EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

Institute for Environment and Sustainability

ENERGY SERVICE COMPANIES IN EUROPE

STATUS REPORT 2005

Scientific Technical REFERENCE System on RENEWABLE ENERGY and ENERGY END-USE EFFICIENCY

PAOLO BERTOLDI AND **SILVIA REZESSY**

European Commission, DG JRC,
Institute for Environment and Sustainability, Renewable Energies Unit

2005 **EUR 21646 EN**

A great deal of additional information on the
European Union is available on the Internet.
It can be accessed through the Europa server
(http://europa.eu.int)

Luxembourg: Office for Official Publication of the European Communities
ISBN 92-894-9424-7

Printed in Italy

Preface

Energy service companies (ESCOs) are important agents to promote energy efficiency improvements. Although the European Commission and the Member States of the European Union (EU) have supported a number of policy initiatives to foster the ESCO industry, a recent survey of ESCO businesses in Europe has indicated that major differences exist in the development of the ESCO business among the various countries. The survey "ESCOs in Europe" covers EU-25, the New Accession Countries (NACs), Switzerland and Norway. With a few notable exceptions, such as Germany, Austria, Hungary, and to certain extent France, the ESCO industry is still in its infancy stage and ESCOs are struggling to get off the ground. Major differences exist among Member States not only in the development of national ESCO industries, but also in terms of actual type of ESCO projects (sectors, sizes, etc.) and their implementation (contractual terms, financing, etc.). This difference could be explained by several factors, such as different levels of support offered to ESCOs by national and regional energy authorities, local market structures and rules, and variation in the definitions, roles and activities of ESCOs.

This report reviews and analyses the development and the current status of ESCO industries in Europe. It builds on and summarizes the first results of an ongoing in-depth survey of ESCO businesses in Europe (EU-25, NACs and selected neighbouring countries) and analyses a selection of ESCO projects, both ongoing and completed. Based on the review and the analysis, areas of activity are identified and indication is given as to what action is likely to foster the further development of ESCOs in Europe. The strategic actions indicated build on successful experience in Europe or in individual Member States and are proposed with an eye to existing and planned legislative measures, such as the proposed Energy Service Directive and the implementation of the Kyoto flexible mechanisms.

This document does not represent the point of view of the European Commission. The interpretation and opinions contained in it are solely those of the authors.

Acknowledgements

The authors would like to thank to all experts who provided comments on earlier drafts and who assisted in updating country information and in working out often dubiously interpreted ESCO terminology.

We would like to acknowledge the contribution of Shirley Hansen, Thomas Dreessen, Pierre Langlois, Anees Iqbal, Jerome Adnot, Friedrich Seefeldt, Joerg Dietrich, Heikki Vaisanen, Isabel Blanco, Guillermo Escobar, Diogo Beirao, Martin Bela, Milan Staron, Jiří Zeman, Konstantinos Lytras, Geert Flipts, Casper Kofod, Manuel Swärd, Birgit Baumgartner, Ryszard Wnuk, Laszlo Molnar, Diana Ürge-Vorsatz, Jasmina Fanjek, Vedran Krstulovic, Cristian Tantareanu, Corneliu Rotaru, Anna Forsberg, Jaan Tepp, Dagnia Blumberga, Mario de Renzio, and of other national experts who provided inputs to the survey and responded to our question and of course to all ESCOs that provided information that was used for the analysis in the present report.

TABLE OF CONTENTS

LIST OF FIGURES, TABLES AND BOXES

1. Introduction

While the initial European Energy Service Company (ESCO) concept started in Europe more than 100 years ago and moved to North America, in the last decade Europe has seen an increased interest in the provision of energy services that has been driven by electricity and gas restructuring and the push to bring sustainability to the energy sector. The market for energy efficiency services in Western Europe was estimated to be 150 million Euro per annum in 2000, while the market potential was estimated to be 5 to 10 billion Euro per annum[1] (Bertoldi et al. 2003 and references herein, Butson 1998).

Despite the recent increase in provision of energy services (see definitions in section 3) in Europe, no comprehensive review of the development and the current status of the ESCO industry in Europe has been compiled to date. To correct for this deficiency, this report presents the results of a three-stage project carried out at the Renewable Energies Unit of the Institute for Environment and Sustainability (DG Joint Research Centre, European Commission). Three dedicated questionnaires have been developed for the separate phases of the survey that constitutes the main element of the project.

First, an expert survey has been carried out in the period 2003-2004. The purpose of the survey was to gather insights and discuss the experience of energy efficiency experts, national authorities and ESCO professionals regarding the development and status of national ESCO industries. A dedicated ESCO questionnaire with ten open-ended questions was developed and distributed among the above mentioned target groups. The questions related to issues such as existing ESCOs (number, national or multinational, existence of accreditation, or of a standard protocol defining their characteristics and requirements), targeted sectors and most common projects, support mechanisms for ESCOs, interest from financing institutions in energy efficiency projects. The attempt was to cover all Member States of the EU and New Accession States. An average of three experts per country were contacted. For the large majority of the EU-25 Member States and Bulgaria and Romania at least one country expert responded to the questionnaire; in addition the authors conducted informal semi-structured interviews based on the questionnaire and obtained complementary information via e-mail from country experts and ESCO professionals.

Next, an ESCO Characterisation Form and an ESCO Project Form have been created. The former aims at getting understanding of companies in terms of scope of activities, geographical coverage and origin, types of services provided and specific details related to their provision, criteria for passing a contract, etc. The ESCO Project Form has been developed at a much later stage and has aimed at collecting detailed information about a specific project implemented by each ESCO. An attempt has been made to distribute these forms among as wide circle of ESCOs as possible in EU Member States and Candidate Countries. Existing country lists of ESCOs have been used, national energy efficiency experts, authorities and academia have been asked for ESCO contacts; the authors also used their network of professional contacts. The two forms are attached in Appendix I and Appendix II, respectively. As of April 2005 more than 180 ESCOs

[1] These estimates are according to our definitions of ESCO, Energy Performance Contracting (EPC) and Third Part Contracting (TPF) (see definitions later) and do not include energy supply.

have entered the database, which is available at http://energyefficiency.jrc.cec.eu.int/html/list_esco.htm

The report builds on the results of the survey and supplements them with a review of existing literature on national ESCO developments in Europe and with the perspectives gathered through dedicated European initiatives such as the First European Conference on ESCOs (May 2003, Milan)[2], the conference Improving Energy Efficiency in Commercial Buildings (April 2004, Frankfurt), the international workshop Electricity End-Use Efficiency in Candidate Countries (December 2004, Brussels)[3], results from the work carried under task X "Performance Contracting" of the International Energy Agency Demand Side (IEA-DSM) Implementing Agreement[4] and the Clearing House for Contracting Schemes (Clear Contract) project, carried out by the Austrian National Energy Agency and the Berlin Energy Agency[5].

This report

- Provides insights in the European policies that shape the context in which ESCOs in Europe operate and that drive their development;
- Gives concise definitions of the terminology often used in relation to the provision of energy services;
- Reviews the current status of the ESCO industry in Europe and project specifics of the most common types of activities;
- Analyses the features of the ESCO industry in selected EU Member States and NACs on a country-by-country basis;
- Identifies areas where concerted effort at national as well as European level is expected to further foster the development of the ESCO industry in Europe.

Based on the review and analysis of European experiences the report concludes with

- A set of suggestions that may form the foundation of a possible long-term strategy to further the development of ESCOs in Europe.

The strategic measures outlined in the final section are based on the re-emerging factors in the countries with most developed ESCO industry, rather than on an overarching review of all existing and possible driving forces.

[2] Proceedings available at http://energyefficiency.jrc.cec.eu.int/events/esco_conf.htm
[3] Proceedings available at http://energyefficiency.jrc.cec.eu.int/html/Workshop_EE_9.12.04.html
[4] Reports available at http://dsm.iea.org/NewDSM/Work/Tasks/10/task10.asp
[5] Reports available at http://clearcontract.net/

2. The European policy context

Two major drivers shape the European energy policy context in which ESCOs operate: restructuring and liberalization of electricity and gas markets, and measures to mitigate climate change.

Under the Kyoto protocol, the EU has agreed to reduce greenhouse gas (GHG) emissions by 8 percent between 2008 and 2012 relative to 1990 levels. Directive 2003/87/EC of 13 October 2003 has introduced a scheme for GHG allowance trading within the Community to reduce GHG emissions. The EU Emission Trading System (ETS) is the first trans-national emissions trading scheme; emissions trading in some sectors has started in 2005. The scheme is supposed to cover about 46 % of the EU-15's total CO_2 emissions in 2010 (the first three-year trading period is limited only to CO_2) and involves about 12,000 installations that fall under the activities specified in Annex I: practically all energy intensive sectors (apart from the chemical sector). Each installation gets emissions allowances for the whole period.

For the first period (2005-2007) allowances are free of charge (grandfathering), for the second phase (2008-2012) up to 10 % can be auctioned. The Member States have allocated or are in the process of allocating the emissions to the concerned installations by means of a national allocation plan (NAP) and according to defined criteria. If installations do not meet their obligations they have to pay a penalty of 40 Euro per ton CO_2 for the period 2005-2007, for the next periods it will be 100 Euro per ton CO_2.

In principle, this scheme offers the possibility to achieve the desired outcome by implementing the most cost-effective measures to reduce GHG emissions. Emission reductions from joint implementation (JI) or clean development mechanism (CDM) projects can be used by the companies to fulfil their emission reduction targets. The details are regulated in a Directive (2004/101/EC), which entered into force in November 2004 and should be transposed by the Member States by 13 November 2005. Starting from 2005 firms will have direct access through CDM to credits from countries without targets; from 2006 JI credits will be available for countries with targets. It is also agreed that companies have the possibility to pool their emissions allocations until 2012: industrial branches can try to find a common solution. In principle this scheme offers the possibility to implement the most cost-effective measures to reduce GHG emissions while still achieving the same overall. Box 1 presents the basic principles of EU ETS. More information about the role of the EU in global climate change efforts, as well as European action to address its own GHG emissions can be found at http://europa.eu.int/comm/environment/climat/home_en.htm.

Box 1. Basics of EU ETS

The EU ETS is based on six fundamental principles:

- It is a 'cap-and-trade' system;
- Its initial focus is on CO_2 from big industrial emitters;
- Implementation will take place in phases, with periodic reviews and opportunities for expansion to other gases and sectors;
- Allocation plans for emission allowances are decided periodically by Member States;
- It includes a strong compliance framework;
- The market is EU-wide but taps emission reduction opportunities in the rest of the world through the use of CDM and JI, and provides for links with compatible schemes in third countries.

More information about the EU ETS can be obtained at http://europa.eu.int/comm/environment/climat/emission.htm.

The other main EU energy policy drive is to liberalise electricity and gas markets. Directive 96/92/EC established the rules for an Internal Electricity Market. To accelerate electricity market restructuring, the European Commission proposed a new Directive in 2001 (COM (2001)125 final). In June 2003, the new Directive on market liberalisation was adopted (2003/54/EC). The timetable for market opening was revised: the electricity and gas markets would be fully liberalised by July 2004 for non-household customers, while all customers (including households) will be able to choose their supplier by 1 July 2007 at the latest[6].

The effect of the market liberalisation on energy efficiency is still under discussion and is dependent upon a complex plethora of factors. Falling and volatile prices are expected to have a negative impact on ESCO projects and short-term oriented suppliers maximising turnover and margins may be hostile to action beyond the consumer's meter. At the same time improved efficiency at the demand side may be fostered by distribution companies trying to retain consumers and attract new ones by offering energy services as 'added value' to an otherwise homogenous commodity such as electricity.

Many energy efficiency advocates and policy makers have called for legislation introducing energy services as a natural complement to the electricity and gas market liberalisation. In December 2003, the Commission proposed a new Directive on energy efficiency and energy services in the EU (COM (2003) 739 final). Its objective is to save an additional fixed amount of energy every year equal to at least 1% of previous consumption in each Member State, leading in

[6] The earlier proposal envisaged that Member States give all non-domestic (i.e., industrial and commercial) electricity customers freedom to choose their electricity suppliers by January 1, 2003, and to all customers (i.e. 100% market opening) by January 1, 2005.

2012 to an annual improvement in energy efficiency of around 6%. Most of this energy savings potential can be effectively realised through energy services and other cost efficient energy end-use efficiency measures. The main mechanism to achieve this objective will be to improve the functioning of the EU energy market by removing barriers hampering the development of a well functioning, commercially viable and competitive market for cost-effective energy-efficiency measures on the end-use side. Initially, market subsidies and government programs may be necessary. Over time, the provision of energy services will be implemented on purely commercial grounds. The proposed Directive will stimulate and facilitate cost-effective investment in energy efficiency and will foster the development of ESCOs by requiring Member States to remove barriers to ESCOs and Third Party Financing (TPF).

The European Commission has long been promoting the ESCO industry and TPF. The first initiative was in 1988 when the European Commission adopted a Recommendation to Member States to promote ESCOs and the use of TPF, defining TPF and describing how ESCOs operate. In 1992, the European Council and Parliament adopted a Directive (93/76/EC), which invited Member States to design and implement programmes to use TPF in the public sector. Under the European Commission's THERMIE and SAVE programs, several studies and pilot projects were implemented to promote ESCO and TPF activities, mainly in public buildings and combined heat and power (CHP). In 1996, two standard ESCO-type contracts were published – for buildings and for industry – in all the languages of the EU. In 2002, the European Commission's GreenLight Program identified ESCOs operating in the lighting field, and created a preliminary list of ESCOs (see www.eu-greenlight.org). More recently, in 2003, the European Commission DG JRC conducted a survey of ESCOs in the EU, resulting in the creation of the first online EU database of ESCOs (see http://energyefficiency.jrc.cec.eu.int/html/list_esco.htm); analysis of the results to date from the survey and the database constitute the backbone of the current report.

3. Energy services and associated terminology: definitions

Energy services include a wide range of activities, such as

- energy analysis and audits,
- energy management,
- project design and implementation,
- maintenance and operation,
- monitoring and evaluation of savings,
- property/facility management,
- energy and/or equipment supply,
- provision of service (space heating/cooling, lighting, etc.)

In this report we refer to companies providing energy services to final energy users, including the supply and installation of energy-efficient equipment, the supply of energy, and/or building refurbishment, maintenance and operation, facility management, and the supply of energy (including heat), as *Energy Service Provider Companies (ESPCs)*. They may be consulting engineers specialised in efficiency improvements, equipment manufacturers, energy suppliers or utilities. ESPCs provide a service for a fixed fee or as added value to the supply of equipment or energy. ESPC may have some incentives to reduce consumption, but these are not as clear as in the ESCO approach (see below). Often the full cost of energy services is recovered in the fee, so the ESPC does not assume any risk in case of underperformance. ESPCs are paid a fee for their advice/service rather than being paid based on the results of their recommendations (WEEA 1999). Principally, projects implemented by ESPCs are related to primary energy conversion equipment (boilers, CHPs). In such projects the ESPC is unlikely to guarantee a reduction in the delivered energy consumption because it may have no control or on-going responsibility over the efficiency of secondary conversion equipment (such as radiators, motors, drives) and over the demand for final energy services (such as space heating, motive power and light) (Sorrell 2005).

