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A snapshot of the European energy service market in 2010 and policy recommendations to foster a further market development

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ABSTRACT

As of 2010, the energy service market in Europe is still far from utilising its full potential. Wide-scale peer-reviewed studies investigating the development and up-to-date status of the European ESCo market are scarce. This article presents a comprehensive insight of the European ESCo industry based on the results from a large-scale survey carried out 2009–2010 in 39 European countries. The observed market development during the period 2007–2010, trends in business practices, and factors influencing the ESCo industry evolution are described. Finally, having considered the remaining barriers and the supporting factors as well as the successful experiences in Europe, policy measures that could further promote ESCo activities are proposed.

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1. Introduction

Energy service projects provide comprehensive solutions for improving energy efficiency and increasing the utilisation of renewable energy sources. Energy service contracting helps to overcome financial constraints to energy efficiency investments by paying off investment costs through the future energy cost savings resulting from reduced energy consumption. Energy Service Companies (ESCos) offer an opportunity to curb increasing energy demand and control CO_2 emissions while capturing market benefits by decreasing clients' energy costs and making profit for themselves. ESCos in Europe have been operational on a large scale since the late 1980s–early 1990s. However, the energy service market in the European Union (EU) and neighbouring countries is far from utilising its full potential even in countries with a particularly developed ESCo sector.

Research is available on factors influencing the decision making process of energy efficiency investments (Okay and Akman, 2010). Peer-reviewed studies on the status of the European ESCo market are however rare and often outdated. The first overview of the European ESCo market dates back to 2002 when Vine (2005) conducted an international survey of the ESCo industry, which was followed by a series of comprehensive research carried out by the European Commission's Joint Research Centre (Bertoldi and Rezessy, 2005; Bertoldi et al., 2007; Marino et al., 2010) based on the European ESCo industry surveys in 2004, 2006, and 2010 and by Labanca (2010) in the ChangeBest project. Updated and comprehensive information on the European ESCo industry is valuable for further understanding of the factors influencing the ESCo market. The identification of the barriers and success factors including the effect of national and European policies improves the effectiveness and efficiency of ESCo promotion efforts and enables reliable industry forecasts. The present article discusses the results from an ESCo survey carried out in 2009–2010.

1.1. Methodology

A combination of stakeholder interviews and large-scale surveying of ESCos was carried out in 39 European countries. ESCo experts, experts in related fields, and financial institutions participated in the survey. Over 100 informative answers were received and interviews were conducted by phone, electronic mail, and in person with an average of 2–3 experts per country. The questionnaire used in the survey was composed of 17 multiple choice and open ended questions related to ESCos, projects characteristics, and supporting and hindering factors. Country sections were developed and cross-country analysis was conducted in order to identify trends and influencing factors. One methodological difficulty of carrying out such broad-scale ESCO studies is rooted in the lack of a common and unambiguous definition of "ESCo" thought national markets.

The present paper is structured in the following way. A brief introduction to the ESCo concept is followed by a summary of the ESCo industry status and the current market trends (Section 2). Section 2 includes the description of the market development during the period 2007–2010, trends in business practices, and trends and factors influencing the ESCo industry evolution. Section 3 presents policy recommendations based on the identified enabling policies and re-emerging success factors. A summary table

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of national market developments and characteristics is annexed to the article.

1.2. Defining the ESCo concept

Directive 2006/32/EC of the European Parliament and of the Council of 5 April 2006 on Energy End-use Efficiency and Energy Services (Energy Services Directive) has had a crucial role in establishing ESCO related terminology. The term "energy service company" (ESCO) is defined according to the directive as follows:

> "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".

Energy services include a variety of activities such as energy analysis and audits, energy management, project design and implementation, maintenance and operation, monitoring and evaluation of savings, property management, and energy and equipment supply. ESCos provide energy services to final energy users, including the supply and installation of energy-efficient equipment, and/or building refurbishment, maintenance and operation, facility management, and the supply of energy (including heating and cooling) (Bertoldi et al., 2006).

Unlike other energy service providers, equipment providers or facility managers, ESCos share or take over the customer's technical and/or financial risk of the project. The ESCo can cover the technical risk by *guaranteeing the energy savings*, which can lower the cost of financing. Under such an arrangement, the ESCo guarantees a certain level of energy savings and shields the client from any performance risk. The ESCo and the client can also split the technical risk in accordance with a pre-arranged percentage by introducing a shared savings scheme in the contract. The remuneration of the ESCo can also be directly tied to the energy savings achieved.[1] Depending on the resources of the ESCo and on the market demand, ESCos may finance projects themselves or assist in the arrangement of project financing by means of providing performance guarantees.

