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ESCO Market Report for Non-European Countries 2013

Strahil Panev
Nicola Labanca
Paolo Bertoldi
Tiago Serrenho
Caiman Cahill
Benigna Boza Kiss

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Joint Research Centre
Institute for Energy and Transport

Contact information

Strahil Panev

Address: Joint Research Centre,
Via E. Fermi 2749, TP450
21027 Ispra (VA), Italy
E-mail: strahil.panev@ec.europa.eu
Tel.: +39 0332 78 6255

<https://ec.europa.eu/jrc>

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Abstract

The current report depicts the status of the ESCO markets in Non-European countries of 2013. The aim of the report is to provide a snapshot of the key developments of the national ESCO markets in Asia, Africa, Middle East, Oceania as well as in North and South America. The ESCO report focuses on collecting information about the market features and structures, barriers, policy background, financing opportunities and future expectations.

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Introduction

Energy efficiency is emerging as a key element of energy and climate policies in several countries around the globe. Concerns with the effects of climate change and security of supplies have triggered in most countries policies and programmes to foster energy efficiency, including creating a market for energy efficiency services and attracting private capitals. In addition, rising energy prices and increased interest in energy management in public and private organisations have created a new demand for energy efficiency services. These developments have an impact on the ESCO industry globally. In recent years several countries have recognised the unique role of ESCOs in delivering energy efficiency in a cost-effective manner involving commercial companies. These countries have started policies and programmes to introduce the ESCO industry, including creating a demand. This is not an easy task and to have a fully working and self-sustainable market it may take several years and it requires often a very good regulatory framework. Other countries, such as the USA, have a long experience with a fully functioning ESCO market. However, even the USA as well as other well established ESCO markets are still far ways from reaching their full potential.

The European Commission DG Joint Research Centre has regularly published information about the Energy Service Company markets in Europe¹ since 2005. The last report, which is the 4th in the series, depicting the status of the ESCO markets as of 2013 was published in July 2013 (<http://iet.jrc.ec.europa.eu/energyefficiency/publication/european-esco-market-report-2013>). Using its expertise in analysing ESCO markets and the extensive network of ESCO experts the JRC has investigated the ESCO markets in countries outside Europe.

This document is the first status report related to development of the Energy Service Market in Non-European Countries. The aim of the report is to provide a snapshot of the key developments of the national ESCO markets in Asia, Africa, Middle East, Oceania as well as in North and South America. The ESCO report focuses on presenting information about the market features and structures, barriers, policy background, financing opportunities and future expectations. The information presented in this report is mainly for year 2013, although for less-studied ESCO markets, the report describes the ESCO developments in the last decade.

The ESCO markets covered in the present report are very different in terms of maturity, supporting policies and regulations, client awareness and financial opportunities. This makes any comparison among countries impossible. The report tries to offer a picture of each ESCO market, in particular for new and emerging markets. It presents for each country analysed: the current ESCO market development, the type of ESCO projects implemented, the energy efficiency policy and regulatory framework, especially in relation to ESCOs, the market factors, the actions and activities to inform potential clients and to raise awareness, including actions by the ESCO associations where they exist.

The report also analyses the financial opportunities present in the country to implement ESCO projects and the barriers that impede the establishment, growth and expansion of the ESCO market.

¹ European ESCO Market Report covers: EU 28, Norway, Switzerland, EU Candidates and Potential Candidate Countries (Albania, Bosnia and Herzegovina, the former Yugoslav Republic of Macedonia, Kosovo, Montenegro, Serbia, Turkey) and Armenia, Belarus, Georgia, Moldova, Russia, Ukraine.

For each country analysed some conclusions are drawn including presenting some future expectations for the ESCO market.

The minimum set of quantitative data we aim to provide in the report for each country chapter are: the current ESCO market size and potential; the general trend of the ESCO market; the presence of an ESCO association; the typical types of ESCO projects implemented; the main types of contract adopted by the ESCOs.

For several countries (mainly in Africa, but some also in South America), it has not been possible to write a chapter either due to lack of contacts and information on ESCO market, or to a documented absence of ESCOs, ESCO type projects and policies to introduce or support the ESCO market creation.

The definitions used in this report are mostly taken from the European ESCO report cited above. The specific market and recent developments are presented for 32 Countries. Drivers as well as obstacles to a wider proliferation are taken under a microscope in the country chapters and in the conclusions. These chapters are meant to be of practical use for readers that are interested in learning about a particular country and can be read as stand-alone documents.

The JRC reports have been useful for ESCO companies, interested potential ESCO clients, as well as policy makers at national levels and energy efficiency experts. While the reports are meant for a professional audience, nonetheless the general public may find them interesting to understand the concept and the local ESCO and energy efficiency situation. It is hoped that the present publication will serve well again in providing an up-to-date, overall but locally relevant portrait of the present and the expected future of this crucial sector.

The report closes with some summary and tables that give a general overview about the ESCO market development in Asia, Middle East, Africa, North and South America, Oceania as well as a comparative summary of the surveyed national markets.

Methodology

The current report, the ESCO Market Report for Non-European Countries 2013 builds on an online survey combined and complemented with personal and phone interviews of outstanding experts. Information was also collected from national reports, scientific articles, legal documents, and grey literature.

The principal methodology of the research was based on stakeholders' information and large-scale ESCOs survey as performed with the support of international and national ESCO experts and experts from related fields, academia, and financial institutions. By using a kind of snow-ball technique, interviewees were asked for further contacts who were then involved in the survey. A questionnaire was prepared and made available through the internet based on the experience gained with the surveys performed for the *European ESCO Update Report 2007* and *2010*. Potential informants were then invited to fill in the questionnaire by e-mail. After analysing the survey outcomes, drafts documents summarising the information collected according to the same template were sent out to survey participants and additional experts who very often provided valuable comments. The list of experts who sacrificed time and unparalleled knowledge for the compilation of the country reviews is available at the end of each chapter, and the authors express their greatest gratitude to them.

The on field research performed in the 32 Non-European countries (including the online survey, interviews and comments processing) was carried out mainly between November 2013 and June 2014. Around 80 informants' contributions were received. This indicates that, on average, about 2-3 experts have contributed to the analysis of each of the national markets covered. Overall, the survey can be considered as very successful with a large amount of new information gathered. Nevertheless, the authors encountered difficulties in collecting information in some countries, and results may therefore not be as detailed as initially expected. Moreover, information gathered by the survey was not always easy to be processed, especially when different experts resulted to have provided contradicting answers to same questions. To partially overcome these problems, existing literature, reports, governmental archives, and project documents were consulted to verify and enrich the information gathered. In spite of the extensive efforts of the authors to produce a proper overview of the existing market situation, any future comments, constructive critique or feedback allowing to improve the quality of the analyses presented herein will be highly appreciated.

Africa

The ESCO business in African countries with an exception of Tunisia and South Africa is still in the process of development and establishment. Absences of appropriate ESCO legislation, difficult access to financing, lack of trust in the ESCO industry, subsidized energy prices and insufficient awareness and knowledge for ESCO are the barriers which constrain the growth of the African ESCO market.

Egypt (together with Tunisia) was the first North African country, where with support of the international organizations the first ESCOs have been established in early 2000s. However, these ESCOs have not been able to do much business because of difficulties in accessing financial resources. There is not clear organizational, institutional and regulatory framework to support EE activities and programs. To date, the inability of the Egyptian ESCO industry to implement EPC agreements under current market conditions remains a formidable challenge.

The development of ESCOs in Tunisia started in 2005 and since then the market has grown continuously. The key factors for the expansion of the ESCO business in Tunisia are: the legislative framework (Law on Energy Management), the institutional set up (the Agency of Energy Efficiency and Renewable Energy (ANME)) and Energy Efficiency Program in the Industrial Sector (PEEI). Pursuant to the Law on Energy Management of August 2004, ESCOs shall be involved in preparation, implementation, monitoring and eventually in financing of projects for energy savings. ESCOs guarantee the energy savings from implemented projects. This law also set the basis for introduction of mandatory energy audits in industrial, transportation and residential sectors.

Besides the absence of appropriate legislation for ESCOs, the financing of ESCOs was highlighted by experts as one of the main barriers that constrain development of the energy services industry in Africa. The commercial banks perceive financing of ESCOs on the basis of EPC as an investment with high risk, and therefore they are reluctant to provide financing for energy services projects. Therefore some of the African countries are trying with support of IFIs to create governmental EE funds, guarantee EE funds or to introduce other financial schemes.

The Partial Guarantee Fund in Tunisia was created in the framework of Energy Efficiency Program in the Industrial Sector (PEEI) to promote the use of energy service companies (ESCOs) by offering loan guarantees to companies that contract with ESCOs (up to a maximum of US\$ 400,000). Implementation of a partial credit guarantee fund helped facilitate project financing. Four ESCOs were fully operational during the project, and with the support of credit guarantees, 30 EPCs were signed between ESCOs (4) and industrial companies.

In Morocco the SIE (Société d'investissement énergétique) and the European Bank for Reconstruction and Development (EBRD) are in the course of negotiating on a partnership to create an investment fund dedicated to energy efficiency operating in Morocco to address national needs. The initial financial endowment would be 120 Million Euros.

The energy crisis that affected South Africa in 2007 and 2008 was a significant factor for development of Demand Side Management (DSM) Program in South Africa. Eskom (the biggest energy utility company of South Africa) established the Integrated Demand Management (IDM) program for funding EE projects in South Africa. Two of these programs are for financing of energy services and ESCOs.

ESCO market in Morocco 2013

Although the first ESCO was established as early as in 1992 as a joint venture company to assist industries in the implementation of energy efficiency projects, there are still many barriers that constrain the further development of energy performance contracting in Morocco.

Current size, trends and features of the market

Currently, there are 3-4 companies that can provide limited energy services both to the public (in the form of lighting projects) and the private sector. Used contracts are based on fixed fees. The Moroccan ESCOs are typically utility companies and offer investment, maintenance and management of public lighting.

The Agency for Renewable Energy and Energy Efficiency Development (ADEREE) is the responsible authority for the implementation of national policies and programs for EE and RE, as well as for the promotion of RE and EE. ADEREE shall also promote national and international financial instruments to support the realization of national programs.²

ADEREE in cooperation with the Ministry for Energy, Mineral Resources, Water and Environment (MEMEE) developed the so called Program Energy Efficiency in Industry (PEEI). The PEEI's main goal is to promote measures for energy efficiency in the industrial sector, one of the sectors with the biggest energy consumption.³ In the framework of this programme energy audits have been carried out in the industry, with three major conclusions⁴:

- there is considerable potential for the improvement of energy efficiency in the industry, exceeding 15% of baseline energy consumption;
- only a minor ratio (less than 5%) of the recommended measures in energy audits are realized;
- the ROI (return of investment) of those measures that are being implemented is less than 24 months for more than 50% of the projects.

Morocco has launched several programs to increase EE in public buildings and in industry. SIE (Societe d'investissement Energetique) commits to projects emerging in the priority sectors, by funding capacity building activities and service which promote energy efficiency. The two targeted priority sectors are public lighting and state buildings and this initiative should foster the ESCOs in Morocco. They may also involve industrial platforms and business parks which are known to be demanding energy consumers.⁵

In February 2014 the SIE published a Call for Expression of Interest in order to⁶:

- Identify Energy services companies (ESCOs) interested to move into the Moroccan market and to be promoted by the SIE and its institutional partners;
- Create a database of potential ESCOs that are willing to cooperate with SIE in the implementation of its activities relating to EE;

² Source: Agence Nationale pour le Développement des Energies Renouvelables et de l'Efficacité Energétique ADEREE <http://www.aderee.ma/index.php/aderee/nos-missions>

³ Source: Agence Nationale pour le Développement des Energies Renouvelables et de l'Efficacité Energétique ADEREE <http://www.aderee.ma/index.php/expertise/programmes-integres/programme-pee>

⁴Source: Agence Nationale pour le Développement des Energies Renouvelables et de l'Efficacité Energétique ADEREE <http://www.aderee.ma/index.php/expertise/programmes-integres/programme-pee>

⁵ Source: SIE http://www.siem.ma/images/doc/AMI_ESCO_Ang.pdf

⁶ Source: SIE http://www.siem.ma/images/doc/AMI_ESCO_Ang.pdf

Types of projects

Although the energy audits done in the industry showed significant potential for energy savings, project implementation rate is still very low and the potential in terms of energy savings is untapped.

The current energy services provided by the ESCOs are: Investments, maintenance and follow up for EE projects (public lighting) fee based on energy savings achieved and service for utility management on long term contract with local community based on investments in public lighting and fixed-fee payments. (Langlois et al. 2012)

Regulatory factors

The Law on Energy Efficiency (Law No.47-09) was adopted in 2009 and it includes provisions for energy performance, rational use of energy and energy audits. The Law provides definition for ESCOs. Pursuant to this Law, ESCOs are responsible for the preparation, realization, management and eventually of financing of energy projects. They should guarantee the economic use of energy. The Law also prescribes the obligation of public administration to improve energy efficiency and commit to the rational use of energy.⁷

Pursuant to the Law on Energy Efficiency energy audits are mandatory for important energy consumers, operating in production, transport and distribution of energy. Energy auditors have to be accredited.

The high level of cooperation and coordination between the League of Arab States, the Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) and the EU funded regional projects MED-EMIP and MED-ENEC was one of the driving factors behind the success story of the NEEAPs in the Arab region. Morocco as a member of the Arab Ministerial Council for Electricity has prepared its first NEEAP.

