An Assessment of on Energy Service Companies (ESCOs) Worldwide

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<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1 The concept of ESCOs</td>
<td>2</td>
</tr>
<tr>
<td>1.1.1 Definition of ESCOs and Energy Performance Contracting</td>
<td>2</td>
</tr>
<tr>
<td>1.1.2 Funding and models of energy performance contracting</td>
<td>2</td>
</tr>
<tr>
<td>1.2 Development and current situation of ESCOs worldwide</td>
<td>3</td>
</tr>
<tr>
<td>1.2.1 History of ESCOs</td>
<td>3</td>
</tr>
<tr>
<td>1.2.2 Current situation of ESCOs in different countries</td>
<td>3</td>
</tr>
<tr>
<td>1.2.3 Energy Performance Contracting in different sectors</td>
<td>4</td>
</tr>
<tr>
<td>1.3 Barriers to the ESCO development</td>
<td>4</td>
</tr>
<tr>
<td>1.3.1 Barriers to EPC in the public sector</td>
<td>5</td>
</tr>
<tr>
<td>1.3.2 Barriers to EPC in the industrial sector</td>
<td>6</td>
</tr>
<tr>
<td>1.3.3 Barriers for EPC in the residential sector</td>
<td>7</td>
</tr>
<tr>
<td>1.3.4 Barriers to EPC in the commercial sector</td>
<td>8</td>
</tr>
<tr>
<td>1.3.5 Barriers related to financing of EPC projects</td>
<td>8</td>
</tr>
<tr>
<td>1.3.6 Barriers related to financing of EPC projects</td>
<td>8</td>
</tr>
<tr>
<td>1.3.7 Barriers related to financing of EPC projects</td>
<td>8</td>
</tr>
<tr>
<td>1.3.8 Barriers related to financing of EPC projects</td>
<td>8</td>
</tr>
<tr>
<td>1.3.9 Barriers related to financing of EPC projects</td>
<td>8</td>
</tr>
<tr>
<td>1.3.10 Barriers related to financing of EPC projects</td>
<td>8</td>
</tr>
<tr>
<td>1.3.11 Barriers related to financing of EPC projects</td>
<td>8</td>
</tr>
<tr>
<td>1.4 Enabling factors for a successful ESCO industry</td>
<td>10</td>
</tr>
<tr>
<td>1.4.1 General energy market context</td>
<td>10</td>
</tr>
<tr>
<td>1.4.1.1 Energy price levels</td>
<td>10</td>
</tr>
<tr>
<td>1.4.1.2 Liberalization of the energy market</td>
<td>10</td>
</tr>
<tr>
<td>1.4.1.3 High energy intensity</td>
<td>11</td>
</tr>
<tr>
<td>1.4.2 Legislative and regulatory measures</td>
<td>11</td>
</tr>
<tr>
<td>1.4.2.1 General Policy instruments to promote energy efficiency</td>
<td>11</td>
</tr>
<tr>
<td>1.4.2.2 Energy efficiency obligations</td>
<td>11</td>
</tr>
<tr>
<td>1.4.2.3 Energy saving targets in public buildings</td>
<td>12</td>
</tr>
<tr>
<td>1.4.3 Governmental and other programs</td>
<td>12</td>
</tr>
<tr>
<td>1.4.3.1 Demonstration projects</td>
<td>12</td>
</tr>
<tr>
<td>1.4.3.2 Project bundling</td>
<td>12</td>
</tr>
<tr>
<td>1.4.3.3 Information campaigns and training programs</td>
<td>12</td>
</tr>
<tr>
<td>1.4.4 Developing countries and economies in transition: special need for financial instruments</td>
<td>13</td>
</tr>
<tr>
<td>1.4.4.1 National financial support mechanisms</td>
<td>13</td>
</tr>
<tr>
<td>1.4.4.2 International financial support</td>
<td>13</td>
</tr>
<tr>
<td>1.4.4.3 Measures to support the local/ national banking sector</td>
<td>14</td>
</tr>
<tr>
<td>1.4.5 Other measures</td>
<td>14</td>
</tr>
<tr>
<td>1.4.5.1 Standardization of contract procedures and Measurement and Verification</td>
<td>14</td>
</tr>
<tr>
<td>1.5 Recommendations</td>
<td>15</td>
</tr>
<tr>
<td>1.5.1 Legislative and financial conditions</td>
<td>15</td>
</tr>
<tr>
<td>1.5.2 Creation of Energy agencies</td>
<td>15</td>
</tr>
<tr>
<td>1.5.3 Development of Accreditation systems</td>
<td>16</td>
</tr>
<tr>
<td>1.5.4 ESCO association</td>
<td>16</td>
</tr>
<tr>
<td>1.5.5 International cooperation</td>
<td>16</td>
</tr>
<tr>
<td>1.5.6 Special measures to promote EPC in the residential sector</td>
<td>16</td>
</tr>
<tr>
<td>1.5.7 Special measures to promote EPC in the commercial sector</td>
<td>17</td>
</tr>
<tr>
<td>1.5.8 The necessity of country-specific approaches</td>
<td>17</td>
</tr>
<tr>
<td>1.6 Conclusion</td>
<td>17</td>
</tr>
</tbody>
</table>
1.1 **The concept of ESCOs**

1.1.1 **Definition of ESCOs and Energy Performance Contracting**

Definitions for ESCOs vary from country to country. ESCOs are usually differentiated from other firms that offer energy efficiency improvement or energy services, such as consulting firms and equipment contractors, by the concept of performance-based contracting, which means that the ESCO’s payment is directly linked to the amount of energy saved (in physical or monetary terms). Energy services may include for instance energy audits, energy management, energy or equipment supply, provision of services such as space heating (Bertoldi and Rezessy 2005). ESCOs offer similar services as Energy Service Providing Companies (ESPCs). However, in contrast to them, they guarantee the savings and their remuneration is linked to the projects’ performance. ESCOs may also provide or arrange financing. They usually offer the following services: they develop, design, and finance energy efficiency projects; install and maintain the energy efficient equipment involved; measure, monitor, and verify the project’s energy savings; and assume the risk involved in the expected amount of energy savings. Therefore, they take financial, technical and other risks (Bertoldi et al 2006).

1.1.2 **Funding and models of energy performance contracting**

Financing for the investment can either be provided by the ESCO from its internal funds (ESCO financing) or by the customer backed by a savings guarantee from the ESCO (end-user/customer financing). Another possibility is *third party funding (TPF)* in which a financial institution or bank allows a credit either to the ESCO or directly to its client backed by a guarantee for the projected energy or cost savings given by the ESCO (Bertoldi and Rezessy 2005). Under off-balance sheet financing, also called non-appropriation financing, the financiers hold the title to equipment during the project. This can be very beneficial for public and private customers because the debt service is treated as an operational expense and not a capital obligation, so the debt rating is not affected. This is important as borrowing capital is freed up.

There are different models for energy performance contracting: One possibility is to distinguish between shared and guaranteed savings. Under the *shared savings model* the cost savings are shared by the ESCO and the client at a pre-determined percentage for a fixed number of years. In this model, the ESCO guarantees a certain level of cost savings to the customer whereas in the *guaranteed savings model*, the ESCO guarantees a certain level of energy savings to the customer (Bertoldi and Rezessy 2005). In the latter model, the ESCO assumes the performance risk, but usually not the credit risk since the customer has to provide funding himself (from his own funds or from banks). This model is therefore based on end-user or third party financing. It has the advantage that interest rates are usually much lower and therefore more energy efficiency investment is possible. In contrast, in the *shared savings model*, the ESCO assumes both the performance and the credit risk.

Energy performance contracting should be differentiated from energy supply/delivery contracting which describes the supply of a set of services such as heating or lighting via outsourcing to ESCOs. There are also other models such as chauffage (Bertoldi and Rezessy 2005).

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1 More information about the models and financing options is available for instance in Bertoldi and Rezessy 2005
2 Chauffage means that an ESCO assumes the total responsibility for providing an agreed set of energy services (Bertoldi and Rezessy 2005).
1.2 Development and current situation of ESCOs worldwide

1.2.1 History of ESCOs

The ESCO concept appeared for the first time in Europe more than 100 years ago (Bertoldi, et al. 2006). In the United States ESCOs emerged in the 1970s, after the oil crisis which led to increasing energy prices. The ESCO success in the USA was also supported by governmental programs and, before the liberalization and in contrast to Denmark and the Netherlands, integrated resource planning and utility Demand Side Management (DSM) programs which selected ESCOs through DSM bidding\(^3\) to achieve demand savings (see US country report). During the decades to follow, the concept came back to Europe where the ESCO industry has successfully developed in some countries, such as Germany, but not in others. In the 1990s, the first ESCOs were created in developing countries. Today, the ESCO concept has spread with varying success to most industrialized countries, to several economies in transition and to the biggest developing countries.

1.2.2 Current situation of ESCOs in different countries

The USA has always been the leading ESCO-country with a total number of about 500-1000 ESCOs today achieving an annual turnover of about 5 billion USD (Goldman et al. 2005). In the rest of the world, the success of the ESCO-industry varies widely, even within the European Union: Germany, Austria and the United Kingdom are often considered as ESCO champions in Europe while the Netherlands and Denmark have seen little commercial EPC. The latter countries are characterized by mandatory DSM programs and strong involvement in project implementation on the side of the state (Bertoldi and Rezessy 2005). By contrast, Hungary is proud to have more ESCOs than some of the old EU-member states. According to an international ESCO-survey in 2002\(^4\) (Vine 2005), the total value of ESCO-projects outside the United States was highest in Germany with 150 million USD, followed by Brazil, Japan, Canada, China, Poland, Sweden, Australia, Korea and others. This shows that ESCO success is not only concentrated in developed, but also in some developing countries. However, this list is based on absolute numbers, not relative to the total population or size of the country, which are the real proxies for the size of the ESCO market. Table 1 shows the numbers relative to total population size.

Table 1: Total value of ESCO projects relative to population size

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>United States</td>
<td>1800-2100 Million USD</td>
<td>300 Million</td>
<td>6 USD</td>
</tr>
<tr>
<td>Germany</td>
<td>150 Million USD</td>
<td>82 Million</td>
<td>1,8 USD</td>
</tr>
<tr>
<td>Brazil</td>
<td>100 Million USD</td>
<td>185 Million</td>
<td>0,54</td>
</tr>
<tr>
<td>Japan</td>
<td>61,7 Million USD</td>
<td>127 Million</td>
<td>0,48</td>
</tr>
<tr>
<td>Canada</td>
<td>50-100 Million USD</td>
<td>32,8 Million</td>
<td>1,52-3</td>
</tr>
<tr>
<td>China</td>
<td>49,7 Million USD</td>
<td>1300 Million</td>
<td>0,03</td>
</tr>
<tr>
<td>Poland</td>
<td>30 Million USD</td>
<td>38,5 Million</td>
<td>0,77</td>
</tr>
<tr>
<td>Sweden</td>
<td>30 Million USD</td>
<td>9 Million</td>
<td>3,3</td>
</tr>
<tr>
<td>Australia</td>
<td>25 Million USD</td>
<td>20,7 Million</td>
<td>1,2</td>
</tr>
<tr>
<td>Korea</td>
<td>20 Million USD</td>
<td>49 Million</td>
<td>0,4</td>
</tr>
<tr>
<td>Switzerland</td>
<td>13,5 Million USD</td>
<td>7,5 Million</td>
<td>1,8</td>
</tr>
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\(^3\) DSM bidding is an auction in which a utility generally solicits proposals from ESCOs interested in achieving specified amounts of demand or peak load savings (Goldman et al. 2005). The proposals are evaluated and selected competitively in terms of the price bid and other criteria such as the bidder’s experience and qualifications, and the technical, marketing, and financial approach. The utility then pays the price (for instance, $500/kW) for DSM savings estimated or achieved within a specified period of time.

\(^4\) These numbers date back several years and might therefore be outdated in some cases; however, this survey represents the only publicly available international comparative ESCO study.
<table>
<thead>
<tr>
<th>Country</th>
<th>ESCO Projects</th>
<th>Energy Savings</th>
<th>Energy Saving Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>India</td>
<td>0.5-1 Million USD</td>
<td>1100 Million</td>
<td>0.0009</td>
</tr>
<tr>
<td>South Africa</td>
<td>10 Million USD</td>
<td>46.5 Million</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Source: based on Vine (2005)

In relative terms, as can be seen in column 4 of table 1, the USA has the highest value of ESCO projects per capita, followed by Sweden, Germany, Switzerland and Canada.

The following report is based on a general review of literature concerning ESCOs as well as on six country studies which were conducted from June 2006 to February 2007 by the Central European University in 3 developed and 3 developing countries: Germany, Hungary, the United States, and India, China and Brazil. In the first category of countries, in order to identify factors for success, best-practice examples of developed countries were chosen where the ESCO-industry is strong. The choice of countries in the second category of developing or non-OECD-countries was made on the basis of data availability, dynamic development of the ESCO-industry and relevance of countries. India, China and Brazil are on the one hand the biggest developing countries with rapid industrial development and vast energy saving potentials, and have on the other hand at least a nascent ESCO industry which can help identify both barriers and possible remedies for ESCO success in such countries. These countries have also seen the support of different donor organisations to promote EE or develop the ESCO industry. The country studies were mostly prepared by nationals of the respective countries using methods such as literature review, interviews with representatives of the ESCO industry and ESCO associations as well as local ESCO experts and attendance at ESCO conferences.

1.2.3 Energy Performance Contracting in different sectors

ESCOs are active in different sectors depending on the country. Especially in industrialized countries such as the United States and Germany, the public sector is one of the most important ESCO clients and has even often triggered the development of the national ESCO-industry through projects in public buildings as well as through favorable legislation and financial support (Vine 2005). The commercial sector is an emerging ESCO-client, especially in developing countries such as Brazil. Many ESCOs targeted 10-40% of their projects in this sector, ESCOs in India, Japan, and Mexico at least 50%. ESCO-activity in the industrial sector varies from country to country, but often seems to be higher in developing than in developed countries; in numerous countries, this sector is even the most important for ESCOs. For example, ESCOs in Bulgaria, Egypt, Kenya, the Philippines, Thailand, and Ukraine targeted at least 70% of their activity in this sector (Vine 2005). On the other hand, mainly developed countries such as the United States, Canada, Japan and Hungary have experienced serious difficulties in achieving acceptance of the ESCO-concept in the industrial sector. Their ESCO industry relies more on the public and/or commercial sectors. The residential sector is the least important for ESCOs in most countries: only ESCOs in 7 countries targeted at least 10% of their activity in this sector, including Nepal (30%) and South Africa (15%). This is due to the supposedly low profits to be made in this sector for ESCOS, to legal complications between owner and tenant as well as to other factors such as difficult decision-making due to the often high number of stakeholders. Reasons for ESCO’s success and failure in different sectors and countries are provided in the section on barriers below, followed by a section on possible remedies.

1.3 Barriers to the ESCO development

Since the business concept of ESCOs is very attractive from a theoretical perspective, if we accept the widely published and accepted fact that cost-effective energy-efficiency potentials
are abundant in all countries (IEA 2003, IPCC 2007), ESCOs should be ubiquitous. However, this industry’s prevalence is very diverse by country and sector. This implies that there are significant barriers to their success, and these differ by country, sector and other circumstances. This section presents an overview of the different barriers that hinder the proliferation of the ESCO concept. Some barriers are country-specific, whereas others are common for several or even all states. Since they partly differ in the various sectors, sector-specific barriers will be presented first followed by general barriers.

1.3.1 Barriers to EPC in the public sector

Although the public sector was a trigger for the ESCO market development in many countries and remains one of the most important sectors in the ESCO activities, numerous barriers prevent the realization of more projects especially in the absence of a clear tendering (public procurement) process. Significant opportunities for energy and cost savings exist in many countries, but decision makers at all levels (state, regional, local) are often unaware of these potentials since their priorities are aimed at areas more popular with voters such as education, health, public infrastructure or unemployment. Energy efficiency improvements then compete with other projects for scarce capital and staff time. In numerous countries, election-cycle and term/period of office thinking hampers long-term vision in the administration since pay-back periods for EPC-projects are mostly between 5 and 10 years - longer than the usual election mandate (Hungary country report). This problem is aggravated in countries where the best saving potentials have already been realized and implemented and the remaining options are more expensive as in Hungary and Germany, for example.

In some countries such as Germany, public authorities are afraid of outsourcing through EPC, because they fear a loss of jobs (Geißler et al. 2006) and a loss of control over outsourced systems. In many countries, specific provision on ESCOs and EPC are still missing in the regulatory framework and certain traditional legal provisions can create problems for ESCOs, especially concerning public procurement. Administrative procedures are often burdensome allowing only large projects. In Greece for example, properly adapted procurement, contractual and administrative procedure for the selection, control and repayment for the integrated energy service provided by ESCOs are missing (Bertoldi and Rezessy 2005) In Croatia as well as in some other countries, the budget of municipalities and state-owned organizations is based on the past year’s consumption (Franjek 2006). An exception to this is for example Hungary where local authorities can keep their operational costs constant if they have a signed contract with an ESCO. If the energy costs are reduced through EPC the budget will also decrease, so incentives for the public authorities to use less energy are missing. If the public authority provides the financing for EPC (Shared savings and end-user financing model), long-term EPC contracts are considered as a credit relationship and therefore the municipality is bound to certain credit limits (Grim 2005). In some countries, as in China, laws are missing in the public finance system which would allow the public authorities to pay for improvements today although the resulting cost savings will only be realized in the future. In other countries such as Germany, lots of municipalities are confronted with the problem that they have to pay energy efficiency investments from their investment budget whereas the resulting savings are credited to the operational budget (Germany country report). This separation of budgets does not allow that cost savings are further invested into new energy efficiency improvements.

Energy performance contracting in the public sector almost always requires public procurement and therefore needs to follow public procurement rules, such as a tendering obligation. Unfortunately, public procurement decisions are often taken centered on assets rather than energy services and based only on the best price without taking into account the lifecycle costs of new equipment. It is therefore very difficult to consider EPC in public
procurement. In Germany and Hungary, for instance, public procurement rules are sometimes difficult to understand and to deal with for ESCOs and require competent administrative officials who are not available in many small towns (Szoó pers. Com. 2006). There are no specifications for EPC in the public tendering process in Greece and no proper definition of EPC or third party financing exists. The same problem exists in China (China country report). High transaction costs for the preparation of contracts are an associated problem for instance in Germany and India (see country reports). Furthermore, public tenders for EPC often include old provisions or old EPC-contract models which are not adapted to the rapidly changing EPC-market and the ESCOs’ needs. In China, the public procurement rules have not yet included EPC as an item to be sourced through a tender process. However, the Chinese government is in the process of introducing EPC into its public procurement system.

An important barrier for EPC mainly in developing countries is the inadequate energy service levels. If satisfactory comfort standards are not met prior to the intervention (e.g. under-heated or under-lit rooms), this complicates the construction of baselines and inevitably results in some savings absorbed to reach acceptable comfort levels. Hungarian schools and hospitals for example, complained about the insufficient lighting levels, old and unsafe wiring, noisy luminaires etc. (Ürge-Vorsatz et al. 2002).