Under an *energy performance contracting* (EPC) arrangement, the ESCo uses the stream of income from the cost savings or the renewable energy produced from a determinate project to repay the costs of the project (including the investment costs). *Contract energy management (CEM)* includes the supply of a set of energy service (e.g. space heating and lighting) at a fixed price. Further definitions and clarifications of these concepts can be found in the previous reports developed by the European Commission's Directorate General Joint Research Centre (Bertoldi and Rezessy, 2005; Bertoldi et al., 2007; Marino et al., 2010)

2. ESCo industry trends, market development, and influencing factors

The first companies offering services in the energy field and applying the ESCo concept appeared in Europe as long ago as the 1800s (Dupont and Adnot, 2004). Companies offering integrated energy efficiency solutions started to spread again throughout Europe in the 1980s (Bertoldi et al., 2007). This section provides an insight into the European ESCo industry in 2010 based on stakeholder interviews and surveys carried out during 2009–2010 and regarding the period 2007–2010.

2.1. ESCo market development during 2007–2010

The most common trend of national market change within the scope of the research is a slow growth. However, significant differences exist across Europe.

A strong market growth between 2007 and 2010 was reported in Denmark, Sweden, and Romania and to a smaller extent, in Spain, Italy, and France. The drivers for this strong growth differ among countries, but can be associated with improved efforts and tools to enable the ESCo market (some related drivers are described below in the section dedicated to supporting trends and factors). Thanks to changes in the legal framework and the availability of grants for project financing, a number of countries (outside the European Union), which had an ESCo market in an embryonic state in 2007, have established a market with a relatively high number of active ESCos by 2010. For example, the ESCo market in Turkey grew from no ESCo activity to 5 registered "ESCo-type" energy consultant companies and 33 organisations waiting to be registered. Ukraine's ESCo market grew from 3 ESCos in 2007 to 30 small local companies active in conducting energy audits, energy consulting, information services, and project management for energy efficiency projects in 2010.

The larger part of the European Union's new member states did not undergo any major market development. Problems related to the stalling of the ESCo market in these countries are often due to the problematic access to finance, cross-subsidised energy prices, and the unavailability of energy consumption data to construct baselines.[2]

A decreasing growth is reported in Austria, Croatia, Norway, and the United Kingdom. The main problem encountered in these markets is the access to finance, which can be partly related to the economic downturn and financial crisis. In Norway and the United Kingdom, the awareness and understanding of the ESCo market increased, but without experiencing any rise in project implementation or market volume.

2.2. Trends in business practices in 2010

The cumulative number of ESCos operating within the European Union is estimated between 650 and 1040 companies in 2010. Germany, Italy, and France have large number of ESCos, while in most countries only a few ESCos are established. In addition, engineering consultancies and energy efficiency technology providers offer solutions with some ESCo elements such as equipment leasing and performance guarantees.

ESCos are commonly established as local subsidiaries of multinational companies where energy services are related to their core business. Most companies providing energy services are active as energy supply or engineering companies, international manufacturers of building automation and control systems, or facility management companies.

ESCo projects are mainly developed in the public sector and involve education facilities, hospitals, and public housing. Due to the high transaction costs of ESCo projects, large facilities or sites with a high number of buildings are preferred for they provide an

[1] As opposed to the more general definition, in the Directive on Energy End-Use Efficiency and Energy Services (2006/32/EC) ESCOs are defined as companies whose 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.

[2] The baseline data show the situation before the ESCO intervention took place. The baseline is used for the comparison of the energy consumption with and without the ESCo intervention.

opportunity for bundling projects. Ageing infrastructure and insufficient capital budget has been the driving factor for the demand for ESCo projects in the public sector. Local authorities and energy agencies in a number of countries are retrofitting the public building sector with the assistance of ESCos.

The most common energy efficiency measure is the modernisation and refurbishment of public buildings involving heating, ventilation, and air conditioning (HVAC) control system installations and new boiler houses. Street-lighting and district heating using the ESCo concept are developed by municipalities. Co-generation and refurbishment is common in commercial centres and industrial facilities. Improvement of industrial processes, heat recovery, and replacement of motor and driver systems are implemented in industrial facilities.

About 80% of ESCOs offer contract energy management; however, energy performance contracting, leasing, and operational contracts are also common. Contract energy management is dominant for projects involving public infrastructure (such as street-lighting), industry facilities, and the residential buildings. Contract energy management projects consist of small-scale biomass heat supply, CHP, and district heating. Energy performance contracts mainly target public buildings. The ''Build-own-operate-transfer (BOOT) contract scheme remain rare but is applied in projects involving co-generation and renewable energy projects. Guaranteed savings appears to be the preferred saving scheme, while shared savings contracts are used to a lower extent.

Project financing depends on the access to finance on the market. In Western Europe, financing is done primarily via bank loans to the ESCo or to the client, ESCos' and clients' internal funds, and state funds. In Eastern Europe projects are mainly financed with ESCos own funds and through financial institutions (commercial banks and EBRD's credit line to industry).

2.3. Trends and factors influencing the ESCo industry evolution

The financial crisis and the economic downturn (2008–2010) are identified as partly responsible for the slow growth in a number of countries. However, changes towards a more favourable legislative framework focused on energy conservation, increased activity in the refurbishment of public buildings, financial incentives for refurbishment and modernisation of private real estate, and a stronger environmental awareness have been able to counterbalance the negative effect of the financial crisis in some cases.