Market factors

Morocco is one of the few Arabic countries which are net importers of energy and have high energy dependence. Morocco imported 17.6 % of total electricity from the neighbouring countries in 2012.⁸ The growth of population and industrial development lead to an increase of energy demand. According the Energy strategy, the demand for primary energy will increase by 45% in 2020.⁹

Primary energy demand has sustained annual growth rate at an average of 5% per year between 2000 and 2010. The petroleum products remain dominant over the decade with a part of 60% on average in the primary energy consumption.¹⁰ The government started to balance the share of natural gas and renewable energy sources in electricity production in order to cover the growth in electricity consumption. The share of natural gas in electricity production increased in the period 2000 to 2010. It has been mainly imported from Algeria (local minor production that is used by some consumers such as ceramics, paper factory.).

In the framework of the new Energy Strategy adopted in 2011, public authorities set up a primary energy consumption reduction target of 12% by 2020 and 15% by 2030.¹¹ The Government laid out

⁷ Source: Ministry of Energy, Mineral Resources, Water and Environmental
http://benseghirpartners.com/avocat/pdf/loi_47_09_relative_efficacite_energetique.pdf

⁸ Source: "Bilan des Activités Industrielles et Commerciales.2012"

⁹ Source: Societe d'investissement energetique <http://www.siem.ma/images/pdf/rapports/brochuresieanglais.pdf>

¹⁰ Source: Ministry of Energy, Mines, water and Environment

¹¹ Source: Societe d'investissement energetique <http://www.siem.ma/images/pdf/rapports/brochuresieanglais.pdf>

a number of steps for the residential, industrial and the transport sectors to achieve energy demand reduction within a short timeframe.¹²

Information, awareness and demonstration

Information campaigns about EE have been organized in the framework of different initiatives carried out by organizations of the Arab countries (e.g. Arab Ministerial Council for Electricity, RCREEE) as well as by international organizations active in Arab countries, including EBRD, MED-ENEC, World Bank, etc.

The “Arab Energy Efficiency Day” is a pan-Arab initiative that aims to raise awareness of energy efficiency practices and technologies. The Arab Ministerial Council for Electricity at the League of Arab States (LAS) sets strategic goals to enhance cooperation amongst Arabic countries in the fields of transmitting, generating and distributing electricity to save energy. RCREEE teamed with LAS and MED-ENEC to organize the “Arab Energy Efficiency Day” for the first time in Cairo, Egypt on 21 May, 2013.¹³

SIE will participate in several pilot projects to establish and evaluate financial models that can support EE in Morocco. For example SIE in cooperation with the Municipality of Sale is implementing a pilot project for the improvement of street lighting. The public lighting management and the operational coordination of the project will be outsourced to private companies. The achieved results of this project should be replicated in other cities in order to reduce the overall energy consumption of the Moroccan municipalities.¹⁴

Financing

SIE and the European Bank for Reconstruction and Development (EBRD) are in the course of negotiating on a partnership to create an investment fund dedicated to energy efficiency operating in Morocco to address national needs. The initial financial endowment would be 120 Million Euros.¹⁵

Barriers

Although there is a definition for ESCOs in the Law No.47-09, it does not include other legal provisions for EPC, third party financial schemes and other issues related to ESCOs. Financing of ESCO projects is also one of the main barriers that constrain development of energy services in Morocco. Commercial banks perceive financing of ESCO on basis of EPC as a high risk investment, and therefore they do not provide financing for energy services. Therefore other forms of financing are needed as for example a creation of EE Fund.

Other barriers to the development of ESCOs are:

- Absence of regulatory framework for energy services for public sector and complicated and inadequate procedures for public procurement;
- Low awareness about ESCOs and about the benefits of implementation of EE projects based on the ESCO concept;
- Low trust in ESCOs.

Conclusions and future expectations

¹² Source: EBRD “Commercial Law in Morocco”. 2013 <http://www.ebrd.com/downloads/sector/legal/morocco.pdf>

¹³ Source: Regional Centre for EE and RE <http://www.rcreee.org/content/arab-energy-efficiency-day-2014>

¹⁴ Source: <http://www.siem.ma/index.php/en/2012-12-29-07-06-22/energy-efficiency>

¹⁵ Source: Societe D'Investissements Energetique –SIE <http://www.siem.ma/index.php/en/financial-tools>

Implementation of measures to achieve the targets related to the reduction of energy demand and to the increase of EE should result in a growth of investments in EE. However, the Government shall develop legislation, particularly for the implementation of contracts based on energy performance and energy savings for the public sector in order to ensure a faster development of energy services and ESCOs. A very important factor for financing of ESCO shall be the creation of EE and RE fund, since local commercial banks are reluctant to cooperate with ESCOs. The experience of SIE regarding the development of local society with communes (Société de développement local) such as Salé for public lighting can lead the way to other projects.

Possible break-through points

- Development of ESCO legislation;
- State financial and fiscal incentives;
- Implementation of state energy strategies and policies (NEEAP);
- Creation of a revolving RE&EE Fund;
- Simplifying the public procurement procedure;
- Awareness raising activities for promotion of ESCO results achieved in industry;

Benefits of projects based on EPC shall be disseminated through public campaigns and organization of expert workshops and seminars.

Number of ESCOs	3-4
ESCO market size and potential	n/a
ESCO market trend	Not changed
ESCO association	none
Typical ESCO projects	Street lighting; Energy audits in industry;
Main type of contract	fee based on energy savings achieved; fixed-fee payments

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Langlois, P., Hansen, S. J., 2012. World ESCO Outlook. The Fairmont Press. ISBN 0-88173-675-9

ESCO market in South Africa 2013

ESCOs are considered as very important designated implementation vehicles for EE projects in South Africa. The industry has witnessed an enormous growth since the creation of the Demand Side Management (DSM) fund by South Africa's biggest energy utility company - Eskom, in 2002 (Industrial Development Corporation 2012)

Current size, trends and features of the market

ESCOs in South Africa have been active in four major sectors: residential, municipalities, commercial and industrial. The industry became more formal in 2004, when the DSM fund was established by Eskom for financing of EE projects.

As a response to the energy challenges of South Africa, Eskom has established an Integrated Demand Management (IDM) division. IDM is responsible to ensure short-term security of electricity supply through coordinating and consolidating the various initiatives aimed to optimise the energy use and electricity supply and demand. A key aspect of this demand side management programme is the promotion and implementation of more energy-efficient technologies, processes and behaviours amongst all consumers.¹⁶

An ESCO must be registered in the Eskom IDM (Integrated Demand Management) register in order to work as an energy services supplier.¹⁷

The Eskom DSM evaluation process considers¹⁸:

- The experience of the company;
- The approach taken towards project management;
- The technical, financial and legal approach of the potential supplier to projects;
- The procurement approach;
- ESCO registration form;

As of today, over 500 ESCOs have been registered in the Eskom's DSM register. However, only 50 of them are active on the ESCO market. (Verheijen et al. 2012)

The majority of the ESCOs are small private companies that operate as (EC JRC 2012):

- Building and control manufactures;
- Facility management and operating companies;
- Consulting and engineering companies;
- Equipment manufactures or suppliers and equipment installers.

The central focus of the IDM Division is a series of large-scale DSM programmes, including¹⁹:

¹⁶ Source: Eskom <http://www.eskom.co.za/sites/idm/AboutUs/Pages/About%20Us.aspx>

¹⁷ Source: Eskom <http://www.eskom.co.za/sites/idm/Pages/Esco.aspx>

¹⁸ Source: Eskom <http://www.eskom.co.za/sites/idm/Pages/Esco.aspx>

¹⁹ Source: Eskom <http://www.eskom.co.za/sites/idm/AboutUs/Pages/About%20Us.aspx>

- Energy Efficiency Demand Side Management (EEDSM) - promoting energy efficient use of electricity through the support of behavioural change of customers and switching to energy efficient technologies, systems and processes;
- Energy Management Programme (EMP) – supporting the corporate customers to improve energy efficiency;
- Financial incentives for consumers in order to switch to solar water heating technologies;
- Energy Conservation Scheme (ECS) - aiming to achieve a 10% energy reduction among customers using more than 25GWh per year;
- Demand Response (DR) - the system operator pays customers to reduce load on instruction as a measure to balance demand and supply on the national power;

Although many ESCOs are linked with the IDM programmes, there are also ESCOs that work outside.

The services offered by local ESCOs have covered different types of energy solutions, installation and maintenance of equipment, facilities management, energy demand monitoring, project management, etc. (Volshenk 2007)

The potential size of the ESCO market (the value of possible EE projects in buildings and industrial sectors) in South Africa is estimated at USD 1billion.(EC JRC 2012)

ESCOs are organized in the South African Association of ESCOs (SAAE), which is a non-profit organization and has currently 75 members including ESCOs, equipment suppliers, engineers and consultants.²⁰

The aim of SAAE is to promote and to protect interests of the South African ESCO industry for the benefit of all stakeholders. SAAE has organized forums to discuss topics that are important for the ESCOs. SAAE issued a Code of Conduct in order to regulate professional activities of the members. Registration with Eskom DSM is a basic requirement to become a member of SAAE.²¹

Types of projects

ESCOs typically offer the following services (EC JRC. 2012):

- Improvement of heating and hot water systems;
- Improvement of indoor and outdoor lighting systems (for industrial facilities and municipalities);
- Improvement of HVAC systems in the industrial sector;
- Supply and installation of variable speed drivers;
- Installation of Energy Efficiency pumps and motors;
- EE interventions in mines and industry, typically water pumping, cooling, ventilation, compressed air.

ESCOs also provide staff trainings and facility management for the industry.

The majority of the funding from Eskom in the scope of the Integrated Demand Management (IDM) programmes has been distributed to a small number of ESCOs. According to the data provided by Eskom (dated 6 February 2012), 1045 applications were received from 148 ESCOs requesting DSM funding. Out of 1045 projects, 613 have been completed or have been verified and further 312 are in the implementation phase. The total value of the projects financed from the IDM has been ZAR 5.6 billion (around \$ 521million) (Industrial Development Corporation.2012).

²⁰ Source: South African Association of ESCOs – SAAEs <http://www.esco.org.za/>

²¹ Source: Eskom <http://www.eskom.co.za/sites/idm/Pages/Esco.aspx>

According to a survey about ESCOs, carried out by Industrial Development Corporation (IDC) in 2012, 54% of ESCOs indicate that the average value of their projects are below ZAR 1 million (\$ 93.000). 50% also indicated that their annual gross revenue derived from their ESCO business was below ZAR 1 million. Since most of the International Finance Institutions do not finance projects below ZAR 1 million, almost 50% of the ESCOs in South Africa are excluded from possible financing. (Industrial Development Corporation 2012)

The most common types of contracts used by ESCOs are (EC JRC 2012):

- EPC with guaranteed savings (whereas the ESCO guarantees the energy savings and the client takes the financial risk) EPC with shared savings (whereas the ESCO and the client share the savings, and the ESCO takes financial risk)
- Very few BOOT contracts have been concluded.

The payback period for almost three quarters of the projects implemented in the framework of the DSM/IDM programmes have been below three years. This means that the extended lending terms offered by financial institutions would not generally be required, except in the case of PV installation and other complex interventions. (Industrial Development Corporation 2012)

Regulatory factors

The National Energy Efficiency Strategy of South Africa (NEES) was approved by the Government in March 2005 (revised in 2008). It is based on the White Paper on Energy Policy, published in 1998. The strategy links the development of the energy sector with socio-economic development plans and sets a target for improved energy efficiency at 12% by 2015. This target is in relation to the forecasted national energy demand at that time. The strategy covers all sectors and is to be implemented through Sectorial Implementation Plans.²²

Having recognised that EE is an economically attractive option, the Government of South Africa adopted the Policy for EE and Demand Side Management (EEDSM) in 2010. This policy focuses on the management of electricity demand taking into account EE interventions within residential, commercial and industrial sector. EEDSM policies aim at (Department of Energy of South Africa 2010):

- Quick power system relief;
- Relative cost effectiveness;
- Quick development of interventions across the residential, commercial and industrial sectors to create SME opportunities and quality employment;
- Mitigation of greenhouse gas emission and the resulting climate change impacts;
- Reduction of energy bills.

The Electricity Regulation Act of 2006 introduced a new regulatory framework for the electricity industry, with additional DSM obligation to existing licences. Section 15(1) of the Electricity Regulation Act requires every licenced company to comply with EE standards and demand side management requirements. (Department of Energy of South Africa 2010)

The Energy Act (Act No.34) enacted in November 2008, includes provision for EE (Department of Energy of South Africa 2010). The Energy Act foresees the development of an Integrated Recourse

²² Source: <http://www.iea.org/policiesandmeasures/pams/southafrica/name,34652,en.php>

Plan (IRP) and the creation of the South African National Energy Development Institute (SANEDI). (Industrial Development Corporation 2012)

An EE resources standard (EERS) is a quantitative, long term energy savings target that is met by implementing EE programs to help customers to save energy. The Integration Recourse Plan (IRP) shall stipulate the EERS over the planning period, and the regulator shall include the commensurate financial incentive in the tariff, to fund the EERS. (Industrial Development Corporation 2012)

The Income Tax Act – “Regulations on tax allowances for EE Savings (S12L) ” allows for additional depreciation allowances up to 55% for greenfield projects over ZAR 200 million (\$18.6 million), where one of the criteria is the level of energy savings to be achieved. (Industrial Development Corporation 2012)

The mission of the Energy Efficiency Directorate within the Department of Energy (DoE) is to develop measures, promote energy saving, reduce a negative impact of energy use on the environment, reduce energy costs for the economy, to contribute towards sustainable development, and achieve the national energy policy targets. It is responsible for the development of EE policies, strategies and guidelines.²³

Eskom has a number of responsible divisions relevant for the EE and ESCO markets. The Energy Audit division is independent from the Performance assurance division within the Assurance and Forensic department. It manages the Monitoring and Verification program. University M&V teams are contracted to do the actual M&V work and to report thereon for an Energy Audit.²⁴

Market factors

The past growth of the ESCO market of South Africa is based on a number of important drivers of the energy market, such as (Industrial Development Corporation 2012):

- The electricity supply crisis from 2007;
- Increasing of cost of energy;
- The increasing pressure to mitigate climate change impacts, including of Carbon Tax;
- Government strategies, polices, legislation and tax incentives;

The prospects for ESCOs in South Africa can be only understood in the context of future energy scenarios. The energy crises that affected South Africa in 2007 and 2008 (blackouts) were a significant factor in the development of Demand Side Management and other EE initiatives. (Industrial Development Corporation 2012).