Finally, one major barrier in the public sector is the budgetary problems experienced by public administrations in developing and today increasingly also in developed countries.

1.3.2 Barriers to EPC in the industrial sector

In the industrial sector, EPC is much less frequent than in the public sector since numerous problems hinder ESCO activities. Most importantly, the interest especially of non-energy intensive industrial firms in EPC is generally low compared to their core activities. In many countries including China and India, big companies that would be the most profitable clients for ESCOs consider that they can implement and finance energy efficiency improvements themselves since they have sufficient funds and technical in-house expertise. Therefore, they might only need an energy audit. Even Indian Small and Medium Enterprises (SMEs) are reluctant to ask for external financing from banks or ESCOs for energy efficiency and would rather use their own funds if the projects are quite attractive (India country report). In fact, EPC can limit the company’s investment ability since the loans and payments for EPC can negatively affect the balance sheet. In the United States, ESCOs are sometimes hired to submit a proposal, but then the company implements the improvements and services proposed by the ESCO on its own without any compensation for the ESCO, since the company has sufficient funds and knowledge for the required investments (Goldman et al. 2005). In many countries such as Germany and the USA, numerous companies do not allow ESCOs to check the core industrial processes because of fears about trade secrets and because specialized knowledge and interruptions of the production would be necessary to implement changes there. For these reasons, ESCOs concentrate on standard applications such as boilers, pumps etc. in the industrial sector rather than on processes.

One of the major problems for EPC in the industrial sector is that the time spans considered in many companies are shorter than the payback-periods for many ESCO-projects: Managers accept payback-periods longer than 3 years only when investments in the production area are concerned, but not for “inputs” such as energy. Life-cycle costs are rarely taken into account.

In state-owned companies in China, managers are evaluated only according to the improvements achieved during their working period, but since energy efficiency improvements can have payback periods of several years, they are often attributed to their successors.

Furthermore, the organizational structure – a company’s grouping into departments, reporting lines and budgets - often render EPC very difficult (Bertoldi et al. 2006). In numerous companies, the qualified and available staff is insufficient, the energy management
infrastructure is limited and the link between the technical staff and the strategic management level is missing. In EPC projects, the technical understanding can come from ESCOs, but the management’s commitment and an energy efficiency culture in the company are also necessary for success in energy savings.

In developing countries, many companies prefer to modernize their outdated manufacturing processes rather than invest their small revenues in energy efficiency (Painuly et al. 2003). Finally, in developed countries, ESCOs themselves often consider it more risky to invest in the private than in the public sector because industrial sites might be moved to another country or location or the company can go bankrupt before the end of the EPC contract, or change production processes or lines. On the other hand, in developing countries where the credit system is not well developed, the private sector often involves higher credit risk, which also makes ESCOs more willing to cooperate with the public sector.

To summarize, barriers in the industrial sector are not so much of a financial nature, but are rather due to low interest and fears of potential clients so that the industrial sector’s share in the ESCO’s activities is currently often much lower than its potential.

### 1.3.3 Barriers for EPC in the residential sector

As already mentioned, the **residential sector** is the most problematic and the smallest part of ESCO activities in almost all countries, although saving potentials are estimated to reach up to 40% (Grim 2005). ESCOs are often not interested in this sector, for various reasons. First, energy and cost saving possibilities of a single project/site are usually small compared to the transaction costs especially in cases when ownership of buildings is dispersed among many private owners (Grim 2005). Secondly, transaction costs and the complexity of projects are usually high (Javaroni/Aragao Neto 2006) because of the risk of “non-contract” and the often 2-year long negotiations. In Germany, for example, legal uncertainties about the ownership of buildings as well as the cost partition between renter and landlord in EPC projects make them difficult (“split incentives”). The renters usually have to be informed and approve the energy efficiency measures in advance. Costs for EPC projects can only be imposed on the renters if this was stipulated in the contract. These problems are even greater in apartment buildings since the more actors are involved, the more difficult it is to reach an agreement, especially on the costs. Furthermore, in multiple family dwellings, ownership of certain common elements such as pipes is often unclear (Giczi 2006). One of the first ESCOs active in the private sector mentions as further barrier the absence of the guaranteed savings model in this sector, at least in Belgium (de Groote 2006).

On the side of the customers, energy service levels are sometimes not sufficient, so that money first has to be spent on improving these (see above and Ürge-Vorsatz et al. 2002). Building owners are often not aware of energy saving potentials and the opportunities which EPC offers (Javaroni/Aragao Neto 2006). Low subsidized energy prices as in many developing countries do not provide an incentive for energy efficiency improvements – see table 2 (Ürge-Vorsatz et al. 2004).

<table>
<thead>
<tr>
<th>Country</th>
<th>Electricity price for households</th>
<th>GDP per capita in 2006</th>
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<tbody>
<tr>
<td>USA</td>
<td>10.86 US ct / kWh (in 2006)</td>
<td>42 000 $/capita</td>
</tr>
<tr>
<td>Germany</td>
<td>19.8 US ct /kWh (in 2004)</td>
<td>33 854 $/capita</td>
</tr>
<tr>
<td>Hungary</td>
<td>14.1 US ct/ kWh (in 2006)</td>
<td>10 814 $/capita</td>
</tr>
<tr>
<td>Brazil</td>
<td>9.3 ct US ct /kWh (in 2004)</td>
<td>4 3320 $/capita</td>
</tr>
<tr>
<td>China</td>
<td>4.9 ct US ct/kWh (in1997)</td>
<td>1 709 $/capita</td>
</tr>
<tr>
<td>India</td>
<td>4.3 US ct / kWh (in 2002)</td>
<td>705 $/capita</td>
</tr>
</tbody>
</table>

Source: Energy Information Administration 2007; IMF 2006
Many building owners also mistrust the projected saving potentials mainly because the motivation for the EPC mechanism is not understood (Bertoldi and Rezessy 2006). Bertoldi et al (2006) mention as further barriers the perceived disturbance to the home, the hassle, the upfront cost, concern with borrowing with a 2-5 year tie-in, suspicion of energy suppliers and fear of commitment. Energy efficiency is not a priority for consumers due to the low energy costs in some countries and actions cannot be ‘shown off’ to peers. Indeed, Lees (2006) mentions as the most significant barrier, which cannot easily be solved, the disinterest of consumers. Lack of time and money is a major problem for EPC in the domestic sector in affluent populations since many building and flat owners have a limited budget and would rather spend money on improvements of the comfort such as building an elevator (Hungary country report). In Brazil, a survey was conducted among consumers, ESCOs and utilities to identify barriers for EPC in the residential sector (Javaroni/Aragao Neto 2006). Building owners with higher incomes showed interest in energy savings, but not in ESCOs since they can implement energy efficiency improvements on their own progressively as measures are simple and the amount to be invested insignificant to their budgets. In Great Britain where the Energy Efficiency Commitment obliges energy suppliers to achieve energy savings with their customers, several programs were aimed at increasing the interest of consumers in EPC, but with limited success: consumers couldn’t believe that energy suppliers were interested in reducing energy use and feared that the energy audit would be used to sell other products (Lees 2006). Furthermore, they judged EPC to be too complicated and not even free since they are paying a premium. Since the price for cavity insulation is very low in the UK, energy performance contracting is not considered necessary and effective. Other barriers to EPC in this sector include initial capital constraints and fiscal/VAT barriers. In Hungary, for example, EPC projects only enjoy reduced VAT rates if the ESCO operates the equipment and the project is therefore classified as an energy service project (Ürge-Vorsatz et al. 2004).

In summary, major barriers in the residential sector are the high relative transaction costs, the low level of information and lack of interest about this mechanism among building owners as well as the complexity of the decision process. They prevent almost every ESCO activity in this sector, although saving potentials would be easier to realize than in other sectors.

1.3.4 Barriers to EPC in the commercial sector
Barriers or EPC in the commercial sector resemble those in the residential sector. Building owners often lack awareness about the possibility of EPC or knowledge on how to implement it (Grim 2005), but they cannot or do not want to hire an expensive adviser. Some building owners are bound to running service contacts, others are reluctant to engage in multi-year contracts and large companies owning many buildings often have sufficient funds to implement energy efficiency upgrades themselves. Furthermore, EPC sometimes has a bad reputation in the tertiary sector since in the past, the expectations of some building owners towards EPC have been too high, resulting in disappointment. ESCOs and banks often consider the tertiary sector to be an unreliable client and the potential energy savings to be too small if the annual energy costs are below a certain amount.

1.3.5 Barriers related to financing of EPC projects
Financing of energy performance contracting is another major problem in many countries, especially in developing countries where the ESCO industry is still young and unknown and the banking sector is too conservative. Since numerous banks and financial institutions lack information about energy efficiency potentials and especially experience in lending to ESCOs they consider EPC often as a risky business. This is further complicated by the fact that the
banks need to evaluate their clients’ credit-worthiness - either the ESCO’s or the client’s. For this reason, very often they either do not want to lend any money to ESCOs or demand high interest rates, as in Brazil (Brazil country report). Banks are especially reluctant to lend money to small and new ESCOs, who cannot bring guarantees (collateral is a standard provision), or to the ESCO-clients themselves whose creditworthiness they cannot judge. In China, credit risk is at present the biggest challenge to ESCO development since many ESCO clients do not believe that the project will result in the energy and cost savings projected by the ESCOs. In India, many ESCOs do not know whether their clients are creditworthy and sometimes discover that no one is willing to lend money to their potential clients only after they have finished all the preparatory work for the EPC contract. Although this is a normal risk for ESCOs, it can be problematic for new and small ESCOs.

However, in principle sufficient money is available in the international markets: a plethora of financial support mechanisms such as grants, concessional loans, credit facilities etc. are offered to countries in transition and developing countries by the European Bank for Reconstruction and Development (EBRD), the World Bank, the Global Environmental Facility (GEF), IFC etc. Such a fund, the UNDP/GEF Hungary Public Sector Energy Efficiency Project, has considerably supported the development of the ESCO-industry in Hungary by providing partial guarantees to EE projects. However, in many other countries, the main problem seems to be the missing link between possible funders and ESCOs/ their clients.

Finally, funding for EPC competes with explicit or implicit energy price subsidies, which still exist in many developing and transition countries, and other energy efficiency support mechanisms such as subsidies and soft loans provided by the governments.

1.3.6 Structural and political barriers

Energy efficiency is not considered important in some countries due to various reasons. For example, low non-cost reflective energy prices do not provide incentives to reduce energy use by improving energy efficiency (Vine 2005, Westling 2003). In many developing and even developed countries, energy prices are still heavily subsidized so that the money which could be much more efficiently spent on energy efficiency improvements is diverted for supposedly necessary energy subsidies. In developed countries, energy prices for large and sometimes medium consumers (less for small consumers) are often decreasing due to liberalization, but they mostly rise again relatively soon (as no price race to the bottom can go on forever). This happened in Europe after the liberalization and in the USA after the restructuring of the energy market when energy prices increased during in recent years due to, among other reasons, the rising oil price (German country report).

The necessary understanding of the opportunities that energy efficiency offers or the necessary culture of project financing is often missing (Vine 2005). In some countries, there is a lack of government support for energy performance contracting. Safety and reliability concerns can hinder the introduction of more energy efficient new technologies. Many utilities are not interested in reducing energy use or are even opposed to such measures because they fear a loss of income.

However, there are also countries trying to improve their energy efficiency by other tools than EPC. For example, the Netherlands and Denmark, among the EU leaders in energy efficiency, have only very few ESCOs. In the Netherlands, some utilities offer energy management or energy service contracts, Denmark has introduced mandatory demand-side management provisions for utilities and public entities are not allowed to finance energy savings through loans such as EPC (Bertoldi and Rezessy 2005).

The federal structure of a few states such as India and Germany makes country-wide support-programs or favorable legislation for ESCOS difficult because policy tools, energy prices, ESCO existence may vary widely within the country. In Germany, different states have
different practices for approving energy efficiency projects in the public sector and for handling it financially (Geißler et al. 2006).

Furthermore, EPC is not an easy business and requires deep know-how of energy, financing, buildings, and industry processes to become a win-win project. However, some developing countries, such as India, currently do not have sufficient national experts in EPC. Furthermore, the appropriate energy efficiency technology and equipment is sometimes not manufactured domestically or is very costly, for example due to high import taxes. If the ESCOs are not engineering companies themselves, they need to purchase this equipment somehow (Vine 2005). This equipment can be provided by energy efficient technology providers and equipment manufacturers from overseas, for example through the Kyoto Flexible Mechanisms. Linking the Clean-Development Mechanisms\(^5\) and EPC is therefore a promising new concept if the EPC project is implemented in a developing country. Furthermore, there are also some barriers internal to the ESCOs themselves: Previous failures of EPC projects as well as insufficient capacity can be problematic. ESCOs are also very selective in their choice of projects which need to meet specific criteria such as a certain project size and short payback periods.

Summarizing the barriers,ESCOs as well as their partners (banks, clients etc.) face numerous risks when engaging in EPC (technical, financial, operational, credit risks etc.)

### 1.4 Enabling factors for a successful ESCO industry

A wide variety of factors has enabled the development of a successful ESCO industry in various countries. Some of these factors such as favorable legislation are generally important; however, many of them apply more to certain countries or groups of countries than others.

#### 1.4.1 General energy market context

##### 1.4.1.1 Energy price levels

Elevated energy prices provide an important incentive for energy efficiency improvements. In Korea, for instance, the increase in energy prices related to the Asian financial crisis and the resulting devaluation of the Korean currency represented an important driver for the ESCO industry (Lee 2003). Pricing reforms which led to energy prices now reflecting direct costs, are also considered as a major factor explaining the success of the Hungarian ESCO industry (Ürge-Vorsatz et al. 2004).

##### 1.4.1.2 Liberalization of the energy market

Liberalizing the electricity market can have negative or positive consequences for ESCOs (German country report): in the short term, energy prices often drop which decreases the incentives for energy efficiency improvements and is usually problematic for ESCOs, but they usually rise again later. Combining liberalization with the introduction of energy or CO2 taxes can be helpful due to the resulting rise in energy prices. On the other hand, because of the increased competition due to liberalization, some utilities might extend their area of business and start to offer also energy services such as EPC as happened in Germany. Furthermore,

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\(^5\) CDM is one of the three flexible mechanisms defined by the Kyoto Protocol, which intends to promote project-based cooperation between developed countries that have committed emissions reduction amounts and developing countries that do not have obligations to reduce their greenhouse gases. Developing countries benefit from additional investment or advanced technologies into emissions reductions projects implemented within their country while their counterpart from the developed world benefit from obtaining emissions reductions credit at a lower cost.
liberalization can have positive effects for ESCOs since it is usually linked to removal of
energy price subsidies as well as to privatization of formerly state owned utilities and large
companies which usually increases the pressure to improve efficiency in general as well as
efficiency of energy end-use (Vine 2005).
Lack of competition in the general industry can be a barrier as it provides no incentive for
energy efficiency measures (Painuly et al. 2003). Therefore, privatization and liberalization of
companies can be beneficial in order to increase incentives for cutting costs which usually
increases the companies’ interest in energy savings through improved efficiency.

1.4.1.3 High energy intensity

High energy intensities, as in Central and Eastern Europe (CEE) or in developing countries
such as India, usually imply high potentials for energy savings and thereby for EPC (Ürge-
Vorsatz et al. 2004). China’s energy intensity remains very high, which might partly explain
the success of the ESCOs there (China country report). During the past five years, the growth
rate of China’s energy demand has greatly surpassed that of the economic growth rate. On the
other hand, the example of Hungary, one of the CEE countries with lower energy intensity
compared to the others shows that high energy intensity alone is not sufficient to create a
sustainable ESCO industry (Ürge-Vorsatz et al. 2004).

1.4.2 Legislative and regulatory measures

1.4.2.1 General Policy instruments to promote energy efficiency

Governmental leadership or at least commitment to energy efficiency is important for ESCO
success. General programs and policy tools for energy efficiency even if not targeted
specifically at ESCOs can still help them, including building codes, demand-side management
programs or energy audit and management requirements, since their implementation usually
increases the demand for energy service providers such as ESCOs. Mandatory energy audits
or energy management can be carried out by ESCOs or, if implemented by others, the
resulting recommendations present a field of activity for ESCOs. Some governments are
subsidizing such energy audits. However, this is not always seen positively by ESCOs since
the quality of such subsidized audits is often low, so that a second audit might be needed later
if the ESCOs are asked to submit an EPC offer (Rezessy 2007, pers. Communication).
Actually, if an audit is done by an energy consultant (which is often the case, as due to the
subsidy many engineering consultants without project implementation capacity enter the
auditing business), then if a ‘real’ ESCO is to implement a project, it has to do another audit
as it cannot really rely on someone else’s judgments. Thus the client will have to pay for
another audit.

1.4.2.2 Energy efficiency obligations

Energy efficiency obligations on utilities as in the United Kingdom, Italy, France or Flanders
are another policy instrument to support ESCOs indirectly. By making public that utilities are
now required to save electricity, governments can possibly stimulate EPC in the residential
sector. For instance, the EU Energy Services Directive, adopted in 2006, sets targets for
Member States for energy end-use savings resulting from policies and programmes of 1% per
year, cumulative, for 9 years (from 2008 until 2017). It will probably increase the need for
ESCOs by requesting member states to remove barriers for ESCOs and third party financing
(Bertoldi and Rezessy 2005). In Brazil, utilities are obliged since 1997 to invest a minimum
of 1% of their annual revenues in energy conservation and efficiency improvements at the
supply and demand side (Javaroni et al. 2006). Furthermore, 25% of the annual investments
needs to be set aside for end-use measures, and 10% for general Research and Development.
ESCOs in Brazil greatly benefit from the 1% fund which has been a very important factor for the relative success of the ESCO industry in this country. However, financing problems might increase in the future since the Brazilian government is considering abolishing the 1% fund.

1.4.2.3 Energy saving targets in public buildings
As the example of the US shows, a requirement or at least incentive to improve the energy efficiency in public buildings can be an important ingredient of success for the ESCO industry (Vine 2005). Clear legal provisions for the public procurement process which should aim at improving energy efficiency and not only lowering upfront costs for product or service purchase are important in this regard. In the USA, federal administrations were obliged to improve their energy efficiency by fixed deadlines. Laws enabled public institutions to enter into multi-year financial commitments and to favour “best value” proposals rather than lowest-cost bids in procurement decisions (Goldman et al. 2005). These programs created a demand for ESCO services in the public sector.

1.4.3 Governmental and other programs
1.4.3.1 Demonstration projects
Demonstration projects in or organized by the public sector may be essential in order to increase awareness about EPC as well as trust in ESCOs among other potential clients (Ürge-Vorsatz et al. 2004). In Germany, for instance, the ESCO industry was greatly stimulated through EPC projects commissioned by the government of the city of Berlin in the 1990s. The “Energy Saving Partnerships” have until today saved 20,000 tons of CO₂ emissions (Seefeldt 2003, Bertoldi et al 2006). Since early success is very important for a positive development of the ESCO industry, demonstration projects should be done in cooperation with experienced ESCOs or energy agencies, if possible from the local market (Vine 2005).