2.3.1. Supporting trends and factors

A number of legislative, structural, and market related changes have fostered a number of national ESCO markets by producing indirect effects on the supply of and the demand for energy efficiency. Re-emerging factors and actions supporting the European ESCO markets are outlined below.

2.3.1.1. Supportive policy frameworks and implementing measures. A number of supportive policies and measures addressing energy efficiency with direct or indirect impacts on the demand for energy services have been implemented both at national and European level in the EU member states. Relevant legislative acts introduced at European level include the Directive on Energy End-Use Efficiency and Energy Services (2006/32/EC), the European Performance of Buildings Directive (2002/91/EC), the cogeneration (CHP) Directive 2004/8/EC, and the Eco-design Directive (2009/125/EC).

The Directive on Energy End-Use Efficiency and Energy Services (2006/32/EC) is aimed (among other objectives) at creating the conditions for an energy services market by establishing indicative targets, incentives and an institutional, financial, and legal frameworks. In transposing and complying with the Directive, European Union member states must ensure that energy distributors, distribution system operators, and energy retail businesses (selling electricity, natural gas, heating oil, and district heating) refrain from any activity, which could hamper the supply of energy services and other measures aimed at improving general energy efficiency. It is at the discretion of the member states to ensure that energy distributors and retailers offer and promote energy services to their final customers or offer and promote energy audits and/or measures to improve energy efficiency or contribute to the financial instruments for improving energy efficiency. Member states must also repeal or amend national legislative provisions and regulations, which unnecessarily or disproportionately impede or restrict the use of financial instruments or other measures for making energy savings on the energy services market. Model contracts for financial instruments must be made available to interested parties. Annex VI of the Energy End-Use Efficiency and Energy Services Directive (2006/32/EC) provides a list of energy efficient procurement measures at least two of which shall be implemented by member states.

The European Performance of Buildings Directive (2002/91/EC) and its recast 2010/31/EU of 19 May 2010 lay down the national obligation to introduce minimum energy performance requirements for new and existing buildings and a general methodology framework for the calculation of integrated energy performance. The directive also introduces requirements for national plans to increase the number of nearly zero-energy buildings, energy certification of buildings or building units, regular inspection of heating and air-conditioning systems in buildings, and independent control systems for energy performance certificates and inspection reports.

The CHP directive 2004/8/EC establishes a common framework to promote and facilitate the installation of co-generation plants where demand for useful heat exists or is anticipated.

The Eco-design directive (2009/125/EC) provides EU-wide rules for reducing the environmental impact of products, including energy consumption throughout their entire life-cycle. The directive defines conditions and criteria for setting requirements regarding environmentally relevant product characteristics. The Implementing Directives define the specific energy and environmental requirements for each energy-using product groups.

However, opinions about European policies as driver of the ESCo market differ. While some countries merely transpose European legislation, others implement the spirit of the legislative acts, using them to establish ambitious action plans and to implement concrete policy packages. Actors active in the Finnish market consider the Energy Services Directive together with the energy certification for buildings (EPBD) to be important ESCo market drivers.

A number of comprehensive national policy frameworks have also had important impact on national markets. In Sweden, the relevance and cost savings from energy efficiency measures have increased thanks to the mixture of policies including energy certification for buildings, energy efficiency investment subsidies (such as KLIMP and OFFROT), and a set of market instruments (CO_2 taxes, green certificates, electricity tax for energy intensive companies (PFE), etc.) (Forsberg et al., 2007; Lindgren Soroye and Nilsson, 2010; Stenqvist and Lindgren, 2009). In France, the action plan ''Le Grenelle de l'environnement'' has created an ESCo market in the public sector with public–private partnerships and private investments. In Slovenia, the recent decree setting limits on environmental pollution, the building and lighting legislation, the voluntary CO_2 agreements, the availability of structural funds (2009 tender), as well as various financial incentives, are expected to contribute to the ESCO market growth in the forthcoming years. In Italy, the growth of the ESCo market

is strongly connected to the introduction of White Certificates. In 2008, 44% of the energy services companies obtaining White Certificates declared to have the ESCo activity as their main business profile (AEEG, 2008).

Public procurement rules and evaluation criteria in the public tendering process remain the main barriers for ESCo project development in the public sector. However, significant improvements have been achieved in some countries in removing these barriers and/or by establishing procedures that favour ESCos. For instance in Spain, until October 2007 when the new national procurement law was approved, procedures were not adapted to long term service contracts. The new Energy Efficiency agreements 2008–2016 in Finland aim at ensuring that municipalities are able to use ESCo services when implementing energy efficiency investments (Motiva Oy, 2008). Additionally, in an increasing number of countries local authorities can retain the financial savings generated from energy saving projects rather than be penalised for reducing their operational expenditure by decreased budgets. The ability of local authorities to retain financial savings generated has a crucial impact on their ability to enter into contractual arrangements with ESCos.