The price of electricity is expected to increase with a rate above inflation in the foreseeable future, and is expected to motivate individuals, businesses, government and industry to implement EE projects (Industrial Development Corporation 2012)

Information, awareness and demonstration

The Energy Efficiency Directorate is responsible to:²⁵

- Promote and develop energy efficiency practices, norms and standards in industries, commercial buildings, households, transport and agriculture;
- Facilitate the development of information awareness, and capacity building campaigns on energy efficiency and environmental issues;

²³ Source: Department of Energy’s Energy Efficiency Directorate http://www.energy.gov.za/files/eee_frame.html

²⁴ Source: Eskom http://www.eskom.co.za/IDM/MeasurementVerification/Pages/Measurement_Verification.aspx

²⁵ Source: Energy Efficiency Directorate http://www.energy.gov.za/files/eee_frame.html

- Promote energy for sustainable development;
- Promote energy efficiency technologies, clean energy technologies including environmentally sound energy technologies;
- Promote and facilitate international collaboration and cooperation;

The Directorate in cooperation with international organisations, such as UNDP, has organized thematic workshops and carried out trainings in cooperation with the Danish International Development Assistance (DANIDA) for energy auditors for buildings.²⁶

Financing

Eskom has been the largest funder of the EE initiatives through its IDM funding initiatives and programs. The funding models provided by Eskom are²⁷:

- Standard offer rebate programme;
- Standard Product rebate programme;
- ESCO rebate programme;
- Performance Contracting;

The ESCO rebate programme is based on a tri-partite relationship between Eskom, an Eskom accredited ESCO company and a customer. This model is applicable for energy users with an energy load of over 200 kW. The ESCO assesses the energy saving potential to determine the best measures at the project site. After completing an energy audit and receiving the commission from the customer, the ESCO submits a funding proposal to Eskom. The Eskom IDM programme has supported ESCO projects by funding up to 100% of the financial benchmark value for viable EE projects. Upon approval of the funding proposal, the ESCO is given permission to implement the project. In order to ensure that the ESCO projects deliver the promised savings, there are penalties, i.e. the ESCO must guarantee the projected consumption savings. (Verheijen et al. 2012)

The Performance Contracting programme aims to purchase bulk verified energy savings across multiple sites and technologies by contracting with a single Project Developer. This will significantly reduce the current administrative requirements regarding project approvals, reduce contractual complexity, improve sustainability and reduce project lead times.²⁸

The target market for Performance Contracting will be large energy consumers or ESCOs, typically in operations with high load factors. The Project Developers will be knowledgeable on the management of large energy efficiency programmes and be able to benefit from a high level of independence in their methods to attain savings.²⁹

Eskom will be responsible for the appointment and management of independent M&V bodies ; however, the Project Developer will be accountable for the procurement and installation of metering, in line with an agreed M&V plan.³⁰

Since December 2013 these programmes have been put on hold, due to significant financial constrains experienced by Eskom.³¹

²⁶ Source: Energy Efficiency Directorate http://www.energy.gov.za/files/eee_frame.html

²⁷ Source: Eskom <http://www.eskom.co.za/sites/idm/Business/Pages/Business.aspx>

²⁸ Source: Eskom <http://www.eskom.co.za/sites/idm/Pages/Performance%20Contracting.aspx>

²⁹ Source: Eskom <http://www.eskom.co.za/sites/idm/Pages/Performance%20Contracting.aspx>

³⁰ Source: Eskom <http://www.eskom.co.za/sites/idm/Pages/Performance%20Contracting.aspx>

³¹ Source: Eskom <http://www.eskom.co.za/sites/idm/Business/Pages/Business.aspx>

The financial institutions are primarily focused on financing renewable energy projects within the energy market. The ESCO-mediated energy efficiency market has not attracted the same amount of capital from the banks and in some cases has not even been on the radar due to the lack of awareness or a lack of viable projects. (Industrial Development Corporation 2012)

Barriers

Barriers for development of ESCO market in South Africa are as follows (EC JRC 2012):

- Procurement rules are complex and project's approval (financed by Eskom) takes long time;
- Lack of appropriate forms for finance and lack of EPC/ESCO understanding within the financial sector;
- Low trust from clients;
- Lack of awareness about energy services and ESCOs in different sectors (financial, public, etc.);
- Low energy prices – state subsidies for energy prices;
- Perceived business and technical risk;
- Small size projects and high transaction costs.

Although there is a number of energy and EE related policies and regulations, especially for the industrial sector, a common understanding of the policies and regulations is missing. The stakeholders believe that the complexity and the administrative time related to regulatory clearances need to be addressed. (Industrial Development Corporation 2012)

Commercial banks view ESCO projects as business as usual, and do not apply credit criteria specific to the design of ESCO projects. Due to the nature of EE projects limited collateral is available in EE projects, the EPC model and uncertain cash flow, these projects are associated with high risks by financial institutions. (Industrial Development Corporation 2012)

Lack of trust and scepticism are amongst the most significant barriers to the development of the ESCO business. The lack of uniform, widely accepted, and clear definition, standards for ESCOs, lack of accreditation system for ESCOs, the complex process of contracting of ESCOs are some of the reasons for mistrust.

The too long process for the approval of projects financed by IDM/DSM (in average more than 6 months) is also one of the barriers for ESCOs to participate in projects financed by Eskom. For smaller ESCOs financing of initial energy audits has been also a problem, since they do not have own resources to pre finance them (EC JRC 2012)

Conclusions and future expectations

The ESCO market in South Africa has already started an exemplary growth and has a further potential, thus it is expected to continue its march forward in the next years as a result of the visible results of already implemented projects. However, for a faster development some changes are needed. South Africa has to develop clearer legislation and procurement rules which will allow ESCOs (including small companies) to take more active role in the market.

Key drivers that are expected to turn the changes around:

- Development of specific legislation for ESCO;
- Implementing of a system for accreditation of ESCOs;
- Standardization of EPC;

- The Income Tax Act – “Regulations on tax allowances for EE Savings” (S12L and S12i);
- IDM programme financed by Eskom (continuation);
- Introduction of Carbon taxes;
- Capacity building and training for financial institutions;
- Increased awareness raising activities for promotion EE project and ESCO concept.

Eskom has been the main sponsor of the ESCO market through the IDM programmes up to now. However, these programmes have been put on hold since December 2013. ESCOs are expected to finance projects through other financial sources or through own equity. The tax incentive schemes (Acts) S12L and S12i are new initiatives that can become a driving force for the ESCO market.

Number of ESCOs	500 registered in DSM register (around 50 are active)
ESCO market size and potential	US\$ 1 billion (potential of the market)
ESCO market trend	Increasing
ESCO association	South African Association of ESCO's (SAAE)
Typical ESCO projects	Indoor and outdoor lighting, HVAC systems improvement; installation of SWH; installation of variable speed drivers; industrial and mining sectors;
Main type of contract	EPCs with guaranteed savings or EPC with shared savings; very few BOOT contracts

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Industrial Development Corporation. 2012. “Development of Vibrant ESCO Market – Prospects for South Africa's Energy Efficiency Future“

http://www.esco.org.za/home/pdf/IDC_ESCO_Report_Sept_2012.pdf

Verheijen, Anouk, Joel Freeling. 2012. “Energy Efficiency Finance – Supporting SME Leading Activities in South Africa – a Mapping Study” prepared for USAID

Volshenk, Jako. 2007. “The Use of the ESCOs to Facilitates Sustainable Energy Interventions in the low Income Housing Sector“ http://toolkits.reep.org/file_upload/10307023_2.pdf

Department of Energy of South Africa. 2010. “Policy to support the Energy Efficiency and Demand Side Management Program for the Electricity Sector through the Standard Offer Incentive Scheme“

http://www.energy.gov.za/files/policies/Energy_Efficiency_and_Demand_Side_Management_Policy.pdf

ESCO market in Tunisia 2013

ESCOs were identified as key actors in developing a sustainable EE market in the industrial sector of Tunisia. The development of ESCOs in Tunisia started in 2005 and the market grows continuously since then. (International Finance Corporation 2011)

Current size, trends and features of the market

Currently 10 ESCOs have been accredited by the National Agency for Energy Management (ANME), but only 4 are able to offer EPC. Most of the ESCOs are small private engineering companies, one is an energy provider and three are equipment providers. (EC JRC 2012).

In 2004, the government launched the Energy Efficiency Program in the Industrial Sector (*PEEI*). In support of the program, a project, managed by the World Bank and financed by the GEF, was arranged to foster the development of a sustainable market for energy efficient products. In addition to the removal of institutional and capacity related barriers, it aimed to establish energy service companies considering them as the main vehicles for a sustainable energy efficiency market.³²

The project achieved the following results:³³

- Energy efficiency actions by medium-sized and large enterprises through ESCOs;
- Establishment of a partial credit guarantee fund. Ten ESCOs were licensed by the National Energy Management Agency (*Agence Nationale pour la Maitrise de l'Energie – ANME*), of which four were fully operational during the project. Altogether 30 contracts were signed with industrial companies using credit guarantees. At the time of the end of the project closed, 37% of energy efficiency projects in the industrial sector were using the Partial Guarantee Facility;
- Technical assistance and training was provided for stakeholders (such as public institutions, industries, financial institutions, energy service providers, ESCOs). A National Program for Energy Efficiency has been developed and a dedicated Energy Efficiency Fund, the FNME, has been put in place. The program provided resources for raising awareness, enhancing technical skills and empowering market operators, for example ESCOs and industrial companies, to invest in energy efficiency projects.

Direct beneficiaries were industrial companies, engineering consultants, the newly created ESCOs and financial institutions (banks, leasing companies).

A measurement and verification protocol was developed that ANME plans to use in future energy efficiency projects. This can enhance trust between industry, ESCOs and commercial banks (World Bank 2012).

Types of ESCO projects

³² Source: <http://www.worldbank.org/en/results/2013/05/23/energy-efficiency-in-tunisia-promoting-industry-while-protecting-the-environment>

³³ Source: <http://www.worldbank.org/en/results/2013/05/23/energy-efficiency-in-tunisia-promoting-industry-while-protecting-the-environment>

As said above, four accredited ESCOs contracted for 30 EPC with industrial companies in the framework of the PEEI. (EC JRC 2012, World Bank 2012)

ESCOs typically offer: (EC JRC 2012)

- Energy audit;
- Improvement of heating and air conditioning systems;
- Improvement of external and indoor lighting systems;
- Training of staff;
- Exchange of pumps and electrical motors;
- Waste heat recovery.

The potential size of the ESCO market in the building and industry sector is estimated at ca. \$16 million with pay-back period of up to 10 years. (EC JRC 2012)

Regulatory factors

The Law on Energy Management (No.2004-72) of 02.08.2004 includes a provision (art.6) related to energy services and ESCOs. Pursuant to this Law, energy consumers can conclude contracts with ESCOs for energy services, whereas ESCOs shall be involved in preparation, implementation, monitoring and eventually in financing of projects for energy savings. They shall guarantee energy savings within the implemented projects³⁴.

The Law on Energy Management also set a base for the introduction of mandatory energy audits. Energy audits are regulated according the Decree No. 2004-2144 issued by the Ministry of Industry and Energy on 02.09.2004. Pursuant to this by law energy audits are mandatory for:

- Industrial enterprises with energy consumption equal or larger than 800 toe;
- Transport, residential and service sector with energy consumption equal or larger than 500 toe;

An additional premium of 10% of the total investment for EE, with ceiling of USD 135,000 may be granted to the client and the ESCO based on their contribution to EE project investment.

The Ministry of Finance issued the Decree No.2010-1521 of 21.06.2010 related to reduction of taxes and custom duties for the following categories of products³⁵:

- Reduction of custom duties to the minimum rate of 10% (from a general rate of 18%) and exemption from VAT for imported equipment used for EE and RE, for which no similar equipment is manufactured locally;
- Exemption from VAT for equipment manufactured locally and used in the field of EE or of RE;

The ANME is responsible for the development and implementation of policies related to energy efficiency, renewable energies and energy substitution. ANME is a non-administrative public body under the authority of the Ministry in charge of Energy, established in 1985.³⁶

Tunisia has launched an ambitious EE policy strategy in order to scale up EE investment and to reduce energy intensity of Tunisian economy.

³⁴ Source : l'Agence Nationale pour la Maîtrise de l'Energie (ANME)
http://www.anme.nat.tn/fileadmin/user1/doc/fr/lois/Loi_2004_72_fr.pdf

³⁵ Source : l'Agence Nationale pour la Maîtrise de l'Energie (ANME)
<http://www.anme.nat.tn/fileadmin/user1/doc/fr/decrets/d-2010-1521.pdf>

³⁶ source: l'Agence Nationale pour la Maîtrise de l'Energie (ANME) <http://www.anme.nat.tn/index.php?id=93>

The National Energy Efficiency Action Plan, implemented over the period 2005-2011, allowed the achievement of a cumulative energy savings 3500 ktoe in the targeted period, the industrial sector (mainly Energy Efficiency Performance contracts and cogeneration) contributed about 42% of total energy savings, reflecting the role played by this sector in the Tunisian energy conservation strategy. A new EE policy strategy has been adopted, reinforcing the existing policy and setting more ambitious objectives for energy efficiency, aims to reduce primary energy consumption by 17% in 2020 and by 34% in 2030.