1.4.3.2 Project bundling
Since high transaction costs are a major barrier for EPC projects, bundling projects in a pool, such as several buildings into one project can be a solution to facilitate projects in the municipal and commercial sector for lowering transaction costs. In the Berlin Energy Saving Partnership, about 100 buildings were bundled together in pools so that the necessary tender as well as negotiation process could be combined. This has significantly contributed to the success of the Energy Saving Partnership. Bundling of buildings is especially important since many ESCOs and banks do not accept projects below a certain value (Bertoldi and Rezessy 2005)

1.4.3.3 Information campaigns and training programs
Providing information and raising awareness about the importance of energy efficiency as well as measures to improve it are very important. Disseminating the role and potential of ESCOs in campaigns as soon as the first EPC projects have taken off helps to sustain the nascent ESCO industry. This dissemination of information or simply publicity for ESCOs can be done by an energy agency, the ESCOs or their associations themselves (mostly with support from a third party): a Ukrainian ESCO has for example set up an Internet portal called “ESCO magazine” with more than 12,000 pages of information in Russian about energy efficiency and EPC (Vine 2005). Since energy managers are often responsible for energy use in the private and public sector, training programs can be organized for this target group. Brazil and many other countries have successfully introduced awareness raising programmes on the importance of energy savings (Brazil country report). Information and advice on EPC can also be given through housing associations or industrial associations in the industrial
sector. Even schools and kindergartens should be target groups to increase awareness about the importance of energy efficiency. Finally, financial institutions’ employees can be trained to provide information and increase trust in EPC.

1.4.4 Developing countries and economies in transition: special need for financial instruments

As presented under barriers, access to financing of energy efficiency is a major difficulty in many developing countries. Although in total sufficient funds are usually available on the international financial markets, the link between financial institutions and ESCOs is often missing.

1.4.4.1 National financial support mechanisms

Co-financing is especially important at the beginning of ESCOs’ emergence in a country, since at that stage the ESCO industry is unknown, but subjected to similar or even stricter treatment when seeking financing than other customer (Painuly et al. 2003). Since ESCOs in developing countries are often not set up by utilities or other large companies, but independently, they need guarantees enabling them to receive credits from banks as well as financial support (Painuly et al. 2003). They often have good ideas and technical knowledge, but can only provide their personal property such as a house or car as a guarantee to the banks (Langlois 2006, pers. communication). Therefore, the Brazilian government has created a guarantee facility for energy efficiency projects, called PROESCO, where the Brazilian National Development Bank (BNDES) shares up to 80% of the credit risk and the remaining 20% is assumed by the intermediary bank (Brazil country report). The technical and economic viability of the project must be evaluated by an entity authorized by the BNDES. The Hungary Energy Efficiency Co-Financing Program (HEECP2) aims at enhancing the energy efficiency (EE) financing capacity of domestic Hungarian financial intermediaries (FIs) and thereby at facilitating the development of energy efficiency projects using the financing opportunity (Hungary country report). A similar guarantee fund initiated by the World Bank and Global Environmental Facility also exists in China. Spain has introduced a revolving fund for energy efficiency activities. Other states raise funds for energy efficiency and ESCOs through public benefit charges as do several US-states.

Other financial support mechanisms may include partial risk guarantees, loan loss reserve funds, special purpose funds or interest credits. Innovative financing mechanisms such as forfeiting or leasing are increasingly used, for example, in the United States (Ligot 2006).

1.4.4.2 International financial support

Because of limited budgets, many developing countries may not be able to create guarantee funds and other support mechanisms for ESCOs on their own. Financial support from multilateral banks such as the European Bank for Reconstruction and Development (EBRD) or international donor agencies for ESCOs in developing countries, mainly the World Bank, the Global Environmental Facility (GEF) and the United Nations Development Program (UNDP) has therefore been very important. Grants can be used for project preparation, as a seed capital and cash incentive and also as a guarantee (Ligot 2006). Grants are widely used as a mechanism for supporting ESCOs as well as, more rarely, concessional loans as in China and in the UK (Carbon Trust). They may take the form of unsecured interest-free loans for SMEs. The World Bank has for example given loans for EPC in Croatia and Poland, but with varying success (Johansen 2006). In Bulgaria and Romania, an energy efficiency fund has been created (Johansen 2006), which was successful in Bulgaria. In China, ESCOS supported by a World Bank/GEF Project had made an investment of 117 million Euros by the end of 2005, thereby reducing carbon emissions by 1355 million tonnes per year (China country report).
However, although financial support can be suitable for overcoming market failures, it might have negative consequences such as market distortion and is therefore unsustainable in the long term. For this reason, it should always be limited in time and performance-based (Ligot 2006).

1.4.4.3 Measures to support the local/ national banking sector

Since international or national funds are usually not maintained in the long term, it is of crucial importance to create a local banking system open and willing for EPC financing (Vine 2005). A mature financial industry that understands and supports EPC, or perhaps even considers it as a good business opportunity (such as in Hungary), can enable a sustainable ESCO industry. As presented above, the major problems for banks in developing countries with a nascent ESCO-industry are lack of knowledge about EPC, high initial costs and uncertainty about the credit-worthiness of ESCOs and their clients, limited understanding of the logic of ESCO projects (still predominantly asset-based financing and not common cashflow based financing supportive to ESCO needs). Local and regional financial institutions often lack the internal capacity to properly evaluate EPC offers and are unwilling to invest time and resources (Dreesen 2006). Therefore, information and capacity-building are important for bankers as well as for ESCOs to help the former understand EPC and teach the latter how to deal with banks or financial balances. Energy agencies or other institutions can organize training workshops and provide manuals for these stakeholders as is done in India (India country report). Publishing and recommending bank pioneers who offer lending for EPC on an official website can create incentives for banks to engage in EPC-financing. The 3CEE project report (World Bank et al. 2006) suggests that in order to make EPC more attractive for banks in India, the credit risk should be shared between the ESCO and the client, and the lender should be guaranteed repayment regardless of the success of the EPC project.

Furthermore, Dreesen (2006) proposes to create an International Energy Efficiency Financing Protocol as a blueprint with guidelines for local financial institutions to lend money to ESCOs as well as an incentive fund which can guarantee loan losses and cover extended repayment periods if necessary.

However, the transition between funding from public or international institutions in the form of loans, funds or subsidies to commercial bank financing is not easy since the former can usually give better conditions than the latter and they might therefore compete with each other (Langlois 2002). For this reason, terminating public loans or funds as soon as the commercial banks are able and willing to engage in EPC is very important or the support programmes should only finance less profitable projects which banks do not want to finance. One possibility is to give loans or grants not to ESCOs, but to set up guarantee facilities for (local or national) banks and financial institutions. This is for example part of the IFC CEEF programme (International Financial Corporation – Commercializing Energy Efficiency Finance). The Hungary Commercialising Energy Efficiency Co-Financing Programme (HEECP) not only provided a credit guarantee facility to banks and lending institutions, but also technical support to the ESCO industry and the financial community so that now after several years, the financial institutions are able and willing to lend money to ESCOs on their own (Vine 2005). The support mechanisms are very important movers and catalysts for the EPC industry (Ürge-Vorsatz et al. 2004).

1.4.5 Other measures

1.4.5.1 Standardization of contract procedures and Measurement and Verification

End-users’ and the financial community’s concerns about the reliability of ESCOs can also be answered by standardization of contracts or key contractual provisions. Standardization also improves time and cost effectiveness as well as competition and transparency. Such a step by
the Berlin energy agency and the state of Hessen was very important for the success of the German ESCO industry during the 90s, especially in the public sector (Seefeldt 2003). Standardized contracts can increase the trust of customers, especially the public sector as in Germany and thereby their willingness to engage in EPC as well as simplify and accelerate the negotiation process, but ESCOs themselves often prefer not to be bound to fixed standard contracts and to elaborate their own unique contract approaches instead (German country report). For this reason, standardization of key contractual provisions is often more helpful than complete standardized contracts. For instance, NAESCO, the US ESCO association, is now drafting language formulations for standard elements of each EPC contract such as insurance, equipment ownership and purchase options, instead of drafting an entire model contract (Vine 2005). The European Standardization Bodies CEN and CENELEC are jointly developing common Standards, defining requirements for certified ESCOs and Energy Experts (de Renzio 2006). Furthermore, standardization of measurement and verification, for instance through the International Measurement and Verification Protocol (IMVP), can be helpful in increasing the trust of customers and banks in ESCOs’ activities (Vine 2005).

1.5 Recommendations

1.5.1 Legislative and financial conditions

In order to promote the development of the ESCO industry, demand for EPC is needed, which can come for example from public authorities as in the United States, from the private sector or from electricity scarcity as in Brazil or high energy prices. Demand for EPC either from the public or the private sector requires awareness of the existence and advantages of EPC in potential clients’ groups. In addition, though, a sufficient technical and financial capacity of ESCOs as well as openness of the legal and financing system for EPC are also important. The success of ESCOs especially in the developed countries analyzed for this report is mainly due to direct or indirect governmental support as well as favourable legislation. As presented under barriers, clear and favourable legislation allowing and supporting EPC is one of the most important factors for the success of EPC mainly in the public sector (Waldmann 2006). Clear information on the tender and award procedure as well as budgetary provisions favourable for EPC are crucial in this regard. Furthermore, energy price levels and enforcement of contracts as well as long-term predictability of the legislation are major factors for EPC investment (Ligot 2006). For most developing countries financial support of EPC is crucial, but supportive measures by the government are also necessary (Langlois 2002) to enable the development of the first projects. However, it is very difficult to define general conditions for the success of ESCOs as they depend on the sector, the country context and the energy system. A plethora of direct and enabling factors can help the ESCO industry, some of which are discussed below.

1.5.2 Creation of Energy agencies

Energy agencies can disseminate information about EPC and promote the ESCO industry. The Czech energy agency has for example created an information platform for ESCOs. Energy agencies such as the Berlin Energy Agency which acts itself as an ESCO are often set up by the local or regional government (Geißler et al. 2006) as limited companies and understand the ESCO as well as the customer side. Therefore they can play an important role as mediators between ESCOs and their customers especially in the public, but also in the residential sector. Energy agencies can support officials in the public sector whose time and knowledge are often limited, provide model elements for EPC contracts and advice, perform energy efficiency checks and assist during the negotiations between the ESCO and the customer.
1.5.3 Development of Accreditation systems
Since mistrust is a major barrier, as presented above, information about ESCOs needs to be complemented by measures to confirm and increase their reliability for the potential clients. This is especially important in countries with a large number of self-proclaimed ESCOs as in Italy where, after the introduction of the white certificate scheme, more than 150 companies call themselves ESCOs, although only a minority of them are real ESCOs (de Renzio 2006). One measure to increase trust and reliability is an accreditation system as developed by the US ESCO association, NAESCO, (US country report) or the Chinese ESCO association (China report). Similarly, the European Standardization Organization CEN is currently elaborating criteria and mechanisms for an EU-wide certification system (de Renzio 2006). However, an accreditation system may also have disadvantages since the process of receiving accreditation is usually so expensive that small ESCOs might not be able to afford it (Goldmann 2006, pers. communication).

1.5.4 ESCO association
The main function of ESCO associations is to provide technical, legal and other support to their member companies. ESCO associations are therefore important, but not absolutely necessary for the success of the ESCO industry. For example, Germany, USA, Brazil and China have important ESCO associations. Although Hungary does not, the ESCO industry is successful in this country. India’s ESCO association is in a nascent stage. However, the absence of an ESCO association may have other causes such as the absence of a tradition of collaboration.

1.5.5 International cooperation
International contacts through conferences or networks can help to increase the interest in EPC, raise the competence of new ESCOs and their (potential or actual) clients as well as foster valuable exchange of experience. Contacts and networks are especially important since the EPC concept is often disseminated through these channels (Johansen 2006). In Europe, experience on ESCOs is shared for example through the network Eurocontract (Bertoldi et al 2006) and the European OPET network on ESCOs which develops country profiles, best practice and case studies, benchmarks of EPC projects, tools and guidelines, financing and contract approaches, and monitoring of EPC projects and contracts. In the European Union as well as in some other countries, a database of energy service companies has been established (Bertoldi/Rezessy 2005) which can help to bring together ESCOs and potential clients across country borders.
Furthermore, transfer of technology and knowledge through partnerships is very important: the Berlin Energy Agency as well as the Austrian Energy Agency started a vast support programme for EPC in CEE countries (Seefeldt 2003) called Clearcontract offering exchange of experience, technical assistance and tools, which has now been extended into the Eurocontract project supported by the European Commission. The HEECP was extended to other countries from the region after the initial success in Hungary into CEEF (Vorisek 2006). A European ESCO conference is for example organized every year (www.esco-europe.com).

1.5.6 Special measures to promote EPC in the residential sector
In the residential sector, new efforts such as special incentive programs are currently made to support ESCO activities and to achieve a breakthrough in this sector for instance in the UK (Lees 2006). In a few European countries such as in Hungary some ESCOs are focusing on the residential sector: in Belgium one ESCO offers energy audits with follow-up, sales and direct installation of energy efficient appliances and lighting as well as consultancy on demand (De Groote 2006). This company suggests that as an incentive to get involved in the residential sector, ESCOs could be allowed to keep the emission reductions they save and
possibly trade them within the ETS scheme. This would require a common monitoring and verification protocol.

Bertoldi et al (2006) propose to improve the information about energy use of buildings and to introduce smart metering and billing in more buildings. This could raise the awareness of consumers about energy use and therefore their interest in EPC. Other supportive policy measures include demand-side management, an energy efficiency commitment, a white certificate scheme (trading of energy efficiency certificates as in Italy or France) or a personal carbon allowance⁶. In the UK, the Energy Efficiency Commitment created some interest for EPC in energy suppliers who tried to give incentives to end-users through energy audits, interest free finance agreement of insulation or even free insulation as well as longer contracts (Lees 2006). Furthermore, the EBRD has created a credit line for EPC in the residential sector in certain countries (Ligot 2006).

1.5.7 Special measures to promote EPC in the commercial sector

Since large building owner companies frequently outsource the building management and operation to facility managers, combining EPC and facility management by the ESCOs or the facility managers is a new and promising model (Grim 2005). Similarly, EPC is increasingly combined with leasing which companies prefer due to their balance-sheet. Furthermore, in order to promote EPC in the commercial sector consultants can be trained in EPC and consulting-services can be co-financed by the government as in Austria (Grim 2005). Finally, standardising the project management system of EPC projects can be helpful to guarantee quality and cost-efficiency.

1.5.8 The necessity of country-specific approaches

Although experience can be shared and lessons learned from others, measures rarely fit all countries especially since barriers are often country-specific. International donors and governments should adopt a country-specific approach in each case. When choosing the ESCO business model, for example, some countries or sectors favour the shared savings, others the guaranteed savings model (World Bank et al. 2006). Building owners with little experience in energy efficiency often prefer the guarantee of savings whereas industrial facilities are more interested in the shared savings model. The choice should finally be made by the local market.

Furthermore, it is very important to involve local experts in projects: Several World Bank projects such as the Romanian energy efficiency fund have been less successful than for example the Bulgarian fund because of insufficient knowledge about the local conditions (Langlois 2006). The latter fund is managed by an international consultancy, but in cooperation with 2 local Bulgarian companies and it provides not only lending, but also a guarantee mechanism.

1.6 Conclusion

This report has shown that the concept of ESCOs or EPC has spread to most developed countries, several countries in transition and to the biggest developing countries, however with varying success. ESCOs are active in different sectors from country to country, but in general, the public sector and in some cases the industrial sector is one of the most important clients and driver for the ESCO industry whereas the residential sector is not a frequent target of EPC. In industrialized countries, the public sector is usually the most important in the ESCO activities portfolio as many ESCOs are created from utilities and large multinational

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⁶ A personal carbon allowance means assigning a certain limited amount of carbon to each person which he/she can emit. Rights for emissions above that limit must be purchased on the carbon market.
manufacturing firms which enables them to receive financing more easily. However, it seems that in developing countries the industrial sector often prevails as client for ESCOs which might be due to limited funds of public administrations in these countries. Although in theory, the EPC concept should be very attractive to tap the enormous potential of cost-effective energy efficiency options in all countries, the varying success of ESCOs in different sectors and countries suggests that numerous barriers impede the development of the ESCO industry. Some important factors influencing the success of ESCOs include the size and openness of the banking system to engage in EPC, the energy efficiency market structure, the local institutional environment, the financial, technical and business experience of staff in ESCOs, potential clients and funders and especially the access to financing (World Bank et al. 2006). Lack of clarity in administrative and budgetary procedures concerning EPC is a major problem for EPC in the public sector in many countries (Waldmann 2006), as well as unsupportive public procurement rules. Potential industrial clients are often less interested in EPC due to own expertise, lack of trust in ESCOs etc. Barriers in the residential sector include lack of awareness and information, high transaction costs compared to expected profits, split incentives and others. Lack of incentives due to, for example, low energy prices, inadequate energy service levels and lack of access to financing are major barriers for all sectors. Financing might be available, but banks and financial institutions usually first need to be informed about and convinced of the advantages of EPC. The following table displays the most important barriers for EPC and possible remedies.