2.3.1.2. Public authorities support. Environmental awareness and climate change policies have had a spin-off effect with the implementation of favourable legislative frameworks and concrete implementing measures. Several international programmes promote cooperation, technical assistance, and financial aid for energy efficiency and conservation projects.[3]

Public authorities are increasingly active in supporting the development of an ESCO market by preparing ESCo model contracts, opening credit lines, working with public banks, and preparing calls for tender to implement energy services in public buildings. The role of public support is to enhance both the demand and the offer of energy services, including establishing appropriate framework conditions that channel private financing in the sector. The coordinated actions of a public authority disseminating information, advising potential project participants (Forsberg et al., 2007), and establishing qualification, certification, and accreditation schemes for energy service providers gives more legitimacy to the business model and to providers creating confidence on the market.

2.3.1.3. Higher cost pressure to achieve energy efficiency. High energy price is one of the main factors influencing the demand of energy efficiency investments and therefore ESCo services. The steady rise in energy taxes has shortened the payback time of energy efficiency investments and increased the relevance of energy efficiency in cost competition. The rise in energy prices has also increased the interest in energy conservation for non energy intensive consumers. For instance, in the Netherlands and Hungary the introduction of substantial energy taxes and removal of energy subsides raised the energy price for households and small companies, resulting in a raised interest in energy saving measures.

The financial crisis and economic restrictions have brought into focus cost reductions through energy efficiency measures and the flexible financing mechanisms offered by ESCos. In order to counterbalance the economic downturn, financial incentives have been used for initiating ESCo projects in the public sector (especially building refurbishment). The shift in new projects from the industrial sector to public buildings has been related to the tightened access to finance in the private sector and higher investment risks.

[3] Such as the Covenant of Mayors, the Clinton Climate Initiative for Cities and the (European Local ENergy Assistance) ELENA, among many others.

The effects of cost competition together with the need to improve cash flows and the possibility to use off-balance sheet solutions for energy efficiency investments have been strong drivers in the private sector of most countries surveyed, most notably in Finland, Denmark, and Belgium.

2.3.1.4. Improved understanding of energy efficiency services. The awareness and understanding of energy efficiency services has improved, creating more confidence in the market, and providers are met with a lower degree of mistrust compared to previous years.

Financial institutions have acquired experience in financing energy efficiency projects and in taking into consideration the guaranteed savings offered by some ESCos and energy performance contracting. In France, finance institutions can cover the risk of the guaranteed savings by insuring the savings. Yet, low awareness of the specifics of the ESCo model and scepticism towards its advantages remain among the most commonly reported barriers to the deployment of ESCo projects in the large majority of countries surveyed.

2.3.1.5. Market liberalisation. The liberalisation of the energy markets has been underway since the last decade and is considered an important enabling factor in order to create the right market conditions for ESCos to operate (Bertoldi et al., 2006). The liberalisation of gas and electricity markets has transformed the semi-public energy sectors of some member States into sectors with competing market oriented companies, thus creating more room for value-added services and facilitating contractual arrangements.

2.3.1.6. Structural and market related changes. The change in mindset towards the outsourcing of services such as energy management (e.g. in Sweden and the Czech Republic) and public building facilities management (e.g. in Spain and Ireland) has increased the attractiveness of ESCos.

Furthermore, the refurbishment and modernisation needs (especially in the buildings sector) have increased the number of projects implemented by ESCOs. In Sweden, building owners show a growing preference to outsource operation and maintenance services (Energimyndigheten, 2011; Forsberg et al., 2007). In the Czech Republic, the increased freedom in decision making of building and facility managers and owners together with the high operational costs and obsolete energy infrastructure has been an important market driver.

2.3.1.7. The establishment of national ESCO associations. Established ESCo associations or a similar type of formal networks are exist in 25% of the countries within the scope of this research (33% of the European Union member states). The establishment of national ESCO associations has partly been supported by public authorities. The creation of an ESCo association enables important activities such as standardisation and quality control efforts, dissemination of information, and capacity building. In Belgium, the federal authorities' energy service company and third party investor Fedesco and the newly established ESCo association Belesco facilitate energy performance contracting in the public sector.

2.3.2. Hindering factors

2.3.2.1. Ambiguities in the legislative framework. Energy efficiency projects are hindered due to the complexity and inflexibility of the public procurement rules. Public procurement procedures are often complex and time consuming, which adds to the transaction costs of projects, undermining their viability. The entry of new

and less established market actors (such as ESCos start-ups) is limited by the public tendering requirement on applicants to have experience in all relevant project specific sectors. The focus on initial investment costs instead of life-cycle costs poses a disadvantage to energy performance projects that may have a higher initial investment cost but significantly lower life-cycle cost. In addition, direct cost comparison of different energy supply options is often difficult, as experience in Germany shows.