Market factors

Total energy consumption increased rapidly until 2010 (2.8%/year over 2000-2010) and it decreased by almost 4% in 2011 due to the economic crisis. Electricity consumption strongly increased until 2010 (6.2% per year, on average between 1990 and 2000 and 4.4% per year between 2000 and 2010). Industry accounts for about 37% of the total consumption, followed by the residential sector (27%) and tertiary sector (28%). Gas consumption also increased very strongly between 1993 and 2010 (8.2% per year). In 2011 it fell by 3.4% due to a large slowdown in industrial gas consumption.³⁷ Gas fired power plants are fuelled by natural gas from the country's own reserves and from imports from Algeria. The oil production has decreased from 4.6Mt in 2007 to 3.3Mt in 2011.

The Tunisian government started the PEEI program in order to compensate for the increase of energy demand in industry. Investments in EE reached TND 82.2 million (\$ 57.54 million) for the period 2005 – 2011 and resulted with quantified energy savings of 31 ktoe/year in 2011.³⁸

Information, awareness and demonstration

ESCOs have been promoted through targeted workshops and seminars organized by The Regional Centre for Renewable Energy and Energy Efficiency (RCREEE), the MED-ENEC Project and in the framework of the PEEI project implemented by WB. The objective of these events was promotion and awareness rising for energy services and energy audits in industry sector.

Financing

The National Energy Management Fund (FNME) was created by the Law No.2005-106 of 19.12.2005. This is a special fund designed to promote the policy of EE, in the form of subsidies to traders willing to make investments in EE. The fund is raised from the following sources:

- Taxes on the first registration of cars;
- Taxes on air conditioners imported or locally produced;

Energy Efficiency Investment subsidies are (EC JRC 2012):

- 20% of the Energy Efficiency Action Plan (EEAP) investment cost provided to the company through the FNME;
- Additional Subsidy of 10% of the EE Investment cost implemented through an Energy Performance Contract (EPC);
- Additional Subsidy of 20% of EE Investment cost through Energy Performance Contract (EPC), in case of ESCO involvement;
- Dedicated credit line for ESCO, which offered an interest free loan for 15% of the investment costs;

³⁷ Source: <https://estore.enerdata.net/energy-market/tunisia-energy-report-and-data.html>

³⁸ Source: http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/07/11/000333038_20120711001426/Rendered/PDF/ICR19380P078130LIC0dislosed07090120.pdf

The Guarantee Fund for Energy Efficiency (GFEE) was created in the framework of PEEI and is intended to guarantee loans granted by credit institutions to the Industrial Enterprises or the Energy Service Companies (ESCOs) to finance energy efficiency measures. GFEE was financed by the GEF through the World Bank. ANME has been entrusted with the management of the GFEE to the Tunisian Guarantee Company (SOTUGAR), which is a public interest company meant to reinforce the mechanisms set up for the development and promotion of the SMEs during the most decisive phases of their life (Creation, Development, Innovation and Restructuring).³⁹

Eligible enterprises for the GFEE are medium and large industrial enterprises that meet the following criteria⁴⁰:

- Operate in the industrial sector for at least two years,
- Plan to implement energy efficiency measures with the help of ESCOs and where the total costs are higher or equal to USD 50,000, and where the investment time of return is lower or equal to three years;

This fund aimed at promoting the use of energy service companies (ESCOs) by giving access to guarantees.

For any given energy efficiency investment project, implemented through ESCO in the framework of Energy Performance Contract "EPC" would receive: (EC JRC 2012)

-75% guarantee for their bank loans (up to a maximum of \$ 400,000).

-75% guarantee to cover any payments due to the ESCOs from industry.

Tunisian banks do not lend to ESCOs due to their uncertain credit-worthiness, the absence of adequate regulation and their lack of knowledge on EE projects.

Barriers

The most important barriers to the development of the ESCO market in Tunisia are as follows (JRC Survey 2012-2013):

- Lack of appropriate forms for finance. Commercial banks do not have appropriate portfolio;
- Low trust from clients;
- Perceived business and technical risk;
- Aversion to outsource energy management;
- Lack of reliable energy consumption data;
- Procurement rules are very complex and inflexible;

Conclusions and future expectations

Generally the development of ESCO market in Tunisia is on a good track. ESCOs have been supported by the government through the Guarantee Funds of Energy Efficiency (GFEE) and through the National Fund for Energy Conservation (FNME). The government also introduced fiscal and financial incentives for EE and ESCO.

Key drivers that are expected to turn the changes around:

- State financial and fiscal incentives;
- Implementation of state strategies and policies (NEEAP) ;

³⁹ Source: SOTUGAR http://www.sotugar.com.tn/en/index.php?option=com_frontpage&Itemid=1

⁴⁰ Source: SOTUGAR http://www.sotugar.com.tn/en/index.php?option=com_frontpage&Itemid=1

- Creation of a revolving RE&EE Fund;
- Simplifying the public procurement procedure;
- Awareness raising activities for promotion of ESCO results achieved in industry;

Number of ESCOs	10
ESCO market size and potential	US\$ 16 million
ESCO market trend	Continuous growth
ESCO association	none
Typical ESCO projects	Energy audits, installation of EE&RE equipment (HVAC,PV), improvement of EE in industry, Improvement of external and indoor lighting systems
Main type of contract	EPCs with guaranteed savings

Information in this chapter was based on the following source:

EC JRC 2012. Joint Research Centre. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

International Finance Corporation. 2011. "IFC Energy Service Company Market Analysis"

<http://www.ifc.org/wps/wcm/connect/dbaaf8804aabab1c978dd79e0dc67fc6/IFC+EE+ESCOS+Market+Analysis.pdf?MOD=AJPERES>

World Bank. 2012. "Implementation and Completion Report for Energy Efficiency Program in Industrial Sector" [http://www-](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/07/11/000333038_20120711001426/Rendered/PDF/ICR19380P078130LIC0dislosed0709_0120.pdf)

[wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/07/11/000333038_20120711001426/Rendered/PDF/ICR19380P078130LIC0dislosed0709_0120.pdf](http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2012/07/11/000333038_20120711001426/Rendered/PDF/ICR19380P078130LIC0dislosed0709_0120.pdf)

Asia

The Asian countries where a proper ESCO market exists, or where some level of activity has been registered from companies acting in an ESCO-like manner, are China, Chinese Taipei, India, Indonesia, Japan, Malaysia, Philippines, the Republic of Korea, Thailand, Vietnam and the city-state of Singapore.

Compared to existing market potentials, the states where the ESCO market is most developed are probably the Republic of Korea and Thailand. Singapore also shows a quite good level of market activity. The economic support provided by governments is the main market stimulator in these countries. Industry is the sector where most of ESCO activities are undertaken in the Republic of Korea and Thailand, whereas Singapore is more generally focused on energy efficiency improvement actions in the buildings' sector. Untapped potentials are however still huge and several steps need to be undertaken in order to create the proper conditions for thriving ESCO markets. For example, ESCO projects typically implemented in the two aforementioned countries are mostly of small size and a need for a scaling-up to bigger and more complex projects is generally registered. Moreover, lack of competences and expertise on the ESCO business, lack of standard contracts and procedures for energy saving measurement and verification (M&V) and scarce involvement of local financing institutions are among the main barriers that make further government support highly necessary in these countries. China is another country where the number of operating ESCOs has been increasing very fast since fifteen years. However, there seems to be a general lack of clarity concerning the ESCO concept and ESCOs' contracts. Moreover, many companies have entered the public ESCO registry created in this country just to benefit from state subsidies while providing services that could hardly constitute the offer of a proper ESCO. Also the ESCO market in Chinese Taipei is expanding fast, although most of existing potential remains unexploited, especially in the industry sector. The ESCO market activity appears instead considerably limited in India with most of the relatively few ESCOs operating in this country concentrated around big industrial sites. These ESCOs focus on big projects and act in conditions of very low market competition, leaving most of the existing economic energy saving potential untapped. Also in Indonesia the ESCO market activity level is very low. Indonesia is indeed mentioned among the countries with the largest market potential and the lowest ESCO capacity in South East Asia. The Japanese ESCO market has instead increased very fast between 1999 and 2010 and projects implemented in the commercial sector have made most of ESCOs' market in the last years. This market has recently entered a period of stagnation, with the earthquake of 2011 and the current worldwide economic crisis probably having a part in this situation. Very few companies provide instead proper ESCOs services in Malaysia and these few companies focus mainly on the energy intensive industry sector. Philippines are then a country where the ESCO business is still very immature, although some positive development trends are expected in the next years. Finally, Vietnam is a country where an ESCO market could not yet start and only two or three companies, out of the about 20 existing enterprises that could act as an ESCO, have actually implemented ESCO projects so far.

Clearly, the ESCO market development status in the above mentioned states and cities is influenced by factors that are mostly country specific. Nevertheless, a series of common market stimulators or damping factors can be identified. For example, most of these countries have been experiencing a high rate of economic growth since many years and this growth is being accompanied by higher energy needs which might potentially make ESCO investments more attractive for energy end-users. Nevertheless, the governments of some countries (e.g. Chinese Taipei, Indonesia, Malaysia, Vietnam) have heavily subsidized energy prices or have kept these prices low in order to further stimulate the growth of their markets, this creating an obstacle to companies investing on energy efficiency. On the other hand, this same economic growth is transforming some of the above

mentioned countries into net energy importers (e.g. Malaysia, Vietnam) or is making some of them almost totally dependent on energy imports (e.g. Chinese Taipei and Republic of Korea). These transformations somehow oblige governments to envisage the adoption of market-based energy pricing policies and to open their energy sectors to foreign investors, while implementing policies promoting energy efficiency improvements and stimulating the exploitation of local renewable energy sources possibly available on their territories. These transformations are typically accompanied by an increase in the energy prices and all together make ESCO business promotion an option that governments may consider to reduce their energy dependence and counterbalance the increasing burden of energy costs. The scarce involvement of the public sector in the implementation of projects by private ESCOs is another common characteristic in Asian economies. Although governments are generally quite active in providing economic support and incentives to energy efficiency investments that can indirectly stimulate the ESCO business, the public sector is rarely involved in the implementation of ESCO projects. Some level of activity is registered in Chinese Taipei and India and some states (e.g. Malaysia) seem seriously intentioned to make this sector drive their national ESCO market development. Nevertheless, existing public tender procedures and rules for budget administration represent often a serious obstacle to ESCO projects implementation and a lack of competence and expertise by public administrations in the management of these types of projects is generally observed. In China, where a certain level of activity is registered also in the public sector and where several ESCO projects are implemented in state-owned enterprises (SOEs), public ESCOs and ESCOs affiliated to SOEs have typically an important competitive advantage compared to private ESCOs and this situation probably hinders a higher development of private ESCOs business. The sector where ESCO projects are mostly implemented is generally the industry sector, with energy intensive industries representing the main target for ESCOs investors. However, the commercial sector has overtaken industry in Japan during the last three-four years and seems to be the sector whereon ESCO activities are mainly focused also in Singapore and Philippines. The lack of involvement in the ESCO business by local financial institutions is another common characteristic of the Asian markets. International donors or financing bodies like the World Bank, the United Nations Environment Programme (UNEP), the Global Environment Facility (GEF) or the German Development Bank (KfW) have played or still play an important role (e.g. in China and India) in fostering the activation of credit lines for ESCOs. The Indian market in particular seems to attract the interest of several international financial institutions and a series of activities for the financing of energy efficiency investments in small and medium enterprises are being developed by involving local banks. Overall, it can be stated that high technical and financial perceived risks are still associated with ESCO projects also in the Asian countries with the highest ESCOs activity. A lack of common understanding concerning the ESCO concept is often at the basis of the energy end-users mistrust in the ESCO offers and the scarce involvement of local financing institutions in this business can be ultimately attributed to a still largely not sufficient ESCO market maturation. Although it is certainly not possible to identify a common recipe that can serve to stimulate this maturation everywhere, complexities linked to the implementation of ESCO projects and to the stipulation of energy performance contracts (EPCs) should probably generally suggest to go for a gradual introduction of the associated business models. Important preliminary steps to be undertaken by several Asian governments are given by a more intensive promotion of capacity building activities, adoption of suitable and standardised energy saving M&V methodologies, production of standard models for ESCO contracts, creation of certification systems for ESCOs and for professionals operating in this sector.

ESCO market in China 2013

The ESCO concept was introduced and implemented for the first time in China through the first China Energy Conservation Project financed by the World Bank and the Global Environment Facility (GEF). This project was carried out for 15 years and was implemented in three five-year phases starting from 1998. It led at first to the creation of three pilot government-owned ESCOs called Energy Management Companies (EMCs) that implemented a large series of projects in the industry and in the building sector. The line of credit provided by the World Bank and other government support provided funding for project investments that reportedly achieved USD 0.24 billion in 2006 (EMCA, 2011). An ESCO association named China's Energy Management Company Association (EMCA) was created in 2004 during the second phase of the Energy Conservation Project. EMCA had 59 in 2004 which increased significantly to 560 in 2010. Since 2008 the World Bank has provided loans corresponding to USD 0.4 billion for energy efficiency and conservation projects (ERI-NDRC, 2013) and Energy Performance Contracting (EPC) investments could raise from USD 1.7 billion in 2005 to USD 4.25 billion in 2010 (EMCA, 2011). Further support to the expansion of the Chinese ESCO industry has been provided by a new favourable tax policy and subsidies supplied by the central and provincial government since 2010. To be eligible, ESCOs have to register with the National Development and National Development and Reform Commission (NDRC) which is the national development policy maker for the five year plans and price regulator and approval agency for all energy-related projects in China. As of August 2011, about 1,700 companies had entered the ESCO registration list to apply for these subsidies⁴¹ (Langlois & Hansen 2012). The Chinese case represents a successful example of government support to ESCO market development and is often presented as a best practice from which other countries willing to foster ESCO market development could learn. Nevertheless, the Chinese ESCO market is not yet considered as well developed, especially when compared with the huge economic energy saving potential existing in this country (Kostka & Shin, 2011).