Energy Service Companies (ESCOs) also offer these same services. ESCOs are fundamentally different from ESPCs and the ESCO activities can be distinguished from ESPCs' activities in the following ways:

1. ESCOs guarantee the energy savings and/or the provision of the same level of energy service at a lower cost by implementing an energy efficiency project. A performance guarantee can take several forms. It can revolve around the actual flow of energy savings from a project, can stipulate that the energy savings will be sufficient to repay monthly debt service costs for an efficiency project, or that the same level of energy service will be provided for less money.
2. The remuneration of ESCOs is directly tied to the energy savings achieved;

3. ESCOs typically finance, or assist in arranging financing for the installation of an energy project they implement by providing a savings guarantee;
4. ESCOs retain an on-going operational role in measuring and verifying the savings over the financing term.

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

Energy Performance Contracting (EPC) is a form of 'creative financing' for capital improvement which allows funding energy efficiency upgrades from cost reductions. The approach is based on the transfer of technical risks from the client to the ESCO based on performance guarantees given by the ESCO. In EPC, ESCO remuneration is based on demonstrated performance; a measure of performance is the level of energy or cost savings or the level of energy service. EPC is a means to deliver infrastructure improvements to facilities that lack energy engineering skills, manpower or management time, capital funding, understanding of risk, or technology information. Cash-poor, yet creditworthy, customers are therefore good potential clients for EPC.

EPC should be clearly distinguished from energy *supply contracting* (delivery contracting) that is focused on the supply of a set of energy services (e.g. heating, lighting, motive power, etc.) mainly via outsourcing the energy supply. Chauffage (see details later) is a form of supply contracting. In contrast EPC targets savings in production and distribution.

Box 2 summarizes the key characteristics of an ESCO and gives a concise definition of EPC; Figure 1 illustrates the EPC concept.

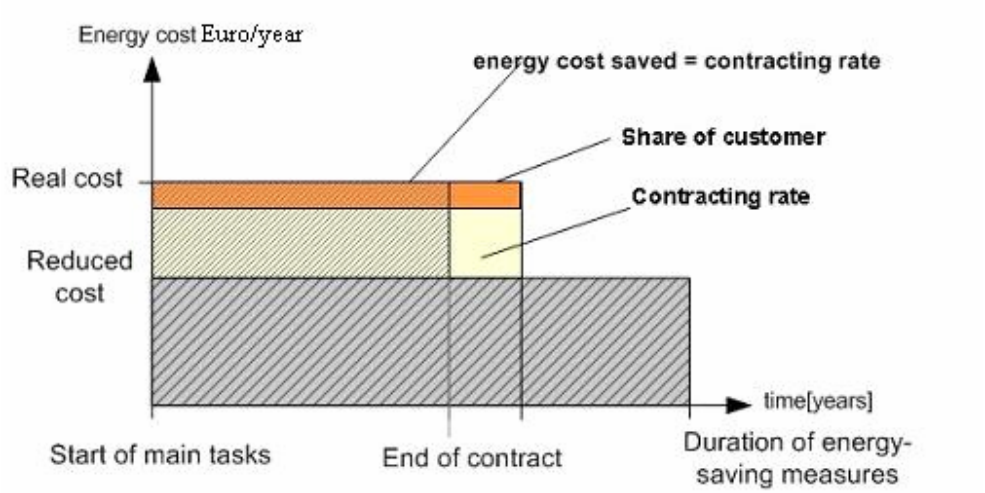
Box 2. Main characteristics of ESCOs and Energy Performance Contracting

An ESCO has the following key characteristics:

- It guarantees the energy savings and/or provision of the same level of energy service at lower cost;
- Its remuneration is directly tied to the energy savings achieved;
- It can either finance, or assist in arranging financing for the installation of an energy project they implement by providing a savings guarantee.

Under an *energy performance contracting* (EPC) arrangement, an external organisation (ESCO) develops, implements and finances (or arranges financing of) an energy efficiency project or a renewable energy project, and uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project, including the costs of the investment. Essentially the ESCO will not recover all of its costs unless the project delivers all of the energy savings guaranteed.

Figure 1. Energy Performance Contract



* Note: Note that on this graph real cost refers to the initial cost, while the contracting rate depicts the cost savings which in this case are shared between the customer and the ESCO (see later the explanation on shared savings).

Source: Berlin Energy Agency

Three broad options for financing energy efficiency improvements can be distinguished (see Box 3). The approach to financing is just one factor that shapes the structure of an EPC; other factors relevant for the type of financing arrangements and repayments structure include the allocation of risks, the services contracted, and the length of the contract (Poole and Stoner 2003).

Box 3. Sources of financing energy efficiency projects

ESCO financing refers to financing with internal funds of the ESCO and may involve use of its own capital or funding through other debt or lease instruments. ESCO rarely use equity for financing, as this options limits their capability of implementing projects on a sustainable basis.

Energy-user/customer financing usually involves financing with internal funds of the user/customer backed by an energy savings guarantee provided by the ESCO (for instance, a university can use its endowment fund to finance an energy project, in which the energy savings are guaranteed by an ESCO). Energy-user/customer financing may also be associated with borrowing in the case when the energy-user/customer as a direct borrower has to provide a guarantee (collateral) to the finance institution.

Third-party financing (TPF) refers solely to debt financing. As its name suggests, project financing comes from a third party, e.g. a finance institution, and not from internal funds of the ESCO or of the customer. The finance institution may either assume the rights to the energy savings or may take a security interest in the project equipment (WEEA 1999). There are two conceptually different TPF arrangements associated with EPC; the key difference between them is which party borrows the money: the ESCO or the client.

- The first option is that the *ESCO borrows* the financial resources necessary for project implementation.
- The second option is that the *energy-user/customer takes a loan* from a finance institution, backed by an energy savings guarantee agreement with the ESCO. The purpose of the savings guarantee is to demonstrate to the bank that the project for which the customer borrows will generate a positive cash flow, i.e. that the savings achieved will certainly cover the debt repayment. Thus the energy savings guarantee reduces the risk perception of the bank, which has implications for the interest rates at which financing is acquired. The 'cost of borrowing' is strongly influenced by the size and credit history of the borrower.

When the ESCO is the borrower, the customer is safeguarded from *financial risks* related to the project *technical performance* because the savings guarantee provided by the ESCO is either coming from the project value itself or is appearing on the balance sheet of the ESCO; hence the debt resides on someone else's balance sheet (ESCOs, finance institution's). Both public and private customers can benefit from off-balance sheet financing because the debt service is treated as an operational expense and not a capital obligation; debt ratings are therefore not impacted. For highly leveraged companies this is important because the obligation not showing up on the balance sheet as debt means that company borrowing capacity is freed up (Mc Gowan 2001). However, different countries apply various conditions that need to be met in order financing to be viewed as e.g. operating lease; unless conditions are met financing is automatically considered e.g. capital lease. Therefore parties seeking financing need to first inquire the country-specific conditions for operational financing.

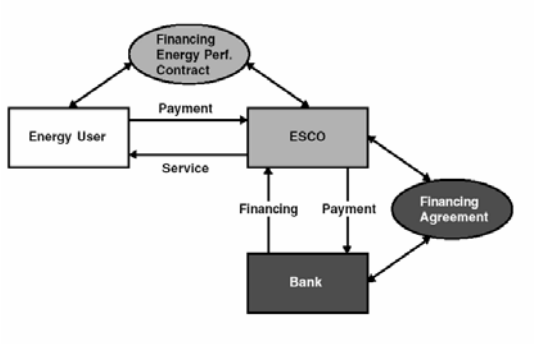
Large ESCOs with deep pockets and hence high credit rating have started to prefer TPF to their own funds because their costs of equity financing and long-term financing are often much greater than what can be accessed in the financial markets. Also, if an ESCO arranges TPF, then its own risk is smaller. This would allow for lower cost of money and hence for the same level of investment more money would be assigned to the project (Hansen 2004). The cost associated with non-recourse project financing by a third party – e.g. one where project loans are secured only by the project's assets – is the highest as it entails more risk and hence higher interest rates (WEEA 1999).

Furthermore, as already mentioned, equity contributions from the ESCO are often deemed undesirable by ESCOs as they tie up capital in a project. This emphasises the fundamental concept that an ESCO is a service company and *not* a bank or a leasing company. The primary reason that ESCOs do not and "should not" provide project financing with internal funds is that it makes their balance sheet look like a bank and not a service company. Local practices, the inability of customers to meet financiers' creditworthiness criteria and costs of equity financing are some of the factors that determine whether ESCOs will provide financing (debt or equity) (Hansen 2004). Small and/or under-capitalised ESCOs which cannot borrow significant amounts of money from the financial markets prefer their role not to be to finance energy efficiency investment.

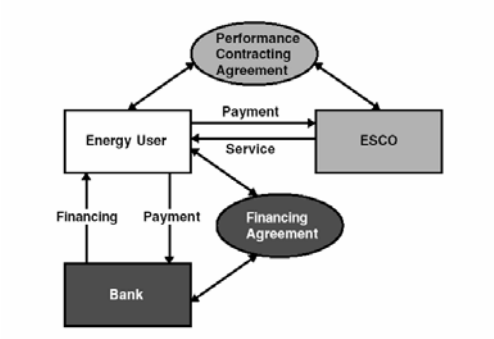
EPC is risk management and effective ESCOs have learned to use project financial structure to help manage the risks. For this reason the two sections to follow look at contracting models and the elements of an ESCO project, placing a special focus in the latter section to investment grade audit.

Figure 2 illustrates the relations between ESCO, finance institution and client under TPF with ESCO borrowing and TPF with customer borrowing.

Figure 2. Third Party Financing with ESCO borrowing and TPF with energy-user/customer borrowing: summary of relations



Third partyfinancing(TPF) with ESCO borrowing



Third party financing (TPF) with energy user/customer borrowing

Source: ECS 2003[7]

[7] Unlike the present report, ECS (2003) defines TPF with energy user/customer borrowing as energy user/customer financing

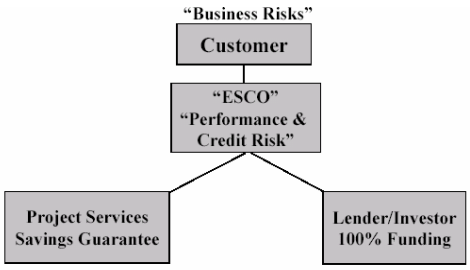
4. Performance contracting models

4.1. Guaranteed savings and shared savings

Figure 2 illustrates the relationships and risk allocations among the ESCO, customer and lender in the two major performance contracting models: shared savings and guaranteed savings. Brief descriptions are also given.

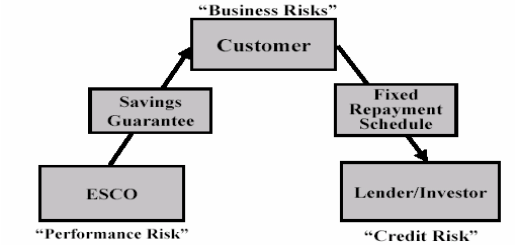
Figure 3. Major types of performance contracting models/repayment options

Shared savings



Under a *shared savings* contract the cost savings are split for a pre-determined length of time in accordance with a pre-arranged percentage: there is no 'standard' split as this depends on the cost of the project, the length of the contract and the risks taken by the ESCO and the consumer.

Guaranteed savings



Under a *guaranteed savings* contract the ESCO guarantees a certain level of energy savings and in this way shields the client from any performance risk.

Source: Dreessen 2003a

An important difference between guaranteed and shared savings models is that in the former case the performance guarantee is the level of energy saved, while in the latter this is the cost of energy saved (Hansen 2003, Poole and Stoner 2003).

Under a guaranteed savings contract, the ESCO assumes the entire design, installation and savings performance risks, but does not assume credit risk of repayment by the customer. Consequently, guaranteed savings contracts are not applicable to ESCO financing provided internally or through TPF with ESCO borrowing. The projects are financed by the customers who can also obtain financing from banks, from other financing agency, or a TPF entity. The key advantage of this model is that it provides the lowest financing cost because it limits the risks of the finance institutions to their area of expertise, which is assessing and handling customer's credit risk. The customer repays the loan and assumes the investment repayment risk[8]. If the savings are not enough to cover debt service, then the ESCO has to cover the difference. If savings exceed the guaranteed level, then the customer pays an agreed upon percentage of the savings to the ESCO[9]. Usually the contract also contains a proviso that the guarantee is only good, i.e. the value of the energy saved will be enough to meet the customer debt obligation, provided that the price of energy does not go below a stipulated floor price[10] (Hansen 2004). A variation of guaranteed savings contracts are *pay from savings* contracts whereby the payment schedule is based on the level (%) of savings: the more the savings, the quicker the repayment (WEEA 1999).

The guaranteed savings scheme is likely to function properly only in countries with an established banking structure, high degree of familiarity with project financing and sufficient technical expertise, also within the banking sector, to understand energy-efficiency projects (e.g. the UK, Austria, and more recently, Hungary). The guaranteed savings concept is difficult to use in introducing the ESCO concept in developing markets because it requires customers to assume investment repayment risk. However, it fosters long-term growth of ESCO and finance industries (Dreessen 2003a): newly-established ESCOs with no credit history and limited own resources would be unable to invest in the project they recommend and may only enter the market if they guarantee the savings and the client secures the financing on its own. In the US the guaranteed savings model evolved from the shared savings model in response to customer's desire to significantly reduce interest costs in exchange for accepting more risk due to their increased comfort with energy savings technologies. It also was initiated by smaller ESCOs and fostered by financial institutions to allow them to grow their respective industries. The primary benefit of this structure is that its reduced financing cost enables a lot more project investment to be made for the same debt service level. The public sector normally prefers this structure in order to maximize the amount of infrastructure investment made in its facilities from an EPC.

Conversely under a shared savings the ESCO assumes both performance and credit risk (as the client takes over some performance risk, it will try to avoid assuming any credit risk). This is why a shared savings contract is more likely to be linked with TPF, with ESCO financing or with

[8] The financing institution (FI), of course always has some risk for loan non-payment. The assessment of customer's credit risk is done by the FI; it is one of the factors that define interest rates.

[9] However, changes in energy consumption – e.g. business expansion and/or changes of processes or production lines are likely to bring increased energy that can deteriorate the targets. Conversely, a contraction of business (e.g. an empty wing of a hotel) or a smaller production output will results in energy savings. Therefore crucial issues to consider involve setting the baselines and associated growth projections, setting the system boundary and conditions, as well as avoiding leakages. A clause in the contract, which allows either party to re-open and renegotiate the baseline to reflect current conditions, can resolve this problem.

[10] Performance contracting is risk management and dropping fuel prices, such as those experienced in North America in 1986, gave rise to this provision. We are indebted for this clarification to Shirley Hansen.

a mixed scheme with financing coming from the client and the ESCO whereby the ESCO repays the loan and takes over the credit risk. The ESCO therefore assumes both performance and the underlying customer credit risk – if the customer goes out of business, the revenue stream from the project will stop, putting the ESCO at risk (WEEA 1999). Unfortunately, such contractual arrangement may create leveraging and increased capital requirement problems for ESCOs, because ESCOs become too indebted and at some point financial institutions may refuse lending to an ESCO due to high debt to equity ratio[11]. In effect the ESCO collateralizes the loan with anticipated savings payments from the customer, based on a share of the energy cost savings. The financing in this case goes off the customer's balance sheet[12].

