in a usual rule. Also, one of the general provisions of the Act promotes to consider ESCO contracts when replacing equipment or renovating buildings.

The government also supports local governments to utilize ESCO projects in their facility management and energy cost savings. Several manuals and model documents for tendering and contracts have been provided, such as ECCJ (2006) and METI (2007).

Some of the local governments are very active in implementing ESCO projects. Those activities are driven not only by energy and environmental concerns, but also by cost concern and the facility management perspective. Some of the successful cities and prefectures, such as Tokyo and Aomori prefecture, adopt a so-called "in-house ESCO" approach. This is basically a kind of audit and consulting scheme and not a financial scheme. In this approach, energy audits, potential assessment, and operational supports are provided by in-house engineers in their facility division. In an in-house ESCO program of Aomori prefecture in 2005 and 2006, energy cost saving of 53 million JPY per year was achieved by more than 200 energy saving measures conducted in 49 buildings (Aomori Prefecture 2008). Sakura city takes a flexible scheme by making use of a part of reduced energy cost by ESCO projects to finance energy efficient renovation of different buildings (Sakura City 2013).

2.5 Spain

i. Current ESCO market

According to Invest in Spain (2013), Spain is one of the European countries with higher energy use per GDP rate which represents interesting business opportunities.

Considering the Spanish situation regarding energy market, two issues should be highlighted;

a) A strong exterior dependency, 71.2 % in 2013 according to Eurostat methodology (Secretaría de Estado de Energía, 2013).
b) 91.6% of Spanish building stock was built before 2006, year of the approval of the new National Building Code based on 2011 data.

Therefore boosting the energy service market represents a priority for public bodies.

As a result of previous and current policy plans, which will be introduced in the following section, the energy service market in Spain has increased substantially in the last years, but

considering the above figures, big efforts need to be done to bridge the gap in comparison with other European countries.

Concerning ESCO market, despite the fact that ESCO models have been under operation since 1990s its application is far from its potential. Thus, the market is still in a novel phase.

The Institute of Energy Diversification and Savings (IDEA in advance), the Spanish body responsible for fostering and driving energy strategies at the national level, has compiled a data base of ESCO companies. This data base is not official in the sense ESCO companies are not obliged to register in this database to be certified as ESCOs, but in the absence of official data, it could provide a valuable sizing of the national market.

Nowadays there are 1.080 companies registered. The database has been developed in collaboration with three associations;

- Integral Maintenance and Energy Service Companies association. (AMI)
- Energy efficiency Companies association. (a3e)
- ESCO Companies association. (Anese)

These associations bring together around 200 companies;

- AMI; 19 companies
- a3e; 78 companies
- Anese; 84 companies

According to the Joint Research Center (European Commission), it is more likely to be around 20-60 real ESCOs in Spain able to offer a variety of energy services.

This variability in the figures could be understood as a sign of immaturity of the market, and also lack of clarity into what is defined as an ESCO and what is not.

Based on consolidated companies, as it is quoted in Marino et al. (2010), most active companies in the field are those with a larger size as their financial capacity allow them to develop energy efficiency project assuming the initial investment risks.

Based on the National Energy Efficiency Plan (2011-2020) AMI (2015), expected investments in the industrial sector in the timeframe 2011 to 2020 is presented in table 3.

Table 3: Expected investments in the industrial sector in the timeframe 2011 to 2020

	Budget in M€		
Actions	2011-2016	2017-2020	2011-2020
Energy audits	9.4	6.2	**15.6**
Technology improvement. Equipment and processes	4,442.2	2,961	**7,403**
Energy management	385	257	**642**

The above figures represent investments combining private and public funds.

According to ESCO Market report (2013), the size of the ESCO market is around 400 – 500 M€ annually and the investment potential in the range between 1.5 and 6 billion of euros.