Current size, trends and features of the market

Almost 4,000 ESCOs were active in the Chinese market in 2012 (ERI-NDRC, 2013). The national registry for ESCOs included 2339 companies whereas only 1472 ESCOs had already implemented EPC projects at the end of this year⁴². The ESCO market volume on EPCs increased by about 23% just between 2011 and 2012 going from USD 6.73 billion in 2011 to USD 8.25 billion in 2012. This dramatic rate of increase is being registered at least from 2007 and has recently included a 14% growth in the number of persons employed by ESCOs. This number has indeed passed from about 378,000 in 2011 to 435,000 employed units in 2012 (ERI-NDRC, 2013). Chinese ESCOs have mostly addressed industrial clients, although some part of their activities relate also to commercial buildings, public buildings and district heating companies supplying heat for residential and commercial uses. The ESCO projects that were initially implemented in China focused on the installation of single energy efficient technologies. However more complex projects based on EPCs

⁴¹ However, it should be noted that the selection criteria for these ESCOs to be 'registered' did not require them to be qualified or to have any meaningful prior experience in implementing EPC projects when registered. The Chinese government has recently begun re-evaluating and reducing these registered ESCOs by requiring demonstrated experience.

⁴² It has to be mentioned that some studies indicate that many of the companies included in the registry are actually companies that applied for registration just to take advantage of financial and tax benefits that were introduced in 2010 without implementing EPC projects (Kostka & Shin, 2011).

with shared saving have started spreading widely in the recent years. Under these contract types ESCOs usually provide all the financing under the shared savings model requiring the ESCO to take client credit risk and clients to only pay ESCOs for the stipulated percentage of achieved savings. Moreover the client receives the assets at the end of a contract period of usually five years or less and can then receive the full benefits from the energy efficient solutions installed. These EPC contract conditions are usually very attractive for clients willing to implement energy efficient solutions with an ESCO. Clients' insolvency represents, however, the major risk for ESCOs active on the Chinese market (Langlois & Hansen 2012). Energy savings generated by implemented EPC projects are estimated to constantly increase and are supposed to have achieved 10.65 Mtce for EPCs implemented in 2010 (ERI-NDRC, 2013). According to the survey performed by the JRC in 2013, Chinese ESCOs are mainly made of building and system control manufacturers, energy supply companies, energy efficient equipment manufacturers, suppliers or installers.

Types of projects

According to surveys performed among EMCA members, about 50% of EPC projects implemented in the years between 2007 and 2009 were related to industry activities, with a remaining 49% in the buildings sector. However 74% of total EPC investments were made for industry and 24% for the building sector according to the companies surveyed. Although the initial ESCO projects were mainly implemented for large state-owned enterprise (SOEs), the emphasis of donors financing these activities is now shifting towards small projects implemented at the municipal level (ERI-NDRC, 2013). The main technologies/fields of applications covered by ESCO projects are heating and lighting systems, building automation and control systems, efficient pumps, electric motors and inverters, waste heat recovery, CHP plants, renewable energy sources, industrial cooling and compressed air systems used in industry (JRC survey, 2013).

Regulatory factors

China has adopted an aggressive approach to foster energy efficiency within its 11th Five-Year Plan implemented between 2006 and 2010 that reduced China energy intensity by 19% during the time span covered. It consisted of measures aiming at establishing energy conservation targets for provinces, autonomous regions and municipalities under the central government and included an action plan for energy conservation addressing about 1000 enterprises. Moreover it established a system of incentive funds for energy efficiency projects, it indicated several measures to improve energy efficiency and led to the elimination of the most outdated and inefficient technologies used for production. Ambitious energy efficiency targets have been established also in the 12th Five-Year Plan for the period between 2011 and 2015. This Plan aims at further reducing China energy intensity by 16% for that period through energy conservation. It also aims to improve the ESCO business by establishing a suitable ESCO accreditation system and by improving existing energy saving M&V methods. The creation of 20 large ESCOs at SOEs with a per ESCO output value greater than USD 0.16 billion/year and the implementation of EPC projects requiring an overall investment over USD 29 billion are also envisaged.

Market factors

Some important and peculiar Chinese ESCO market characteristics can be deduced by the types of energy performance contracts stipulated. Three contract types are mainly used with peculiar aspects and clauses when compared with the corresponding EU or US types. These contract types are indicated as EPC with shared energy savings, EPC with guaranteed energy savings and as outsourcing contracts (Langlois & Hansen 2012). Assets created by EPC projects with shared savings are owned by ESCOs and are transferred to the clients typically for no charge at project termination. EPCs with

shared savings are the only contract types eligible for government's EPC incentives and will probably become much more widespread in the future in China. With guaranteed savings the project assets belong instead to clients, who provide for most of the project financing. The ESCOs incur financial penalties if the energy savings guaranteed are not generated. Finally, ESCOs stipulating outsourcing contracts typically operate clients' energy efficient facilities, pay the energy supply for the energy consumed and receive payments usually correlated to the energy savings generated and the amount of the energy consumed during the contract duration. These contract types are often similar to *chauffage* contracts in other countries of the world.

Information, awareness and demonstration

Information and awareness raising activities performed by the Chinese government and EMCA have contributed to increased knowledge about ESCOs both among potential ESCO clients and companies willing to enter this market on the supply side. Nevertheless, lack of information and awareness concerning the ESCO concept are usually indicated as one of the main barriers to ESCO market development. The problem of information is complicated by the lack of clarity concerning what should be considered as an energy service and an ESCO in China. Many companies (e.g. energy suppliers, engineering firms, equipment manufacturers, construction companies, etc.) present themselves as ESCOs by offering hundreds of different services and technologies to their clients. This situation makes information and awareness raising activities very complicated, impede a trust relationship to be established between ESCOs and potential clients and increase transactions costs linked to the clients' search of the most suitable and energy efficient products.

Financing

As already mentioned, the financial support (mainly consisting in loans and subsidies) received from international donors like GEF and the World Bank was very relevant to demonstrating the ESCO concept and provided a start for the ESCO market in China in the period between 1998 and 2008. A new favourable tax policy and a funding programme have been then established by the Chinese government since 2010. The established funding programme reportedly rewarded EPCs projects at least with about USD 49 per tce saved⁴³ in 2010 equating to USD 0.2 billion during that year. These incentives have been accompanied by a tax incentive mechanism⁴⁴ and a value added tax exemption for ESCOs implementing EPCs. Moreover, rules related to how to deal with budget and assets within EPC projects in public institutes have been established and pilot actions aiming at the provision of financial services consisting of green credit lines, loan guarantee programmes and low-interest loans have been also implemented.

Barriers

Two major barriers to ESCO market development in China are represented by the low energy prices and by a low level of market integrity (Pengcheng et al., 2011). Low energy prices, partly due to energy subsidies applied by the government to foster the economic development of the country, discourage companies and energy end-users in general, to invest on energy efficiency, whereas the low level of market integrity can be partly associated to a situation of scarce awareness among the

⁴³ Both central and local governments participated in this funding programme. Whereas the central government provided about USD 39, local governments supplied at least USD 10 per tce saved. However some local governments rewarded these projects with up to USD 42 per tce saved (information kindly provided by Dr. Li Pencheng, China National Institute of Standardization).

⁴⁴ This mechanism consisted of a corporate income tax exemption during the first 3 years of activity and of a 50% tax reduction during the next 3 years for ESCOs.

energy end-users about the ESCO concept. This situation is determined both by a lack in the provision of information to energy end-users and by a lack of skills and technical competences often registered within companies acting as ESCOs. The latter aspect has probably to be considered as the most important obstacle to the provision of proper information, as competency and expertise on the supply side are the first pre-requisite to make people aware about the ESCO business and related opportunities. Barriers related to lack of information and technical competence combine then with the absence of standardized procedures for energy audits and measurement and verification (M&V) of energy savings in China⁴⁵. All together, these obstacles create a situation of mistrust on ESCO business among potential clients. This situation is then worsened by a lack of laws and regulations guaranteeing the application of the clauses included in EPCs in case expected energy performances are not achieved by projects implemented by ESCOs.

On the supply side, the complications associated to EPCs' stipulation and the usually high transaction costs linked to the identification of potential clients make EPCs not always very interesting for companies that could start supplying these contract types. Moreover ESCOs, small ESCOs in particular, have often serious problems with projects' financing because banks are typically very reluctant in providing loans to them, require very solid collaterals as loan guarantee or do not accept savings of EPC projects as collateral or primary form of repayment. Finally it is worth mentioning that public ESCOs and ESCOs affiliated to state-owned enterprise (SOEs) have typically an important competitive advantage compared to private or foreign investors operating on the Chinese ESCO market. Public ESCOs and ESCOs affiliated to SOEs (which are presently a very small minority of the ESCO market) are indeed the ESCO types that can more likely exploit the important market potential existing in government agencies, public institutions and state-owned heavy industries. Their advantage is due to the fact that they typically have more capital to invest in energy efficiency projects and that banks and potential clients have generally more trust in these companies. Concerning this last point, it is worth mentioning that the creation of good local networks of relationships with potential clients is a very important pre-requisite for a company to enter the ESCO market and to get third party financing in China (Kostka & Shin, 2011).

Conclusions, future expectations

The ESCO market in China has been developing very fast since 1998, mostly thanks to a system of support provided by international donors and the national government. The number of existing ESCOs is high and the increase of ESCO investments in the last few years is considerable. Nevertheless, some experts argue that most companies have entered the existing public registry of ESCOs just to have access to state subsidies while providing services that could be hardly included in ESCOs offers. Moreover, a general situation of mistrust and absence of clarity concerning the ESCO concept and ESCO contracts is also indicated by experts as an important barrier acting against ESCO market development in China. Lack of technical, development and project financing capabilities, coupled with limited standardization and lack of reliable methods for energy saving measurement and verification are other areas of major improvements. ESCO business could also probably be better promoted within the system of energy conservation targets established in China. On the side of ESCO business financing, the extension of economic supports to projects beyond EPCs with shared savings and the adoption of more advanced financing mechanisms (like project financing, or the creation of guarantee funds, or an energy saving trading system) could probably be highly beneficial. The low competition level in the public sector is certainly another important area of attention. A revision of public procurement rules in order to facilitate private and/or foreign ESCO investments

⁴⁵ Market experts highlight that because of this barrier, the funding programme based on energy savings mentioned in the previous section is affected by a very high uncertainty and determines ESCO market distortions.

could probably allow ESCOs to better exploit the considerable market potential existing in this sector. Overall, the impression is that the China government is dedicating a significant amount of resources to ESCO market development and that future government's actions and investments should probably be more focused on creating instruments allowing this market to thrive on pure commercial bases.

Key drivers	
<ul style="list-style-type: none"> - Strong government commitment and economic support - Support from international donors - Huge economic potential for energy efficiency improvement - System of energy conservation targets 	

Number of ESCOs	2339 companies registered in the national ESCO registry in 2012. 1472 ESCOs are supposed to have already implemented EPC projects in this year.
ESCO market size and potential	ESCO market volume of USD 8.25 billion in 2012. Potential market in 2012 estimated at about USD 14.5 billion in the same year (Leaver, 2013).
ESCO market trend	Growth
ESCO association	EMCA (Energy Management Company Association). 560 members in 2010
Typical ESCO projects	Projects implemented in industry (mainly state owned enterprises) and buildings. Technologies/fields of applications covered: heating and lighting systems, building automation and control systems, efficient pumps, electric motors and inverters, waste heat recovery, CHP plants, renewable energy sources, industrial cooling and compressed air systems used in industry
Main type of contract	EPC with shared savings, EPC with guaranteed savings, outsourcing contracts.

Information in this chapter was based on the following source:

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ERI-NDRC, 2013. Energy Efficiency Policies and Current Status of ESCO industry in China. Presentation held by Zhang Jianguo (Energy Research Institute, National Development and Reform Commission, China) at APEC – Cooperative Energy Efficiency Design for Sustainability (CEEDS) workshop on the promotion of ESCOs, Bangkok, 21-23 January 2013

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ESCO market in Chinese Taipei 2013

The first ESCOs appeared in Chinese Taipei at the beginning of the 2000s. The government of this country has been supporting the development of the ESCO market since that time, as confirmed also by the recent publication of the White Paper of Energy Industry Technology by the Ministry of Economic Affairs in 2012. This document mentions the promotion of the grants for ESCOs as a means to foster energy efficiency improvements and services linked to energy saving technologies (Cheng & Chen, 2013).