A situation where savings exceed expectations should be taken into account in a shared savings contract. This setting may create an adversarial relationship between the ESCO and customer (Hansen 2003), whereby the ESCO may attempt to 'lowball' the savings estimate and then receive more from the 'excess savings' (Poole and Stoner 2003)[13].

Furthermore, to avoid the risk of energy price changes, it is possible to stipulate in the contract *a single energy price*. In this situation the customer and the ESCO agree on the value of the service upfront and neither side gains from changes in energy prices: if the actual prices are lower than the stipulated floor value, then the consumer has a windfall profit, which compensates the lower return of the project; conversely if the actual prices are higher than the stipulated ceiling, then the return on the project is higher than projected, but the consumer pays no more for the project. In effect this variation sets performance in physical terms with fixed energy prices, which makes the approach resemble guaranteed savings (Poole and Stoner 2003).

The shared savings concept is a good introductory model in developing markets because customers assume no financial risk[14]. From ESCO's perspective the shared savings approach has the added value of the financing service (Poole and Stoner 2003). However this model tends to create barriers for small companies; small ESCOs that implement projects based on shared savings rapidly become too highly leveraged and unable to contract further debt for subsequent projects (Poole and Stoner 2003, Hansen 2004). Shared savings concept therefore may limit long-term market growth and competition between ESCOs and between financing institutions: for instance, small and/or new ESCOs with no previous experience in borrowing and few own resources are unlikely to enter the market if such agreements dominate (CTI 2003, Dreessen 2003a). It focuses the attention on projects with short payback times ('cream skimming').

[11] Experience in the US shows that lenders tend to require a variety of credit enhancements for this type of financing, such as bonding or insurance (WEEA 1999).

[12] Under off-balance sheet financing, also called non-appropriation financing, financiers hold title to equipment during the term of the agreement.

[13] Deliberate estimation of lower value of savings is not restricted to the shared savings model only; it is a standard practice for the ESCO to secure itself for the guaranteed performance with some buffer. The real questions are **how big** this buffer/cushion is and how the **'excess' savings** above the estimated ones are **split** between the client and the ESCO (Poole and Stoner 2003).

[14] The customers may have different reasons to be reluctant to assume financing, even if the cost of capital is higher for ESCOs than for customers. Among the reasons are adversity to assuming debt, borrowing limits and budgetary restraints (Poole and Stoner 2003).

Table 1 summarizes the features of the guaranteed and shared savings models.

Table 1. Guaranteed savings and shared savings: a comparison

Guaranteed savings	Shared Savings
Performance related to level of energy saved	Performance related to cost of energy saved
Value of energy saved is guaranteed to meet debt service obligations down to a floor price	Value of payments to ESCO is linked to energy price
ESCO carries performance risk Energy-user/customer carries credit risk	ESCO carries performance and credit risk as it typically carries out the financing
If the energy-user/customer borrows, then debt appears on its balance sheet	Usually off the balance sheet of energy-user/customer
Requires creditworthy customer	Can serve customers that do not have access to financing, but still requires a creditworthy customer
Extensive M&V	Extensive M&V
ESCO can do more projects without getting highly leveraged	Favours large ESCOs; small ESCOs become too leveraged to do more projects
More comprehensive project scope due to lower financing costs	Favours projects with short payback ('cream skimming') due to higher financing costs

Sources of data: Dreessen 2003, Hansen 2003 and 2004, Poole and Stoner 2003

4.2. Other contracting models

While there are numerous ways to structure a contract and hence any attempt to be comprehensive in describing contracting variations is doomed, other contractual arrangements deserve attention. Here we describe the 'chauffage' contract, the 'first-out', the Build-Own-Operate-Transfer (BOOT) contract and leasing contract.

A very frequently used type of contract in Europe is the '*chauffage'* contract, where an ESPC or an ESCO takes over complete responsibility for the provision to the client of an agreed set of energy services (e.g. space heat, lighting, motive power, etc.). This arrangement is a type of supply contracting and in effect is an extreme form of energy management outsourcing. Where the energy supply market is competitive, the ESCO in a chauffage arrangement also takes over full responsibility for fuel/electricity purchasing. The fee paid by the client under a chauffage arrangement is calculated on the basis of its existing energy bill minus a percentage saving (often in the range of 5-10 %), or a fee may be charged per square meter of conditioned space. Thus the client is guaranteed an immediate saving relative to its current bill. The ESCO takes on the

responsibility for providing the improved level of energy service for a reduced bill. The more efficiently and cheaply it can do this, the greater its earnings: chauffage contracts give the strongest incentive to ESPCs or ESCOs to provide services in an efficient way.

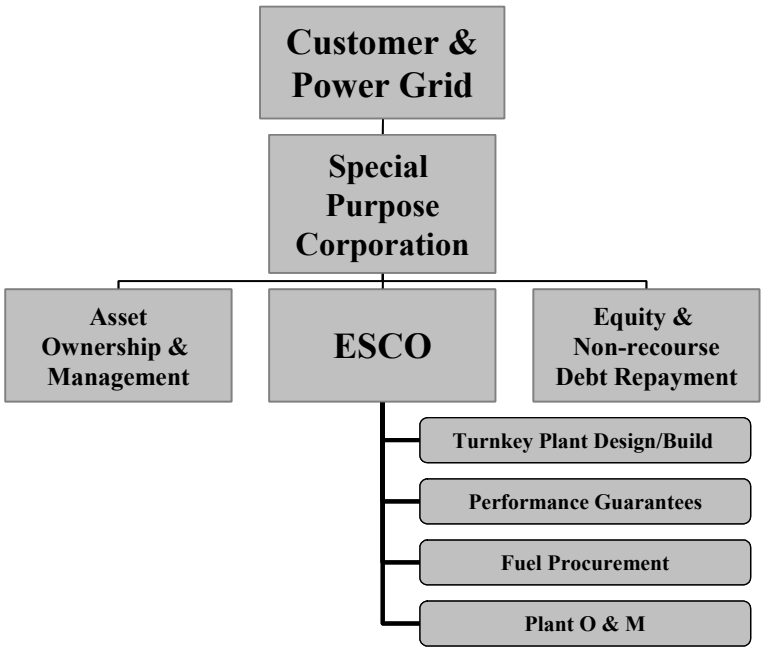
Such contracts may have an element of shared savings in addition to the guaranteed savings element to provide incentive for the customer. For instance, all savings up to an agreed figure would go to the ESCO to repay project costs and return on capital; above this savings will be shared between the ESCO and the customer.

Chauffage contracts are typically very long (20-30 years) and the ESCO provides all the associated maintenance and operation during the contract. Chauffage contracts are very useful where the customer wants to outsource facility services and investment (WEEA 1999).

Another variation is the *'first out'* approach whereby the ESCO is paid 100 % of the energy savings until the project costs – including the ESCO profit – are fully paid. The exact duration of the contract will actually depend on the level of savings achieved: the greater the savings, the shorter the contract (ECS 2003).

A *BOOT* model may involve an ESCO designing, building, financing, owning and operating the equipment for a defined period of time and then transferring this ownership across to the client. This model resembles a special purpose enterprise created for a particular project. Clients enter into long term supply contracts with the BOOT operator and are charged accordingly for the service delivered; the service charge includes capital and operating cost recovery and project profit. BOOT schemes are becoming an increasingly popular means of financing CHP projects in Europe. Figure 4 shows the relationships between parties in a BOOT contract.

Figure 4. Build-Own-Operate-Transfer (BOOT) model



Source: Dreessen 2003

Leasing can be an attractive alternative to borrowing because the lease payments tend to be lower than the loan payments; it is commonly used for industrial equipment. The client (lessee) makes payments of principal and interest; the frequency of payments depends on the contract. The stream of income from the cost savings covers the lease payment. The ESCO can bid out and arrange an equipment lease-purchase agreement with a financing institution. If the ESCO is not affiliated to an equipment manufacturer or supplier, it can bid out, make suppliers competitive analysis and arrange the equipment. There are two major types of leases: capital and operating. Capital leases are installment purchases of equipment. In a capital lease, the lessee owns and depreciates the equipment and may benefit from associated tax benefits. A capital asset and associated liability appears on the balance sheet. In operating lease the owner of the asset (lessor – the ESCO) owns the equipment and essentially rents it to the lessee for a fixed monthly fee; this is off-balance sheet financing source. It shifts the risk from the lessee to the lessor, but tends to be more expensive to the lessor. Unlike in capital lease, the lessor claims any tax benefits associated with the depreciation of the equipment. The non-appropriation clause means that the financing is not seen as debt.

5. ESCO project elements

The typical ESCO project may include the following elements/steps:

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

The Investment Grade Audit (IGA) deserves special attention. The traditional energy audit does not sufficiently consider how implemented measures will behave over time. Because auditors must consider the conditions under which measures will function during the life of the project, an IGA builds on the conventional energy audit. Unlike the traditional energy audit, which assumes that all conditions (related to system, payback, people) remain the same over time, IGA attempts to more accurately predict a building's *future* energy use by adding the dimension of a 'risk assessment component' which evaluates conditions in a specific building and/or processes. Aspect of the IGA include risk management, the "people" factor, measurement and verification, financing issues, report presentation guidelines, and master planning strategies (see Hansen and Brown 2003).

An IGA should therefore serve as a financial investment guide as to how the physical assets of an organization can be improved.

6. Barriers to energy performance contracting

Below the main barriers that inhibit the wider deployment of development of EPC and development of ESCOs are summarized (Bertoldi et al 2003, Dreessen 2003b, Dreessen 2004, ECS 2001, Ligot 2001, Vine 2005, WEEA 1999).

- **Low awareness, lack of information and skepticism at the demand side of the market for energy services** because (a) energy savings are "not seen" and there is lack of information and understanding of the opportunities that energy efficiency offers and especially of how EPC works; (b) high technical risk perceived and concerns over the safety and reliability of equipment; (c) fear of job losses; (d) limited understanding of energy use patterns and load profiles, as well as unavailability of such data, (e) lack of culture for project financing, and (f) limited confidence in ESCOs due to short track record or poor performance;

- **Limited understanding of energy efficiency and EPC by financial institutions** and lack of commercially viable and sustainable project financing due to conservative lending practices and limited experience with energy efficiency project financing – especially through ESCOs – within the banking sector. Because energy efficiency projects and EPC are perceived to be more risky, interest rates are high and debt terms are short. The real problem however is not the lack of funds, but rather the "disconnect", or gap, between established methods of traditional corporate 'asset based' lending and the special financing intricacies of energy efficiency projects requiring 'cash-flow based' lending. The scarcity of project financing is also caused by the fact that most facility owners, especially large energy-consuming industrial plants, are not motivated or willing to use their own capital funds to pay for energy projects versus capital improvements needed for their core business.

- **Small size of projects**: many energy efficiency projects and ventures are too small to attract the attention of large multilateral financial institutions. This creates a perceived small market size by the banking industry and lack of interest on their part to invest the time and resources to learn how to finance energy efficiency projects;

- High **technical and business risk perception** and conservative behaviour from both financial institutions and consumers. End-use energy efficiency projects are often non-asset based and hence collateral may be difficult to obtain. In addition consumers may be oriented towards short paybacks;

- **Legal and regulatory frameworks** not compatible with energy efficiency investments, particularly EPC. The extent to which contract enforcement procedures are in place.

- **Measurement and verification protocols** for assuring performance guarantees are **not understood**.

- **Administrative hurdles** persist, such as complicated procurement procedures that are unsupportive towards the ESCO concept (e.g. often separate calls for tenders required for project design and for project implementation) and high transaction costs, spilt incentives (different responsibility for investment and operation), and unwillingness to allow and involve outsiders in facility operation;

- **Lack of motivation**: energy is a small fraction in total costs and hence low priority (or where it is large portion, then in-house energy manager is justified). In addition energy efficiency projects compete for scarce capital with core business investments or more 'traditional' and 'visible' investments;

- **Limited government support** for energy performance contracting, especially in residential sector where local banks and private investors are reluctant to participate.

The International Energy Agency's Demand-Side Management Implementing Agreement's Task X identified some major barriers to the development of the ESCO industry such as lack of information and understanding of the opportunities that energy efficiency offer; lack of culture for project financing; public procurement rules that prevent the use of ESCOs in the public sector; "low" price of electricity; burdensome administrative procedures that allow only very large projects to be carried out; and limited understanding of energy efficiency and performance contracting by financial institutions (Westling 2003a and 2003b).

Good overviews of generic barriers to energy efficiency, including but not limited to a range of market impediments, are provided by Schipper *et al.* (1994), Weizsäcker *et al.*(1998), and Wuppertal institute *et al.* (2000).

7. ESCOs and ESCO projects in Europe: summary of development and current status

In Europe many ESPCs (see Box 2) have offered energy services for a number of years. ESPCs became active in three major ways:

- through regulation, in particular for the provision of heating in public buildings (e.g. provision of degree days in Italy and France),
- with the gradual restructuring of electricity and gas and utilities seeking to provide energy services as added value, especially given the low electricity/gas prices and the reduced profit margins in selling it (e.g. in Germany, where several municipal utilities were initially forced to offer energy services, and later developed this as a business activity),
- via business ventures by large building control and equipment manufacturers.

In Europe most ESCOs have been founded either by large companies or as subsidiaries of large companies and under EPC arrangements have provided financing themselves (mainly in France, Italy and Germany). Only recently have more ESCOs started implementing EPC using TPF with a private bank or a lending institution as a project financier. For this reason no matter that almost all ESCO projects in Europe have been based on the shared savings concept, TPF has only recently started to attract the attention of ESCOs and project developers in Europe. Chauffage contracts are very commonly used. The guaranteed savings concept has been used rarely. This has been influenced by the predominance of district heating projects.

In Europe the market is segmented in 'functionally specialised' companies: for example companies specialising in supply contracting for industry rarely compete directly with those specialising in performance contracting in buildings (Sorrell 2005).

The majority of ESCO projects in Europe have been undertaken in the public sector, primarily because the public sector is perceived as having 'safer' clients that do not normally go out of business, but in some cases (e.g. Germany, Austria, Spain) also as a result of national or local authorities and energy agencies taking the lead with retrofitting public sector buildings. The most common projects have been in co-generation, public lighting, heating, ventilation, and air-conditioning (HVAC), and energy management systems. The recent energy industry restructuring has stimulated projects in CHP for large commercial centres, hospitals, and industrial facilities. It has also triggered public lighting projects, where municipalities tendered lighting operation, including the supply of electricity. Boiler house improvements (and the provision of "heat service") have featured significantly in many ESCO contracts too, particularly in the public sector.

Below we summarize the results from the preliminary analysis of 106 ESCO Characterisation Forms that have been received by January 2005 in the process of expanding the first online European ESCO database compiled by the DG Joint Research Centre of the European Commission (see http://energyefficiency.jrc.cec.eu.int/html/list_esco.htm). It should be emphasized that as the European ESCO database is quickly growing, the current results should

be treated as provisional; nevertheless they give useful insights into the current status of ESCO industry and activities in Europe.