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<th>Examples</th>
<th>Possible solutions</th>
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<tbody>
<tr>
<td>Insufficient levels of information and awareness of EPC and its opportunities</td>
<td>All</td>
<td>potential clients and many financial institutions are unfamiliar with the principles of EPC</td>
<td>All countries</td>
<td>Information and demonstration programs, training of financial facilities, model contracts, energy agencies</td>
</tr>
<tr>
<td>Low share of energy expenditures in total income resulting in Low interest of customers</td>
<td>All</td>
<td>Low energy prices or low consumption, Customers such as companies can implement improvements on their own</td>
<td>All countries</td>
<td>Information and Demonstration programs, energy efficiency obligation</td>
</tr>
<tr>
<td>Several projects compete for scarce capital, therefore low interest in EPC</td>
<td>All, mainly ind.</td>
<td>Higher expected turnover if amount invested in other project</td>
<td>Many</td>
<td>Information and Demonstration programs, energy efficiency obligation</td>
</tr>
<tr>
<td>High Perceived technical and business risk by clients</td>
<td>All and banks</td>
<td>Fear to lose jobs, fear about trade secrets, not understanding/ trusting the payback scheme of EE, end-use EE projects often non-asset based, so collateral hard to obtain</td>
<td>All countries, e.g. Germany</td>
<td>Information and demonstration programs, accreditation system, standardization of contract procedures</td>
</tr>
<tr>
<td>Lack of Credibility of ESCOs</td>
<td>All</td>
<td>Poor early experiences, many free-riders</td>
<td>E.g. SE, IT, PL</td>
<td>Accreditation system</td>
</tr>
<tr>
<td>Lack of Confidence and trust in ESCOs</td>
<td>All</td>
<td>Customers are suspicious of the “win-win” solution, don’t believe in success of saving measures</td>
<td>All</td>
<td>Accreditation system, standardization of contract procedures, M&amp;V protocols</td>
</tr>
<tr>
<td>Banks not willing to lend for EPC</td>
<td>All</td>
<td>Conservative lending practices and limited experience with EE project financing,</td>
<td>Mainly countries</td>
<td>Demonstration projects, training, grants, concessional loans, credit</td>
</tr>
<tr>
<td>Barrier</td>
<td>Sector</td>
<td>Reasons</td>
<td>Examples</td>
<td>Possible solutions</td>
</tr>
<tr>
<td>--------</td>
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</tr>
<tr>
<td>ESCOs not interested in small projects</td>
<td>Res., but also other sectors</td>
<td>Transaction costs high (i.e. profit is too low and risky)</td>
<td>Developing countr. Res. most countr.</td>
<td>Guarantee fund, pooling, combination with state support schemes</td>
</tr>
<tr>
<td>Principal/agent problem: investor different from beneficiary of savings</td>
<td>Res. hospitals, schools</td>
<td>Split incentives between landlord and tenant, municipal or institutional budget units, etc.</td>
<td>DE, HU, all</td>
<td>Enabling public procurement legislation, progressive rental and leasing contract arrangements</td>
</tr>
<tr>
<td>Financing problem: ESCOs have insufficient internal funds and do not get access to grants</td>
<td>All</td>
<td>Especially small new ESCOs</td>
<td>Mainly developing countr. (Cn, I)</td>
<td>Guarantee fund if high perceived risk, loan schemes, preferential loan schemes</td>
</tr>
<tr>
<td>Lack of credit ratings among some consumer groups</td>
<td>SMEs public institutions</td>
<td>Poor balance sheet of SMEs, cash transaction prevalent in many SMEs, potential clients like public institutions may not be creditworthy</td>
<td>India</td>
<td>International support</td>
</tr>
<tr>
<td>Unfavorable procurement rules</td>
<td>Public</td>
<td>Rules and/or procedures difficult to understand, procurement rules not reflecting the specific of EE investments (focusing on initial least cost rather than life-cycle), no green procurement</td>
<td>Germany, Hungary, India</td>
<td>Change in procurement law/policy</td>
</tr>
<tr>
<td>No incentive for EPC due to subsidized energy prices</td>
<td>All</td>
<td>Varied energy mix, political reasons</td>
<td>Mainly developing countr.</td>
<td>Privatization of energy sector, gradual phase-out of subsidies</td>
</tr>
<tr>
<td>Short payback times required by customers</td>
<td>Industrial</td>
<td></td>
<td>DE, USA</td>
<td>Mandatory energy audits</td>
</tr>
<tr>
<td>High transaction costs relative to profit</td>
<td>Mainly residential</td>
<td></td>
<td>Many</td>
<td>Bundling of buildings/similar projects Leveraging the benefits of programmatic CDM</td>
</tr>
<tr>
<td>Low level of data collection, no baseline data available</td>
<td>All</td>
<td>High transaction costs and long preparation time</td>
<td>HU, developing countr.</td>
<td>Systematic collection of consumption data (which is useful for many other reasons)</td>
</tr>
<tr>
<td>Inadequate energy service levels</td>
<td>Residential, public</td>
<td>Comfort standards not met prior to intervention (e.g. under-heated or under-lit rooms), which makes difficult the construction of base-</td>
<td>Bulgaria, developing countr.</td>
<td>Combination of EPC with other renovation efforts</td>
</tr>
<tr>
<td>Barrier</td>
<td>Sector</td>
<td>Reasons</td>
<td>Example</td>
<td>Possible solutions</td>
</tr>
<tr>
<td>---------------------------------------------</td>
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<td>--------------------------------------------------------------------------</td>
<td>---------</td>
<td>-----------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Lack of government leadership on EE</td>
<td>All</td>
<td>Other priorities, possibly conflict with other policies</td>
<td>India</td>
<td>initiate exemplary retrofits in public sector, Introduce general EE policies, en standards, mandatory energy audits</td>
</tr>
<tr>
<td>Unfavorable tax regimes</td>
<td>all</td>
<td>E.g. VAT on investments, equipment is higher than on energy prices</td>
<td>DE</td>
<td>Changes in the tax regimes</td>
</tr>
<tr>
<td>Political and economic uncertainty</td>
<td>all</td>
<td>Volatile energy prices, ownership structures, unpredictable business environment, changing regulation</td>
<td>Mainly developing countr., TE s</td>
<td></td>
</tr>
<tr>
<td>Shortage of qualified staff and equipment for ESCOs</td>
<td>all</td>
<td>Insufficient high quality education, highly qualified young people move to other countries</td>
<td>Mainly developing countr., India</td>
<td>Education programs, training, ESCO association</td>
</tr>
</tbody>
</table>

List of abbreviations: countr- countries, DE- Germany, CN- China, HU- Hungary, IN- India, ind- industrial , IT- Italy, PL- Poland, res- residential, SE- Sweden, SME- small and medium enterprise, TE- countries in transition  
Source: Vine 2005, Painuly et al. 2003, all country reports  
Numerous legislative, regulatory and financial measures as well as national and international programs have enabled the development of successful ESCO industries as in the USA, Germany or Brazil. The examples of China, the United States and Germany have shown that direct and indirect governmental support as well as the exemplary role of the public sector to initiate energy-efficiency reconstruction through EPC is crucial to kick-start a sustainable ESCO industry. In some developed countries, favourable legislation and procurement regulations as well as demonstration projects might be sufficient. However, mainly in developing countries favourable legislation is often not sufficient, but access to sustainable financing also needs to be secured. National support programs as in Brazil or international funds as in Hungary and China have increased the trust in EPC among banks and potential clients and therefore enabled the development of a successful ESCO industry. Other recommendations include the creation of energy agencies and ESCO associations, international cooperation, information campaigns, accreditation systems and general energy efficiency policy instruments such as energy efficiency obligations.  
Although EPC is not always a solution, support for ESCOs is worth the effort since it usually has co-benefits: especially in developing countries such as India where significant energy shortages still exist (India country report), improving energy efficiency can help considerably to meet the increasing energy demand. ESCOs could for instance support utilities in demand-side management programs. ESCOs create highly qualified jobs and business opportunities. Due to these benefits, the rising energy prices worldwide and the increasing use of policy instruments to mitigate climate change, such as the Kyoto flexible mechanisms, a positive development for ESCOs worldwide can be predicted. The case studies analyzed in this report confirm that great potentials for more EPC still exist in all countries, especially in developing ones with nascent ESCO sectors, but even in developed states where the ESCO industry is already successful.
References


Eurocontract: www.eurocontract.net


Energy Information Administration (EIA) 2007. Electricity Prices for Households. URL: http://www.eia.doe.gov/emeu/international/elecprih.html


Szoó, Zita (BME OMIKK). Personal communication with Benigna Kiss. 12 June 2006


An Assessment of Energy Service Companies (ESCOs) worldwide

Country studies
India, China, Brazil, Hungary, Germany, United States of America

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March 2007
## India

### Introduction

**General characteristics**

Although the energy efficiency program started in India a long time ago in 1964, a more serious interest in energy efficiency and conservation matters was witnessed in the country after the enactment of the Energy Conservation Act 2001. There is a huge potential for energy efficiency & conservation and the total immediate market potential for energy saving is estimated to be around 53 billion KWh and corresponding peak saving of 8935 MW (Datta Roy, 2004). Energy Service Companies (ESCOs) could play an important role in addressing this market. However, currently only a few ESCOs are operating in the country and they are yet to make a major impact, which is due to a variety of reasons. Realizing the importance of ESCOs and the need for their capacity building, the Bureau of Energy Efficiency (BEE), a statutory body formed under the Energy Conservation Act 2001, has taken up the delivery mechanism for energy efficiency services as one of their main working areas. During the last 5-6 years there has been international support for capacity building of ESCOs in the country, the most notable being the Energy Conservation and Commercialisation (ECO) Project by USAID, the 3 CEE project by the World Bank and UNEP, as well as the recent Renewable Energy and Energy Efficiency Partnership (REEEP) project on street lighting in Madhya Pradesh.

### Context/ History and roots of ESCOs

The energy audit market in the country is fairly matured with twenty-seven firms having more than a decade of experience and some having more than two decades of operational experience in energy auditing (www.bee-india.nic.in). ESCOs, in contrast to energy audits, are a fairly new concept in India, which started to appear in 1994-95. The beginning of the Indian ESCO industry is attributed to the USAID EMCAT programme during the mid-1990s. INTESCO-Bharuka, India’s first private energy service company was formed as a joint venture in 1994 (WEEA, 1995).

### Description of the ESCO industry

#### Number and size of ESCOs

Although twenty ESCOs are reported to be operating in the country (World Bank et al, 2006) according to the industry practitioners, currently only around twelve may be seriously doing ESCO business (Zahar, pers. Communication). Except a few, the ESCOs in the country are small or medium scale private players with consultant strength of five or less. Most of the ESCOs in the country operate from a single state with no branch offices. Furthermore, the ESCO companies are located in only a few states and the majority of them are located in states like Maharashtra, Madhya Pradesh and Karnataka. The annual service earning by ESCOs in the country is estimated to be in the range of 3.3 Million USD to 6.6 Million USD (Datta Roy, 2003).

#### Types and activities of ESCOs

The ESCOs in India can be broadly classified into two types, i.e. equipment related and service-related ESCOs. The equipment linked ESCOs generally manufacture/provide one set of products, like lighting, whereas service providers cater to different sectors. A few of the ESCOs, especially equipment manufacturers, have taken up the ESCO projects as joint ventures with foreign companies.

ESCOs in the country undertake a broad range of projects in different customer categories like in private industries, commercial and government buildings, power utilities and municipal corporations (Sridharan, 2005). The average payback period of most of the energy efficiency projects by ESCOs is 1-3 years, which is quite attractive. The ESCOs have undertaken projects with capital costs ranging from 3000 USD to 2 million USD (World Bank et al, 2006).
## Financing

The ESCO projects in India are generally carried out under the guaranteed savings scheme but in a few cases the shared savings scheme is also used. The Indian Renewable Energy Development Agency Ltd (IREDA), is a prominent organization in India in Energy Efficiency financing. The World Bank has extended a Line of Credit to IREDA for developing and financing energy efficiency and conservation projects that includes project implemented in ESCO model (including performance contracting and revenue sharing). The loan, which could be up to 70% of the project cost, has an interest rate lower than that offered by commercial banks and has a maximum moratorium for repayment of 2 years (www.ireda.in).

The commercial banks in the country are generally apprehensive of financing EE projects. However, recently, five prominent banks in India, State Bank of India (SBI), Canara Bank, Union Bank of India, Bank of India and Bank of Baroda have launched EE schemes for SMEs. The schemes are addressed towards their existing SME clients and for small projects up to USD 22,000 (World Bank *et al*, 2006).

## ESCO-association

The Indian Council for Promotion of Energy Efficiency Business (ICPEEB) is the association for the ESCOs in the country. The Association is new and was formed in 2005, mainly under the 3 CEE project initiative, wherein the World Bank had entrusted one of the private ESCOs to develop a business plan for ICPEEB. ICPEEB, which is still in its fledgling stage, currently has a brief profile of eight ESCOs. However, it is criticised as not very effective and the fact that it was initiated by a private ESCO might have resulted in less interest among other ESCOs (personal communication).

## Impact/evaluation

### Enabling factors

#### General energy market context

In order to sustain the present economic growth, it is desired to have a capacity increase of 100,000 MW by the year 2012 and the peak demand and energy shortages in the country are 10.5% and 7.7% respectively (MoP; 2006). The past trend of capacity addition that always fell short of target makes it difficult to meet the demand by capacity addition alone. Energy efficiency and conservation is considered as one of the cost effective solutions to bridge the gap and a planning commission study estimated the energy efficiency potential in the industrial commercial and residential sectors as 25%, 20% and 20% respectively. In the last five years the government has introduced a few regulations and policies to realise the energy efficiency & conservation potential. Furthermore, in terms of purchasing power parity, the electricity tariffs in industries, commerce & large households are among the highest in the world (Integrated Energy Policy, 2006).

#### Legislation

In the last 4-5 years, there have been a few policy initiatives from the government in the energy sector, such as the enactment of the Energy Conservation Act 2001 that could be beneficial to the ESCOs as well. Among other mandates related to energy conservation, the above act also aims to strengthen the delivery mechanism of energy efficiency services, which targets capacity building of ESCOs. Furthermore, the National electricity policy (2005) suggests that energy conservation will be adopted in all government buildings for which the energy saving potential is estimated to be 30%. The policy suggests enlarging the role of ESCOs in order to have effective implementation of energy conservation measures and steps would be taken to encourage and incentivise the emergence of such companies.

#### Demonstration projects

Recently there has also been support by the government and international funding agencies for capacity building of ESCOs. The most significant in this direction was the initiative by the BEE, wherein energy audits were conducted in nine government buildings in New Delhi which included the President’s House. This was followed by the implementation of the suggestions made in the energy audit through performance contract mode by an ESCO in 2006 at the President’s House. This project could be of importance to EPCs since a

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1 There was shortfall in targeted and actual capacity addition during the 8th and 9th plan
positive feedback can increase the confidence of the various stakeholders involved and thereby could improve the ESCO market in the country.

Financial support

The Indian commercial banks mentioned earlier have introduced energy efficiency schemes in their portfolio targeting SMEs. Some of these banks have some incentive schemes in place as well, like partially covering the cost of energy audit and detailed project preparation.

International programs

There have been some ongoing international aided projects to strengthen the ESCOs in the country. One important project aimed at assisting the ESCOs in the country and increasing energy efficiency investment is the 3 CEE country project supported by the World Bank and UNEP. The draft report of the above project includes suggestions for improving the financial mechanism to facilitate the development of energy efficiency projects and also to strengthen ESCOs in the country. The 3CEE project completed in 2006, aiming to increase energy efficiency investment in the country, was a major initiative towards capacity building of ESCOs. The newly launched ECO III project by USAID has deliverables to build capacities of ESCOs like, developing specific Monitoring & Verification protocol across sectors suitable to Indian conditions, to improve the marketing and concept selling skills of ESCOs etc.

Improving the municipality’s’ energy performance is considered an area where ESCOs can successfully assist. In 2006, REEEP (Renewable Energy and Energy Efficiency Partnership) started a new project in Madhya Pradesh (involving the municipalities of Bhopal, Dewas, Sehore and Jabalpur) for energy and operating cost reduction measures of street lighting & pumping systems and to support the implementation of an innovative financial mechanism. The major project objective of reducing the street lighting bills of the municipalities (by around 39%) is based on shared saving mode, wherein 100 % of project cost is born by ESCO through loans from IREDA or other Financial Institutions (Hakim Zahar – personal communication). The contract awarding to the ESCOs are in the final stages and the payment will be made based on performance testing on 20% of sample fittings. The municipalities will open an escrow account to ensure payment to ESCOs (Hakim Zahar – personal communication). The project involving an International ESCO which provides consultancy to the municipality, is expected to expose various stakeholders to the above mentioned financing mechanism. It may also lead to opening of markets for ESCOs, like Demand Side Management outsourcing by electricity distribution companies (Econoler International, 2006).

Other factors

The Bureau of Energy Efficiency in 2007 initiated a process for enlisting ESCOs and has formulated a list of criteria for evaluating the ESCOs based on competence, financial capabilities etc. The criteria is not yet finalised (February 2007) and BEE has invited public comment on the same.

Barriers for ESCOs

Although a lot of potential exists in energy efficiency & conservation, several barriers prevent the ESCO concept from really taking off in the country.

Financial barriers

The ESCOs in the country are small and have limited financial resources. Only a few ESCO projects can be financed with the ESCOs' own resources and it is difficult to raise money based on their actual balance sheet. The Fls’ and banks’ interest in ESCO projects remains low due to factors such as financial conditions of ESCOs/endusers, lack of technical expertise to evaluate EE projects by banks security concerns etc. Furthermore, there are problems related to financing EE measures that are retrofitted to the existing equipment. If the equipment to which retrofitting is done is already hypothecated to the bank, which provides working capital to the unit, this can cause a security concern. This is because as a usual security norm all the present and future assets generated by the project are kept as security for

2 The UNEP Risoe Centre on Energy, Climate and Sustainable Development (URC)
3 As of January 2007
Regulatory barriers

The bank’s loan. This prevents the ESCO from hypothecating the assets to the bank as a security (Cherail K, 2004). In normal situations for ESCO projects, the banks would prefer to lend to their existing clients based on the balance sheet performance and relationships rather than to an ESCO (World Bank et al, 2006).

Though some of the banks have EE schemes for SMEs, the financing available from such schemes is not attractive to the end users considering the transaction requirement. Creditworthy SMEs prefer not to undergo the hassle to obtain approval for loans from banks for smaller projects (DSCL ESCO, 2005). The reluctance of Indian Small & Medium sized Enterprise (SMEs) to reveal the financial information required for loans is a bottleneck for tapping the SME market (DSCL ESCO, 2005). Apart from this, in order to avoid taxes, cash transactions are prevalent in SMEs in the country. This could be a major barrier against undertaking projects with SMEs requiring verification until taxation is simplified and better governed (DSCL ESCO, 2005).

The government & commercial buildings offer significant energy efficiency investment potential that are estimated to be around 250 million USD with an energy saving potential of 3.52 million MWh (Ramswamy, 2004) and are potential clients for ESCOs. The draft energy conservation building code (2006) prepared by BEE stipulates installation of energy conservation measures in buildings above certain parameters, which may assist in tapping this potential once it is implemented. However, the current procurement procedures and policies of the government which make it essential to purchase the lowest cost equipment, without considering the life cycle cost, are a deterrent to the ESCO business (Cherail K, 2003).

Barriers in industrial sector

In India, large and professionally managed industries are generally not interested in utilizing the services of ESCOs to reduce energy costs, since they already have the required resources and capability to implement recommendations on their own. They prefer suggestions and new ideas from energy audit firms based on a fixed fee. Whereas smaller firms, with little technical know-how, no access to financing and no capability to implement recommendations to reduce energy cost, would greatly benefit from an ESCO even at a higher cost (Raghuraman V, 2006). However, ESCOs may not be sure about the credit worthiness of SMEs. Hence the most desirable clients are not interested in ESCOs, and those firms that may associate with an ESCO will not easily find an ESCO willing to take the risks.

Identification of customers for ESCO projects is sometimes hard. It is extremely difficult for ESCOs to determine without the customers cooperation whether they are dealing with a creditworthy customer or not (Athale S, 2006, pers. communication). It is likely that the ESCO might spend a lot of time and effort only to discover that although the customer is willing to implement the project, no one is willing to finance the customer. This puts a heavy financial burden on small ESCOs.