In some countries the implementation of ESCo projects is particularly hampered. The contractual arrangements specific to ESCo projects is in these cases "incompatible" with national contractual regulations and definitions. In France, the legally regulated contractual agreements for project development in the public sector are seen as a major hurdle for the introduction of energy performance contracting. The legal definition of the product provided by ESCo-type of contracts may have important adverse impacts, especially related to the taxation status of ESCo projects. For instance, in Croatia the ESCo model is not recognised by the authorities as an individual business model providing a service, but as a contract for delivering goods. Consequently, ESCos need to pay value added tax on the total equipment value at the moment of putting the energy saving equipment in operation.

The international accounting rules (IFRS for operational and finance leases) are still perceived as a common barrier due to the unsuitability to the ESCo model. In the case of an operating lease the annual contracting fee needs to be booked as revenue while the unbilled receivables are reduced. This operation in the balance sheet can have a negative impact on the credit rating. In the case of a financial lease, the total revenue needs to be booked at the end of the project and therefore annual booking is not allowed. In this case, the ESCO needs to finance the VAT for the whole duration of the project. Hindering accounting rules are however seen to have lost relevance in comparison to earlier studies carried out (see Bertoldi et al., 2007). Recommendations from the national accounting authorities are needed in order to allow a market development involving more complex energy services (Energimyndigheten, 2011).

2.3.2.2. The financial crisis and economic downturn. The financial crisis and the economic downturn is claimed to have made access to finance more difficult in the large majority of countries surveyed. In Spain, Belgium, Finland, Denmark, Czech Republic, Poland, and Ukraine this has been identified as the most common barrier.

The economic downturn has lead to a freeze in refurbishment investments, blocking a number of projects under development and the initiation of new ones. The economic downturn also raised the importance of contractual flexibility (contract duration, production levels, energy prices, etc.).

The financial crisis and economic downturn have influenced the initiation and development of projects due to the tighter access to loans, higher interest rates, the need for stronger guarantees (for instance in Spain), reduced investment budget of clients, higher insolvency risk of clients, and the lower number of clients willing to engage in long term contracts (Czech Republic). Additionally, despite an increased knowledge of energy efficiency projects, lending remains primarily asset-based. Financial institutions are still cautious with cash flow based lending.

2.3.2.3. Business and technical risk. With variations across countries and sectors, perceived business and technical risks remain strong barriers. Common perceived business and technical risks are related to the following issues:

- the risk that energy efficiency interventions might compromise the production or operation processes related to the core business;
- the aversion to outsource energy management, especially where in-house technical expertise exists;
- the lack of flexibility and long commitment required with ESCo contracts;
- the small size of projects and low priority of energy efficiency investments on the corporate agendas;
- low and fluctuating energy prices;
- the lack of reliable energy consumption data makes it difficult to establish baselines and hence provide reliable data on actual savings.

In specific industrial sectors ESCO projects are restricted to areas outside the core process. In small and medium companies and the commercial sector, interventions that can compromise the core business such as energy management and "non-standard" energy use is met with scepticism. In Austria, Netherlands, and Spain, outsourcing energy management is often met with resistance from the technical department and internal project development is preferred when the financial resources and know-how are available.

The lack of reliable energy consumption data is an important issue in Eastern Europe where the use of metres and energy monitoring are rare due to the traditionally low price of energy.

2.3.2.4. Lack of standardisation and inexperience of actors cause mistrust. Although the level of awareness has increased during the last years, a certain level of mistrust of the ESCo model from customers and financial institutions still remains.

The lack of standardisation is perceived as the most important reason for mistrust and includes: complex contracts, unclear definitions, and a lack of standardized measurement and verification of savings methodology. The complex definition of a baseline with external factors influencing energy consumption and the inhomogeneous ESCo offer hinder the establishment of simple contractual agreements, particularly for contracts including shared savings. The monitoring required by energy performance contracting is considered costly and time consuming, especially for projects of smaller scale. On the other hand, no performance can be guaranteed in the absence of a sound monitoring system.

Lack of experience (of clients, ESCos and financial institutions) and lack of competition have also been identified as reasons for mistrust. Local financial institutions often lack experience in project financing, financing energy efficiency measures, and evaluating new concepts (such as guaranteed savings). Experience from a number of countries show that financial institutions only build up or scale up their expertise when they start seeing energy efficiency businesses as a promising market niche.

In Austria, mistrust from the clients is mainly based on bad experience with energy consultants. In the Czech Republic, mistrust (perceived as the main barrier) is based on the scepticism by management towards energy efficiency investments, the complexity of the ESCo solutions, unclear definitions, and failed contract. In the Netherlands and Poland a low level of confidence is present in the market due to the absence of standardisation and a specific legal framework for energy performance contracting.

The insufficient competitiveness to meet the costumers needs is linked to the lack of skilled staff (Sweden (Gottberg et al., 2009; Energimyndigheten, 2011), Spain, Turkey, etc.). ESCOs need to gain further experience and improve their technical, financial, management, and marketing abilities in order to develop the market.