Current size, trends and features of the market

ESCOs activity in Chinese Taipei has increased significantly in the last decade. The number of ESCOs participating in the Taiwan Association of Energy Service Companies (TAESCO) passed from 20 in 2005, to 175 in 2011 and to around 200 in 2012. About 80% of these ESCOs are small companies with less than 50 employees, whereas 10% of the total is made of companies with more than 250 employees (JRC, 2013). ESCOs operating in Chinese Taipei are both private local/national companies and daughter companies of large international corporations. They are mostly building and control manufacturers (e.g. Siemens, Schneider), consulting and engineering firms providing professional construction management (PCM) services, equipment manufacturers and suppliers (e.g. Trane). The government is trying to promote also the creation of ESCOs focusing on the installation of PV panels and has set quite ambitious targets in terms of MWs to be installed by 2030 (JRC, 2013). Services supplied to clients cover the whole energy efficiency service value chain, from information and awareness raising concerning existing energy saving opportunities, to technical planning and implementation of energy efficiency improvement measures, to project financing and energy saving measurement and verification. However companies supplying integrated services including all the partial services previously mentioned are still rare and started their activity only in 2013. Another smaller ESCO association operating in Chinese Taipei is TESA (Taiwan Energy Service Association). Whereas TAESCO seems more focused on connecting ESCOs with other market players (e.g. potential customers and the government), TESA seems more focused on ESCOs administration activities (e.g. set up and maintain ESCO orders). The Taiwan Green Productivity Foundation (TGPF) is another important ESCO market actor in this country. On the government side, the Bureau of Energy, Ministry of Economic Affairs (MOEABOE), formerly known as the Energy Commission, is a relevant stakeholder supporting the ESCO business in Chinese Taipei. The most recent information concerning the size of this business dates back to 2010 and 2011. Total annual average ESCO investments (including all projects' costs) in the years between 2007 and 2010 are estimated around USD 760 million⁴⁶ (APEC, 2013), whilst estimated ESCOs revenues have been estimated around USD 83.5 million in 2010 and around 118.7 million in 2011 (Huei-Jiunn & Bing-Chwen, 2010). ESCOs revenues have almost steadily increased since 2005 when they amounted to around USD 11.5 million.

Types of projects

The first ESCOs projects in Chinese Taipei have been implemented in central government buildings where a good level of ESCO activity can still be registered also thanks to the energy efficiency improvement commitment in place (see the report section dedicated to regulatory factors). Primary schools, universities, local administrations and industry are other demand sectors where the ESCO

⁴⁶ This amount includes also investments for energy saving renovations not achieved by Energy Performance Contracts (EPCs).

market development is quite satisfactory. Hospitals and the commercial sector receive instead scarce attention by energy service suppliers perhaps because of the scarcity of economic incentives provided by the government compared to other sectors. ESCOs activity in the residential sector is low, whereas energy efficiency improvements in the industry sector are often restrained due to the fact that the equipment installed is typically imported from foreign countries. Technologies and fields of application covered by ESCOs are very frequently air-conditioning, ventilation, external and public lighting (Taiwan is an important manufacturer of LED technologies), pumps for air conditioning, electrical motors and inverters, industrial process optimisation and industrial cooling. Buildings envelope insulation and heating systems are not yet considered, whereas building automation and control systems and indoor lighting systems in offices and compressed air systems in industry are fields of application frequently covered (JRC, 2013). Generation of electricity from renewable energies is finally an important point of attention in Chinese Taipei and involves ESCOs to some extent. ESCOs covered e.g. 47.5% of the market related to the installation of PV panels in 2012 and participate in this market at least since 2009 also due to a feed-in tariff mechanism put in place by the government (see the report section dedicated to financing).

Regulatory factors

An overall energy intensity reduction target of 25% to be achieved by 2015 compared to 2005 has been established in Chinese Taipei by a Master Plan on Energy Conservation and Emission Reduction. Notably, energy consumption of governmental agencies and schools is supposed to be reduced annually by 1% during this time lag (APEREC, 2011). Although only indirectly influencing ESCOs activities, investments realized to achieve these targets represent an important business opportunity for energy service companies. Another relevant regulation affecting ESCOs activities is the Energy Management Law obliging large energy end-users⁴⁷ to implement energy audits, to establish annual energy saving targets and to submit energy efficiency improvement plans to the Bureau of Energy (BOE)⁴⁸. It is finally worth mentioning that a subsidy scheme has been implemented by the government to support the ESCO business (see the report section dedicated to financing). The government's willingness to support this business is also confirmed by the White Paper on Energy Industry Technology published in 2012 by the Ministry of Economic Affairs (MOEA) which includes the provision of further subsidies for ESCOs promotion under the list of actions whereby the government intend to sustain energy efficiency improvement and energy-saving technology services in Chinese Taipei. The ESCO market on energy efficiency is also to some extent stimulated by multi-promotion strategies for PV panels set up by the BOE⁴⁹.

Market factors

Chinese Taipei is experiencing a rapid economic growth since the second half of the 20th century and is now the 19th largest economy in the world with its high-tech industry playing a key role in the global market. This rapid development, however, has caused the exhausting of the indigenous fossil fuels supplying 15-20% of its energy during the last thirty years and has made the island completely dependent on energy imports, now amounting to 99% of the energy totally consumed each year. On the other hand, the insular geography of the country precludes the possibility of direct electricity

⁴⁷ Large end-users are defined in this law as energy end-users consuming annually more than 6,000 Mt of carbon, or more than 6,000 kL of fuel oil, or more than 10 million m³ of natural gas, or with a power capacity over 800 kW.

⁴⁸ See http://web3.moeaboe.gov.tw/ECW/english/content/Content.aspx?menu_id=1107 for further information on the Energy Management Law.

⁴⁹ These strategies include the Million Rooftop PVs Promotion Program, the PV Foreign Market Expansion Plan, the Plan for Innovation of Solar PV Industry (see Lin, 2013).

imports, determines a strong push to the construction of nuclear power plants, despite the presence of a diffused anti-nuclear sentiment, and requires much higher fossil fuel-based energy reserves compared to other countries. Because of this situation the local government is particularly sensitive to the opportunities to reduce energy dependence and to increase energy security by the ESCO business and energy efficiency policies in general. Moreover energy efficiency is seen as an important mean to achieve the national carbon reduction targets that have been set in 2011. These targets have increased the island's need for alternatives to fossil fuels and have pushed the government to try to exploit local "green energy" sources⁵⁰. Another fundamental driver of the ESCO market is represented by energy pricing policies. The energy market structure in Chinese Taipei is based on government control of domestic energy prices. One of the two petroleum refining companies operating in this country is public-owned, whereas the public-owned utility Taipower controls the electricity market. The government has been generally controlling the energy prices for long time to maintain exports competitiveness while ensuring low-cost domestic energy supply⁵¹. This situation however represents a serious obstacle for the development of ESCOs activities and casts doubts on government's ability to achieve the quite ambitious national energy efficiency targets set (Ssu-Li et al., 2012).

Information, awareness and demonstration

Information and awareness raising activities are undertaken by the government with a wide focus on energy efficiency investments opportunities, whereas information and awareness raising initiatives specifically dedicated to ESCO business are typically promoted by the ESCO associations in Chinese Taipei. Economy-wide telephone surveys have been conducted by the government to assess public awareness concerning existing energy efficiency investments opportunities. Moreover two programs are in place to raise general awareness concerning energy efficiency and energy conservation. One relates to energy efficiency and energy conservation labels and the other is more focused on the promotion of energy efficient technologies and results achieved in the field (APER, 2011). Initiatives undertaken by ESCO associations include instead a number of annually organized training programs for ESCOs, seminars on financial resources available for ESCO business, seminars on the presentation of successful case studies and conferences aiming at creating business links among ESCOs. ESCO associations produce also periodical newsletters describing ESCO activities in Chinese Taipei (Huei-Jiunn & Bing-Chwen, 2010). It is finally worth mentioning that the BOE has been implementing a demonstration project named "energy-saving performance guarantee project" since several years. This project is being implemented with the financial support of the Ministry of the Economic Affairs and relates to the implementation of ESCO projects in governmental offices, hospitals, schools and in the commercial sector in general (SIDN, 2012).

Financing

Financing mechanisms that can rely on the revenues associated to the energy savings generated by ESCO projects are difficult to implement in Chinese Taipei. The main obstacles to this are the low energy prices and the fact that ESCOs operating in this country are mostly small and medium enterprises. The limited amount of capital available makes it often even difficult for these companies to buy and install the equipment needed to verify the amount of energy savings generated. Technical risks are generally a relevant barrier to ESCO projects financing also due to a lack of sufficient knowledge and expertise needed for the implementation of projects. Nevertheless the

⁵⁰ In this respect it is worth noticing that Taiwan is the world's second largest supplier of solar cells and that the government has implemented a subsidy scheme since 1999 and a feed-in tariff mechanism since 2009 whereby PV power generation is promoted in the island.

⁵¹ The domestic electricity price in 2013 has been for example estimated at 0.09 USD/Kwh (JRC, 2013)

Chinese government is actively involved in ESCOs projects financing. For example, in 2011 it has made available about USD 4.9 million in the form of subsidies for the implementation of demonstration projects in government offices and schools by EPCs with shared savings⁵² (JRC, 2013). Moreover one hundred locations among 120 schools have been selected for the implementation of these demonstration projects in 2012 (SIDN, 2012). Subsidies are provided also by local governments (e.g. by the city of Taipei). ESCOs have generally serious problems in taking the financial risks associated to bank loans and EPC with shared savings are the main EPC contract type stipulated by these companies probably just because the possibility of obtaining government subsidies has been linked to this specific contract type. It is worth mentioning that procurement contract models and standard implementation procedures for energy performance contracts have been respectively produced by the Public Construction Commission and the Taiwan Green Productivity Foundation to facilitate the implementation of ESCO projects in government buildings (APEC, 2013). Although not directly linked to energy efficiency improvement projects, it has to be mentioned that a financing mechanism has been put in place for ESCOs installing PV panels. ESCOs involved in this market typically install PV panels at roof owners, pay rents to these owners for their installations and receive money for the electricity produced according to a feed-in tariff mechanism established by the government (Lin, 2013).

Barriers

The main barrier to ESCO market development in Chinese Taipei is represented by the low energy prices and the consequent long payback periods of ESCO projects. The small dimension of ESCOs operating in Chinese Taipei is mentioned by experts interviewed (JRC, 2013) as another important barrier impeding that companies can get credits for their investments from banks. Moreover, despite a general growth trend of the economy can be registered in the last decade, these companies are particularly sensitive to the negative impacts of the present economic crisis given their quite limited business capacity. Another important obstacle to a further ESCO market development is given by a lack of familiarity with ESCO projects by potential customers. Information on ESCO business among energy end-users are quite scarce and not very transparent and it is probably for this reason that mistrust and lack of confidence in ESCO products are sometime created among these users (APEC, 2013). Moreover energy experts of Chinese Taipei (JRC, 2013) claim a lack of activities dedicated to energy audits. Audit activities are very relevant to increase awareness among citizens about energy efficiency improvement needs and opportunities, to allow stipulating sound EPC contracts and to guarantee ESCO projects results. Overall it seems that inexperience among existing ESCOs has played a role in the creation of some of the obstacles above described. However it seems also that the creation of quality standards with the support of the government (e.g. the creation of an ESCO certification system, of standard and independent procedures for energy saving measurement and verification and of standard contract models) could contribute to overcome part of them. Clearly these changes should be accompanied by structural energy market changes that seem to be destined to take place soon given the overall political situation and the existing economic trends being registered in the island.

Conclusions, future expectations

Considering that the high dependence from energy imports pushes for higher energy price and given the growth rates of the whole economy expected for the near future, the ESCO business in Chinese Taipei is expected to continue with the fast rate of expansion registered in the last decade. A

⁵² These subsidies were made available for EPCs whereby 50% of engineering costs are repaid by shared savings.

considerable saving potential is available in particular in the industry sector where implemented ESCOs activities have been so far quite limited. Experts estimate that the potential size of the ESCO market (total value of possible energy efficiency projects investments in the building sector and industry with payback time below 10 years) was around USD 3.3 billion in 2013 (JRC, 2013). Moreover demonstration ESCO projects being implemented in public buildings and schools thanks to the public subsidies available allow the government to play the exemplary role generally expected to provide an important push to the development of an energy efficiency market. Nevertheless important steps to allow exploiting the available market potential need to be undertaken. A certification and registration system for ESCOs needs to be implemented to produce a common understanding of the ESCO concept and ensure the quality of the services provided by these companies. Energy saving measurement and verification activities do not seem to be yet sufficiently well developed and the creation of an independent body performing these activities is indicated by experts as an important step to be accomplished to increase potential customers confidence in the ESCO business and to allow stipulating sound EPCs (JRC, 2013). More intensive and frequent initiatives dedicated to building capacity and expertise within ESCO companies can also surely contribute to achieve this target. Moreover energy auditing seems to be a service type not sufficiently developed in Chinese Taipei and the provision of this service on a larger scale could increase customers' awareness of existing energy saving opportunities while determining a higher number of investments. On the financial side, collaborations and strategic alliances among energy efficient equipment manufacturers, engineering companies and financial institutions are lacking. The small size of existing ESCOs may be a reason for this situation. Nevertheless the implementation of policy instruments like a guarantee fund or revolving funds for ESCOs investments could probably contribute to change the situation and convince banks to be more involved in this business.