7.1. Origin and services provided

Table 2 below summarizes societal characteristics (namely area of origin) and services provided by the ESCO sample analysed.

Table 2. ESCO: societal characteristics and services provided*

ESCOs: societal characteristics**	Nr. of companies	Share in total
Equipment manufacturers and suppliers	32	30,48%
Independent specialist companies	65	61,9%
ESCOs of finance institutions	1	0,95%
Energy utility or supply company	18	17,14%
public sector agency	8	7,62%
public-private joint venture	9	8,57%
Other	4	3,81%
Services provided	**Nr. of companies**	**Share in total**
Guarantee of performance	93	88,57%
Financing	98	93,33%
Purchase of fuel/electricity	73	69,52%
Operation	91	86,67%
Insurance coverage***	61	58,10%

* Based on 106 ESCO Characterisation Forms

** Note: The total sum of companies exceeds the 106 ESCO Characterisation Forms analysed and consequently the percentage shares add up to more than 100 % because some companies have defined themselves as belonging to two or even three of the below categories.

*** Note: The benefit of insurance is improved credibility with customers and – since the performance aspects of a contract are insured – transfer of some of the performance risk.

As can be seen, the majority of ESCOs consider themselves to be independent specialist companies. Around one third of the ESCOs originate from equipment manufacturers and suppliers. Approximately one sixth of the companies stem from energy utilities or supply companies and roughly 15 % are public sector agencies or public-private joint ventures. In Europe the largest and most active ESCOs have been founded either by large companies or as subsidiaries of large companies, such as equipment manufacturers, facility management companies, operation, management and construction companies, or energy utilities[15]. In many

[15] Obtaining data about annual turnover of ESCOs is often an illusive task and has been left out of the present attempt. We have left out of the current research the division of domestic versus multinational companies because the line is blurred. Most large ESCOs work on a multinational scale; as they often merge with or acquire national companies as their country branches, it is difficult to claim whether a company is domestic or multinational. Rather we are collecting information on countries where a company is active.

cases ESCOs are more interested in the business of selling energy or equipment than in exploiting the financial opportunities of energy savings.

More than 87 % of the companies in the database provide a guarantee of performance, which means that they are prepared to accept the part of technical and financial risks that they can control. More than 92 % of ESCOs participate in project financing: through own internal funds (ESCO financing option), through TPF (either ESCO borrowing or client borrowing backed by energy savings guarantee), or through a combination of debt and equity.

In Europe under EPC arrangements many ESCOs have provided financing themselves (mainly in France, Italy and Germany). Only recently have more ESCOs started implementing EPC using TPF with a private bank or a lending institution as a project financier. As experience in the US shows, if an ESCO arranges TPF, then its own risk is smaller, which allows for lower cost of money and hence more projects for the size of the investment (Hansen 2004). Decisive factors that determine whether ESCOs will provide financing include many things such as local practices, customers' tolerance for risk, the inability of customers to meet financiers' creditworthiness criteria and costs of equity financing (Hansen 2004 and Dreessen 2005).

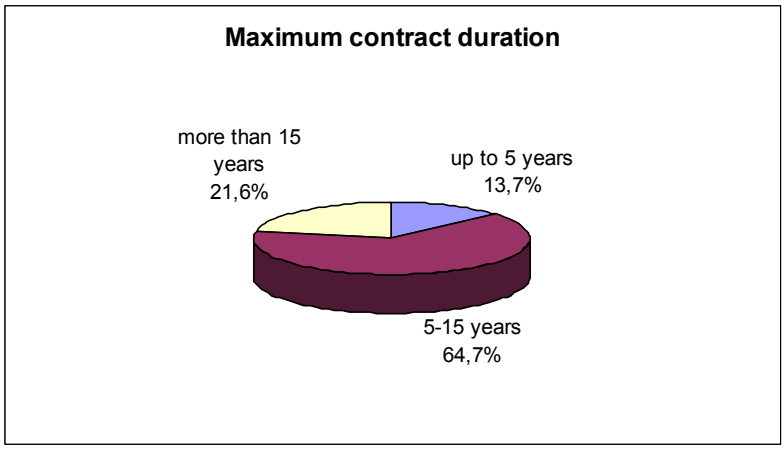
Slightly more than two thirds of the companies in our database state that they can take care of purchasing the fuel or electricity. However from the comments and explanations provided in the survey forms it becomes clear that while ESCOs are eager to get involved in fuel/electricity supply, selling the energy service to the client in terms of heat, cool, lighting is not yet very wide-spread (France and Italy are exceptions in this sense and selling heat is popular there).

More than 85 % of the companies surveyed to date indicate that they manage and maintain the equipment for a contractually stipulated time period (can be test period or a longer one). Finally, a bit more than half of the ESCOs surveyed indicate that depending on the guarantee of performance provided, they insure themselves against events that can imply financial penalties to them.

7.2. Criteria for passing contracts

To get understanding of what is the typical contract duration and above what minimum annual energy bill an energy user is likely to generate interest among ESCOs, we have included these two criteria as optional questions in the ESCO Characterisation Form. To date nearly half of the respondents to our ongoing ESCO survey have provided details about these two criteria; the results are summarized in the figures below.

Figure 5. Maximum contract duration

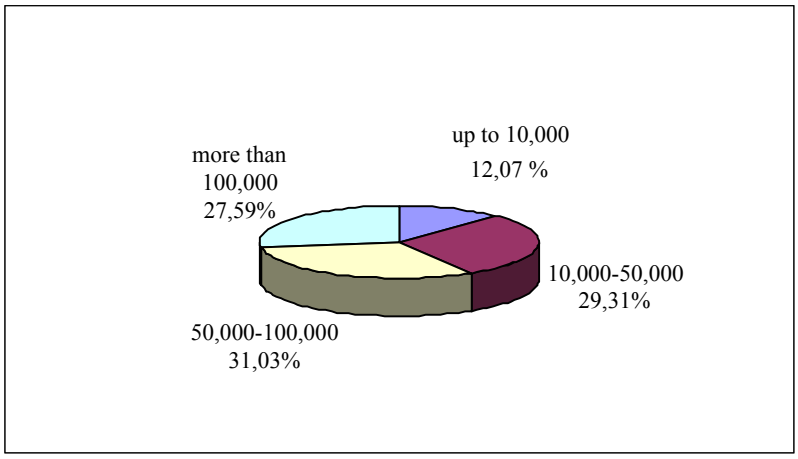


* Note: Based on a total of 51 responses.

As can be seen on Figure 5 typically a contract signed ESCO covers a period of 5 to 15 years. 10 years is the most often quoted maximum contract duration within the sample of 51 responses we received on this question and 12.5 years is the average value of all responses. Less than 15 % of the respondents indicated maximum contract duration of less than 5 years; more than one fifth indicated maximum contract duration exceeding 15 years. Certainly there is a strong relation between the type of project/technology and the maximum contract duration and we have observed that ESCOs specialised in indoor lighting are likely to indicate shorter maximum contract duration periods; conversely streetlighting projects that include outsourcing electricity supply usually involve very long contract duration. This issue has not yet been addressed in a systematic way in the present research.

As can be seen on Figure 6, roughly one third of respondents indicated that they will work with an energy user only in case the latter has an annual energy bill between 50,000 and 100,000 Euro. Slightly more than a quarter of the respondents require an annual energy bill of above 100,000 Euro; similar is the share of ESCOs that are interested in clients with annual energy bill between 10,000 and 50,000 Euro. Only 12.7 % of the respondents will work with a client, whose annual energy bill is below 10,000 Euro. The most commonly cited minimum annual energy bill that generates interest among ESCOs is 100,000 Euro. Again in our view there is a strong relation between the type of project/technology and the minimum annual energy bill required; this issue will be addressed in a systematic way in the future.

Figure 6. Minimum annual energy bill of potential clients (in Euro)



* Note: Based on a total of 58 responses.

7.3. Project specifics

Out of the 28 ESCO Project Forms submitted by mid-March 2005, only 24 contain sufficient and unambiguous information to be included in the present analysis. The results are summarized in Table 3 below.

As can be seen, the majority of the projects in our database have been implemented at the supply side: CHP, DH refurbishment and fuel switch, burner improvements. Lighting and HVAC projects together account for one third of the projects analysed. The majority of the projects have been implemented in the industrial and public sectors. Almost equal number of respondents indicated that they have applied guaranteed and shared savings; however we are still expecting clarifications about contract type from 4 respondents that we have placed under "unspecified"[16]. Along the financing lines: almost all projects have a TPF arrangement; the majority of these arrangements – as becomes clear from explanatory notes in the ESCO Project Forms – are a mixture of ESCO financing (equity and/or leasing) and debt financing. This analysis is based on first results; with the expansion of the project database new insights may emerge.

[16] Many ESCOs consider their contracts unique and proprietary and have difficulties with understanding such clear-cut categorisation of contractual modes.

Table 3 Project specifics*

CONTRACT DURATION	Nr. of projects	Share in total
up to 5 years	8	33.33 %
5-15 years	14	58.33 %
more than 15 years	1	4.17 %
unspecified	1	4.17 %
TECHNOLOGY		
Combined Heat and Power (CHP), District heating (DH) refurbishment, fuel switch, burner improvements	9	37.5 %
Heating, Ventilation, Air Conditioning (HVAC)	3	12.5 %
Renewable Energy Sources (RES) utilization	2	8.33 %
Lighting (indoor and streetlighting)	5	20.83 %
other (gas distribution, compressed air, reactive power, process unit and combustion improvement)	4	16.67 %
Complex solutions	1	4.17 %
SECTOR		
Industry	12	50 %
Public	9	37.5 %
Tertiary	1	4.17 %
Residential	1	4.17 %
All sectors	1	4.17 %
CONTRACT TYPE		
Guaranteed savings	9	37.5 %
Shared savings	8	33.33 %
Build-Own-Operate-Transfer (BOOT)	2	8.33 %
Chauffage	1	4.17 %
Unspecified	4	16.67 %
FINANCING		
TPF	22	90.67 %
Client financing	2	8.33 %

* Based on 24 ESCO Project Forms

The findings presented in this section cannot be used to make any statistical inferences as the data on which Table 3 is based were not obtained through any random sample but comes from the responses received from entities included in our ESCO database. Because this is not a statistically significant sample, no inferences can be made to the total population[17]. The ESCO project database nevertheless provides practical insights on project implementation.

The results of our expert survey and the sources listed in the beginning of the report show that the majority of ESCOs' projects in Europe have focused on CHP, public lighting, HVAC, and energy management systems. In the 90s and before the majority of ESCO projects in Europe have been undertaken in the public sector, because the public sector is perceived as having 'safer' clients that do not normally go out of business, but in some cases (e.g. Germany and Austria) also as a result of national or local authorities and energy agencies taking the lead with

[17] To use inferential statistics one either has to sample every known element in the population or list all the known elements and do a statistically random sample. Both are clearly infeasible with regard to ESCO projects in Europe.

public sector buildings. The recent energy industry restructuring has stimulated projects in CHP for industrial facilities, large commercial centres and hospitals; it has also triggered public lighting projects, where municipalities tendered lighting operation, including the supply of electricity. Supply contracting is very common and chauffage contracts are among the most common ones.

8. National ESCO developments

The following sections report on the status of the ESCO industry in some European countries. The discussion illustrates both the diverging patterns of ESCO industry development and the various factors that have shaped them. The countries discussed in separate sections have been researched in more detail. Nearly all of the detailed cases belong to the most developed ESCO markets in Europe. The successful policies and drivers that have fostered the development of ESCO markets in some countries are outlined in comparison with the rest of the countries with less developed ESCO markets.

Italy

In Italy there has been 20 years experience in energy service matters. The first ESPCs started to operate in Italy in the early 80's by providing "heat service" to public buildings under contracts to supply the fuel and to operate/upgrade the boilers. TPF was used, mostly in the service sector. During this period, several CHP plants were installed in hospitals. Many TPF projects have been implemented, for example for cogeneration in hospitals, HVAC, BEMS, lighting efficiency improvements, etc. In 1984, the association of heat supply companies (ASSOCALOR) was established. In mid-90's, ASSOCALOR changed its name to AGESI (the Italian energy service industry association) in response to a new legislative framework that required public authorities to consider energy-saving options when looking at energy supply options.

According to Capozza (2003) about 15 Italian companies declare themselves ESCOs and the following types of ESCOs can be distinguished: 'ad hoc' independent company, equipment supplier, fuel and/or electricity supplier, public energy agency, and public/private joint venture. However in the framework of the current research project more than 50 companies have been listed as ESCOs in the online database based on the information provided by them in the process of applying for entry to the database.

The major sectors targeted include co-generation in the local health board sector, heating for public buildings, cogeneration and heat generation in the industrial sector, and lighting (Capozza 2003). A few large multinational companies coming from the heat supply and the building control sectors dominate the Italian ESCO industry. There are many small and medium-size ESCOs too. A few new ESCOs are starting operation, mainly in street lighting.

In general, ESPCs are still more common on the Italian market for energy services: for instance, there are more than 50 operators of facility management (Pela 2003). The Italian banks are still hesitant to provide financing for ESCO projects.

Recently, an innovative policy mix was introduced in Italy, which ensures additional cash flow for energy efficiency projects and thus provides a strong incentive for ESCO activities. Two Decrees of the Italian Minster of Industry, Commerce and Craftsmanship and the Minister of Environment on energy end-use saving targets and instruments in the electricity and gas markets

may give a strong incentive for the ESCO industry's development. The decrees establish a scheme that combines command-and-control measures (energy-savings targets for electricity distributors), with market instruments (tradable energy-efficiency certificates issued both to electricity distributors and energy service companies), as well as with elements of tariff regulation (cost recovery mechanism via electricity and gas tariffs and multiple driver tariff schemes to avoid profit losses). The Italian scheme finally became operational in January 2005 (Pavan 2002, Bertoldi and Rezessy 2004).

ESCO projects are eligible for certification and it is expected that several electricity distributors will purchase the so-called "white certificates" from ESCOs, increasing the financial attractiveness of ESCO projects. Many traditional energy supply and/or engineering firms without much experience and expertise are now rushing into the ESCO market. Since no definition or prerequisites of the ESCOs that can acquire white certificates are provided in the decrees introducing the scheme, this rush into the ESCO market may potentially pose a threat to the credibility of companies that provide energy service if no certification or quality check on future projects is introduced. There is therefore a strong need for a clear definition of ESCOs, of their essential characteristics, their most appropriate "modus operandi" and the minimum requirements.

Guidelines and model contracts for EPC and TPF have been published by some regions. A centralized procurement procedure for energy services has been established by the government-controlled CONSIP agency, available to all Public Administrations and mandatory for Government Administrations.

France

The term "energy service" appeared recently in France as a generic name to designate a rather broad range of activities. Before this name was introduced, many companies were already providing such services, all more or less based on the concept of EPC, under the name of "Exploitation de chauffage".