Lack of incentives: energy price

Another barrier for the uniform attractiveness of specific EE measures across the country is the difference in electricity tariffs in different states. As fixing electricity tariffs are still mainly the prerogative of the States, there exists variation in electricity tariffs for different consumer segments across the country due to reasons like different energy mix in power generation, cross subsidies etc. To illustrate this with an example during 2001-02, the average commercial electricity tariff for the state of Karnataka was 13 US cent/KWh compared to 8.5 US cent/KWh for Punjab (Planning Commission, 2002). Hence the payback for energy efficient products suited to that market varies accordingly and can affect subsequent ESCOs’ interest in that particular market.
Recommendations, lessons and conditions of replication-

| Market potential | The potential Indian ESCO market is broadly categorized into three, i.e. EE projects in SMEs, EE projects in buildings and DSM projects in cooperation with utilities (Econoler International, 2005). Though the exact market potential for ESCOs in India is not known, the energy efficiency consultancy market is estimated to be around 311 million USD and against this potential the current total consultancy market for energy efficiency including energy audit, performance contract, engineering and TA consultancy is in the range of 12 to 22 million USD (Datta Roy, 2004). This shows a huge untapped market potential in this sector. Furthermore, the initial voluntary phase of the Energy Conservation Act is coming to an end in 2007 and since fifteen designated sectors have to conduct mandatory energy audits, the present situation of low penetration of EE measures is expected to change in the near future. The expected increase in the energy efficiency market may have some positive consequences for ESCOs as there could be some customers who are not sure about the outcome of energy efficiency measures or have financial & technical constraints and may therefore approach ESCOs. |
| Recommendations | In order to improve the capacity of ESCOs, more projects need to be undertaken and the municipalities that operate with inefficient lighting and pumping systems provide an excellent opportunity for the ESCO business. There are more than a thousand municipalities in the country and only a few municipalities have their own resources to take up the project. ESCOs can assist municipalities in this endeavour and of late some of the municipalities, like those in Madhya Pradesh through REEEP project & Tamil Nadu (which floated an expression of interest)4 are showing interest in EPCs for EE in street lighting and water pumps. The experience that will be gained from the REEEP project mentioned above will be an important step in this direction. It would be helpful for ESCOs if the Integrated Energy Policy report suggestion that directs BEE to facilitate 15-20 demonstration projects in different sectors, and has to be well documented, is taken up as soon as possible (Planning Commission, 2006). Most of the ESCOs in the country do not possess financial and legal skills required to take up large projects. The development of model documents, which includes performance contracts, M & V protocol, financial structures suited to the Indian context is regarded as a solution to overcome this barrier (World Bank et al, 2006). In addition, most of the ESCOs in the country cater to the local market and are specialized in specific areas, but are not venturing out due to uncertain market and financial constraints. It would be beneficial if some sort of cooperation among the ESCOs could be triggered, such as sharing of expertise or by associating with large organizations for the execution of projects (Hakim Zahar 2007–Personal communication). |

In order to have better penetration of ESCO services, new business models are being suggested and the 3 CEE country projects have put forth two examples, a local industrial association centric approach and a leasing ESCO hybrid. In the first case the local association, which has the confidence of SMEs, would act as an interface between ESCO and SMEs. The second option wherein EE equipment is leased based on a contract is yet to be tried and strong financial conditions of ESCOs are a prerequisite (World Bank et al, 2006).

Another aspect lacking among ESCOs in India is productive mutual interaction. Through the ICPEEB forum some informal interaction occasionally takes place among a few of the ESCOs. However, it would be in the common interest of ESCOs that a formal interaction among the ESCOs may be initiated by some of the leading ESCOs and association, involving agencies like BEE on a regular interval with some specific goals (Hakim |

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4 Last date for submission of EOI was 22nd January 2007
The majority of the State Electricity Boards (SEB) are incurring losses and the cash strapped SEBs are facing difficulty in adding capacity to meet the ever increasing demand. ESCOs could support the SEBs in DSM projects, which could be beneficial for SEBs as well as for ESCOs. Though a few utilities are tying up with ESCOs, such as the Ahemedabad Electricity Company, which implemented measures like efficient lighting and reactive power compensation measures through ESCOs this is not common practice. In order to make a successful ESCO programme, the SEBs should take a lead and build the confidence of its own as well as its consumers, like improving billing efficiencies, proper metering etc (Cherail K, 2003).

It has been stated by some of the experts that ESCOs are not able to achieve the desired success due to insufficient support from the government. This support could be through different ways: financing support like payment security mechanism or tax breaks as suggested in the integrated energy policy report (Planning Commission, 2006) or the proposed use of the energy conservation fund created under EC Act directive to assist ESCOs such as that envisaged in Maharashtra Energy Development Agency strategic plan (MEDA, 2005) will be of much assistance to the development of ESCOs. Furthermore, a change in procurement policy similar to the USA, which is flexible and favours the best value proposal rather than the least cost proposal, may be introduced for all government projects related to energy supply and end use (Cherail K, 2003).

REFERENCES

Sources

Cherail K: 2003, ESCO Scenario In India URL: http://www.econolerint.com/en/PDF/ESCONSenarioinIndiaSep03.pdf


DSCL Energy Service Company Ltd (DSCL ESCO), 2005 Development of energy efficiency projects in SME paper cluster in the states of Punjab/Haryana/Uttaranchal under 3 CEE project

Econoler International , 2005 Developing Financial Intermediation Mechanism for Energy Efficiency Projects in Brazil, China and India ( 3CEE) Workshop on ESCOs & Equity financing, June 12 2005

Econoler International , 2006 Project presentation on Cost reduction measures for the Street Lighting Networks and Pumping


Ministry of Power (MoP) Annual Report 2005-06

Planning Commission, 2002, Annual Report on the working of State Electricity Boards and Electricity Departments
URL: http://planningcommission.nic.in/reports/genrep/repgen.htm


URL:http://www.icpeeb.org/p/UpLoad/idb/admin/f/IndiaESCOIndia%20Overview-%20KSSridharan%20IREDA.ppt


World Energy Efficiency Association (WEEA) 1995 ESCO Case Study: Bhoruka Steel Bangalore, India

Contacts
Koshy Cherial, Core Group Secretariat, 3 CEE Project, India
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Introduction

General characteristics

The past few years has seen a rapid expansion of the ESCO (in China often referred to as EMC, or Energy Management Company) business penetrating into China’s economy and starting to play an important role in achieving China’s goal in energy conservation. One distinctive feature of China’s ESCOs is that, among others, the shared savings and guaranteed savings contracts have proved popular in China. In terms of number of projects implemented in 2005, the shared savings, guaranteed savings and chauffage contracts account for 19%, 76% and 5% of the market, respectively (EMCA 2006).

Context/ History and roots of ESCOs

The concept of ESCO entered China at a time when energy had become a global issue, whereas China’s energy constraint was rapidly growing at a remarkable rate, partly due to low efficiency in generating and using energy. The ESCO concept was brought into practice in 1998 when the first phase of the World Bank/Global Environment Facility Project (WB/GEF project) on Promoting Energy Conservation in China was initiated. The project aimed at introducing the concept of ESCO into China through establishing three pilot ESCOs, whose primary business was to gain revenues through Energy Performance Contracting. The second phase of the WB/GEF project is currently being implemented through enhancing the capacity of China’s ESCOs by providing strong loan guarantees to ESCOs as well as the establishment of the Chinese EMC Association (EMCA).

Description of the ESCO industry

Number and size of ESCOs

During the past couple of years, there has been a tremendous expansion of China’s ESCO industry, both in terms of the number of new ESCOs entering the market and the size of investments in ESCO projects. From 1998 till 2006, the number of ESCOs in China increased at an exponential rate. There were about 150 players in the market until mid-2006 while there were only 3 in 1998, among which at least 106 focus their business on energy performance contracting as of the end of 2005, as shown in Figure 1.

A more recent trend suggests that foreign ESCOs, especially those from the USA and Europe, are starting to open subsidiaries China (Zhao Ming, 2006). One of the key features of the foreign ESCOs is that they often come with energy efficient technologies and are willing to operate the project as a co-owner in order to maximize their interests (Chen 2006).
The majority of ESCO projects (in terms of number of projects) implemented in China in 2005 are found in the building sector, where the most popular projects involve centralized heating/air conditioning, industrial processes and heat/cold storage (Zhao Ming, 2006). Figure 2 provides a visualized description of the ESCO projects implemented in 2005 in terms of number of projects and investment.

Figure 2. China’s ESCO project distribution in terms of investment fields. Source: EMCA 2006.

It can be seen that in terms of average investment, industrial process improvements are the most costly projects, followed by gas based power generation and waste heat utilization projects. A recent trend shows that the Chinese ESCOs are targeting the huge potential lying in China’s large scale energy-intensive industries, like iron and steel and cement, where large quantities of heat are being released without any utilization measures, mainly due to lack of investment (Chen 2006). Many of these industries cannot finance their energy saving projects while investing large amounts of money in expanding their production lines. Such a dilemma is firstly due to the relatively low energy prices that are subsidized and traditionally deep-rooted philosophy of market-orientation. A company’s priority is to make every effort to maximize the market penetration of their products. Energy is among the lowest concerns unless it accounts for a bigger share of operational cost. Therefore, when funds become available they are more likely to be invested into expanding the production rather than purchasing technologies for energy conservation.

The majority of the ESCO projects have been financed by project operators firstly because Chinese ESCOs, except the few pilot ones, are essentially small in size and this does not give them the capacity to take the entire financial risk of their projects. Secondly, there is a serious lack of awareness in the Chinese banking system of financing energy efficiency projects through third party financing, as banks are conservative and require solid collateral as loan guarantees for any loan they grant. Small ESCOs cannot source enough equity as guarantee to get loans from banks. Furthermore, there is high uncertainty as to whether the customers will be able to pay back the loan with predicted performance, which adds to the difficulties that ESCOs face.

The shared savings concept is a good introductory model in developing countries because customers assume no financial risk (Bertoldi and Rezessy 2005). 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 small resources are unlikely to enter the market if such agreements dominate (CTI 2003, Dreessen 2003a). This focuses the attention on projects with short payback times.

ESC association

China’s ESCO association, named EMCA (Energy Management Company Association, www.emca.cn), launched its operation in early 2004 supported by the second phase of the WB/GEF project. By the end of 2005, EMCA had 158 members (Zhao Ming, 2006). A notable feature is that the majority of its members come from economically more developed regions of the country: 59 members come from Beijing; 18 come from Shanghai and 13 from Guangdong (Zhao Ming, 2006). EMCA’s main activities include: assisting the government in disseminating energy conservation policies and regulations; disseminating EPC nationwide; developing capacity building and establishing platforms for information exchange for member EMCos; conducting ESCO policy researches, etc.

Impact/evaluation

Enabling factors

General energy market context

1. Large market potential in energy efficiency. China’s economy is among the most energy-intensive ones in the world. China’s CO2 emissions have risen from 1.4% of the global total since the foundation of the country to 20% at the beginning of the 21st century. Despite the rapidly growing economy, China’s energy intensity remains very high. During the past five years, the growth rate of China’s energy demand has greatly surpassed that of the economic growth rate (Dai 2006). In June 2004, the Chinese government released its Special Plan on Energy Conservation in the Mid- to Long-term, with its focus on reducing China’s GDP energy intensity by 20%, as well as a reduction in the total emissions of pollutants by 20% below the current level. The plan intends to achieve its goals by 2020. Given the size of the energy and economic system of China, a 20% reduction in energy intensity implies a large market potential for ESCOs to realise.

2. International and governmental support-the WB/GEF project. International and governmental support is vital to initiatives that bring in new concepts like EPC into China (World Bank et al, 2006). Governmental involvement in China often gives new business models credibility as well as legitimacy. The first phase of the WB/GEF project helped establish the three pilot ESCOs that received strong financial support to start up their business. Their success has a very strong demonstration effect on the market. The project also helped with the establishment of EMCA, which is playing an important role in China’s ESCO industry.

3. Good practice in managing credit risk. Risk management on clients’ creditworthiness is deemed as the top challenge for Chinese ESCOs. Successful ESCOs so far in the market have set up a good practice in managing the credit risk associated with their clients. Good practice in managing clients’ credibility becomes crucial for the success of ESCOs. It was found out that the prevailing practice of EPC in the market goes in the form of shared-savings in which the majority of cost savings in the first 1-3 years goes to the ESCO involved and all the savings belong to the customer afterwards (Wang Shumao, 2006). In the extreme case, this is a first-out arrangement whereby the ESCO party received 100% of the energy savings until the project costs and ESCO profits are fully paid. The exact duration of the contract will then depend on the level of energy savings achieved: the greater the savings, the shorter the contract. In such arrangement it becomes easier for the ESCO to manage the risks associated with customers’ willingness to comply with the contracts.
4. **Rising awareness of cost saving potentials through energy conservation in industries.** Another enabling factor for China’s ESCOs can be the rising awareness of energy conservation in the industries, including privately- and publicly-owned industries where energy cost accounts for a growing portion in their production. Starting from 2006, the government will take into account indicators on energy savings when evaluating officials’ performance. This measure puts pressure on the government of different levels to prioritize energy savings. It is expected that government-driven actions will lead to a signification impact on energy conservation in China.

5. **Transfer of advanced know-how.** Many of the Chinese industries are willing to conserve energy but their motivation was depreciated by lack of technology and know-how due to the high cost of technology imports and lack of qualified personnel to implement their energy saving plans (Chen, 2006). The entry of foreign ESCOs that provide advanced technology and management has made the ESCO business very attractive to the industries of the above type.

6. **Combination with the Clean Development Mechanism (CDM).** Another trend has been observed that energy efficient technology providers and equipment manufacturers from overseas (mainly North America, Europe and Japan) are starting to implement ESCO projects in the form of EPC combined with the CDM. This aims at strengthening their ability to penetrate China’s huge energy efficiency market by bringing additional revenues which Chinese project operators can expect from the sales of carbon emissions reduction credits (Chen 2006). CDM requires that eligible projects must be additional in terms of technology advancement and that investment should not involve Official Development Aid (ODA). Due to the fact that in many cases transferred technologies and equipment represent a high standard and investment into ESCO projects does not relate to ODA, such type of ESCO projects have very high potential in implementing the CDM. Chinese entrepreneurs are very proactive in having their projects labeled as CDM for business image purposes. The widespread concept of CDM has accelerated the dissemination of ESCOs, but it has been noticed that presently the only successful type of energy efficiency project falls under the category of waste heat utilization and not all of them are implemented through EPC. Potential exists in other energy efficient technologies but due to the availability of CDM methodologies their implementation under CDM is rather slow. However, although the buildings sector has one of the biggest ESCO market potential, CDM has been found inefficient in small emissions reduction projects (Novikova A., D. Urge-Vorsatz and C. Liang 2006). It can be foreseen that without any major changes in the international rules, CDM will not harvest the low-hanging fruits in the buildings sector through ESCOs. As a matter of fact, technology-transfer-based ESCOs have been seeking projects mainly from the large energy consuming industries to combine with the CDM (Chen 2006).

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### Barriers for ESCOs

#### Financial barriers

1. **Financing barrier.** Most Chinese ESCOs are small in size and do not have sufficient funds to support large investments on their own. The lack of awareness in the banking system makes it more difficult for small size ESCOs to secure financing based on EPC and it was found that only 33% of China’s ESCOs used bank financing (World Bank et al, 2006). Moreover, even if a small ESCO gets a loan from a bank to conduct a proposed project, using most of its own equity as guarantee to pay back the loan, it becomes impossible for them to get a second loan for the coming projects before the first loan is paid back. The World Bank et al (2006) also found that many new ESCOs in China could not demonstrate transparent financial and accounting systems required to convince investors and there is a shortage of bank finance available for the energy efficiency sector. To change the situation, the WB/GEF project launched its second phase with its financing barrier removal.
goal focusing on providing loan guarantees to ESCOs. The project lasts from 2004 till 2009, with an expectation to provide loan guarantee to 280 ESCO projects with a total loan of 880 million RMB (88 million EUR) (Zeng Shangyou, 2006).

2. Credit risk. The biggest challenge facing the Chinese ESCOs relates to their risk management capacity, wherein the biggest difficulty lies in the societal creditworthiness. China is still a country in economic transition and a strong credit system has not been established. Many ESCO clients have been observed not to accept the energy savings and to break the contracts in the end and some ESCOs have to give up their interests due to that in China. A legal suit could take up to 3-5 years which costs a lot of resources and time which a small ESCO cannot afford (Chen 2006).

3. Public procurement procedure. The Chinese government has not yet listed EPC-based energy services on the public procurement items that have to be purchased through public tender processes. In addition, it is often not clear whether the winning criterion is the lowest initial investment or least life cycle cost. This has been causing difficulties for ESCOs in negotiations with governmental bodies. However, it is being suggested that EPC-based energy service on the public procurement list be added, which will also make the public procurement process more transparent and clear (EMCA, 2006).

There is a large potential for ESCOs to exploit energy savings in public (government) buildings. According to the Ministry of Construction (Fan Xu Chen, 2006), the public buildings in China have a total area of 600 million m² as of 2005. A retrofitting and modification scheme was launched by the Chinese government to realize 50% energy saving in these public buildings, which is equivalent to 18 million tones of standard coal equivalent per year. However, the current Chinese public finance system does not permit the government sub-bodies, many of which can be the target customers for ESCOs, to allow such a currency outflow (payment for investment or ESCOs) today and to bring cost savings in the future. There is no such item on the public procurement list. Therefore, ESCOs face significant difficulties to penetrate into the public energy efficiency projects through the EPC approach.

4. Institutional barrier in evaluating enterprise leaders. A considerable energy savings potential lies in the large-scale state-owned enterprises. The leaders of these enterprises often serve for an average term of 3-5 years. For a lot of these business leaders, an ESCO business means using the current resources to save money for their successors. However, the assessment method to evaluate these leaders primarily takes into account the current performance of the top management in generating revenues. The large potential to save cost from energy saving has been more likely to be less prioritized. Initiative steps are being taken to include energy efficiency indicators in assessing the performance of the large-scale state-owned enterprises but without significant reforms within such a system, it will continue to be difficult to capture the large potential lying in the state-owned large scale industries.

5. Absence of standardized procedures for energy audit and energy savings measurement and verification. In China, there is a lack of a standardized procedure that is enforceable to conduct an energy audit before implementing an ESCO project. Internationally acknowledged protocols are not widely promoted because these are not legally enforceable national standards which may still raise issues during implementation. The customer often holds disputes with ESCOs with regard to the procedures to conduct an energy audit ex-/post- ante, as well as the savings achieved through implementing the proposed solutions.
Lessons learned

There is a large energy efficiency market potential for ESCOs in China. The market has seen a rapid ESCO growth over the past few years. However, in order to meet the large market demand, the expansion on the ESCO industry needs to continue (EMCA, 2006). As EPC is a relatively new concept for China, ESCOs need to internally enhance their capacity in market development, securing project financing, and risk management as well as project implementation. And externally, it is crucial for the governmental to take the lead in creating relevant energy efficiency and ESCO promotion policies, including, but not limited to, establishing financial and public procurement policies to stimulate further development of the ESCO industry (Zhao Ming, 2006).

It is very important for an ESCO to apply a tailored project strategy to manage risks related to clients’ credit. Example measures include a guarantee contract, which enables the ESCO to claim part of the clients’ equity when the client ends up breaking the contract. The involvement of a third party financing guarantee institution can be another solution because such an organization often has its own resources and connections to force the clients to comply with the ESCO contracts. Finally, as the government has a strong influence on industries, it would be useful to introduce a government mechanism to help enforce the contracts, e.g. establishing a governmental body where all ESCO contracts can get registered and monitored.