Key drivers

- High dependence on energy imports
- Low energy prices
- Government subsidies for ESCO investments in public buildings and schools
- Important untapped energy saving potential existing in particular in the industry sector

Number of ESCOs	Around 200 in 2012 (JRC, 2013).
ESCO market size and potential	ESCO total investments (including all project costs) around USD 760 million in 2010 (APEC, 2013). ESCO market potential (all investments in building and industry sector) around USD 3.3 billion in 2013 (JRC, 2013).
ESCO market trend	Growth
ESCO association	TAESCO, TESA
Typical ESCO projects	Projects mostly implemented in government's buildings and schools. Technologies and fields of application covered by ESCOs are very frequently air-conditioning, ventilation, external and public lighting, pumps for air conditioning.
Main type of contract	EPCs with shared savings

Information in this chapter was based on the following source:

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ESCO market in India 2013

The first three ESCOs have been established in India in the early 1990's thanks to the assistance and the financing by the U.S. Agency for International Development (USAID)⁵³. Further stimulation to the ESCO business in this country has successively come from the Energy Conservation Act enforced in 2001. By this Act the India Government defined for the first time a regulatory framework to drive a more energy efficient evolution of its economy and implemented provisions for the establishment of energy performance standards and energy labelling of appliances and buildings. This Act also instituted a Bureau of Energy Efficiency (BEE) and an Energy Conservation Fund. The India Ministry of Power, the BEE and the state-designated agencies (SDAs) created to support the BEE, have progressively brought energy conservation and energy efficiency to the centre of their agenda and have contributed to the design of various energy efficiency measures and programmes promoting the ESCO concept. Between 2002 and 2005, international donors like the World Bank and the United Nations Environment Programme (UNEP) funded ESCO enabling mechanisms such as the 3 Country Energy Efficiency Projects (3-CEE) providing financial support to ESCO projects implemented in India, China and Brazil. The number of operational ESCOs was around 20 in 2005 and has slowly increased ever since. Nevertheless, most of the investments have been and are still being made by a few big ESCOs. Although the increase in ESCOs' revenues registered in the last few years is very consistent, the number of projects implemented annually is still quite small and the market struggles to grow mainly because of a lack in the quality of the services supplied and a lack of a clear understanding of the ESCO model.

Current size, trends and features of the market

Significant discrepancies can be observed in the estimates so far produced concerning the India ESCO market size. The most recent available information indicate a market size around USD 140 million in 2012 (see for example Langlois & Hansen, 2012). If it is hard to estimate the current ESCO market size it is even harder to make quantitative forecasts concerning future trends. However, experts generally foresee considerable market expansion due to the important climb expected in the future energy demand because of demographic and economic factors. Up to the last few years, the role of international donors, such as USAID, the World Bank, the Alliance to Save Energy and the World Resources Institute⁵⁴, has been fundamental for the promotion of the ESCO business in India. This business has mainly developed in the industry and in the public sector. Industries, especially energy intensive ones, typically spend more than 10% of their production costs on energy⁵⁵ (WRI, 2009) and can receive important benefits from a reduction of their energy bills by ESCOs. The increase and the high volatility of energy prices being registered in India are therefore an important driver of ESCO market development. However, the energy prices situation and the efforts made by the BEE and the SDAs to support the certification of energy managers have often induced energy-intensive industries and large commercial building owners and operators to hire energy managers who can implement energy efficiency improvement actions in-house without employing ESCOs⁵⁶. As

⁵³ In the beginning their activity was mainly based on collaboration and competency exchange with a U.S. ESCO.

⁵⁴ This institute is funded by international developmental assistance organizations.

⁵⁵ For some industrial sectors in the Metals, Mining and Minerals sector (cement, aluminium, iron and steel), energy cost can constitute 40-60% of total production cost making energy efficiency a very high priority (Gaba et al., 2011).

⁵⁶ Data from the National Energy Conservation Award organized by the Government of India between 2007 and 2011 indicate that annual cost savings of about USD 2130 million were achieved with an investment of about USD 3270 million with a simple payback of approx. 18 months by many companies largely through in-

it is the case in many countries around the world, the public sector can attract ESCOs investments as public authorities see the possibility of outsourcing financial and operational risks of energy efficient technologies quite favourably. Finally, efficient energy generation or waste heat recovery systems (e.g. by CHP plants) have significant potential and have been implemented to hedge against the highly volatile energy prices in India.

Overall, the India ESCO market is made of a few big companies and the market competition is consequently quite low. Because of the prevailing market conditions and difficulties in closing out deals, ESCOs have become less interested in increasing their competitive advantages over other companies. The few big ESCOs operating in India can obviously take greater financial and technical risks in their energy efficiency investments compared to smaller ESCOs which typically have to deal with more challenges in accessing bank financing and in increasing the credibility of their offers to potential clients. ESCO market facilitators and market enablers have also an important role to play in this market, as demonstrated by the Alliance for an Energy Efficient Economy (AEEE) established in 2009 with the support of USAID ECO-III project and a few large energy service companies. The AEEE has worked as an information exchange platform established to support the government in implementing its energy efficiency policy by helping develop, among others, simple and easy to apply energy performance contracts. It managed to organise various awareness rising and training programmes in collaboration with the Efficiency Valuation Organization (EVO) and to certify more than one hundred energy efficiency professionals on energy saving measurement and verification (M&V). A commercial organization owned by four power sector public undertakings⁵⁷, Energy Efficiency Services Limited (EESL), has been also created in 2009 with the support of the Ministry of Power and the BEE. It works as a Super ESCO financing energy efficiency projects of public agencies, as a consultancy organization on energy efficiency, as a resource for capacity building of utilities, financial institutions, etc., as a co-ordinator of market related actions undertaken by the BEE (Langlois & Hansen, 2012). The accreditation system put in place by the BEE is another relevant driver of ESCO market development. Under this accreditation system, ESCOs are given ratings by an independent third party⁵⁸ based on their success in implementing energy efficiency projects, their proved technical expertise and the amounts invested on these projects. 114 ESCOs had received ratings up to 2012⁵⁹. These ESCOs are mainly building and control systems manufacturers, facility management and operation companies, energy suppliers, equipment manufacturers and suppliers (JRC, 2013).

Types of projects

Most of the ESCOs revenues have been so far generated by projects implemented in the industry sector. Government and municipalities are other sectors where a significant percentage of total ESCOs revenues have been generated. These sectors are then followed by the commercial sector in the ranking of the demand sectors where ESCO realize most of their profits⁶⁰. Technologies and field

house energy management programs. The Energy Conservation Award competition is organized each year to identify energy efficiency best practice in industries, building and municipalities (Deshpande et al., 2012).

⁵⁷ The EESL is a public corporation owned by NTPC Ltd, Power grid Corporation, Power Finance Corporation, and Rural Electrification Corporation.

⁵⁸ The name of this party is Investment Information and Credit Rating Agency of India Limited.

⁵⁹ However, it is worth mentioning that most companies in the BEE accreditation system are mainly energy auditing firms and have extremely limited capacity to undertake execution or management of EE projects.

⁶⁰ The most recent quantitative information available dates back to a survey performed among 24 ESCOs between August and November 2008. Survey outcomes indicated that revenues generated in industry,

of applications generating most of the ESCO revenues are efficient lighting and pumping systems, efficient heating and cooling systems, efficient buildings in general. Several ESCOs are affiliated with or owned by an equipment or control manufacturer and tend to sell single technologies rather than comprehensive services (WRI, 2009).

Regulatory factors

The Energy Conservation Act established in 2001 and the National Mission for Enhanced Energy Efficiency⁶¹ (NMEEE) launched in 2008 represent the framework wherein the main government initiatives for ESCO market development are defined and implemented. These initiatives include, among others, the Perform, Achieve and Trade (PAT) mechanism, the Energy Efficiency Financing Platform (EEFP) and the framework for Energy Efficient Economic Development (FEEED). The PAT is a market-based mechanism defined under the Energy Conservation Act and imposing energy saving obligations to energy intensive industries in India. These industries are obliged to achieve mandatory energy saving targets by implementing energy saving actions whose energy savings are certified and can be traded among the actors participating in the obligation mechanism. The first cycle of the PAT covers the time period between 2012 and 2015 and can potentially allow ESCOs to generate revenues by implementing the actions whereby designated consumers will achieve their mandatory energy saving targets (Bertoldi et al., 2013). The EEFP is instead a platform whereby financing institutions sign Memoranda of Understanding with the BEE for the financing of energy efficiency projects. Financing approaches adopted may be based on the recovering of financial costs from the energy savings generated. The EEFP has been created with the intent of stimulating ESCOs activity and allowing the development of standard energy savings M&V methodologies, standard energy performance contracts (EPCs) and ESCOs building capacity activities (Langlois & Hansen, 2012). Finally, the FEEED aims at developing fiscal instruments for energy efficiency promotion. These instruments include a partial risk guarantee fund (PRGF) for banks offering loans for energy efficiency projects and a venture capital fund for energy efficiency (VCFEE) financing to ESCOs and suppliers of energy efficiency products.

It may be interesting to mention that utilities are regulated by the India states and that this fact can potentially allow creating fruitful collaborations between ESCOs and utilities for the implementations of energy efficiency projects at energy end-users. Some states have indeed already issued regulations requiring that utilities develop and implement a series of demand side management projects⁶² (Wang et al., 2013).

Market factors

As already mentioned, the increasing energy demand and the high and volatile energy prices are very important drivers of the ESCO market. Banks seem to have understood the huge potential of this market that is indeed managing to attract the interest of several national and international financial institutions. Moreover, the India government is supporting the financing activity by national

government and municipalities, commercial offices amounted respectively to 62.1%, 24.2% and 9.3% of the total revenues generated by these ESCOs (WRI, 2009).

⁶¹ The NMEEE is one of eight missions established in the National Action Plan on Climate Change of India.

⁶² Nevertheless, it has to be mentioned that utilities themselves do not have the capabilities to design and execute EE projects. There have been some tentative partnerships between utilities and ESCOs in order to try to approach large industrial or commercial customers but these are still at experimental stages and business models will have to evolve before anything substantive can happen through this route (information kindly provided by Dr. Satish Kumar, Energy Efficiency Ambassador & Vice President, Schneider Electric India).

and international actors and has implemented very innovative market-based instruments (e.g. energy saving obligations for industry) for the stimulation of energy efficiency and ESCO activity. The focus on big projects, the limited number of active ESCOs and the absence of competition in this market signal however that various factors and barriers still hinder ESCO market development in important ways and that there is not a big rush by the ESCOs to offer their services. Apparently, business opportunities for small and medium size ESCOs are still quite limited and the fact that a proper ESCO association has been only recently created confirms that a lot probably still needs to be done to create a market that can work on a commercial basis and deliver sustained results. The very limited number of ESCOs operating through EPCs with shared savings in India is also an indicator of a situation where suppliers do not usually want to take the financial risks associated with the possibility that the energy savings claimed are not delivered to customers. This goes hand in hand with the general situation of potential clients' mistrust of the ESCOs offer and with the lack of credible energy saving M&V methodologies registered in this country. A big challenge relates also to the significantly long time need to prepare and develop a project with no guarantee that a contract will be signed. On top of this, the ESCOs' fear of not being paid even after executing the project, because savings guarantee can always be disputed, is increasingly seen as a big barrier. Moreover the fact that public-private partnerships in general have gained a bad reputation in India has also made private sector extremely wary of complex contracts unless the business model can be simplified and risks can be mitigated.

Information, awareness and demonstration

The India government has invested a consistent amount of money to inform and create awareness on energy efficiency policy instruments so far implemented (e.g. standards and labels for refrigerators, air conditioning, lighting systems, transformers, fans, pumps, motors, TVs, LPG stoves, minimum energy performance standards for new commercial buildings, etc.). National energy conservation awards for industry best performing in energy efficiency and national painting competitions to create awareness on energy efficiency opportunities among young people have been also realised. Training courses on energy efficiency for professionals of the public administration, SMEs, appliance manufacturers, etc. have been extensively organised to increase the existing expertise in the provision of EPCs (Kumar, 2010). Bi-annual national examinations for the certification of energy management professionals organised by the BEE have indeed allowed certifying about 8000 energy managers and auditors. Overall, the need for information and awareness raising campaigns targeted to energy-end users and focused on the ESCO concept has however not yet been sufficiently recognized by policy makers. This is also the case for information and training campaigns related to suitable energy savings M&V methodologies that can be used by ESCOs. Despite some initiatives undertaken by the AEEE can be highlighted, resources so far spent in this area appear quite scarce. Another important aspect to be highlighted relates to the possibility of creating databases with information on energy consumption and energy audits of buildings. Initiatives going in this direction would surely serve to increase awareness on energy efficiency investments opportunities both on the ESCOs' side and on the demand side. Mandatory audits have been enforced by the BEE under the Energy Conservation Act and surely represent a very good starting point. However this activity could probably have been better exploited to create instruments that can inform ESCOs about the existing investment opportunities. Finally, it is worth mentioning that information and awareness raising programmes for banks are also an important leverage to the ESCO market. The capacity-building program for banks and lenders funded by the BEE in cooperation with HSBC Bank and focusing on energy performance contracting has certainly been a very useful initiative in this respect (Wang et. al, 2013).

Financing

The lack of clients' willingness to search for third party financing registered especially in case of small projects represents an important barrier to the development of a market of small and medium size ESCOs. There is a need for specific bank products dedicated to energy efficiency projects of small size and the large amount of collaterals required by banks is often a significant obstacle to the funding this market segment. However, the Small Industries Development Bank of India (SIDBI) has had some success in the market of SME e.g. by bundling loans with small grants. Another interesting line of credit for SMEs is provided by the German Development Bank KfW requiring a minimum of 20% of energy saving per unit of investment. KfW has provided the SIDBI with a dedicated credit line of about USD 65 million and has even provided the SIDBI with technical assistance in order to identify suitable micro, small and medium enterprises that could be financed for the implementation of these types of energy efficiency projects. Another potentially useful ESCO financing option is the venture capital fund for energy efficiency (VCFEE). This fund represents in principle an interesting example of public sector equity fund dedicated to energy efficiency in India. However its design was not yet finalized as of June 2012 and the possibility that it can raise matching funds from private investors remains a big challenge. Finally it is interesting to observe that energy efficiency projects have been also financed by utilities billing mechanisms⁶³ in India. These initiatives may usefully serve to provide energy end-users with the amount of capital needed to trigger ESCO projects implementation.