French energy policy is based on a strong tradition of public service, a notion that is used to integrate the principle of *spécialité*: EDF was not authorized to manage activities that are not directly and naturally linked to its main fields. It did not allow the sale of a mix of energy and services; it therefore led to the very early introduction of the logic of unbundling the quality level of the public service from the means to provide it. This led to the creation of companies able to bear the financial risk of operations: a significant factor in the ESCO industry's development. Such companies were independent of EDF and had energy efficiency and plant maintenance as their only business. The principle of delegated management of public services also explains the French model of the ESCO industry: the outsourcing of public service, the public body remaining in charge of quality control.

Operational contracts for the public and semi-public buildings within public purchase rules led to a coding in items (P1/P2/P3/P4): to ensure the indexing of the prices, to apply differentiated rates of the value added tax (VAT), to distribute the elements of the invoice in accordance with the

law between owner and tenants or occupants, to enter them in the public accounts. This coding and the demand of public accounting for fixed results for a fixed price largely determined the features of energy performance contracting (EPC) in France. For all the P1 contracts, profit sharing can be integrated: e.g., the sharing of energy savings, based on a previously defined heating consumption (the market central commission in the register of the general technical specifications (Collection Marchés Publics n°2008) defines the formulas of profit sharing). Profit sharing involves all actors but, as opposed to a fixed price operation, decreases the payback time for the operator when he decides to invest his own money in the facilities of the customer.

With energy liberalisation underway there is a new definition of public services. As soon as competition is introduced for a class of eligible customers, the principle of *spécialité* is no longer applied, in that energy services can be sold together with energy.

The most original part of the French model consists of the aggregation of operation, financing and guarantee of savings, or aggregation between the operator, the guarantee and the financier: the ESCO ensures the financing of the operation at its risk, and refunding is carried out only through effective savings (Dupont and Adnot 2004).

The current contracts of facility management are concentrated primarily in the tertiary sector[18]. However the deregulation of the electricity market has created a new service supply market in France making it possible for new actors to offer a service of advice focused on the energy provisioning at the upstream of the meter.

In the framework of the current research project more than 15 companies have been listed as ESCOs in the online database based on the information provided by them in the process of applying for entry to the database. The French market is rather well developed, although very special and largely dominated by a few very large companies. Sixty companies adherent to the trade association FG3E represent a significant part of the ESCO industry in France (Jamet and Adnot 2003). The current contracts of facility management are concentrated primarily in the tertiary sector. The French market is among the most developed markets in Europe.

Spain

In Spain around 10 private ESCOs have been operating for a number of years according to the EPC concept (Blanco 2003). In addition, almost all regional and some local energy agencies, together with the national energy agency (Institute for Diversification and Energy Saving, IDAE), act as ESCOs and provide TPF in some of their projects. The private ESCOs are especially active in financing wind farms, while public ESCOs, in particular the IDAE, are trying

[18] The French trade association of facility management has the following definitions. First, contract of means, obligation of means is a contract under which a provider carries out a precisely defined mission, with the means and competences requested by this mission. Second, contract of results, obligation of results is a contract under which a provider carries out a qualified and quantified service, and demonstrates how he obtained the service levels requested by the client. This requires the definition of performance indicators of results, and to set up the means to measure them: the service continuity, comfort levels, the availability of equipment.

to foster new markets such as co-generation with biomass, biomass technologies for different uses, and solar thermal and photovoltaic applications.

ESCOs sometimes compete with national expert companies in the field, like IDAE. IDAE's customers range across all industrial sectors, including large energy intensive industries and small and medium-sized enterprises (SMEs), as well as the residential and transport sectors.

EPC is very common in relation to district heating. "Pay for heat" fee-based service is also provided. The fee comprises the heat generation and distribution (hot water), the operation and maintenance of the boilers' and pumping room, and the recovery of the initial investment made by the ESCOs, when applicable. Long-term BOOT and chauffage contracts are common. However in other project types ESCOs ignore some important project elements such as operation and maintenance (Escobar 2004).

TPF is a popular mechanism provided also by regional and local energy efficiency agencies, as well as IDAE. IDAE has provided TPF in many hydro projects. Direct project financing by energy efficiency agencies (TPF and other financing mechanisms) is a distinctive feature of the Spanish market (Blanco 2003). The number of banks and other financial institutions that carry out energy projects by means of TPF is rapidly increasing.

ESCOs in Spain are well established and very active, especially due to the project involvement and the financial support of the regional and national energy agencies. In addition there is also a flourishing ESPC industry (producers of energy efficient equipment, installers and utilities). The Spanish market is also among the most developed markets in Europe

Germany

Germany is the most mature ESCO market in the EU. The German ESCO market is characterised by more than 70,000 contracts for energy services[19] concluded by the end of 2000, which resulted in a total investment exceeding 5 billion Euro, more than 50,000 generation units, a total installed thermal capacity of 46 GW and a total installed electric capacity of 8 GW (Brand and Geissler 2003).

More than 200 EPC agreements have been made since the mid-1990s, primarily for public buildings in the commercial sector with building "pools" of up to 100 separate buildings[20] (Seefeldt 2003). In the City of Berlin alone more than 900 public buildings have been upgraded since the start of the Energy Saving Partnership program in 1995; these have been grouped in 16 pools. The total guaranteed savings is above 7.8 million Euro and the total investment is around 32 million Euro (Seefeldt 2005). Other large EPC projects have been realised in Hamburg, Munich, Leipzig, Bremen, the region of Hesse and in some cities in North-Rhine-Westphalia and

[19] Brand and Geissler (2003) distinguish between supply contracting, performance contracting and operation contracting. The number of contracts on energy services appears to cover all the three categories.
[20] The role of such pools is to minimize transaction costs.

Saxony-Anhalt. The provision of energy services like energy management and accounting, heat supply have been common for private buildings as well (EnergyProNet n.d.).

There are around 480 ESCOs[21] in Germany with an overall annual turnover of about 3 billion Euro (Brand and Geissler 2003). Energy services are being implemented at 120,000 sites in 2003, estimated to be less than 9 % of the existing market potential. The expectations for 2005 are that energy services will be delivered at around 280,000 sites (Brand and Geissler 2003).

The sector attracting most attention is public buildings primarily due to the support of energy agencies and the restructuring of building administrations towards outsourcing of energy-related operational tasks (EnergyProNet n.d.). The success of the German ESCO market has also been driven by the financial and technical support for energy efficiency projects provided by the concerted effort of governmental action (research and development programs, loan/funding schemes, and incentive programs for renewable energies) and non-governmental programs (e.g. credit programs by eco-banks, efficiency checks by energy agencies, and boiler replacement by utilities). Customer information and motivation, different legal acts and loan programs and public-private partnerships have made Germany the European ESCO leader (Brand and Geissler 2003).

Finland

There are three ESCOs in Finland with ongoing projects, one of them being a business unit of a multinational company providing operation, maintenance and construction services. These companies are very active. Two ESCOs develop and implement only EPC projects. The ESCO market potential in Finland is estimated to be in the range of 350 to 400 million Euro (Väisänen 2003). The turnover in 2002 was estimated to be between 4 and 5 million Euro. The interest in EPC has increased clearly and the turnover in 2004 was expected to exceed 10 million Euro (Väisänen 2003).

The main customer is the process industry (80 %); the municipal sector also has several projects in the pipeline. The most common types of energy efficiency projects are improvements related to industrial processes and building refurbishment of HVAC systems. These types of projects account for more than two thirds of the projects and more than 90 percent of the turnover of ESCO businesses. Commercial buildings and SMEs are marginal sectors with only a few minor projects. Unlike the rest of Europe, in Finland buildings and small-scale CHP are not considered to be the primary targeted sectors, since savings potential in buildings is not sufficient to pay back large refurbishment projects and there is not much place for new small scale CHP due to the high coverage of district heating (Väisänen 2003); the provision of DH is based on CHP.

Since early 90s there has been a program for energy audits; just in 2000 buildings in the service sector with total area of 83 million m^3 were audited and on the average the estimated financial saving potential for energy and water turned out to be about 13 %. Financial support amounting

[21] Due to more relaxed definition of ESCOs, other publications cite much higher number of such companies in Germany.

up to 40 % of the auditing costs is provided for service and industrial sector buildings by the Employment and Economic Development Centres (EnergyProNet n.d.).

Although the number of ESCOs has not changed for some time, there are indications that a few new ESCOs will be entering the marketplace (Väisänen 2003). This would be essential in order to make EPC a real choice for energy users. For the next two years, there will be a special focus by the Finnish energy authorities on the municipal sector.

The Ministry of Trade and Industry (MTI) grants subsidies (15 to 20 %) on certain types of energy-efficiency projects, but only to those buildings and industrial facilities where the owner has signed a Voluntary Agreement on Energy Conservation with the MTI. EPC projects are considered a special area to be promoted: all EPC projects are subsidized by MTI by 15 to 20 %. In the case of the Voluntary Agreement, an additional 5 % subsidy is granted (a total of 20 to 25 %). In the period 1992-2003, nearly 5000 audits were subsidized in Finland, covering more than 60 % of total energy use in industry and 91 million square meters in the service sector (Väisänen 2003).

Currently performance contracts are financed by the ESCOs. There have been a few attempts to get the attention of financial institutions, but there is clearly a chicken and egg problem: as long as the market is not large enough, financial institutions are not interested, and as long as financial institutions are not interested, it is difficult to expand the market. While the number of ESCOs in Finland is still small, their financial turnover is rapidly increasing[22] and now there are signs that the market will move. Nevertheless at present the Finnish market is still among the less developed ESCO markets in Europe.

Austria

There are about 40 ESCOs in Austria. In the last 5 years the Austrian EPC market has seen a quick development (Seefeldt 2003). To date the energy efficiency of about 600 to 700 buildings has been improved via EPC, as compared to almost zero in 1998; these buildings represent roughly 4-6 % of all service sector buildings. Another 300 to 400 federal buildings (about 50 % of total floor area) will get an EPC contract in the next 3 years (Leutgöb 2003). The main customers and driving forces are the federal building administration, a few local governments in large cities (Graz, Salzburg) and, surprisingly, housing associations and some small and medium-sized municipalities. Currently private commercial buildings are not typical EPC customers.

In 2001 the Austrian Energy Agency made a rough estimation of the Austrian EPC market: based on the assumption that around 50 % of the building stock is suitable for implementation of EPC concepts, the estimated investment volume amounts to about 300 million Euro. This would bring an estimated annual energy cost savings of around 50-60 million Euro and associated annual CO_2 reductions of 600.000 to 700.000 t. The EPC potential encompasses different building categories e.g. federal buildings, county buildings, municipal buildings, hospitals as

[22] Estimates for ESCO turnover should be taken with care as these numbers are not easily comparable: apart from degree of ESCO development a number of other factors influence these numbers, such as, for instance, size of the country and hence market size.

well as private service buildings. The Austrian Energy Agency states "Austria is – together with Germany – *the* EPC pioneer in Europe" (Leutgöb 2003). Especially in the last years a further development of contracting to a comprehensive energy service was reached. Innovative technologies and renewable energies are integrated and a pooling of different buildings takes place.

The Austrian ESCOs active on the EPC market have developed from different starting positions: from international companies from the building technology industries have expanded into the EPC business; from civil engineers that cover the energy saving planning and management aspect of the business and engage subcontractors for the operative work, and from a few utilities that have developed towards the energy service concept.

In Austria, as in Germany and Spain, the regional and the national energy agencies played a crucial role in the development of energy services and small ESCOs. The EPC projects in small and medium-sized municipalities have been supported by regional programs, e.g. in Styria, Upper Austria, and Tyrol. The increase of the Austrian EPC market is based mainly on increased know-how: energy agencies at the national, regional and local level have acted as know-how carriers and through action in public buildings drew the attention of businesses to the end-use energy efficiency market niche (Seefeldt 2003). Except in one region, no direct subsidies from public money have been allocated to EPC projects. Instead, public money has been used for information and marketing activities and for advice to potential EPC customers (Seefeldt 2003). Building owners and administrators got increasingly convinced that EPC is helping them in solving day-to-day problems in facility management. The focus has therefore been on competent advice on how to use the EPC approach in practice. Especially the energy agencies play a crucial role in the market development as they are seen as neutral advisors. Furthermore the development of quality criteria and certification is building trust in the application of EPC.

At the beginning of 2003 the program "Ecofacility" by the Federal Ministry for Agriculture, Forestry, Environment and Water Management has been started that targets private commercial and service buildings (e.g. office buildings, shopping centres, hotels, etc.) through EPC, planning and comprehensive service packages. It is estimated that at least 20 % of the operation costs can be saved. A market analysis showed that the CO_2 emissions of private service buildings can be reduced by 520.000 t/year by means of conventional remediation, EPC and TPF.

All these features make Austria one of the European ESCO champions.

United Kingdom

There are approximately 20 established ESCOs operating in the United Kingdom (UK). The major players are subsidiaries of large international heat supply control equipment companies, oil companies, and electric utilities. Many new small companies offering more than one service (e.g., consulting plus finance) consider themselves to be ESCOs. There is no established definition of "ESCO": different titles are used, such as Contract Energy Management (CEM) companies, TPF companies, Technology Performance Contracting (TPC) companies (Iqbal 2003b). Generally, companies providing a totality of services and risk sharing are termed CEM

companies. Commonly, the major players deal only with customers whose annual energy bill exceeds 75,000 Euro. Popular customers are located both in the private sector (commercial buildings, industry, generally excluding process aspects) and in the public sector (large state owned hospitals, prisons and defence establishments, local authority housing) (Iqbal 2003b). According to ESTA, the trade body of the UK ESCO industry, the industry has grown from 190 million Euros in 1993 to 735 million Euros in 2001[23].

In the framework of the current research project more than 10 companies operating in the UK have been listed as ESCOs in the online database based on the information provided by them in the process of applying for entry to the database.

The UK ESCO projects may be classed under three main categories:

1. Demand side refurbishment/retrofits with finance and performance guarantees. These include projects related to building envelope and hot water distribution improvements (insulation); controls; efficient lighting; boiler decentralisation; energy recovery; routine and breakdown maintenance; fuel purchase and management;

2. Supply side retrofit/refurbishment including activities such as boiler house retrofits; fuel switch; improved hot water and steam distribution systems, controls and insulation; medium scale CHP; fuel purchase and management; routine & breakdown maintenance; finance and performance guarantees;

3. New Buildings: this is a new area for larger ESCOs and those in consortia with Mechanical and Electrical and Facility Management contractors. This new business for ESCOs came about with the launch of UK government's Private Finance Initiative (PFI) for Public Estate. This category includes provision of construction finance, turnkey contracting, operation and maintenance, total facilities management if required (catering, gardening, decoration, etc.).

ESCOs with significant capital (such as oil company / utility owned ESCOs) may use their own finance, but most major ESCOs use external TPF from banks. Banks and credit institutions are very active in financing ESCO projects. Undisclosed TPF is a popular financing technique used by big ESCOs[24]. There are no current support mechanisms for ESCOs in the UK, and there never have been such mechanisms. The only favourable tax regime is that the ESCO can claim capital tax allowances on the investment it makes, and pass this on to the customer in whole or in part. Not all the investment, however, qualifies for capital allowances. The UK, due to its large experience in project financing, the more innovative spirit of enterprises and the favourable market structure, has developed a flourishing ESCO industry, which could further develop due to the UK Carbon Levy. These features place the UK ESCO industry among the most developed

[23] Most ESCOs indicate their turnover by the energy bills they handle or by the amount of capital they invest. As a rule of the thumb the capital invested by an ESCO is roughly equal to around 1-year energy bill. Therefore these two indicators are not far apart. We are indebted for this clarification to Anees Iqbal.