There is a need to introduce energy conservation standards and enforce energy auditing in the industries in order to promote the ESCO industrial development (Wang Shumao, 2006). Standardization of the energy audit, monitoring and verification is an important enabling factor for ESCOs. We suggest developing a series of standardized protocols for the monitoring and verification of energy savings achieved by a particular ESCO project or making enforceable the existing measurement and verification protocols that are internationally acknowledged, such as the International Performance Measurement and Verification Protocol (IPMVP). This will be very useful in solving disputes among parties.

Reforms are needed in the public finance department and the evaluation of business leaders of the state-owned large-scale enterprises. One recommendation is to enable the finance department of governments at different levels to allow investment today which brings in a reasonable amount of cost savings in the future through the implementation of energy efficiency projects by ESCOs (EMCA, 2006). Evaluation of the business leaders’ performance from the state-owned industries should take into account their energy and environmental achievements.

REFERENCES

Sources

CTI (Climate Technology Initiative), 2003. Guide to working with energy service companies in Central Europe. CTI Secretariat, Tokyo.
The EMC Association of China (EMCA), 2006. Survey of China’s EMCs in 2005.
Brazil

Introduction

Context/ History and roots of ESCOs

Brazil, with its 182 million inhabitants, has the largest population in Latin America. High inflation and import dependency of the country led to its fuel shifting policies and the promotion of renewable energy sources in the early 1980s. This made Brazil’s energy system one of the least carbon-intensive in the world (IEA, 2002). However, the high dependence on hydropower makes the Brazilian energy system vulnerable to natural conditions. For example, long draughts caused the electricity scarcity for the country in 2001 and 2002. This led, the Brazilian Government to cut electricity and implement rationing policies all over the country.

The above reasons might explain why in Brazil energy performance contracting is not a new concept, compared to other developing countries. After the first ESCOs establishment in the 80’s, the specific ESCO sector emerged only in the mid 1990s (Brazil Country Team, 2006) and their importance was been better understood mainly during the 2001-2002 energy crises. They have been supported via special funds and programs.

General characteristics

In Brazil, the institutional framework is suitable for the development of the ESCO Industry. There is a substantial potential for EE projects, and awareness for the need of such projects. Moreover, the financial programs that have been initiated by the BNDES or the Government have already led to the development of many ESCOs (Brazil Country Team. 2006). However there is still a lot to be done in order to achieve a sustainable ESCO industry. Besides the scarcity of available capital, ESCOs in Brazil still suffer from lack of information and experience by financial institutions about EE projects, and perceive the financial institutions for EE projects as “risky business” (Monteiro, 2006; Amaral, 2006).

Description of the ESCO industry

Number and size of ESCOs

In 2003, there were approximately two dozen firms that could be characterized as energy services provider companies or ESCOs and in 2004 this number rose up to 72 active ESCOs (ABESCO, 2004). In 2006, 40 EE companies were registered at ABESCO. However, it is known that dozens of other ESCOs are not registered with ABESCO (Brazil Country Report, 2006).

In Brazil, all companies implementing energy efficiency projects are designated as ESCOs, regardless of whether they are paid according to their measured performance or not (Javaroni and Aragao Neto, 2006). Although, our research through interviews has shown that the concept of performance contracting is partly applied in a similar way as in Europe or the US (all interviews), it is not clear how many EE companies can be considered as ESCOs according to European or US definitions. This confusion in terminology plagues every ESCO research.

Types and activities of ESCOs

In Brazil, according to Stoner and Poole (2003), ESCOs are mainly small and medium size companies, typically engineering firms or consultancy firms (El-Salmawy, 2006). Lighting projects are the most common type of their projects. However, there are also process control, motor drives and cogeneration projects (Monteiro, 2006).

Financing of ESCOs

ESCOs in Brazil either finance their own projects via own capital or involve a third party for financing EE projects. The most common types of performance contracts are “guaranteed savings” and “first out” types (Monteiro, 2006).
The biggest financial resource of ESCOs is the 1% wire charge tax from utility companies: utility companies in Brazil have to allocate 1% of their revenues for either energy efficiency or R&D projects on energy efficiency. Furthermore, in 2006, a special guarantee fund called PROESCO has been established, by the Brazilian National Development Bank (BNDES), in order to provide financial guarantees for ESCOs when they apply for credits or loans at financial institutions, but its success is still unclear.

<table>
<thead>
<tr>
<th>ESCO-association</th>
<th>The Association of Brazilian Energy Service Companies, ABESCO was established in 1997 with 15 members, to represent Brazilian Energy Service Companies. ABESCO aims to improve energy efficiency industry in Brazil, and elevate the knowledge of Brazilian economy concerning energy efficiency. ABESCO supports the ESCO Industry by organizing events, meetings with regulators and finance agents.</th>
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</table>

**Impact/evaluation**

**Reasons for success/ Accompanying measures**

Although many handicaps exist, which complicate the sustainable ESCO sector development; our interviews have shown that that the ESCO industry can be considered as successful in Brazil. Today, many ESCOs believe that Energy performance contracting is a good or at least developing business in Brazil. According to Maria Cecilia Amaral, both EPCs and third party financing are applied successfully (Amaral, 2006) in Brazil. There are various reasons for the success of the Brazilian ESCO Market. Brazil has shown support towards energy efficiency and energy R&D through various programs and funds.

Since the late 1990s the average price of electricity has increased (Brazil Country Team, 2006). However, like other developing countries, energy subsidies still exist in Brazil. Fuel and electricity prices in remote regions are subsidized as well as the prices of electricity at public services, low income residential consumers and for large industrial consumers.

Early recognition of the importance of energy efficiency has triggered efforts towards the commercial provision of energy services and thus ESCO development, or at least helped their recognition. The high dependence on imported fossil fuels, electricity scarcity and rationing programs have reminded the importance of energy security. As part of the energy security policies, Brazil has implemented policies and programs for energy efficiency along with fuel shifting (switching). Although these policies didn’t target the ESCO Industry particularly, they have helped ESCOs to develop (Brazil Country Team, 2006). There is a substantial market potential for EE projects in Brazil. According to the data from ABESCO from year 2001, the market potential of energy efficiency projects was 19,000 GWh/yr (ABESCO, 2004)

**General energy market context**

As indicated below, Brazil has started governmental programs on energy efficiency long ago, and there are various support mechanisms for ESCOs. Countrywide educational programs have created public consciousness for the importance of saving energy, yet not necessarily for the importance of ESCOs. Governmental Programs such as PROCEL, RELUZ, and CONPET have been established in order to improve the energy efficiency in Brazil. The RELUZ program was established in 2000 to improve the efficiency of public lighting in Brazil. It is by far the largest single energy efficiency program in terms of investments made. PROCEL, the National program to combat the waste of electricity, was established in 1985 as a governmental program to promote energy efficiency of the electricity sector, through projects on energy efficiency in public buildings; labelling programs for domestic and commercial appliances; implementing new standards in buildings; entry of high efficiency motors to the industry; improving EE in the oil and gas sector, and R&D. Savings, which resulted from projects implemented by PROCEL reached up to 2500 GWh in 2001 (Brazil Country Team 2006) Although these programs didn’t directly aim at ESCO development, their implementation required outsourcing to ESCOs.
### Financial support

Unlike many other developing countries, Brazil has experienced active involvement of utilities in end-use efficiency programs starting from the 80’s (Global Energy Efficiency Initiative, 1991). In addition, other programs such as educational programs for the public and the industry and EE projects in public buildings have been implemented.

In order to overcome the loan guarantee/collateral problem, which is considered as the narrowest bottleneck of access to financing (Brazil Country Team, 2006), the government introduced a guarantee facility for ESCOs in 2006 called PROESCO. This was welcomed especially by small ESCOs (Amaral, 2006), because unlike the other guarantee facilities, which mainly targeted SMEs, PROESCO offers guarantees specifically for EE projects. The Brazilian National Development Bank (BNDES) shares up to 80% of the credit risk and the remaining 20% is assumed by the intermediary bank which reduces the time needed for the whole borrowing procedure (Brazil country team 2006).

### Barriers for ESCOs

As in many other developing countries, ESCOs experience difficulties in getting access to finance for energy efficiency projects.

#### Financing barrier

Firstly, financial institutions ask for guarantees in order to protect themselves from project defaults. Satisfying these guarantees is difficult especially for small ESCOs so that they hardly get the required credits from the commercial banks. The rates of the required guarantees from ESCOs make it almost impossible for ESCOs to use these lending opportunities (Monteiro, 2006). Indeed, it is not the provision for guaranteeing the loan as such that is a problem – this is a standard practice for banks – the size and type of the collateral requested (e.g. asset that can cover X % of the loan) (Brazil Country Team, 2006) – the more conservative and underdeveloped the banking system, the larger the collateral required. This securitisation logic also punishes EE projects that generate cash flow over time.

Even if ESCOs can persuade a financial institution to get loans, high interest rates of bank loans is one of the biggest barriers. The credit ratings of ESCOs may not be attractive enough for the financial institutions to give credits to ESCOs for their EE projects. Unfortunately, there has been no systematic evaluation of ESCO’s performance so far which could assist banks to judge their reliability (Brazil Country Team, 2006). This situation is aggravated by the unawareness of the banks about ESCOs and EE projects, which leads to conservative evaluation of the company’s creditworthiness by the bank and overestimating project risks, and hence further to higher interest rates (Brazil Country Team, 2006).

Lack of information and experience by financial institutions are considered to be as important as access to financial resources by the interviewees. As financing of EE projects is relatively new on the market the financial institutions consider such projects as “risky business” (Junior et al., 2003). Performance contracting and the ESCO concept are not well known among the public and the industry either. Although there is awareness for energy savings, many clients do not have energy efficiency projects as their priorities. This is either because they are not familiar with the ESCOs business or because the cost of energy represents only a small percentage among their total expenses.

Another problem is that although state support in the form of outsourcing EE projects to ESCOs in public facilities seemed promising, the contracts were often not performance contracts and ESCOs were being seen as engineering firms (Monteiro; Augusto de Silva; Lima de Silva, 2006). This kind of support is not sufficient for the establishment of a sustainable ESCO industry in Brazil. The public procurement of EE services does not target the development of the Brazilian ESCO industry in particular (Brazil Country Team, 2006).

Finally, the Brazilian Government recently decided to totally cut the financial resources of ESCOs from the wire charge tax, which has so far been the
Brazilian ESCOs’ main financial resource, because of some “macro-economic and budgetary reasons”. Also the funding priorities of the government shifted from EE projects towards R&D projects (Brazil Country Team, 2006). Many ESCOs as well as ABESCO agree that this will have immense negative impacts on the ESCO industry (Amaral, 2006).

Furthermore, Brazilian ESCOs lack experience in drafting project proposals to banks. Most ESCOs need training to take initial proposals through the process (Brazil Country Team, 2006).

**Recommendations, lessons and conditions of replication**

**Recommendations**

Brazilian ESCOs and their association ABESCO recommend delaying the recent government decision on the wire-charge tax until a sustainable ESCO Industry is in place.

PROESCO is a good start to provide guarantees for ESCOs, but governmental loan, investment subsidy and other credit schemes with special payback that are specific for ESCOs would also be beneficial for the ESCO industry’s development. The existing loan programs are not targeted at ESCOs.

Further efforts are needed to increase the ESCOs’ credibility and to inform the financial institutions and the public about them, and the benefits of performance contracting. One possibility would be to create a credit system evaluating each ESCO according to its success in the market which could be done by BNDES and ABESCO for example. This can reduce the barrier of perceived risks involved in ESCO projects.

Finally, the development of commercial banks’ capability to assess projects can be an important part of the solution since getting loans from financial institutions has been among the biggest barriers for ESCOs (Brazil Country Team, 2006). Such a development could be achieved through educational programs and institutional capacity-building for assessing EE projects.

**REFERENCES**

**Sources**


<table>
<thead>
<tr>
<th><strong>Contacts</strong></th>
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<tr>
<td>Amaral, Maria Cecilia: Executive Director of ABESCO</td>
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<td>Augusto de Silva, Amilcare: Amper Energia.</td>
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<td>Lima de Silva, Oscar: ACE Energia</td>
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<td>Pereira, Carlos Augusto Arentz: Petrobras.</td>
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</table>
Introduction
General characteristics

As of 2007, the success and future of the Hungarian ESCO sector are debated among energy efficiency experts and ESCOs. Opinions range from labeling the Hungarian ESCO sector to be an especially profitable and growing market, to calling it a declining and short-lived business area. In earlier studies (see for instance Bertoldi and Rezessy 2005, IIEC 1999, Ürge-Vorsatz et al. 2004, Ligot 2001), the Hungarian energy efficiency market has always been claimed to be a particular ESCO success story in the Central Eastern European region, and the Hungarian case was used as a flagship for the sector. ESCOs emerged in Hungary already in the early 1990s, at the beginning of the transition period. Nevertheless, our survey has revealed that the number of companies and especially the number of projects has been constant or even decreasing (Németh pers.com., Vine 2005) in the last few years. Investments with short payback period and clear profit had been largely exploited, together with decreasing governmental and international support, thus market players today have to plow deeper to find appropriate projects. On the other hand, others consider this period as a transition to a more consolidated ESCO market, which is wider in scope (Weöres pers.com., Beres pers.com.).

Context/ History and roots of ESCOs

Hungary has been gradually transforming from a centrally-planned, closed economy through a slow but steady transition period to a fully liberalized market economy, some economic reforms starting from as early as the late 1960’s (IIEC 1999). With the accession of the country to the European Union in May 2004, the transition period is considered to be accomplished and the social, economic and political processes completed (Ürge-Vorsatz et al. 2004).

The ESCO industry in Hungary dates back already to the times of the political changes, the beginning of the 1990s, partially due to the positive influence of national and international assistance programs, such as the Hungary Commercializing Energy Efficiency Co-Financing Program (HEECP) by IFC/GEF or the German Coal Aid Revolving Fund (IIEC 1999), and the Energy Saving Credit Fund (ESCF) (BME OMIKK. n.d.a.). The early reform of the financial sector and later that of the energy sector were significant factors of the emergence of the ESCO industry (Aron pers.com.). During the early 1990s, trading with energy efficient equipment was regarded as a fruitful business, and it was followed by the emergence of installation companies and private energy auditing firms (Ürge-Vorsatz et al. 2004, BME OMIKK. n.d.b.).

Description of the ESCO industry
Number and size of ESCOs

Based on the registry of the Energy Center, there are about 30 ESCOs in Hungary, but only about 5-6 companies cover 80% of the market. In addition, there are many (100-200) firms whose main profile is not EPC, but still perform some ESCO-type projects (Rodics 2005, Rezessy pers.com.). In 2002, the market value of the ESCO sector was calculated to be between 36-50 million USD by EGI (Bertoldi and Rezessy 2005). As of today, ESCOs estimate a total market size of 200 million EUR. This estimate includes all market segments, but excludes large power plants related investment opportunities (Rezessy pers.com., Makra pers.com.).

Types and activities of ESCOs

ESCOs originate from the following groups: suppliers of energy efficient equipment extending their scope of services to project development and financing; engineers, who also supplemented heir services with financing; or subsidiaries of international ESCO companies (BME OMIKK. n.d.b.). Later, ESCOs were set up as subsidiaries of financial institutions (BME OMIKK. n.d.b.) and as utility-based ESCOs (Bertoldi and Rezessy 2005, BME OMIKK. n.d.b.). The latter group has been expanding most lately, because utilities...
started to offer value-added new services besides direct sale of energy, such as ESCO solutions, in order to keep their clients, or attract new ones after the market opening.

Projects during the 1990s were primarily focused on public lighting, but later on co-generation and district heating systems came in the forefront mainly as a result of legislative and subsidy changes. The picture today is more and more complex. Table 1. shows the distribution of ESCO projects according to applied technology.

Table 1. ESCO projects by technology as of 2005 (categories overlap)

<table>
<thead>
<tr>
<th>Applied technology</th>
<th>Approximate % of total investments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heating and hot water</td>
<td>50%</td>
</tr>
<tr>
<td>Industrial hot water/steam supply</td>
<td>30%</td>
</tr>
<tr>
<td>Co-generation</td>
<td>28%</td>
</tr>
<tr>
<td>Air conditioning</td>
<td>9%</td>
</tr>
<tr>
<td>Renewable energy</td>
<td>9%</td>
</tr>
<tr>
<td>Automatic heating regulation</td>
<td>8%</td>
</tr>
<tr>
<td>Others: indoor/public lighting, building insulation, door/window modernization</td>
<td>limited</td>
</tr>
</tbody>
</table>

Source (Rodics 2005)

Typical projects have been of rather short duration so far with payback times of around 3-5 years (Ürge-Vorsatz and Lazarova 2003). As of today, one of the major problems the ESCOs are facing is that projects with quick payback period have been implemented already, and now they find it hard to adapt to longer projects. Today the average project duration is between 7 and 10 years (Rodics 2005), and the average payback time is 5-7 years. According to Németh (pers.com.), a major holdback is that ESCO projects need 1-2 years for preparation, without any profit and also carrying the risk of non-implementation. This is only possible for ESCOs with sufficient trading capital. In case of residential block houses, projects take at least 10 years (Weöres 2005). On the other hand, normally ESCOs sign operation and maintenance contracts for very long durations (15 years) with the public sector.

## Financing of ESCOs

Financing of ESCO projects in Hungary depends much on the particular project and is subject to agreement between the customer and the contractor, and depends on the financial abilities of the ESCO.

As a result of the early economic reforms, especially the dynamic privatization and modernization of the banking sector, banks have been particularly active and eager to participate even in long-term energy efficiency investments (Ürge-Vorsatz et al. 2004, Weöres pers.com., Giczi pers.com.). In parallel, as indicated above, a number of large-volume international and national grants, preferential loans and guarantee schemes have been available for ESCOs. The most active and successful ESCOs are financially strong, and can provide financing with their own equity. The typical scheme for project financing is 20% ESCO equity and 80% bank loan (Weöres 2005, Rodics 2005). However, this structure is not viable for many smaller ESCOs. These could apply TPF instead, but financing the project preparation is also demanding, and the financial credibility of small ESCOs is not sufficient for taking long-term loans (Kovacsics pers.com., Németh pers.com.). As a result, several small companies change their core business (Németh pers.com.).

A common financial program is the partial guarantee support scheme, which was first introduced by the IFC/GEF through the HEECP (Bertoldi and Rezessy 2005), and has been used, for instance, by Főttáv-Komfort Kft., too, in order to encourage the involvement of the residential sector (Giczi pers.com.).

## ESCO-association

There is no ESCO association in Hungary. The establishment of such a body is considered to be important by many stakeholders (for instance Makra pers.com, Giczi pers.com., Grosser Lagos pers.com., Szoó pers.com.). This
could increase the credibility of ESCOs, and could also act as an “advertising agent” of the opportunities offered by ESCOs, could have the task to prepare standard documents, and would establish a sound quality threshold, eliminating short-term oriented “hit-and-run” opportunist companies.

There are, however, a few associations and organizations that already act as a representative body of the ESCO sector. For instance, most of the ESCOs are members of the Hungarian Combined Heat & Power Association.