It is difficult to disaggregate these big figures into the SME sector, but based on previous research, e.g. Sorrell (2007) and Backlund and Thollander (2011), it can be assumed that the portion of industrial SMEs in the figures is lower than the percentage of total annual energy use among Spanish SMEs, reason be is that energy services are normally targeted towards projects with low transaction costs, such as larger users which a high amount if installations that could be deployed or large installations. In both the latter type of projects, industrial SMEs are in general not applicable.

Table 4: Sector expectations in per sector in terms of investment AMI (2015).

Sector	**Potential investment (in M€)**	**Share (%)**
Industry	8.060	20.2%
Transport	3.100	7.8%
Building and equipment	27.320	68.5%
Public services	810	2.0%
Agriculture and fisheries	600	1.5%

Behind the information presented in table 4, the SME sector could fit into the category “Industry” and “Buildings and equipment”.

According to the National Company Directory (AEEE, 2015a), 99.6% of companies operating in the industrial sector are SME. Therefore potential market for SMEs in the industrial sector in the horizon 2020 could reach 8,030 M€.

It is not possible to quantify investment foreseen under “Building and Equipment” category applicable to SMEs.

So to be conservative, it could be stated potential ESCO market applicable to SME in Spain could reach up to 8,000 M€.

ii. Policies to stimulate ESCO market

Policies to stimulate ESCO market are closely linked to Energy policies.

As every single European country, the general policy framework is defined by European Policies through directives that countries have to transpose and adapt into their particular realities.

From the European perspective following directives should be highlighted;

a) Directive 2010/31/UE, on the energy performance of buildings. Even though this Directive is focused on buildings most of the issues targeted could be applied in the SME sector such as methodologies for calculating energy efficiency or minimum requirements in terms of energy efficiency. Industrial processes are not covered in this directive so high energy use industries are neglected.
b) Directive 2012/27/EU, on energy efficiency. From a general perspective, this directive compiles a set of measures to boost the energy efficiency in the broadest sense.

In the frame of Energy Efficiency in SMEs, article 18 “Energy services” states “Member States shall promote the energy services market and access for SMEs to this market” by the implementation of different mechanisms such as financial instruments or regulatory framework.

This article stresses the important role of public administration to ensure the appropriate ESCO market operation.

From the Spanish National perspective, the implementation of this new paradigm is far from being a reality.

3. Conclusion / Recommendations

Some notable remarks from the results of this report can be found. One is that the creation by the federal government of Belgium of the public ESCO Fedesco has proven to have had a catalytic effect on the development of the ESCO market in Belgium. Despite so, the energy service market in Belgium is declining. The same holds for Japan. The major reason for the decline in Japan is due to a variety of barriers to wider penetration of ESCO projects in Japan. Among them, high transaction costs in the contractual process seem to be the major barrier. For example, it requires a great deal of time and effort for ESCOs only to give customers the basic understanding of ESCO (such as the concept of performance contract) and convince them of potential benefits for both parties. Analyzing energy use and finding saving opportunities also require time and effort. Each industrial/commercial site has its unique characteristics with unique equipment and usage, which requires ESCOs a great deal of experience and expertise. Some ESCOs do not market them into industrial plants because industrial processes are often much more diverse than commercial buildings and difficult to take a standardized approach. Agreeing on how to set the baseline for saving calculation is also time consuming because it directly affects the payment customers make. All those forms of transaction costs diminish the economic attractiveness of an ESCO project, making its market size smaller.

Some general findings from this study is that the market for energy services seem to have started in 1990 and the major focus has been towards buildings, but a growing interest towards industrial SMEs has been seen.

Major barriers to the adoption of energy services are distrust at demand side, e.g. Belgium, Japan and Sweden, together with high transaction costs (Japan) as also stated in general terms by Sorrell (2007) and Backlund and Thollander (2011).

Successful policies towards an emerging energy service market is the creation of competence centers, e.g. Belgium and Denmark, or the creation of associations for knowledge exchange as found in Belgium, Japan and Spain.

Also establishing a public ESCO has a catalytic effect (as observed in Belgium and Tokyo and Aomori prefectures in Japan).

Further studies, not the least research-oriented studies, are suggested in the area of energy services among industrial SMEs.

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