2.3.2.5. Collaboration, commitment and cultural issues. Collaboration, commitment, and cultural issues are still seen as an important limitation for the development of the ESCo concept. The high level of

collaboration required between the client and the provider can be perceived as resource consuming, while the commitment issues are largely related to the long contractual terms and low flexibility that characterize the ESCo model. The cultural clash has mainly been observed within Scandinavia, where the concept of energy efficiency measures is strongly connected to concept of "moral obligations". Therefore a business idea where the provider earns money from the energy savings of a second organisation is not well accepted (Lindgren Soroye and Nilsson, 2010; Gottberg et al., 2009).

3. Policy recommendations

This section provides policy recommendations based on the identified barriers and enablers. Of course, the effect of different support mechanisms is strongly dependant on the particular national circumstances and market maturity.

3.1. Targeted policy support and supportive policy frameworks

Two key aspects are decisive for the proper functioning of ESCos and the implementation of ESCo projects in the public sector. Firstly, adaptation of the public procurement laws in order to facilitate the evaluation of energy performance contracting providers by allowing the inclusion of energy efficiency in technical tender specifications and by taking into consideration the life-cycle cost in the project cost evaluation. Clear, practical and ready-to-use guidelines on how to apply energy efficiency criteria in public procurement procedures help the practical implementation of energy efficient public procurement. The availability of working tools such as internet based calculators, databases, and handbooks, along with dissemination of information and training facilitate the implementation of new assessment criteria in the procurement process and base it on life-cycle cost assessment.[4] Clearly allocated responsibility is important in order to prevent overlaps and to ensure competence.

Secondly, updating the procurement regulations by allowing group tendering by consortia and ESCo providers to be evaluated on other grounds than previous ESCo projects will facilitate the entrance of new and smaller actors in the market.

A favourable policy framework can shorten the payback time of energy efficiency investments, lowering investment risks. Certification, such as the energy performance certificates of buildings, is important in order to increase the demand for energy audits and monitoring requirements, facilitating energy saving estimations available through proper statistics, and increase awareness. Improving the legal basis for the removal of specific barriers has been shown to affect the perceived risks of contractual arrangements. For example, in the Czech Republic the law supports the right of an ESCo to collect payment related to their customers' energy savings. In Hungary, local governments that have a contract with an ESCO can 'freeze' their energy costs in the budget. In contrast, in some countries the legal framework does not allow municipalities to retain the savings derived from implementing energy efficiency projects (Marino et al., 2010).

Concerted effort is needed in order to legitimate the business model and to overcome investment risks through financial instruments. This could be achieved via loan guarantees by recognising the contractual model and the establishment of funding mechanisms, such as revolving funds that co-finance projects at lower interest rates.

The cases of Sweden and Austria show that energy agencies' active engagement in advising clients on energy services and participation in pilot projects have an important role in legitimising the business model.

3.2. Project bundling

Successful project bundling strategies can help overcome many of the key barriers to financing ESCo projects. To achieve sufficient economies of scale, a strategy is required that allows for the aggregation of individual projects, technologies, service offers, and investments into a larger and more comprehensive lots, which could be interesting for ESCos financial institutions. As demonstrated by the uptake of energy performance contracting in Germany and Austria, targeting public institutions and facilities for large-scale retrofit programmes can kick-start market activity.

Public–private partnerships are also encouraged. In Italy are public–private ESCo consortia developed where the public party is responsible for the aggregation of demand, for guaranteeing and implementing the energy saving measure(s), and for the compensation of the financial risk. Energy saving becomes an instrument of aggregate finance. Typically local and regional commercial banks are ready to take part in such a consortium.

3.3. Accreditation and standardisation to build market confidence

A national legal framework addressing the identification of quality standards and the establishment of a certification scheme for ESCo's is essential in order to boost the ESCo markets and maintain confidence in them. The standardisation of common core contractual provisions including clear frameworks, definitions, and measurement and verification standards (such as the International Performance Measurement & Verification Protocol) as well as an accreditation system is essential in order to raise the confidence on the market.

3.4. Facilitating the access to appropriate forms of financing

A wide range of instruments can be employed and/or scaled up to promote the access of ESCos to financing.

The engagement of financial institutions is crucial for the establishment of a successful ESCo market. As public banks are able to structure and competitively fund customised energy efficiency programs and financing initiatives, public authorities or development financing institutions can promote customised financing products to respond to the specific barriers to energy efficiency financing present in each national market.

Special purpose credit lines or revolving funds may be appropriate to mitigate liquidity constraints in the banking sector and/or provide long-term credits to finance institutions and subordinated debt instruments to close existing equity gaps.

A guarantee scheme or other risk mitigating tools that expand access to debt, thereby lowering the cost of financing and enabling more comprehensive energy efficiency project development may be appropriate when the financing sector perceives that the risk of ESCo projects is too high.

Where ESCos equity is insufficient to comply with the minimum equity requirement, a complementary instrument is needed, such as subordinated debt that can substitute and reduce the amount of senior debt and close an existing equity gap.