<table>
<thead>
<tr>
<th>Impact/evaluation</th>
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<tr>
<td><strong>Energy savings</strong></td>
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<tr>
<td>The market potential for ESCOs and EPC is unknown just like in most countries. There have been no specific studies dedicated to this issue.</td>
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<tr>
<th>Reasons for success/ Accompanying measures</th>
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<tr>
<td>The early start of the ESCO industry in Hungary was powered by a number of enabling factors, including, but not restricted to, beneficial macroeconomic conditions. The successful market transformation process, the early and reliable privatization route, eagerness of professionals (engineers) to launch new services, and the role of international ESCOs were key success factors (for reviews see Bertoldi and Rezessy 2005, Úrge-Vorsatz et al. 2004, Vine 2005). This was all based on a highly energy-intensive economy. Energy efficiency was very low on both the supply and the demand side as a legacy of the former socialist regime (Úrge-Vorsatz et al. 2004). Even though changes have started and the gap has been closing, energy intensity is still significantly (20-30%) higher in Hungary than in the EU15 (IEA 2006), which also suggests that there is remaining untapped potential for energy efficiency improvements. Low energy prices have been long considered to be a major barrier to the profitability of ESCO projects. However, energy price rationalization has been taking place in 2006-2007. The subsidy structure for gas price has been modernized and made available based on social needs. Further reforms are expected and these changes will expand the market for ESCOs (Grosser Lagos pers.com.).</td>
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<table>
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<tr>
<th>General energy market context</th>
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<td>Certain regulations have been particularly encouraging for ESCOs. Regulations on preferential feed-in tariffs for energy produced from renewable sources (based on the Regulation 56/2002 of the Ministry of Economics and Transport) increased the ESCO interest in CHP projects significantly (Kovacsics pers.com., Rezessy pers.com.). The regulation has been modified, and the price has been lowered and availability has become more stringent (new CHP below 6MW capacity is only entitled to the fixed tariffs if the heat is used for district heating or for a building with an individual heating system) (Pataki 2006). Municipal ESCO projects have been carried out under the “Light of Our Eyes” Programme. In the residential sector, obligation for creating a renovation fund for apartment houses (defined by the Act no. CXXXIII. of 2003 on apartment houses) has been crucial to increase energy efficiency investments. ESCOs have entered the residential sector using the “Panel Programme” (a grant program scheme that aims at a complex renovation of block houses). A complex financial solution is offered to domestic clients for building refurbishment by combining the opportunities of the grant, the renovation fund collected by the tenants and the ESCO financing for the rest of the cost of the energy efficiency investment.</td>
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<th>Legislation and Regulations</th>
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<tr>
<td>ESCOs have been popularized through a number of initiatives (Szoó pers.com.), although this has not taken place in a strategic and coordinated manner, since there is no coordinating body or structure for this. The programmes coordinated by the Energy Center (such as the UNDP/GEF Hungary Public Sector Energy Efficiency Project) carry out information dissemination, training and seminars in support of the financial grants and loans they provide (Beres pers.com.). EU projects have also been working in this direction in Hungary (for instance the OPET Network and the Clearcontract projects), producing model contracts and guidelines, collecting case studies, organizing conferences and stakeholder meetings (Szoó pers.com.). At the same time, local ESCOs have been widely promoting energy efficiency and EPC themselves by organizing site visits to demonstration projects, organizing and participating in workshops, and</td>
</tr>
</tbody>
</table>
### Demonstration projects

There are still only a few demonstration projects that are well known (examples are collected by, for instance, the Clearcontract project (Szoó pers.com.)).

### Financial support

International Financing Institutions have been actively involved in the early launch of the Hungarian ESCO sector, as it was already indicated above. There have been several programmes that have financially supported, for instance, feasibility studies, audits, and capacity building sponsored by IFIs, such as the UNDP, World Bank, and IFC. The interest and involvement of the banking sector is still high and they are eager to invest (Rezessy pers.com.).

### Other factors

As of 2007, municipalities are still the most preferred clientele of ESCO projects. Authorities are often willing to hand over the operation and management of energy issues to ESCOs because of sometimes limited in-house energy expertise and because of ever-decreasing budgets (Aron pers.com.). From the viewpoint of ESCOs, municipalities are safe clients that do not go out of business or change production processes during a contract period.

The industry normally takes care of the energy-related investments themselves, but lately they have started turning mainly to utility based ESCOs, and outsourcing their energy supply based often on Chauffage contracts.

Although some experts claim that the ESCO business is declining, there is definitely a group of ESCOs that keep developing, and financing efforts and ESCO activities extend to neighbouring countries, for instance to Slovakia, Romania, Croatia and Bulgaria (Weöres 2005).

### Barriers for ESCOs

Contrary to the above, experts report the continued existence of barriers that might impede the further increase of energy efficiency investments as of 2007 and the success of Hungarian ESCOs.

First of all, most experts report that the boom experienced during the last decade was a result of rapid exploitation of low-hanging fruits, primarily public lighting (according to, for instance, Kovacsics pers.com., Németh pers.com., Weöres pers.com.).

Financing of ESCO projects in general is not a problem in Hungary; however, small ESCOs today experience a larger challenge than earlier, because they cannot afford prefinancing the start up of new projects due to the long preparation period. Furthermore, they are sometimes not granted TPF from banks (Weöres pers.com., Németh pers.com.). These companies either turn to other business areas (for instance other engineering investments) or they demise (Németh pers.com., Kovacsics pers.com.). Some ESCOs have reported an ESCO investment decrease from 90% of all orders in the beginning of 2000s to 5% today, or a decrease in the number of projects from 50-100 per year to 1-10 during the last 5-10 years. Nevertheless, other, mostly large ESCOs keep their activity at a constant level.

Co-generation retrofits and installations have decreased in number and value because of the more stringent fixed feed-in tariffs after July 2006 as discussed above (Pataki 2006, Rezessy pers.com.).

The UNDP/GEF Hungary Public Sector Energy Efficiency Project will end in 2007, which might temporarily slow energy efficiency investments in the municipal sector, where this project has supported ESCO projects financially. This should not be a major problem since it was available in principle to aid the development and establishment of the sector, and the Energy Center expects that it will be continued in some other form (Beres pers.com.). Nevertheless, the effect will be seen only later.

In spite of the efforts to disseminate information about the ESCO concept, a large proportion of potential clients (in all sectors) is still not aware of these opportunities (Szoó pers.com., Grosser Lagos pers.com.). The 4-year
mandates of decision-makers in the municipal sector make it particularly difficult to conclude long-term ESCO or EPC contracts. Today, when projects have longer and longer payback times, the incentive is low for the administration for projects with more than 2-4 years return. Personal commitment at local governments has been essential for large take-up of ESCO projects in certain municipalities (Szoó pers.com.).

Legislative and regulatory factors

ESCOs claim that the legislative background for the ESCO market is often non-supportive or even discouraging. The lack of a clear national energy efficiency concept and specific targets has been seen as a problem by ESCOs (Makra pers.com.). The strict implementation of existing regulations, such as the Act on housing associations about the establishment of a renovation fund in every apartment house is desirable (Giczi pers.com.). Unclear ownership and split incentives have often made an ESCO project impossible because nobody has a clear benefit from the investment. In apartment houses, the housing association contract does not clearly stipulate the ownership of some walls, pipes and other installations. In the municipal and residential sectors, the owner and the user of the building is often different. In that case, neither of them have the incentive to invest in energy efficiency, because the owner would bear the costs, while the user would profit from decreased energy costs. Procurement procedures have been considered to be a major obstacle for energy efficiency investments in the municipal sector. Tender decisions are based primarily on the costs of an offer, and do not properly consider the potential savings Kovacsics pers.com., Szoó pers.com.).

Lack of incentives

Furthermore, experts have highlighted the problems caused by the lack of baseline data. First of all, ESCOs are obliged to spend 1-2 years to measure the performance of a building or site to be refurbished, secondly, they cannot prove the savings achieved appropriately during and after the project, which is the basis of EPC. There are some ESCOs that have developed a software to overcome this problem (Rezessy pers.com.).

Other barriers

Recommendations, lessons and conditions of replication

Recommendations

Interviewees to this report emphasized the need to carry out further dissemination of information and capacity building to strengthen ESCOs and inform potential clients about the benefits of EPC. Although energy saving investments through ESCOs have been said to be more and more known in Hungary (Rodics 2005, Szoó pers.com., Révész 2005), the level of trust that a win-win solution is possible for the client and the contractor is still considered to be one of the major impediments (Szoó pers.com.). Usually quoted ways are implementation of well-advertised demonstration projects, establishment of an ESCO Association and finding ways to explain the short and long term benefits for decision makers.

Certain parts of the legislative background could also be improved. A national, widely accepted and clearly targeted energy efficiency program as part of an energy strategy would aid the work of ESCOs. Such a strategy is expected by 2007 (Hatvani 2006). Compulsory auditing of certain sectors has been suggested, which has helped the ESCO industry in the Czech Republic (Kovacsics pers.com.). The establishment of baseline data through, for instance, monitoring of energy consumption at consumers, would decrease transaction costs of ESCO projects and make more projects possible (Kovacsics pers.com., Németh pers.com.). An established procedure for monitoring and verification of energy use and the savings has also been claimed to be a good way of enhancing the success of ESCOs, for instance by IMVP. As of today, ESCOs overcome this difficulty using individual solutions, for instance installing measuring devices or developing software tools (Rezessy pers.com.). Another beneficial factor would be the existence of sectoral benchmarking for classes of consumers and a public clearing house mechanism, via which companies and municipal institutions could see how advanced or how much behind they are.

Financing of ESCO projects per se is not a problem. Banks are particularly
open to participate in performance contracting. But only a limited number of energy service companies have the appropriate capital to carry out ESCO-financed EPC, and small ESCOs have difficulties ensuring the financing of projects (Kovacsics pers.com.).

**Conclusion**

In summary, action should be taken to overcome the still existing barriers to ESCO projects through finding ways to support the market itself and not separate or certain groups of companies. It is essential that any governmental action to support the sector be complex and well developed, including not only (or not at all) financial aid, but a combination of appropriate legislation, regulation, monitoring and enforcement. In addition, extensive but innovative information campaigns should also be carried out. Authorities should play an exemplary role, and the obligation of municipal and governmental buildings and/or the largest industries to effectuate energy saving measures would also be a significant driving force.

**REFERENCES**

**Sources**


Contacts

Aron, Clifford (GreenMax Capital Advisors). Personal communication. 27 September 2006.
Beres, Antonia (Energy Center). Personal communication. 5 February 2007.
Grosser Lagos, Enrique (Lagross Kft.). Personal communication. 2 March 2007.
Makra, J. (RFV Regionális Fejlesztési, Beruházó, Termelő és Szolgáltató Zrt.) Email correspondence. 15 September 2006.
Németh, Laszlo (ENSI Ltd.). Personal communication. 15 June 2006.
Rezessy, Silvia (REEEP, CEU). Personal communication, based on a visit to Kipcalor. 26 July 2006.
Weöres, Botond (EnergoBanking Ltd.). Phone interview. 12 June 2006.
Introduction

General characteristics

Germany is often characterized together with Austria as the most developed ESCO (energy service company) market in the EU (Seefeldt 2003). It is one of the oldest ESCO-markets in Europe and has experienced constant expansion. Compared to other countries the EPC market in Germany is quite successful. However, there is still scope for significant expansion of the industry. The German ESCO association PECU considers that there has never been a real breakthrough in this industry and that problems especially in the legal framework persist (PECU 2006). This might explain why there has been a slow down of the sector's growth rates over the past years.

Context/ History and roots of ESCOs

At the beginning of the 90s, the first ESCOs emerged in Germany, but the market was still rather insignificant and only the heat supply contracting market was growing (Seefeldt 2003). Doubts about trustworthiness of ESCOs, their reliability and the correct value of contracts hindered the development of this new industry. In 1995, the Energy Saving Partnership in Berlin, i.e. the decision of the municipality of Berlin to bundle about 100 municipal buildings together and contract several ESCOs to improve their energy efficiency was the first major ESCO project in Germany and a sort of trigger for further market development. Furthermore, the liberalization and restructuring of the electricity industry stimulated the ESCO market development. For this reason, many utility companies turned into energy service companies so that numerous German ESCOs have their origins in big companies, such as utilities or engineering companies.

Description of the ESCO industry

Number and size of ESCOs

The current number of ESCOs in Germany depends very much on the definition of an ESCO. If all companies, also manufacturers are included, approximately 480 ESCOs existed in Germany in 2005 (Bertoldi and Rezessy 2005). However, 80% of this is Energy Supply Contracting and only 15% Energy Performance Contracting (5%; other forms of contracting such as operation management contracting) (Geissler et al. 2006). The number of real ESCOs offering EPC and not only energy supply contracting is about 50 (Goldmann 2006, personal communication). Approximately 70,000 performance and delivery/supply contracts had been concluded by the end of 2001 with a total value of over 5 billion Euros and more than 50,000 generation units (Brand and Geissler 2003, Geissler et al. 2006). The annual turnover from energy services in Germany in 2005 was approximately 2 billion Euros (BerliNews 2005). In 2004, energy contracting in the industrial sector had an annual turnover of 192 million euros accounting for one fifth of the whole market (EUWID 2006).

Types and activities of ESCOs

German ESCOs evolved from municipal utilities, regional utilities, construction companies, energy agencies and others. Many ESCOs focus on heating improvements, i.e. 85% of all ESCO contracts mainly deal with heating improvements (VIW 2006). The total installed thermal capacity in Germany amounted to approximately 46 GW and the total installed electric capacity to 8 GW through EPC, energy supply contracting and operation contracting (Brand and Geissler 2003). The average payback time for EPC projects in Germany is between 5 and 10 years. According to Vine (2005) as of late 2002 the sectors targeted by ESCOs in Germany have been as follows:

- Municipal sector: 30%
- Industrial sector: 35%
- Commercial sector: 25%
- Residential sector: 10%.
### Financing
Because of the high investment volume and the favourable banking system, third party financing is widely used in Germany. Most German EPC contracts use the model of shared savings which also includes a savings guarantee: the ESCO and its client agree beforehand on a share of energy cost savings for each (for example 70% for ESCO and the rest for client) as well as a share if saving projections are exceeded (often 50% for both).

### ESCO-association
The major cross-regional ESCOs in Germany have formed an ESCO association (Bundesverband Privatwirtschaftlicher Energie-Contracting-Unternehmen (PECU), with only about 16 member companies (PECU 2006). PECU provides information and is engaged in political lobbying in order to improve the conditions for EPC in Germany. Furthermore, there is another ESCO association comprising 230 ESCOs (specialized on heating supply) in Germany which covered about 23,000 projects in 2005 and 1.014 billion € combined annual turnover, the Verband für Wärmelieferung (association for heat supply). It provides its members with information, technical support, political lobbying, and education through seminars to contractors etc. to its members (VFW 2006).

### Impact/evaluation
#### Reasons for success
| Energy market context | The relative success of the ESCO industry in Germany is due to several factors, but owes primarily to political decisions. The liberalization of the German electricity market at the end of the 1990s is considered as an important event by some ESCOs, but the consequences are contested: it led to a significant decrease of energy prices in Germany in the short run, but since they increased again quickly it had no significantly negative consequences for the ESCO industry. Because of the increased competition the liberalization provided opportunity as well as necessity to utility companies to expand their business field beyond the traditional electricity sales to energy services (Bertoldi and Rezessy 2005). Thus, those value-added energy services are becoming more important than simply selling the product of “electricity” (Bauerschmidt 2003). Furthermore, energy taxes increased and account today for approximately 35% of the total industrial electricity price. This, combined with the rising oil price, is an important incentive for companies to care about their energy efficiency and thus to engage in energy performance contracting. Some ESCOs even consider the energy taxes, which were introduced in Germany in 1999 and gradually increased, as the most important political support measure (Diehl 2006, personal communication). |
| Demonstration projects | Creating a demand for energy performance contracting from the public sector through the Energy Saving Partnership in Berlin was a very positive and visible starting signal for the ESCO industry (Seefeldt 2003). The bundling of about 100 buildings in the capital turned out to be helpful since it reduced transaction costs, as well as the incentives for cherry-picking. In 2003, in the City of Berlin alone, 1500 public buildings had been contracted by ESCOs. Since 1995; these involve 11 EPC contracts and annual total guaranteed savings of about 6 million Euro (Seefeldt 2003) leading to carbon dioxide emission reductions of more than 200 000 tons annually. The Berlin best-practice example was further disseminated mainly to the commercial and municipal sectors, e.g. hospitals, by addressing multiplicators such as the German Municipal Corporations. Thereby, the demand for ESCOs increased significantly. Furthermore, the involved actors such as the Berlin Energy Agency started active collaboration and support programs for Central and Eastern European countries. |
| Support Programs And Institutions | The energy agencies at national, regional and local levels such as the Berlin Energy Agency play an important role as mediators between ESCOs and clients, especially from the public sector. They carry-out energy efficiency checks (Seefeldt 2003), help contract negotiations or provide model contracts. Most of them are organized as limited company as public-private partnership and some such as the Berlin Energy Agency offer also energy |
contracting. The German Energy Agency supports public institutions in implementing EPC through the elaboration of guidelines, advice and project-advertisement, as well as the establishment of an electronic platform where public institutions as tender and ESCOs can come in contact (Groeger 2006, personal communication).

A vital step for the evolution of the ESCO industry driven by the energy agencies was the establishment of standard procedures and documents such as a model contract, an energy performance retrofitting model and a standard procurement procedure as well as contracting guidelines in the federal states of Hessen and Berlin followed by others (Seefeldt 2003). Although many ESCOs prefer not to be bound to such standard contracts, they are very important for customers in order to increase trust in the public sector.

Financial support

The financial and technical support for energy efficiency projects is provided by governmental action (research and development programs, loan/funding schemes, and incentive programs for renewable energies) and non-governmental programs such as credit programs by eco-banks or boiler replacement by utilities (Brand and Geissler 2003). Several laws, such as the CHP (Combined Heat and Power) Act, the Renewable Energy Act and the EU Energy Savings Directive act as incentives for energy contracting.

Other factors

Another specificity related to energy contracting in the German public sector is the so-called Intracting model which was invented in Stuttgart (Energie-Cités 2002). One department in an administration acts in a similar way as an ESCO for another department, i.e. organizes, finances and implements energy efficiency improvements mostly through a fund consisting only of municipal money. This can help to save costs since there is no private ESCO involved, but the success is uncertain. The total possible investment is usually lower than with external EPC and the energy savings are not really guaranteed due to lack of sanction mechanisms within the administration (Goldmann 2006, personal communication).

Barriers for ESCOs

In 2006, in Germany, the general institutional, regulatory and financial framework is relatively favourable (Geissler et al. 2006). However, problems exist in the legal conditions (municipal and budgetary law) as well as within the target companies, i.e. the clients. Several ESCOs criticize remaining legal uncertainties, especially in the fiscal law. Furthermore, supervisory authorities in different German Laender (regions) take different views on how to handle EPC, for example with regard to budgetary handling resulting in diverging practices in approving EPC and therefore uncertainties for the ESCOs themselves (Geissler et al. 2006).