[24] Under this arrangement, the customer does not see the source of finance and signs only a single contract with the ESCO for all its services including the finance.

European ESCO markets. It should however be noted that with liberalization falling electricity prices have had a negative impact on energy efficiency projects.

A specific attribute of the UK energy service market is its focus on the residential sector; this is a result of more than a decade of conventional energy suppliers having been required to assist their residential customers in improving energy efficiency. The Energy Efficiency Commitment (EEC) program requires that all gas and electricity suppliers with 15,000 or more domestic customers (50,000 under EEC-2) deliver a certain quantity of 'fuel standardised energy benefits' by encouraging or assisting customers to take energy-efficiency measures in their homes. Suppliers must achieve at least half of their energy savings in households on income-related benefits and tax credits. They are not limited to assisting their own customers only and can achieve improvements in relation to any domestic consumers in Great Britain (Bertoldi and Rezessy 2004). This has facilitated the provision of energy services.

Other Western European Countries

There are some ESCO activities in the Netherlands, Portugal, Greece, Ireland, Belgium and Sweden (the latter two being the most successful among these countries), as well as in Norway and Switzerland.

The pure ESCO activity in *Greece* is still in a pilot phase for some RES[25]. The main reason is the lack of a properly adopted procurement, contractual and administrative procedure for the selection, control and repayment of the integrated energy service provided by an ESCO. Because of lack of EPC-related specifications in public tendering, proposal evaluation, contract monitoring and repayment and in general because of the vague definition of EPC and TPF actors' roles, it seems rather costly and time-consuming for new ESCOs to enter the market, especially in the public building sector (EnergyProNet n.d.). There is an ongoing attempt on the side of the government to develop a new draft legal framework focusing on EPC and TPF for the public sector. Additionally, an umbrella law on private public partnerships is in the pipeline that will have relevance for EPC.

The situation is similar in *Ireland,* where there are three broad categories of companies in the energy efficiency sphere: companies supplying mainly CHP; facilities management companies, and companies offering contract energy management. However, the companies that contract ESCO-type work in Ireland are interested in saving hassle and time, not in energy efficiency (Scott 2004).

[25] Since 1997 the governmental support in Greece has focused on stimulation of TPF via EPC by a) drafting a specific law titled "TPF of Energy Investments for Energy Saving, Cogeneration & Independent Generation of Electrical or/and Thermal Energy from RES" (2001, still not issued), b) the support for the implementation of key pilot demonstration or private investment TPF/EPC projects (2 for solar thermal technologies in industry, 2 for RES power and 3 for pools of public buildings for energy efficient retrofit within EU Energy Framework-SAVE, ALTENER and Community Support Framework-OP Energy and Competitiveness), c) the introduction/specification of upgraded energy management infrastructure, d) the organisation of targeted dissemination events through the documentation of the available international best practice and of the existing procedural specifications (Lytras 2004).

There are around 10 companies that define themselves as ESCOs in *Norway,* though EPC is very limited at present. The public sector is seen as the most interesting market segment, while industry is considered a harder segment to enter (NVE 2003). The most common types of projects are related to building refurbishment and there are a few projects in the industrial sector.

There are 7 major ESCOs in *Portugal*, working primarily with medium and large industries, as well as large commercial buildings. Five of them are implementing mostly CHP projects, the remaining ones are active in the field of renewable energy. ESCOs are often financed by banks.

In *Belgium* there are a limited number of ESCOs mainly active in the lighting field and in industrial and building services (Vine 2005). On a federal level a venture with a start capital of 1.5 million Euro has been established at the end of 2004 with the social aim to support eco-efficiency and promote the rational use of energy in the public and private sector. A task force has been established to remove juridical, financial and organisational obstacles. In Flanders there is also an initiative planned to promote energy services in public buildings and to reduce bottlenecks to TPF (Geert 2005). Large multinational companies are active in providing energy services to the public sector. While still underdeveloped currently the Belgian ESCO market is seeing fast progress.

The situation in *Sweden* is rather mixed and dynamic: while the market is still rather immature and relatively conservative with a history of less successful EPC projects, ESCO industry is moving very fast mainly driven by large multinational companies with foreign owners and own in-house ESCO experiences. As of 2004 3-4 energy producers, and in total 6 building management system, equipment and facility management actors together with consultant/installation firms provide different types of energy services (Swärd 2005). Energy producers focus on extensions of district heating/cooling. Some of these have own financing companies (SEA 2003). While EPC normally are not the sole business of any of these companies, several of them have established individual ESCO branches and business areas to focus and strengthen their ESCO efforts. Energy service provider companies and ESCOs offer various types of arrangements, such as TPF, management agreements (at a fixed fee), energy incentive agreements (similar to previous but with shared profit if savings exceed expectations), energy service agreements (combination of different services), function agreements (guarantee a level of costs and an overall solution) and EPC (SEA 2003). The targeted market segments are medium-sized industry, public buildings, hotels and hospitals, as well as larger residential property companies. The market actors have been able to establish multiple contracts for municipalities and municipality owned real estate companies (dwellings, public building/offices and schools) and also closed contracts with a few county councils and private commercial real estate companies. In 2004 the aggregated value of ESCO projects around 25-30 million Euro, and increasing (Vine 2005, Swärd 2005).

In *Switzerland* local utilities and some national companies offer energy services. Energy delivery contracting is far better established than EPC. Heating plants attract most of project developers' attention. FIs are still not very active in financing ESCO projects. Based on performance the national association for energy saving and contracting ENERGHO provides financing with subsidies from the government.

The cases of Denmark and the Netherlands are rather interesting. Although these countries have been among the leaders in energy efficiency actions, apart from a few multinational companies, there is hardly any ESCO activity. Provisions for mandatory demand-side management (DSM) requiring utilities to implement energy efficiency projects together with numerous projects implemented by the national energy agency have left little space for commercial ESCOs. These examples strengthen our statement that the promotion of energy efficiency can be done by means other than ESCO development only.

In the *Netherlands* some utilities offer energy management and energy service contracts; as of 2002, EPC was non-existent (Sijben 2003). In *Denmark* provisions for mandatory DSM together with the activities of the national energy agency and the national energy saving trust in terms of project implementation have left little space for ESCOs. Furthermore, state institutions cannot use loans to finance energy savings projects and since EPC is classified as a loan by the Danish state, there is no possibility for ministries or state agencies to get such a contract only regional and local authorities can borrow related to EPC projects (ECS 2003).

Hungary

According to a survey made by the Energy Centre in Hungary and the United Nation Development Programme, there are 29 ESCOs, or ESCO related companies[26]. There are many ESPCs. Other studies distinguish between ESCOs not included in the money flow (50-100 in number with a market value of 4-8 million USD), ESCOs working according to the concept "ESCO as the borrower" (10-20 with market value of 12-20 million USD), and ESCOs which undertake operation (below 10, whose overall market value changes year by year but can be estimated at 20–28 million USD annually) (EGI 2002). The larger ESCOs are mainly multinational companies (about 7 large companies are in this category). More than two-thirds of ESCO customers are municipalities. Most projects target district heating systems and public lighting; industrial projects also receive attention. There have been various trends over the years, shaped by the actual legislative and financial background: earlier public lighting projects were typical, whereas today CHPs (typically gas turbine based) are in the spotlight. There have also been some fuel conversion projects, and boiler house reconstructions. Since from a business perspective 'pure' demand-side projects are rather difficult in Central and Eastern Europe (CEE), especially in the industrial sector, comprehensive solutions to fix the whole system are offered combining e.g. on-site co- or tri-generation[27] with ESCO services. The utility-based ESCOs are developing very intensively, and while the market is growing, they are increasing their market share (Ürge-Vorsatz et al. 2004). In addition to earning a profit, the utility-based ESCOs aim to expand the market share of the electricity utilities: the electric utilities currently have territorial monopolies in Hungary and these hold for electricity supply but not for ESCO services – i.e., utilities can provide ESCO services outside of their service territory. Thus, for an electric utility,

[26] This number is only an estimation: out of 107 companies that were asked only 46 gave an answer, from which 29 said that they are ESCOs or their activity is related to it. "Related" means that many of these companies deal with EPC, but this is not the main profile of the company.

[27] The tri-generation energy process produces hot water, steam, cooling (chilled water) and power generation (electrical energy) from the primary energy source; it has also been referred to as CHCP (combined heating, cooling and power generation).

the only way to increase their business in the service territory of another utility is to implement ESCO projects.

Banks and credit institutions are very active in financing ESCO projects. For instance, in 2003 OTP Bank, the largest Hungarian bank, had 20 million Euro worth of lending through ESCOs. The bank is also among the founders of some ESCOs (Weöres 2003). Many international actors (European Bank for Reconstruction and Development (EBRD), International Finance Corporation/Global Environment Facility (IFC/GEF), European Commission, U.S Agency for International Development (USAID)) have been also supportive, through different programs, in the promotion of the ESCO industry in Hungary (see Ürge-Vorsatz et al. 2004 for details). One innovative program is the guarantee support scheme for financing energy-efficiency projects developed by the IFC in cooperation with the GEF, called the Hungarian Energy Efficiency Co-Financing Program (HEECP). Partial guarantee support is provided for banks that finance private ESCOs (50 % in the pilot scheme and 35 % under the ongoing HEECP-2). The financial institutions that participate in HEECP represent over 90 % of the banking sector in the country.

Analysts from the international energy community have observed that in Hungary the energy efficiency industry is better established (in terms of longevity) and at the same time more solidly based (in terms of competition and maturity of the market) than in most other countries with formerly centrally planned economies and also than in some Western European countries, and that Hungary is one of the leading countries to develop the scope of ESCOs (Ürge-Vorsatz et al. 2004 and references herein). In the period 1996-2000 alone the number of ESCOs active on the market increased at least fourfold. The TPF market is developing strongly; there is great competition among the ESCOs. The case of Hungary demonstrates that early energy sector restructuring, good institutional and banking sector reforms and structured aid programs can lead to important positive results in countries in transition in the energy performance contracting business (for more details, see Ürge-Vorsatz et al. 2004).

Other New Member States of the European Union and New Accession Countries

The experiences of ESCOs in the countries with formerly centrally planned economies that joined the European Union on 1st May 2004, and in those that are expected to join it in the near future, are rather mixed. International financial institutions (IFIs) have been active in the region: a recent initiative of IFC/GEF is the Commercializing Energy Efficiency Finance Programme (CEEF) approved in 2002 and covering the Baltic states of Latvia, Lithuania and Estonia, as well as Slovakia and the Czech Republic. The program targets local FIs[28], ESCOs and end-users, and provides a *pari passu*[29] guarantee, up to 50% of the principal. The EBRD has provided financing

[28] As of late 2003 four FIs are participating from Latvia, the Czech republic and Slovakia. The participation of two other FIs – from Estonia and Lithuania – is pending.

[29] This is a clause which states that the claims of the banks and financial institutions which enter into a restructuring agreement will rank at least pari passu (from Latin "at equal pace or rate") in all respects with the claims with respect to external indebtedness of all other unsecured creditors. The pari passu covenant restricts the borrower from legally subordinating the unsecured debt being rescheduled to other external obligations of an unsecured nature. Thus, this clause prevents the debtor from discriminating against any set of creditors or prevents any set of creditors from receiving preferential treatment.

to 14 private and 1 state ESCOs in Hungary, Poland, Czech republic, Slovakia, Lithuania, Romania, and Ukraine (Ligot 2004).

The first ESCOs in the Czech Republic have been established more than 10 years ago and since then dozens of EPC projects have been implemented both in private industrial facilities as well as in public sectors (municipal and state owned facilities). Besides EPC projects, there have been many energy delivery contracting projects with guaranteed price of heat from reconstructed boiler houses. ESCOs in the Czech Republic include both multinationals and national companies. Typically the ESCO business is one of the company's/group's several activities which may also include e.g. district heating, equipment manufacturing, facility management, engineering and others. Some ESCOs, including a multinational one, were not successful in developing their EPC business locally, and had to close their operation in late 1990s[30].On the other hand, all EPC projects implemented so far were successful and have materialized guaranteed energy savings for clients. Currently work is underway to standardize procedures for EPC implementation in state owned facilities. Assistance to clients is provided also by the non-governmental sector– typically from public sector – to prepare and evaluate tenders for EPC projects, and verify results of implemented projects. Another important development has been the inclusion in the Energy Management Act of a requirement for mandatory energy audits in state-owned buildings or in buildings of institutions funded by the state with an annual consumption over 1500 GJ, as well as for industrial companies with annual consumption above 35,000 GJ. Institutions and building owners are then obliged to implement all low-cost energy efficiency measures identified. These provisions have supported the development of EPC that also includes the cost of the audit (ECS 2003). In international comparison, the Czech EPC industry is relatively well developed.

ESCOs became active in the residential sector of *Slovakia* in the mid-1990s; most of them used foreign capital and loans. Since this has been a largely unsuccessful start (for details, see ESC 1999), later municipalities and the local DH companies became the target segment. At present there are 32 ESCOs and the competition among them is strong; there are 20 large district heating projects, some EPC projects in hospitals, a swimming pool, service and industrial companies(Goldmann 2003). Among the existing ESCOs some have developed from utilities (mostly international), some have been established by IFIs; most are public-private partnerships in the form of joint ventures with municipalities. Currently due to major changes in institutional framework and responsibilities, ESCOs are trying to work with public authorities, such as municipalities or the newly established regional administration bodies. Projects cover buildings of the public administration, street lighting and DH. Outsourcing in industry and tertiary sector (shopping centres, banks, hospitals) is getting increasingly popular. Thanks to the settlement of the ownership and administration rights, the residential sector is becoming an interesting target segment too (Bella 2005).

Poland has around 13-15 ESCOs, the majority of which are branches of foreign companies (Wnuk 2003). Most of them are operating mainly in the DH sector. The total market share of TPF is insignificant. In the 90s, when the idea of TPF and EPC was entering the Polish market, numerous projects has contracts formulated in disadvantageous way from the clients' point of view: obligations were not commensurate with the scope and the volume of investments as well

[30] In the late 90s the financial difficulties of hospitals and the economic slowdown in industry led these two sectors to be regarded as unreliable project sites (Evans 2000).

as reductions of energy costs achieved. Currently projects cover both the municipal (public buildings, infrastructure) and the private sectors (mainly housing cooperatives) (Goldmann 2003). A project has been initiated in the city of Łódź with the support of EBRD covers over 420 public buildings and will be the largest ESCO project in the region. In the DH sector the tariff setting methodology creates a wrong incentive to increase costs by stipulating that annual tariff increases are based on the costs actually incurred in the previous year, i.e. input costs plus fees for operation. A positive development is the inclusion in the Energy Law of a provision that the cost of projects and services to reduce energy end-use consumption may be included in tariffs for gas, electricity and heat (ECS 2003).