Expanding partnerships between financing sources and utilities, city agencies, and ESCos, which have long-standing

[4] The European Commission has developed a Green Public Procurement Tool Kit, which covers a number of practical issues for public purchasers. The kit includes training modules and concrete examples of environmental criteria which can be readily introduced in tender documents. This kit addresses, among others, products falling within the construction, transport, and electricity sectors. The Green Public Procurement Tool Kit is available on the following link: http://ec.europa.eu/environment/gpp/toolkit_en.htm.

relationships with customers would rapidly identify energy efficiency opportunities.

3.5. Establishment of bankable ESCo project pipelines

Financing is not a panacea in itself and further enabling policies are needed. Ensuring mechanisms for project development and delivery is instrumental in generating a steady flow of investment ready projects. The range of further tools available for ensuring bankable ESCO project pipelines includes the following:

- targeted communication to potential ESCo clients about the profitability of energy efficiency investments;
- programmes and technical assistance facilities that build the capacities of market participants to develop and structure finance for projects, most notably providing training for feasibility study and business plan preparation across a range of possible project proponents. These facilities can target both public authorities and private actors (such as ESCos and small-and-medium-enterprises) and can be channelled via appropriate local authorities or chambers of commerce;
- the development of member states specific packages that can assist and guide project proponents (such as local authorities) through specific issues and procedures related to e.g. energy performance contracting and public procurement in their national context. This process can build on the outputs from various Intelligent Energy Europe (IEE) projects (EESI, Eurocontract, ClearSupport, Change Best, etc.). Such national packages can unleash a significant replication potential across local authorities once successfully implemented in one city/region. One communication channel for such an option can be the Covenant of Mayors;
- further supplementary policies, such as energy audit mandates or monitoring of energy consumption of public entities and large private energy users with a possible commitment and/or incentive to implement economically feasible projects.

3.6. Establishment of an ESCo association and the collaboration with national energy agencies

An ESCO association can act as a reference point for ESCos customers and suppliers, and trough grouping and concentration of ESCo professionals can represent the point of view of the industry with a unified voice. Two European ESCo associations, EFIEES and EU-ESCO, are promoting the ESCo concept and acting as a reference point for its members.

Additionally, the establishment of an association or a similar platform or forum could concentrate resources in information dissemination and capacity building. The association can create a support network for potential clients with capacity building, give direct advice, and access to information. The association could organise workshops and knowledge sharing events with ESCOs, potential clients (municipal representatives, facility managers, etc.), and financial institutions in order to increase the knowledge of how ESCos engage in projects and what benefits can ESCOs bring to project management from a risk reduction, financial, and environmental perspective.

An ESCo association would also be a useful reference point for collaboration opportunities between ESCos. The establishment of independent market experts can provide confidence in the market and performs the function of a reference point for all stakeholders such as ESCos, clients, and decision makers.

Awareness-raising of the general public can be achieved by promoting energy performance contracts in public buildings and by disseminating best practices with a clear client focus.

4. Conclusions

ESCo markets in Europe continue to show diverse stages of development. Germany, Italy, and France have a large number of ESCos (>100), while only a few ESCos (3–30) are established in most countries. The ESCo markets in these cases are often complemented by engineering consultancies and energy efficiency technology providers offering solutions with some ESCo elements such as equipment leasing and performance guarantees.

A strong market growth has been observed during 2007–2010 in Denmark, Sweden, and Romania and to a smaller extent, in Spain, Italy, and France. The most common trend across all countries in the scope of the research is, however, a slow market growth. A decreasing market has been observed in Austria, Croatia, Norway, and UK.

Despite the increased awareness of energy efficiency measures and favourable legislative framework, the ESCo market has only grown slowly during the past years. Changes towards favourable legislative framework focused on energy conservation and a stronger environmental awareness have in some cases been able to counterbalance the effect of the financial crisis and economic downturn.

The survey conducted within the scope of this research shows that it is essential to have a sound legislative framework that supports, rather than restricts ESCO type projects as well as policies and measures that promote energy efficiency investments. Supporting policies includes the introduction of life-cycle cost assessment in public tenders and the adaptation of public procurement rules that hinders (or complicates in relation to other contractual arrangements) the use of ESCOs.

A favourable policy framework (such as building certifications and CO_2 taxes) can shorten the payback time of energy efficiency investments, lowering thus investment risks.

Loan guarantees by recognising the ESCo contractual model and the establishment of funding mechanisms, such as revolving funds that co-finance projects at lower interest rates would lower the risk for financial institutions and slowly create the needed experience of ESCO project financing missing in the financial sector.

Identification and the establishment of quality standards and certification schemes for ESCo's are essential in order to boost the ESCo markets and maintain confidence in them.

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Appendix A

See Table A1.