Regulatory and legislative barriers

In the public or municipal sector, unfavourable budgeting principles (Vine 2005) hamper the work of ESCOs. Lots of German municipalities are confronted with the problem that they have to pay for energy efficiency investments from their investment budget where as the resulting savings are credited to the annual operation budget. This separation of budgets does not allow that cost savings can be further invested into new energy efficiency improvements or serve as an incentive for general cost savings. Furthermore, the requirement of a tendering procedure represents a major difficulty as it makes the process long and complicated. Sometimes the administration is not competent to open the required tender procedure, thus many different levels and persons have to be involved (EU WID 2006).

Public procurement laws in Germany allow EPC, but cause difficulties for its implementation. Depending on the contracting-model chosen different procurement procedures apply (VOD or VOL) (EU WID 2006) which make the process very complex and time-consuming. EPC projects in federal buildings for example have to undergo the public tendering process and a comparison with the possibilities for own supply (Rotter et al. 2005).

Even if the political leadership is open towards EPC there are many difficulties in the process. The technical staff is often afraid of loosing jobs and control and of the long-term bond to an external contractor (Groeger 2006, pers. communication). In addition, lack of information, awareness and
of competence in the concerned administration departments is often a problem. For this reason, support and mediation through an energy agency or the establishment of competence centers is considered as very important (Groeger 2006, pers. communication). Similarly, significant barriers for EPC in the industrial sector in Germany include the existence of high transaction (information) costs and the inappropriate level of the clients’ competence and awareness of energy-related financial risks as well as their internal politics (Vine 2005). Although the contracting concept is rather well known in the German industrial sector today, it is still rarely applied. Energy supply contracting is used much more than EPC (EUWID 2006). Many companies consider EPC too expensive and have their own staff to implement energy efficiency improvements. Others are reluctant to use ESCOs when the core production process is affected and they are only willing to accept short payback periods.

In the residential sector, lack of awareness is an even greater problem which accordingly explains the very low EPC activities in this sector (EUWID 2006). Legal uncertainties, whether in apartment buildings the costs of energy performance projects can be partly transferred to the tenant are one of the reasons for the low diffusion of EPC in this sector in Germany. A recent ruling by the German Federal Court of Justice has not brought any clarifications in this regard since it was decided that the costs for energy performance contracts can usually only be imposed on the renter if this was stipulated in the rental contract. However, these legal barriers should be removed since there is a huge potential for energy efficiency improvements in the domestic sector: 51% of all domestic energy is spent on heating systems which are often old and ineffective (ECOn 2006). This leads to CO2 emissions of about 119 million tons, which could be reduced by about 24 million tons annually.

Finally, the incomplete liberalization of the electricity and especially the gas market (PECU 2006) is problematic. One of the interviewed ESCOs Anastassacos 2006, pers. communication) criticized that, despite the EU-wide liberalisation of the energy markets they remain controlled by a few major suppliers who are often not interested in EPC as it will reduce the energy consumption and thereby their long-term profit.

Recommendations, lessons and conditions of replication-

Lessons learned

The success of the German ESCO industry has shown that demonstration projects in the public sector, such as the Berlin Energy Saving Partnership, bundling of buildings to reduce transaction costs and the elaboration of standard contracts can be crucial to raise awareness and increase trust in EPC among potential customers. Financial support, but mainly laws aimed at improving energy efficiency and savings boosted the ESCO industry. Finally, energy agencies played an important role.

Market potential

According to estimates (Stadler 2003), only 9% of the energy efficiency potential in Germany is currently realized. In 2003, only 20% of German energy service providers had engaged in energy performance contracting. There is still potential for 30% of economically feasible energy savings through energy efficiency measures in German buildings (BerliNews 2005). In the public sector alone, energy costs of 350 million Euros could be saved annually through energy performance contracting which would consequently conserve 3 million tons of CO2 emissions in Germany. In the so-called “2004 energy contracting barometer”, only one tenth of all questioned companies indicate that they have already planned or engaged in an EPC project whereas one third claims to be interested in this field (RWE 2004). This shows that while German ESCOs have been active and more successful than in most other European countries, significant market potentials still exist.
Recommendations

In order to realize these potentials, the German ESCO association PECU does not ask for financial assistance since the banking sector is sufficiently open for EPC in Germany, but mainly for the completion of the liberalization of the German energy market (PECU 2006). In order to promote EPC in the domestic sector, PECU desires legal clarification concerning the sharing of costs between owner and tenant. Furthermore, life-cycle costs of new equipment should be taken into account (PECU 2006) in the public bidding process and it should become more transparent, since today, the conditions are often not specified and not realistic. Competence centres can be set up to provide information and advice to public institutions interested in EPC (Groeger, 2006 pers. Communication). Investments in energy efficiency could be facilitated through building cost subsidies, a change in the public sector’s budgeting principles (especially to solve problem of separation between investment budget and annual operation budget) as well as acceptance of smaller projects.

REFERENCES

Sources

PECU (German association of private ESCOs) 2006: URL: http://www.pecu.de/index_aktu.html

Contacts

Anastassacos, Titos. Dalkia.
Diehl, Oliver. Axima GmbH
Goldmann, Ralf. Berlin Energy Agency
Groeger, Jens Dena (German Energy Agency)
Ratzmer, Bernd. Tesign Consulting
Stockmann, Ullrich. Siemens Building Technology
USA

Introduction

General characteristics

The United States is described as the oldest and most mature ESCO market in the world (Goldman et al. 2005). However, activities are mainly concentrated in the public sector and in a limited number of states.

Context/ History and roots of ESCOs

The first energy service companies (ESCOs) in the USA emerged in the 1970s, in response to the growing energy prices due to oil shocks. In the early 1980s energy performance contracting was slowly established as a viable, self-sustaining business activity. It grew steadily during the period of integrated resource planning in the late 80s and early 90s. The first American ESCOs have their origins for example in:
- Engineering services companies (design/construction companies, efficiency consultants);
- Manufacturers of building controls/equipment.

In the 1980s, especially from 1988 to 1994, generated electricity shortages led to the introduction of utility Demand-side management (DSM) rebate and bidding programs: the utilities offered monetary incentives to clients who reduced their energy use and peak load (Howard 2005). In order to help their clients, some utilities created ESCOs as subsidiaries. Furthermore, independent start-up ESCO ventures emerged without help from utilities. During the ‘90s, the electricity market restructuring considerably challenged the US ESCO industry and led to a concentration process, which reduced the total number of companies engaged in energy efficiency industry as many utilities closed or sold their ESCO affiliates (Goldman et al. 2005).

Description of the ESCO industry

Number and size of ESCOs

According to Vine (2005) there have been between 500 and 1000 ESCOs in the US as of late 2002. However, according to a narrower definition, Goldman et al. (2005) use the much smaller number of 63 real ESCOs which offer performance contracting. The concentration process in the ESCO-industry is continuing because of increased competition and frequent acquisitions and mergers. In California for example, the number of ESCOs has considerably decreased (California Energy Commission 2005). For several years, 13 ESCOs have accounted for about 75% of total industry activity (Goldman et al. 2005).

Types and activities of ESCOs

In 2004, NAESCO, the US ESCO association did a representative survey of 1426 energy performance contracting projects whose overall reported investment cost was US$ 2.55 billion (Goldman et al. 2005). Most of the surveyed ESCOs were active in the fields of lighting efficiency and comfort conditioning (heating, ventilation and air conditioning). Although ESCO customers are often interested in comprehensive services the three top services provided by ESCOs include project management, energy audits and engineering design (California Energy Commission 2005). As can be seen in table 1, 24% of all ESCOs are independent (not subsidiaries of building equipment/control manufacturers, utilities or other energy companies). However, they account for only 10% of the total industry income. On the other hand, ESCOs which are utility subsidiaries make up only 19% of companies, yet 39% of the industry income (Goldman et al. 2005).
Table 1: Snapshot of the US ESCO industry in 2000

<table>
<thead>
<tr>
<th>Company type</th>
<th>Number of companies</th>
<th>Percent of industry revenue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Building equipment/controls manufacturers</td>
<td>8</td>
<td>27</td>
</tr>
<tr>
<td>Utility subsidiaries</td>
<td>19</td>
<td>39</td>
</tr>
<tr>
<td>Other energy companies</td>
<td>3</td>
<td>24</td>
</tr>
<tr>
<td>Independent ESCOs</td>
<td>24</td>
<td>10</td>
</tr>
</tbody>
</table>

Source: Goldman et al. 2005

The public sector is the major target sector of the US ESCO industry: half to three quarters of all projects concern schools, hospitals and government buildings (Goldman et al. 2005). Schools are the most important customers (California Energy Commission 2005). Investments in the industrial sector account for only 7% or 16% in California and those in the commercial sector for approximately 16% of ESCO's total projects (Goldman et al. 2005).

Financing of ESCOs

The industry's revenues have grown from 450 million US$ per year in 1995 to approximately 2 billion US$ in 2000 (Goldman et al. 2005) with a yearly growth rate of almost 24%. However, US ESCOs are concentrated in certain geographical areas: ESCOs in 4 states (New York, New Jersey, California and Texas) account for 44% of all investment costs.

The medium project time in the US is 10 years and the simple payback time is 7 years. The size of projects varied widely with project costs ranging from US$ 200,000 to greater than US$20 million. In the NAESCO sample, 87% of private and 70% of institutional projects were cost-effective (Benefit/Cost ratio above one).

ESCO-association

The most important ESCO association in the United States, named National Association of Energy Service Companies (NAESCO), comprises about 100 members at the moment (NAESCO 2006). For more than 20 years, it has been the major representative organisation of the US ESCO industry, providing technical and informational support to its members as well as an accreditation programme (NAESCO 2006). The accreditation committee looks at criteria including the following: the precise nature of the applicant's business; the range of measures and services offered to customers; the availability of a performance-based project approach; ethical business practice commitment; project engineering and design, financing, project management, operations, and maintenance capabilities; and the capability of verifying and monitoring energy cost savings.

Impact/evaluation

Energy savings through ESCOs

Since the early 1990s ESCOs investment in energy efficiency retrofits at public and institutional facilities has amounted to $15-19 billion, thereof at least $3 billion in federal facilities from 1990 to 2003 (NAESCO 2005). Most of these ESCO projects were at no cost or a negative cost to the government. Since 1998, $1.9 billion in private-sector funds has been invested in energy efficiency projects at federal facilities which saved approximately 16 trillion Btu annually (FEMP 2007).

Reasons for success/Accompanying measures

A combination of enabling federal legislation and governmental programmes including public benefit charges, electricity restructuring, utility DSM-programmes, customer education and information as well as DSM bidding facilitated the development of the ESCO-market in the USA.

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5 An energy investment's simple payback period is the amount of time it will take to recover the initial investment in energy savings, dividing initial installed cost by the annual energy cost savings. It is not taking into account the time value of money, inflation, project lifetime or operation and maintenance costs.

6 No information is given and could be obtained about non-cost effective projects.

7 DSM bidding is an auction in which a utility generally solicits proposals from ESCOs interested in achieving specified amounts of demand or peak load savings (Goldman et al. 2005). The proposals are evaluated and selected competitively in terms of the price bid and other criteria such as the bidder’s experience and qualifications, and the technical, marketing, and financial approach. The utility then pays the price (for instance, $500/kW) for DSM savings estimated or achieved within a specified period of time.
| Legislation and regulation | The public sector has played a very important role and is still by far the major ESCO target area in the US. Due to supportive legislation, public institutions can enter into multi-year financial commitments and make their procurement decisions more flexible favouring “best value” proposals rather than lowest-cost bids (Goldman et al. 2005). The federal Energy Policy Act of 1992 (EPACT) prescribed that federal agencies take certain steps to manage their energy use and pursue cost-effective energy-efficiency investments, allowing them to use utility DSM programs and rebates and regulated the use of Energy Savings Performance Contracts (ESPC). For instance, Executive Orders (EO) oblige Federal Agencies to reduce energy consumption of buildings cost-effectively by 30% until 2005 and 35% by 2010 as compared to their consumption in 1985. The latest Executive order from January 2007 requires federal agencies to reduce energy consumption by 3% each year and 30% by 2015 (FEMP 2007). They are assisted by the Federal Energy Management Program (FEMP). Furthermore, the federal government engaged in a vast outreach and information campaign for the public sector about energy efficiency and energy performance contracting possibilities. However, the preponderance of the public sector in the ESCO activity is not only due to governmental action, but also to several other factors: many public buildings are old and long project terms of sometimes up to 25 years are acceptable which allow ESCOs to perform extensive energy efficiency improvements. In addition, public institutions often want to focus on their primary function such as teaching in schools and therefore outsource energy efficiency measures to ESCOs (Howard 2005). |
| Governmental and demonstration programs | During the ESCO-industry infancy period, public financial and other support was crucial. Low cost programs for clients, such as schools with low tax-free interest rates to pay for energy efficiency improvement were used in many US-states as an important trigger for the guaranteed savings financing model (Howard 2005). Furthermore, several states had rate payer-funded energy efficiency programs, later transformed into public benefit charges which were used for energy efficiency improvements through information, education or technical and financial assistance to ESCOs. Thus, ESCOs used rebates offered by utilities, and participated in standard performance contract programs in which utilities provide incentives for verified electricity and peak demand savings. |
| Financial support | One specificity in the US-ESCO market is the so-called Super-ESCOs, which at the same time acts both as energy providers and as energy service companies. Super Energy Service Performance Contracts (ESPCs) are indefinite-delivery, indefinite-quantity (IDIQ) contracts established by the Department of Energy (DOE) and aimed at increasing the practicality and cost-effectiveness of ESPCs and thereby their use by federal agencies (FEMP 2007). These general contracts were competitively awarded to ESCOs who demonstrated that they were able to provide energy projects to federal customers. As the general terms and conditions are defined in the IDIQ contracts, and agencies implement projects by awarding delivery orders to the Super ESPC ESCOs, this concept can be implemented much faster than a normal ESPC project. The Federal Energy Management Program’s Regional Super ESPCs are confined to specific U.S. regions whereas Technology-Specific Super ESPCs grant access financing for several advanced energy technologies to any facility (FEMP 2007). |
| Other factors: Super ESCOs |  

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8 More information on Super-ESCOs is provided in Vine 1999.
Although the legal framework has been improved, legal barriers as well as financial barriers for EPC still exist. The deregulation of the energy sector actually represented a challenge for ESCOs since the unclear national policy created confusion and many utilities terminated their sponsored DSM programs of which ESCOs had benefited (Howard 2005). Some created ESCOs on their own, but the general level of DSM declined due to increased competition. In fact, restructuring and market liberalisation led to an increase in competition as ESCOs compete now with companies to sell for example energy efficient technologies and services (Goldmann 2003). This led to an acceleration of the ESCO concentration process and finally even to a decrease in the total energy service investment since lower energy prices give fewer incentives to improve energy efficiency.

Educational barriers hinder ESCO development in the public sector and SMEs (small and medium enterprises), and especially in the residential sector since many building owners are not aware of and even mistrust the energy efficiency potentials and related opportunities which performance contracting offers (ESC 2000). This is one of the many reasons for the slow development of ESCO activity in the residential sector. Other barriers in this sector are the high transaction costs (Edwards et al. 1999) compared to low project costs which are often below the threshold of 350,000 US$ required by many US ESCOs (Vine 1999). ESCOs had been more active in the residential sector when utility DSM programmes provided information and/or financial and technical support to households. However, since these programmes have been reduced or phased out, ESCO engagement in this sector has diminished and the remaining ESCOs focus on the mid- to high-rise social housing market as well as on high rise rental buildings.

In the public sector, legal barriers have been reduced in many states, but fine-tuning continues. Currently, the most important barriers include the long duration of negotiations, which can go up to two years due to bureaucracy (approvals at several levels are required, conditions are complicated) and the lack of well-designed supporting legislation in some states (LBNL 2005). Other barriers cited include “an aversion to off-balance sheet financing, especially in the wake of the Enron scandal, the lack of a centralized effort across states, a history of bad projects “poisoning the market” in some states, the need to educate customers, and a feeling that “the low-hanging fruit is already picked” (LBNL 2005:12).

Several factors explain the very slow development of the ESCO activity in the industrial sector. Firstly, manufacturing companies are reluctant to realize energy efficiency improvements if they affect the core production process since such projects require specialized knowledge which the companies do not want to share. Secondly, some companies let the ESCOs do the energy audit of their sites, but then implement the identified possible improvements themselves without any compensation for the ESCOs beyond the compensation for the audit. Thirdly, US companies often demand very short project and payback periods of sometimes only three years restricting thereby significantly the ESCOs’ scope of measures (Howard 2005). Further barriers for ESCO projects in this sector according to Elliott (2002) are the elevated cost of developing projects, the limited site-to-site replicability of projects due to the much customized nature of process improvements and the resulting need for industry specific know-how, restricted access to decision-makers within companies and difficulty in evaluating the success of projects. Furthermore, many industries are not very much interested in energy efficiency improvements due to the comparatively low electricity price in a number of states.
Recommendations, lessons and conditions of replication

Lessons learned and recommendations

The US ESCO market is often regarded as a model for energy performance contracting for other countries. Although some factors are country specific, numerous lessons are usually deducted from the development of the US ESCO market. According to Goldman et al. (2005) the US experience (as well as the experience of many other countries) has shown that the government should not exclusively or even not at all provide financial support to ESCOs, but design ESCO-friendly legal systems with modified government procurement practices (“best value” instead of lowest bid approach), as well as provide incentives or even requirements for public buildings to be improved under EPC. Third party financing by local financial institutions is crucial. Appropriate energy prices are not sufficient, but utility DSM programs, public facilities energy efficiency programs and customer information can be very helpful (Goldman 2003). Furthermore, EPC cannot be a remedy against energy efficiency barriers in all market segments, since some may be more suitable for other actors such as retailers. Compilation and analysis of ESCO projects including the development of standardization of contract elements can be helpful. Goldmann (2003) identifies as further reasons for the success of the US - ESCO industry the well established US contract law, reasonable interest rates and good relationships with customers.

Conclusion

As shown in this study ESCOs in the United States work mainly with the public sector. Therefore, the recent “stagnation” of the US ESCO industry stated by some experts (e.g. Goldman et al. 2005) might be due to the period of absence of new EPC projects by the federal administration recently as well as to a certain saturation of the ESCO market. In California, ESCOs desire to be supported through provision of financial incentives for projects, education of customers about ESCOs and provision of a list of ESCOs for potential customers (California Energy Commission 2005). ESCOs also stressed the importance of regulatory stability. However, the prospects for the US ESCO industry are rather positive due to growing energy prices and the renewed interest of the administration and even the President in EPC (FEMP 2006). Goldman et al. (2005) predict that ESCOs will increasingly sell more energy “solutions” to the customer with energy efficiency as part of a larger package. Performance contracting as main source of income might be replaced by other value-added services including development, design and construction of complex facility projects as well as risk management products (Goldman et al. 2005). However, the US will certainly not loose its position as clear leader of the ESCO market in the near future.

REFERENCES

Sources