In *Slovenia* there are some private investors acting as ESCOs; a pilot EPC project in public buildings has been implemented in the city of Kranj (a pool of 26 public buildings). 8 companies are capable of providing EPC and/or energy delivery contracting. Oil companies with sufficient investment capital have entered the ESCO business. Electricity trading departments of distribution companies implement DSM activities. TPF has been provided mostly for projects in the public sector.

Since 2000, only 3-5 companies have started ESCO-related activities in *Lithuania*. These are mainly foreign subsidiaries, engaged in heat production and distribution and supply side energy management in the DH sector. The expectations for target market segments in Lithuania are buildings (including residential and public buildings, estimated size 125 million Euro) and industry (mostly food, agriculture, timber, pulp, paper and textiles, estimated size of 50 million Euro) (Franckevicius et al. 2003, Iqbal 2003a). Banks are willing to consider financing energy projects. While the financial climate is now considered generally conductive, the financial sector lacks risk assessment and management as well as project evaluation skills for ESCO projects. However, it has been pointed out that there is a communication failure between the financial and the energy sectors, which involves lack of awareness of availability of finance and of the business potential and also inability to speak each other's language (Iqbal 2003a).

There are around 20 companies offering energy services in *Estonia*, but the total estimated value of ESCO projects is not very high, at around 1-3 million Euro in 2001 (Vine 2005). Several ESPCs offer consultancy. The first ESCO that appeared on the Estonian market started from the guaranteed savings scheme; due to lack of strong market actors the shared savings concept does not seem to work in Estonia. The ESCOs in Estonia are not targeting purely the implementation of energy efficiency measures, but are mostly energy producers, distributors and consultants. In case of sufficient energy efficiency market drivers the named market players are capable to offer necessary services. The local financial institutions are eagerly willing to lend resources for refurbishment of different types of buildings and the government is running a support mechanism for energy efficiency in local governments. The national market is ready for broader activities, but need stronger and dedicated market players

In *Latvia* municipal and state property, together with the housing sector, have been considered for EPC (Blumberga 2003). There are projects related to leasing of boiler stations, CHP, street lighting and efficient lighting of a sports hall (Goldmann 2003). There are many more contracts for energy delivery than for energy performance; only 2 ESCOs provide EPC (Blumberga 2003).

Energy efficiency projects in buildings are stimulated by Energy Performance in Buildings Directive; banks are ready for residential building energy efficiency loans.

To the authors' best knowledge no ESCOs operate either in *Malta* or in *Cyprus*. In Malta there are ESPCs that offer advice and products in energy efficiency, especially building services and energy management systems.

In *Bulgaria* ESCOs are functioning on a limited scale and primarily in the municipal sector: schools and public lighting. Most projects cover small heating plants and the supply of heat at a negotiated price. There are five companies that offer EPC. There is an EPC in a pool of 300 public buildings in Sofia. USAID has provided a loan portfolio guarantee to the United Bulgarian Bank (UBB), under which USAID guarantees 50% of credits taken by municipalities or municipal companies, private industries and companies for implementing energy efficiency projects. The World Bank will extend a grant to Bulgaria to help the establishment of an energy efficiency fund. The Energy Efficiency Law of March 2004 regulates the system of energy efficiency measures and activities at national, regional, municipal level including energy services.

In *Romania* 20 small private companies were selected by the USAID to be trained to become ESCOs; the initiative was completed in 1998. The Romanian-American Enterprise Fund (RAEF) – a private equity fund established by the US Congress – and the EBRD launched an initiative in 2002 to create an ESCO focused primarily on small CHP: RIEEC is one of the first companies to target industrial sector and to also provide financing. The focus is placed exclusively on cogeneration projects under chauffage contractual structure; there are two ongoing cogeneration projects. Through the co-operation between the Romanian government, the World Bank and the GEF, the Romanian Fund for Energy Efficiency was started. It is intended as a revolving debt facility with an expected program life of 8 years; it should leverage co-financing from other commercial sources, in particular domestic banks. The industrial sector is initially the target of the fund, with commercial buildings and later municipal services to be included. The public sector was left out of the focus of the fund because of poor credit rating (ECS 2003). The fund had a very difficult start up, not having one loan for its first 18 months; as of January 2005 three projects are financed.

The GEF and UNDP Romania provide non-reimbursable financing to fund or co-fund services to help leverage energy efficiency projects - such as feasibility studies, energy audits and financial analysis. Since October 2003 more than 25 Agreements-in-Principle (A-i-Ps)[31] have been signed by project developers, project financiers and UNDP/GEF.

While the requirement for mandatory energy efficiency programs for companies with annual consumption above 1000 toe and municipalities with more than 20,000 inhabitants (Rotaru et al. 2003) is a positive development, the extremely low non-compliance penalty (50 Euro) virtually makes this provision non-enforceable. While there is interest among banks in Romania to lend

[31] A typical A-i-P states that - subject to the positive results of technical studies and creditworthiness analysis - commercial financing will be available to carry out the energy efficiency investment project. Based upon the A-i-P, UNDP/GEF invests non-reimbursable funds in financing or co-financing feasibility or other studies to support the investment proposal.

for energy efficiency projects, they require guarantees from the project developer, so it is on balance sheet financing. This is greatly having a negative impact on the interest and capacity of both private and public sectors to get financing and implement such projects.

In *Croatia* the first ESCO started operation in 2003. It is a public company owned by the distribution company HEP. Currently there are two ESCOs, the other being a subsidiary of a Hungarian company. These companies target mostly public administration and industry. Projects are related to public lighting, heating systems, cogeneration, water pumping, and buildings (public, services and residential); most popular projects are building refurbishments, lighting (interior and exterior), heating plants, industrial processes and refrigeration. Guaranteed savings is the preferred contractual structure. There are no ESCO support mechanisms, but energy efficiency projects are encouraged via the GEF guarantee fund and subsidies of interest rates. No finance institution is offering financing to ESCO projects.

Summary of country reviews

As has been discussed in this section, Germany, Austria and the UK are the European ESCO leaders, closely followed by France and Hungary. ESCOs have been also active in Spain, Sweden, the Czech Republic, and, to a lesser extent, in Italy. ESCOs are now getting off the ground with different pace in the rest of the countries in the scope of the current paper, Belgium and Sweden being the leaders in this group.

The discussion and conclusions in the present section are by no means definitive and is based on the expert responses we have received so far, on literature review and the findings of dedicated events as elaborated in our methodology description. The major criteria we have considered include the number of 'real' ESCO companies, approximate annual turnover[32] where available, number and size of EPCs, market liquidity, and involvement of finance institutions. Similar conclusions on the level of ESCO development of different national markets in Europe have been made by Sidler (2004) and Vine (2005). The conclusion of Butson (1998) cited in ECS (2003) differs significantly, but it refers to TPF solely.

The analysis of the current status of ESCO development in the various European countries and the success achieved by some countries point to a number of experiences that can be transferred and lessons that can be learned. Based on the re-emerging factors especially in European countries with most developed ESCO industry in the final section of the report we outline a set of suggestions that may form the foundation of a possible long-term strategy to further the development of ESCOs in Europe.

[32] Estimates for total ESCO turnover in a given country are rare and not easily comparable. We do not consider the value of energy supply.

9. Moving forward: A Possible Strategy to Foster the Development of the ESCO Industry in Europe

Based on the review and the analysis of successful experiences in Europe six areas of activity are identified below, where – in the authors' view – concerted action is expected to foster the further development of ESCOs in Europe. Some of the actions have already been implemented in some countries; therefore they do not necessarily need to be applied at EU level, but could be considered at national or regional level where appropriate.

Increase Dissemination of ESCO Services and Projects

Increasing the dissemination of information about energy-efficiency projects, financing opportunities, and services offered by ESCOs, particularly in the countries with a less developed ESCO industry and in situations where there are limited financial or technical capabilities (e.g. in public buildings) is expected to advance the understanding of the opportunities that energy efficiency offers and of the way e.g. EPC works, reducing the technical risk perception among consumers and financial institutions and increasing the confidence in ESCOs. The target groups should be energy and facility managers and financial institutions. An important measure would be the organisation of training courses for energy managers and financial institutions, making them aware of ESCO activities, ESCO-type projects, and measurement and verification methods and protocols for measuring energy savings.

Launch an accreditation system for ESCOs (to provide a qualified and reliable service)

Since a number of companies are eager to call themselves ESCOs, without having proper qualifications, a second important action is to ensure that ESCOs provide a qualified and reliable service. In the United States, an ESCO accreditation system has been implemented by the National Association of Energy Service Companies (NAESCO).

In Europe, an effort is underway to define the minimum set of qualifications for ESCOs, together with a system to assure the quality of service. While a temporary voluntary solution can be valid in the short term, a long-term solution would be a mandatory European standard. This is proposed by the draft Energy Services Directive, which says that energy services shall be provided (art. 7) by "*qualified*" ESCOs, installers and energy advisors and consultants. Art. 8 of the Directive asks for "*appropriate qualification, accreditation and certification schemes"* for such energy services providers, "*with a view of maintaining a high level of technical competencies of personnel and the quality and reliability of energy services offered"*. From the point of view of expertise requirements it should be further noted that performance contracting is a financial transaction, not only a technical one.

Develop Financing Sources

There is a strong need to create new capabilities and incentives in local markets for Local Financing Institutions (LFIs) and end users to finance energy efficiency projects. If such financing is reliably available on a commercially-viable basis, plenty of ESCOs will get off the ground and will be able to provide their own working capital for marketing and project preparation and development. Training the personnel of local banks in financing energy efficiency projects is expected to have a very positive impact on the provision of commercially viable and sustainable project financing. It can potentially bridge the gap between the traditional asset-based corporate lending and the cash-flow based project financing to EEPs.

In addition, incentives should be provided to "first movers" in the finance sector active in financing energy efficiency and renewable energy projects. Funding feasibility studies, energy audits and the preparation of financing applications would increase their ability to secure additional information and decrease the amount of equity capital required. Sources of debt and equity financing need to be located. Several possible financing sources should be investigated: private banks and lending institutions; venture capital firms; equity funds; strategic partnerships (e.g., utilities and engineering firms); leasing companies; and equipment manufacturers. Encouraging and assisting existing leasing companies to offer energy-efficient equipment is another option.

A revolving fund to finance energy-efficiency measures could also be set up (this has been a big success in e.g. Spain). Dedicated debt organisations offering e.g. 80-100 % financing for projects could be established and could use the above sources. Under this option, a master loan agreement would be standardised and executed between an ESCO and the debt facility which would commit the lender to provide financing according to defined terms and conditions. Funds would be drawn down on a project-by-project basis. The balance of financing would come from the ESCO, the customer or another equity investor. Alternatively, the debt facility could provide 100% of project costs, but returns to the debt facility would be higher to reflect the higher risk.

It should be emphasized that ESCOs are not banks and they will only get involved only in projects with sound economic parameters.

Standardise Savings Measurement and Verification

Since the long-term credibility of energy efficiency is predicated on an ability to verify reduced consumption, it is critical to have a standardized method for measuring and verifying savings throughout Europe. This will help to ameliorate questionable results of unverified efficiency programs that place a cloud over the entire industry, it would be extremely beneficial to standardise savings measurement and verification (M&V) procedures to help end-users and the financial community better understand EPC and gain confidence in their return on investment. The development of standard M&V has been an elusive task as various companies consider their approaches unique and proprietary. Rather than developing a single standard energy services agreement efforts may be channelled towards agreeing upon standard language for a set of key contract provisions, such as insurance, equipment ownership and purchase options, which will allow standard contract forms to be built up gradually.

It would also be useful to have standard contract provisions that could be adapted for use in smaller size projects. There is no reason for EU countries to repeat the US experience of vast expenditures for energy efficiency never subject to verification. European banks should fund only those EPC projects that are subject to M&V protocols, and the International Performance Measurement and Verification Protocol (IPMVP) is a good first step.

Ensure that Governments take the lead with measures in public buildings

A critical factor in the future role, long-term growth and prosperity of ESCOs in Europe is the ability to demonstrate successful applications of the ESCO concept. Promoting EPC in national and local government buildings has brought remarkable success in Austria and Germany. As practice in Germany has shown, pooling of public buildings minimises the risks and transaction costs and acts against cherry picking. In order to attract potential customers, government agencies (or utilities) could identify and qualify customers with energy efficiency potential and, acting on behalf of a single customer or preferably a group of customers, undertake the procurement of turnkey energy efficiency equipment installation and services. The typical method is to develop and issue a request for proposals (RFP) to the energy efficiency industry. Before issuing the RFP, the procuring agency should secure the customer's commitment to the program, assist the customer in defining its decision making process and the acceptable range of financing and contracting terms, perform a preliminary analysis of the customer's creditworthiness, and assemble basic information on the energy cost, consumption and end use characteristics for the customer's facilities. The RFP should define the proposal format, its evaluation and selection process.

However, EPC is very often regarded as unconventional finance by government authorities; therefore it is crucial to have public procurement procedures that take into account the specifics of energy service provisions and are supportive to the 'one-stop-shop' concept on which ESCOs are based. Conversely, rules and regulations may simply not allow or complicate the application of EPC on government property. Complicated tendering procedure (e.g. by requiring separate bids for the project preparation and implementation) may also hinder EPC deployment. Therefore, an important first step to establishing a more hospitable environment for EPC is to review regulations and remove institutional impediments. Clear rules are needed on how EPC is treated within the framework of public budgeting regulations.

Develop a Europe-wide TPF Network

Developing a TPF network that would include ESCOs, associations of ESCOs, national and regional energy efficiency agencies, lighting and equipment manufacturers and suppliers, electrical and mechanical contractors, financial institutions, utilities, and other suppliers of energy services that have an interest in accelerating investments in energy efficiency would bring the benefits of co-ordinating the efforts towards market penetration of energy-efficient

technologies, collaborating information dissemination, and periodically exchanging information on members' experiences.

10. Conclusions

While the initial ESCO concept started in Europe more than 100 years ago and moved to North America, it is now showing some resurgence in Europe. The current status of the ESCO industry shows significant differences from country to country. The most developed ESCO markets in Europe are Germany, Austria, the UK, to a lesser extent France and Hungary; ESCO activity is rather intensive in Sweden, Spain, the Czech Republic and Italy. For the rest of Europe ESCOs are now taking off the ground with different speed. Recent policy developments, such as the new Italian Decree on energy efficiency that allows ESCOs to carry out energy-efficiency projects and be eligible to acquire "white certificates" may result in a strong development of the ESCO industry (a similar scheme will be adopted in France, while in the UK the Energy Efficiency Commitment has brought a lot of projects beyond the consumer's meter in the residential sector).

In the long term, a combination of legislative measures, such as the proposed energy service Directive, coupled with the strategic actions proposed in this paper could trigger a wide expansion of the ESCO business in all 25 EU countries and Bulgaria and Romania. Finally, the implementation of the Kyoto Protocol and its flexible mechanisms (emissions trading, clean development mechanism, and joint implementation) will create a new opportunity for developing the ESCO industry. Energy-efficiency projects offer a very cost-effective approach to reducing GHG emissions. Emerging carbon markets will create new opportunities for project financing and the further diffusion of M&V techniques used in EPC.