Table A1
Status of European national ESCO markets in 2010 and market development during 2007–2010

Country	Market development	Nr. ESCos	Categories of energy service providers	Most common projects
Albania	–	None	–	–
Austria	Decrease	5–14	Energy service & supply companies and consulting/engineering firms.	Supply side projects, building projects involving more energy services, and street and indoor lighting
Belarus	–	None	–	–
Belgium	Stable market	7 large and 5–7 small	Larger international manufacturers of building automation & control systems	Public buildings, HVAC, and cogeneration
Bosnia Herzegovina	N/A	None	N/A	N/A
Bulgaria	Slow growth	20	Manufacturers of building automation & control systems	Public buildings involving lighting, HVAC, and refurbishment projects
Croatia	Decrease	2	Energy service & supply and facility management & operation companies	Public building projects and street lighting
Cyprus	N/A	N/A	N/A	N/A
Czech Republic	Stable growth	8–10	Manufacturers of building automation & control systems and energy services & supply companies	Public buildings involving HVAC-control system installation, boiler houses, lighting, and pipes insulation.
Denmark	Strong growth	10	International small sized manufacturers of building automation & control systems and facility & operation companies	Modernisation and refurbishment of public buildings and industrial projects
Estonia	N/A	2 (in 2007)	N/A	Public sector involving public lighting and control and automation systems (2007)
Finland	No significant changes	8	Manufacturers of building automation & control systems, facility management and operation & control companies, consulting/engineering	Industry sector projects involving process technologies and motor systems with a smaller percentage in public buildings
Former Yugoslav Republic of Macedonia (FYROM)	N/A	1 (in 2006)	N/A	N/A
France	Slow growth	10 big and approx. 100 smaller actors	Facility management and operation companies, manufacturers of building automation & control systems	District heating, CHP, public buildings, and private non residential buildings
Germany	Stable growth	250 – 500	Energy suppliers and manufacturers of building automation & control systems	Public and private non residential building projects and cogeneration, district heating, and renewables through CEM
Greece	Market initiation	2	Energy Services and facility management companies	Industrial and tertiary sector involving thermal solar heating
Hungary	Fluctuation	20–30	Local SMEs, daughter companies of energy suppliers, multinational ESCos	Mainly in public sector, some in residential and CHP/renewables, lighting, heating, boilers, energy system operation, CHP, and block house renovation
Ireland	No significant changes	15	Consulting and engineering firms, energy service & supply companies and facility management companies	CHP and supply side projects
Italy	Slow growth	50–150	Subsidiaries of international groups with core business in Energy Service Provision, mainly small-medium sized	Renewable energy installation, CHP, projects in industry, and lighting refurbishments
Latvia	Strong growth	5	Engineering consulting firms and energy services and supply companies	Co-generation and other supply side projects in the industrial sector involving more energy services
Lithuania	Slow growth	6	National and international manufacturers of building automation & control systems	District heating, co-generation, and public buildings sector
Luxemburg	N/A	3–4 (in 2007)	N/A	N/A
Malta	N/A	None (2007)	N/A	N/A
Moldova	N/A	None	N/A	N/A
Montenegro	N/A	None	N/A	N/A
Netherlands	Stable growth	50	Construction and engineering companies	Energy systems in medium-sized and large non-residential new building projects
Norway	Shrinking market	10	Manufacturers of building automation & control systems, facility management and engineering consultancies	Mainly public buildings, lower share in private non-residential buildings
Poland	No significant change	3–10	Consultancies and energy supply companies	Street and indoor lighting and co-generation in the public sector
Portugal	Slow growth	10–12	Small companies started as public–private partnerships and subsidiaries of larger national or multinational companies	Buildings, outdoor lighting, industry involving cogeneration, micro-cogeneration, audits, lighting, energy recovery, motors and drives
Romania	Strong growth	14	Consulting and engineering companies, facility management and operation companies, energy service & supply companies, equipment suppliers and dealers	Mainly in industry (industrial processes and co-generation) and less in public sector projects (district heating and street-lighting measures)
Russia	Shrinking market	N/A	Energy suppliers and energy equipment manufactures	Co-generation projects with the installation of auxiliary energy equipment such as boilers in the industrial and municipal sectors
Serbia	Growth	10	Small engineering companies and building & control manufactures	Industry and public building projects
Slovakia		2–5		Complex building projects and co-generation

Table A1 (*continued*)

Country	Market development	Nr. ESCos	Categories of energy service providers	Most common projects
	No significant changes		Energy consultant companies, manufactures of building & control systems, and energy service companies	
Slovenia	More actors but a stable market size	2–5	Energy supply companies	District heating and street lighting
Spain	Slow growth	>15	Large utilities, construction, and multi-services companies	Public Buildings, private non-residential buildings, and industries involving cogeneration, audits, HVAC control systems, lighting
Sweden	Strong growth	5–10	International medium sized manufactures of building automation & control and facility & operation companies with EPC as a side business	Modernisation and refurbishment of public buildings involving lighting, HVAC, complex refurbishments, and fuel switch
Switzerland	Slow growth	76 energy contractors	Local energy producers and distributors	District heating and heat pumps in buildings
Turkey	Steady growth	5	Engineering consultancy firms	Industry and private non-residential buildings
Ukraine	Steady growth	30	Energy auditors and equipment manufacturers	Industry
United Kingdom	Decrease	20	Subsidiaries of large international manufacturers of building automation & control systems and energy service & supply companies	Industrial and large commercial applications, complex building projects and co-generation, district heating and supply side projects in the public sector

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