Appendices

Appendix I. ESCO Characterisation Form:

[also available at http://energyefficiency.jrc.cec.eu.int/esco_3.htm]

ESCO Characterisation Form

Date:_____

Name of the ESCO: _____

Internet address**: http://** _____

CONTACT PERSON

First Name**:** _____ Last Name**:** _____

Address:_____

Tel: _____ **Fax**: _____ **E-mail**:_____

URL:_____
_

ESCO PROFILE

Company profile (short description of activities, type of projects and mission): _____

_____

In which country your company is operating:-
_____

CRITERA FOR PASSING A CONTRACT WITH A CLIENT (OPTIONAL):

Minimum client energy bill (Euro): _____ **Max. contract duration:**_____

PLEASE CHECK THOSE THAT APPLY AND ADD MORE COMMENTS/DETAILS IN THE LAST COLUMN:

	SERVICE FUNCTIONS	DESCRIPTION	COMMENTS Please add explanations on how your company implements and/or offers the services
❒	**Project Identification and Appraisal**	Preliminary audit and selection of a number of energy saving options applicable	
❒	**Project Technical Design**	Detailed design specifications of the energy saving measures	
❒	**Project Implementation**	Identification of supplier companies, management of installation works and commissioning	

❒	**Project Financing (or Third party Financing)**	This is the key characteristic of an ESCO. The ESCO may finance up-front capital improvements in exchange for a portion of the savings generated or give a saving guarantee to the client to be used to get credit. Please specify whether the ESCO provides it own financing or through a bank (credit risk) or it gives only a guarantee of the energy savings	
❒	**Guarantee of Performances**	The ESCO is prepared to accept the part of technical and financial risks that it can control. The performances are measured and verifies according to a contractually defined Protocol (monitoring and verification Protocol)	
❒	**Operation Service**	Management and/or maintenance of the equipment for a time period, which can be either the test period or a longer one, as contractually stipulated	
❒	**Purchase of the Fuel/Electricity**	The ESCO can take care of purchasing the fuel or electricity and selling the energy service to the client in terms of heat, cool, lighting, etc.	
❒	**Insurance Coverage**	Depending on the type of Guarantee of Performances given to the client, the ESCO can, in turn, be insured against events that can imply financial penalties for the ESCO	
	SOCIETAL CHARACTERISTICS	**DESCRIPTION**	**Please add explanations on the activity of your company**
❒	**Independent Specialist Company**	A company specifically set up for providing ESCO services	
❒	**An equipment supplier**	Supplier of particular energy efficiency equipment (indicate which type of equipment)	
❒	**An energy utility or supply company**	Gas or electricity utility or oil supplier	
❒	**A public sector energy agency**	A public agency or company, either at national or municipal level	
❒	**A public-private joint venture**	A Joint Venture created to merge together the expertise and access to the market in this specific energy field	
❒	**A operation & maintenance company**		
❒	Other	Specify:	

For the EU list of Energy Service Companies visit:
http://energyefficiency.jrc.cec.eu.int/esco.htm

Appendix II: ESCO Project Form

[also available at http://energyefficiency.jrc.cec.eu.int/esco_3.htm]

ESCO Project Form

Date:_____

Name of the ESCO: _____

Internet address**: http://** _____

CONTACT PERSON

First Name**:** _____ Last Name**:** _____

Address: _____

Tel: _____ **Fax**: _____ **E-mail**: _____

ESCO PROJECT PROFILE

Short project description (up to 300 words): _____

PLEASE ANSWER THE QUESTIONS BELOW AND GIVE THE PROJECT DETAILS IN THE LAST COLUMN:

SERVICE FUNCTIONS	DESCRIPTION	Project Implementation Details
Project Identification and Appraisal	Was a preliminary audit carried out ? Did the project implement all the audit findings?	
What type of equipment/systems did the project cover	E.g. lighting, HVAC, Co-generation, etc	
Project Implementation	Did the ESCO carry out all the project phases or some part of the project were subcontracted ?	
Equipment purchasing	Did the project included equipment purchasing?	
Project Financing (or Third party Financing)	Who did carry the credit risk: the ESCO or the Client? What type of financing scheme was used: ESCO own finance and/or Bank financing? What type of scheme was used? Shared Saving, Guaranteed Savings, First Out, Build Own Operate Transfer (BOOT), etc.	
Guarantee of Performances	What type of guarantee was given for the expected saving (energy and financing)?	
Operation Service	Was management and/or maintenance of the equipment for a time period, included in the contract ?	
Purchase of the Fuel/Electricity	Did the contract include the purchase the fuel or electricity and selling the energy service to the client in terms of heat, cool, lighting, etc. ?	

Duration of the contract		
M&V	To what extent was M&V used? What type of M&V was offered ?	
Type of client and client sector	Public, semi-public, private company	
Project size (OPTIONAL)	In Euro	
Project profitability (OPTIONAL)	Pay back time, or IRR or NPV	
Insurance Coverage	The contract included an insurance policy against events that can imply financial penalties for the ESCO	
Other project information	Specify:	

Please use a Project Form for Each Individual Project
Indicate whether the form is:

❒ Confidential not to be disclosed
❒ To de disclosed only in anonymous manner
❒ To be disclosed

For the EU list of Energy Service Companies visit:
http://energyefficiency.jrc.cec.eu.int/esco.htm

Reference list

Bella, M. (SEA, Slovakia). 2005. Personal communication. February.

Bertoldi, P., Berrutto, V., De Renzio, M., Adnot, J., Vine, E., 2003. How are ESCOs behaving and how to create a real ESCO market. In: Proceedings of the European Council for Energy Efficient Economy 2003 Summer Study. European Council for an Energy-Efficient Economy, Stockholm.

Bertoldi, P. and Rezessy, S. 2004. Tradable Certificates for Energy Efficiency: the Dawn of a New Trend in Energy Policy? In Proceedings of the ACEEE 2004 summer study on energy efficiency in buildings. Washington: American Council for Energy Efficient Economy.

Blanco, I. (IDAE, Spain). 2003. Personal communication. February.

Blumberga, A., 2003. Latvia – the contracting market. In: Private meets Public. Workshop A "clearcontract – Clearinghouse for Energy Contracting" (Berlin, September 2003). Also available at http://www.privatemeetspublic.de/_wcms_editor/pdf_files/WS_A_Ekodoma.pdf

Brand, M., Geissler, M., 2003. Innovations in CHP and Lighting: best Practice in the Public & Building Sector. In: Proceedings of the First Pan-European Conference on Energy Service Companies (Milan, May 2003). Editor: P. Bertoldi.

Butson, J., 1998. The potential for energy service companies in the European Union. In Proceedings of the First International Conference on Improving Electricity Efficiency in Commercial Buildings (Amsterdam, September 1998).

Capozza, A., 2003. Country report Italy. Prepared for the IEA DSM Task X - Performance Contracting.

CTI (Climate Technology Initiative)., 2003. Guide to working with energy service companies in Central Europe. CTI Secretariat, Tokyo.

Dreessen, T., 2003a. Advantages and disadvantages of the two dominant world ESCO models; shared savings and guaranteed savings. In: Proceedings of the First Pan-European Conference on Energy Service Companies. Editor: P. Bertoldi.

Dreessen, T. 2003b. Overcoming international financing barriers. In: Efficient Energy for Sustainable Development" (Washington, November 2003).

Dreessen, T. 2004. Energy efficiency finance protocol. A standardized finance protocol for end-use energy efficiency projects. IEEFP, Working Group Reports.

Dupont, M., Adnot, J., 2004. Investigation of actual Energy Efficiency content of "energy services" in France. In: Proceedings of the International Conference on Improving Electricity Efficiency in Commercial Buildings (Frankfurt, April 2004).

ECS (Energy Charter Secretariat)., 2003. Third Party Financing. Achieving its potential. Energy Charter Secretariat, Brussels.

EGI (EGI Contracting and Engineering)., 2002. TPF and energy municipal utility restructuring. Draft final report for the MUNEE Program of USAID and the ASE. EGI, Budapest.

EnergyProNet, n.d. a. Country profiles. Available at http://www.energy-pro.net/.

Escobar, G. (Energia y Medio Ambiente, Spain), 2005. Personal communication. February.

Evans, M., 2000. Tapping the potential for energy efficiency: the role of ESCOs in the Czech republic, Ukraine and Russia. In: Proceedings of the American Council for Energy Efficient Economy 2000 Summer Study. American Council for an Energy-Efficient Economy, Washington, D.C.

Franckevicius, M., Skema, R., Miskinis, V., 2003. Electricity End-Use Efficiency in Buildings in Lithuania. In: International Workshop on Electricity End-Use in Buildings in Candidate Countries. Edited by V. Berrutto.

Flipts, G. (EWBL Vlaanderen), 2005. Personal communication. February.

Goldmann, R., 2003. Sustainable Energy Management through Energy Contracting - Opening Markets in CEE". In: Private meets Public. Workshop A "clearcontract – Clearinghouse for Energy Contracting (Berlin, September 2003). Also available at http://www.privatemeetspublic.de/_wcms_editor/pdf_files/Clearcontract.pdf

Hansen, S., 2003. Performance contracting models and risk management. Presentation at the workshop Developing the Business of Energy Efficiency Performance Contracting organized by Ibmec and INEE, Rio de Janeiro.

Hansen, S. (Kiona International, USA), 2004. Personal communication. January.

Hansen, S. and Brown, J. 2003. Investment Grade Audit. Making smart energy choices. Fairmont Press: Lilbourn.

Iqbal, A., 2003a. Opportunities for ESCO development in accession countries – Lithuania as an example. In: Proceedings of the First Pan-European Conference on Energy Service Companies. Editor: P. Bertoldi.

Iqbal, A. (Maicon Associates, the UK), 2003b. Personal communication. February.

Jamet, B., Adnot, J., 2003. "Country report France". Prepared for the IEA DSM Task X - Performance Contracting.

Leutgöb, K., 2003. The role of energy agencies in developing the 'classical' EPC-market in Austria. In: Proceedings of the First Pan-European Conference on Energy Service Companies. Editor: P. Bertoldi.

Ligot, J., 2001. EBRD and ESCO/Third Party Financing. In: IEA/CTI Workshop: Regulatory Framework for Energy: Third Party Financing in Central Europe (Budapest, November 2001).

Ligot, J., 2004. Experiences of Energy Services in CEEC. In: Proceedings of the International Conference on Improving Electricity Efficiency in Commercial Buildings (Frankfurt, April 2004). Editor: P. Bertoldi.

McGowan, J., 2001. State-of-the-art performance contracting. Article available online at http://www.energyusernews.com/CDA/ArticleInformation/features/BNP__Features__Item/0,2584,61014,00.html.

NVE (Norwegian Water Resources and Energy Directorate), 2003. Country report Norway. Prepared for the IEA DSM Task X - Performance Contracting.

Pavan, M. 2002. What's up in Italy? Market liberalization, tariff regulation and incentives to promote energy efficiency in end-use sectors, in ACEEE, ed.: Proceedings of the American Council for Energy Efficient Economy (ACEEE) summer study. ACEEE, Washington DC, 2002.

Pela, A., 2003. Development of the ESCO in Italy: State of the Art". In: Proceedings of the First Pan-European Conference on Energy Service Companies. Editor: P. Bertoldi.

Poole, A.D. and Stoner, T.H., 2003. Alternative financing models for energy efficiency performance contracting. Sponsored by the USAID Brazilian Clean and Efficient Energy Program (BCEEP), administered by Winrock International.

Rotaru, C., Stefanciuc, C., Tantareanu, C., 2003. Electricity End-Use Efficiency in Buildings in Romania. In: International Workshop on Electricity End-Use in Buildings in Candidate Countries. Edited by V. Berrutto.

Schipper, L., Meyers, S., Howarth, R. and Steiner, R, 1994. Energy efficiency and human activity: past trends, future prospects. 2nd. Cambridge: Cambridge University Press

Scott, S. (Economic and Social Research Institute). 2004. Personal communication. May 19.

SEA (Swedish Energy Agency), 2003. Country report Sweden. Prepared for the IEA DSM Task X - Performance Contracting.

Seefeldt, F., 2003. Energy Performance Contracting – success in Austria and Germany – dead end for Europe? In: Proceedings of the European Council for Energy Efficient Economy 2003 Summer Study. European Council for an Energy-Efficient Economy, Stockholm.

Seefeldt, F., (Berliner Energieagentur), 2005. Personal communication. February.

Sidler, H., 2004. Development of international energy service markets. In: Proceedings of the International Conference on Improving Electricity Efficiency in Commercial Buildings (Frankfurt, April 2004). Editor: P. Bertoldi.

Sijben, A., 2003. Country report Netherlands. Prepared for the IEA DSM Task X - Performance Contracting.

Sorrell, S. 2005. The economics of energy service contracts. Tyndall Centre Working Paper, Environment & Energy Programme SPRU (Science & Technology Policy Research), Freeman Centre.

Swärd, M. (Energy Agency of Southeast Sweden), 2005. Personal communication. February.

Ürge-Vorsatz, D., Langlois, P., Rezessy, S. 2004. Why Hungry? Lessons learned from the success of the Hungarian ESCO industry. In Proceeding of the American Council for Energy Efficient Economy 2004 Summer Study. American Council for an Energy-Efficient Economy, Washington, D.C.

Väisänen, H. (Ministry of Trade and Industry, Finland), 2003. Personal communication January 15.

Vine, E., 2005. An international survey of the energy service company (ESCO) industry. In: *Energy Policy,* 33 (5), 691-704.

WEEA, World Energy Efficiency Association. 1999. Briefing paper on Energy Service Companies with directory of active companies. WEEA, Washington.

Weizsäcker, E., Lovins, A. and Lovins, H., 1998. Factor Four: doubling health - halving resource use. The new report of the Club of Rome. London: Earthscan.

Weöres, E., 2003. The role of OTP bank in energy saving programs including ESCO financing. In: Proceedings of the First Pan-European Conference on Energy Service Companies (Milan, May 2003). Editor: P. Bertoldi.

Westling, H. 2003a. *Performance Contracting*. Summary Report from the IEA-DSM Task X within the IEA-DSM Implementing Agreement. International Energy Agency, Paris.

Westling, H. 2003b. Energy Performance Contracting Will Improve Climate and Business. . In: Proceedings of the European Council for Energy Efficient Economy 2003 Summer Study. European Council for an Energy-Efficient Economy, Stockholm.

Wnuk, R., 2003. Poland's Way to Energy Efficiency in the Public Sector. In: Private Meets Public Workshop A: Clearcontract – Clearinghouse for Energy Contracting, (Berlin, September 2003). Also available at http://www.privatemeetspublic.de/_wcms_editor/pdf_files/WS_A_KAPE_Wnuk.pdf

Wuppertal institute, ACE, ADEME, ARMINES, CCE, DEA, Energy piano, EEE, ESI, InterRegies, University of Lund and Politecnico di Milano, 2000. Completing the market for least-cost services. Strengthening energy efficiency in changing European electricity and gas markets. Wuppertal: Wuppertal Institute for Climate, Environment, Energy. A study under the SAVE Program.

Mission of the JRC

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

14 LB-NA-21646-EN-C

EUROPEAN COMMISSION
DIRECTORATE-GENERAL
Joint Research Centre

ISBN 92-894-9424-7

Publications Office
Publications.eu.int