Barriers

Experts generally agree that existing policy instruments supporting the ESCO market development in India are weak (JRC, 2013). Although several measures and mechanisms for the stimulation of energy efficiency improvements have been implemented, the number of policy instruments targeting ESCO directly is judged as quite low. Bureaucracy is another relevant obstacle to the application of the ESCO concept that has also not yet been fully recognized and accepted by financial institutions. Interesting financing instruments have been designed for the support of the ESCO market but some of them have not yet been fully implemented or exploited. The high transaction costs are another important barrier to the implementation of projects of small size. This sector has a huge potential, but policy instruments to overcome this barrier are definitely needed together with a cadre of vendors who are willing to work in the SME sector. The low credibility of ESCOs and the fact that potential customers often prefer to implement energy efficiency projects by themselves should probably serve as a stimulus for the government to implement further and more stringent ESCO accreditation systems. An important area of improvement for a wider application of the ESCO concept is finally represented by the ESCOs capacity to adopt and apply proper methods for energy saving M&V. However, it has also to be mentioned that, given the modest level of ESCO market development, simpler instruments compared to energy performance contracts are probably needed in India. Complexities and costs associated with energy saving M&V may in some circumstances discourage energy end-users to implement projects, discourage potential energy efficiency service providers to take the financial and/or technical risks linked to energy efficiency investments and discourage financial institutions to provide the economic support possibly needed. The availability of a larger variety of contractual solutions, including simpler standard contract types, could in principle better allow service providers to adapt their offer to customers' needs especially in a country where

⁶³ The utility financing of EE projects through the billing mechanism has been undertaken for the Bangalore Efficient Lighting Program launched by the Bangalore Electricity Supply Company (BESCOM).

SME and small size projects in general represent an important part of the existing energy saving potential.

Conclusions, future expectations

Amidst the not so optimistic energy services market situation in India, the growth in ESCOs revenues being registered in India is a positive sign. A survey performed in 2008 indicates that ESCOs revenues increased at an average annual rate of 95.6% between 2003 and 2007 starting from a base of less than USD 1.02 million (WRI, 2009) and experts declare that a significant revenues' increase rates have been maintained also in the following years (JRC, 2013). Nevertheless this increase is not necessarily an indicator of broader and more sustained market development. At the same time, large ESCOs are not interested in small projects or in SME sector because of the perceived risks associated with the sector and the high transaction costs during project development and execution. The number of ESCOs actually implementing EPCs is relatively small and ESCOs of small and medium size meet a lot of difficulties in entering the market because of higher impediments in accessing financing and because of the previously mentioned high transaction costs linked to small projects. Most of the market is being made in the industrial sector and most of the active ESCOs are based in the big cities around big industrial sites (e.g. Delhi, Hyderabad, Bangalore, Mumbai, Pune, Chennai, etc.). These ESCOs are typically big ESCOs which face no market competition during their daily business because, among other things, companies willing to enter the ESCO business are not so numerous given the obstacles to profit making existing in this sector. Financial instruments stimulating the bundling of small projects and focused on small and medium size ESCOs would certainly be beneficial for development of a more competitive ESCO market. The government has designed and implemented potentially interesting and effective policy instruments to stimulate this market. Nevertheless the lack of clarity concerning what an ESCO is and what kind of services it should provide does not often make it easy to efficiently use the government's supports available. Apparently, the ESCO market in India is still at a preliminary development stage and important steps need to be undertaken in order to understand and prove the effectiveness of the ESCO concept. Suitable contract models and M&V methodologies have to be developed and adopted to reduce investment financial and technical risks while increasing ESCOs' credibility to potential customers. At the same time an intensification of training activities for ESCOs' experts and more government investments on information and awareness rising would certainly facilitate the exploitation of the huge market potentials existing in this country.

<p>Key drivers</p> <ul style="list-style-type: none"> - Increase in the energy demand - High and volatile energy prices - Supportive actions by the government and international donors - Huge economic energy saving potential
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Number of ESCOs	114 ESCOs accredited as of 2012 (Langlois & Hansen, 2012)
ESCO market size and potential	Market size around USD 140 million in 2012. Market potential estimated around USD 2.8 billion (Langlois & Hansen, 2012).
ESCO market trend	Significant growth
ESCO association	Alliance for Energy Efficient Economy (AEEE) launched in 2007; Energy Efficiency Services Limited (EESL) created in 2009.

Typical ESCO projects	Projects implemented in the industry and public sectors. Technologies and field of applications addressed: efficient lighting and pumping systems, efficient heating and cooling systems, efficient buildings and equipment in general.
Main type of contract	ESCOs stipulating EPCs prefer EPCs with guaranteed savings.

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ESCO market in Indonesia 2013

Indonesia is the country of South East Asia with the lowest ESCO capacity, as measured in terms of number of ESCOs operating over the national territory (RexCapitalAsia, 2011). Nevertheless its energy efficiency market potential is estimated to be the highest in this region (Langlois & Hansen, 2012). The industrial sector alone is supposed to be capable of generating 78% of this potential, while the commercial sector covers the remaining 22% in the experts' estimates (RexCapitalAsia, 2011). This country has seen an increasing in energy intensity since 1996, despite its government's efforts to improve energy efficiency (Wang et al., 2013). The first state-owned ESCO was established in 1986 and was expected to take a leading role in the provision of energy services in the industrial sector in particular (APEREC, 2011). However a proper ESCO market development has been practically absent since then. The heavy state's subsidies applied to oil and electricity have probably to be put in close relation to the lack of state's funding for energy efficiency projects and have determined a marked lowering of energy prices together with a scarce interest towards the improvement of the energy efficiency of the economy. Moreover banks and financial institutes in Indonesia remains not fully convinced of the profitability of the investments on ESCOs projects.

Current size, trends and features of the market

The ESCO business is very limited in Indonesia and it is not possible to provide an estimate of the current ESCO market volume. The number of active ESCOs is 16 and includes 4 state-owned companies and 12 private companies⁶⁴. These companies have often energy efficient equipment's manufacturing and installation as core business. Their business typically consists in the installation of simple energy efficient technologies and not in the provision of energy services. Many of them are actually international companies which are present on the territory more because of their own interests than because of an existing demand for their energy services. The average investment per energy efficiency project implemented is presently around USD 2-3 million. There is a general lack of regulations specifically dedicated to ESCOs and there is no ESCOs' accreditation system in Indonesia. Moreover, financial institutes have generally still quite scarce knowledge of energy performance contracts and are rather unwilling either to finance energy efficiency projects or to accept the energy savings generated by projects as their funding's collateral. The few existing companies providing energy services have limited experience on ESCOs projects and the only ESCO association existing in Indonesia (Apkenindo) was established just in the first quarter of 2011. Its main objective is the promotion of strategic alliances among ESCOs, financing institutes and energy efficient equipment manufacturers. It also aims at creating a special fund dedicated to ESCO investments and to define a financing mechanism to bundle small projects and reduce their associated transaction costs. The provision of technical assistance and the promotion of the results achieved by ESCOs are other objectives of this association.

Types of projects

As mentioned, most of the ESCO projects are being implemented in the industrial sector. Often they consist in the installation of single technologies, like variable speed drives, automation systems, efficient refrigerators, process chillers. More complex solutions and technologies like CHP plants or combined cycle power plants are rarely addressed. Expertise of existing companies acting as ESCOs appear also generally focused on efficient lighting systems and HVAC retrofits, installation of

⁶⁴ Information available do not allow to establish whether all of these ESCO can stipulate energy performance contracts (EPCs).

building control systems, efficient motors and boilers, efficient energy generation (e.g. distributed generation), thermal storage and load shaping, improvement of industrial processes (e.g. compressed air systems). Pilot projects on power generation from waste heat and water recovery are currently under preparation by some Apkenindo associates (Priyanto, 2013). It may be worth mentioning that the government is currently expanding its natural gas pipeline in big cities like Jakarta and that this activity has stimulated the interest of several hotels' and hospitals' owners in the installation of absorption chillers and small CHP systems. These solutions are being financially supported by the government for the part related to feasibility studies and impact assessment and can potentially stimulate the activities of ESCOs providing energy performance guarantee for the solutions installed.

Regulatory factors

The Indonesian government aims to reduce its energy intensity by 1% per year up to 2025 and to achieve a reduction in its total primary energy supply by 41% in 2025 compared to business as usual forecasts. These objectives have been respectively established in its National Energy Conservation Master Plan of 2005 and in its National Energy Management Blueprint of 2006. A presidential regulation regarding the national energy policy has been also published in 2006 and has set the goal of taking the ratio between the total primary energy supply variation rate and the GDP variation rate below 1 by 2025. A long series of energy efficiency improvement measures have been implemented to achieve these objectives. Measures supposed to more directly affect ESCOs activities consist a) in a mandate to implement best practices on energy saving measures in government buildings and to periodically report their monthly energy consumption; b) in the institution of a public-private partnership program whereby government-funded energy audits are made available for industries and commercial buildings to implement identified energy efficiency improvement measures; c) in the participation in the ASEAN energy award program for the implementation of energy conservation best practices in buildings and industries. An Education and Training Centre for Electricity and New Renewable Energy has been also created by the Ministry of Energy and Mineral Resources to train and accrediting energy managers and government officials responsible for energy saving measures implementation and energy consumption reporting. A government regulation issued in November 2009⁶⁵ imposes the appointment of an energy manager, an energy audit and the implementation of the energy saving measures identified at energy end-users consuming more than 6,000 toe of primary energy per year. Moreover the regulation n. 36/2005 sets energy performance standards for air conditioning, lighting systems and envelopes of commercial and residential buildings (APEREC, 2011)⁶⁶. Although not directly targeting ESCO activities, the 2010 government's regulation raising by 18% the electricity prices to industry and supposed to be soon applied also to commercial buildings' owners will probably have a positive impact on the ESCOs' business (Langlois & Hansen, 2012).

Market factors

As mentioned, the very low energy prices represent a strong disincentive to ESCO project implementation despite the important energy saving potential existing in Indonesia. The scarce understanding of the ESCO concept makes banks and financial institutes unwilling to support this type of business. Distrust is then another disincentive for ESCOs' investment in the public sector, as ESCOs have often to face considerable risks of not being paid or risks related to the inobservance of contractual agreements by public clients (Langlois & Hansen, 2012). The exemplary role of public

⁶⁵ Governmental Regulation No. 70/2009 regarding Energy Conservation.

⁶⁶ This regulation has been so far implemented only on a voluntary basis.

administrations in the stimulation of energy efficiency investments does not seem to be very well played in Indonesia. On the other hand, ESCOs tend to stipulate contracts that are more similar to traditional sale contracts without any specific clause covering the technologies' post implementation phase or the verification of the energy performances achieved. EPCs with energy performance guarantees are the only example of EPCs that has been so far stipulated, because EPCs with shared savings are practically not existent in this country. There is a general need for the definition and the acceptance of an ESCO model that can be re-recognized and/or applied by all the stakeholders involved in the ESCO business. The creation of standardized contracts and standardized methods for energy saving measurement and verification is another important step to be made to create the suitable conditions for ESCO market development. Moreover these initiatives should be duly supported and their effectiveness should be demonstrated to all the market actors involved by implementing a higher number of pilot projects.

Information, awareness and demonstration

Energy Efficiency and Conservation Clearing House Indonesia (EECCHI) is the main information platform on activities undertaken in the field of energy efficiency and energy conservation in Indonesia. Its website⁶⁷ provides information on existing competitions on energy efficiency, capacity building courses for energy managers and auditors, existing building codes, etc.. Awareness raising on energy efficiency activities is promoted by the Ministry of Energy and Mineral Resources, by state-owned electricity companies (e.g. PLN) and by the Agency for the Assessment and the Application of Technology (BPPT). Despite energy efficiency projects are widely promoted, the information available on existing ESCOs and related activities remain however very scarce. The situation is slightly improving thanks to the recently created ESCO association Apkenindo⁶⁸. Also the recently launched Green Building Certification program named "Green Ship" could in principle become a useful platform for information exchange on ESCO activities.

Financing

Until recent years, the Indonesia government had not yet implemented any tax scheme or low-interest loans to promote energy efficiency investments and the ESCOs business (APEREC, 2011). The introduction of financing instruments for ESCOs is generally still at an embryonic level and only some potentially interesting attempts can be highlighted. For example, some attempts to introduce project financing are being made by the Asian Development Bank (ADB) via the export-import bank Eximbank (Yasuko & Lykou, 2012). The ESCO association Apkenindo is then studying the possibility of creating a finance guarantee program whereby the International Finance Corporation (IFC) and the Global Environment Facility (GEF) would provide grants that could be used by local financial institutions as a guarantee for loans supplied to ESCO. Bilateral and multilateral co-operations with energy agencies of foreign countries (e.g. in Denmark or in the Netherlands) or with international organizations (e.g. UNIDO) have been realized in order to design and implement energy efficiency projects financing schemes. Nevertheless, the ESCO concept and the tools needed for its implementation remains generally not familiar to Indonesian market actors and financing institutes that continue to not participate in these types of business and do not take the risks of providing financing based on energy saving generation guarantees. Existing contractual frameworks need to be adapted and standard contract models and methodologies for energy saving evaluations need to be adopted before these institutes can be convinced to participate in the ESCO business. The mutual distrust existing between the public and the private sector in Indonesia is another important obstacle to the adoption of financing schemes that could allow exploiting the important market

⁶⁷ See this website at <http://www.energyefficiencyindonesia.info/>

⁶⁸ See the ESCO association website at <http://www.apkenindo.com/index.html>

potential associated to public administrations. The creation of secured repayment mechanisms (e.g. retention or escrow accounts) is seen by some experts as a useful approach to overcome this problem (Langlois & Hansen, 2012).

Barriers

Several barriers to the ESCO market development in Indonesia have been already described in the previous sections. Besides barriers due to the lack of incentives by the government, the absence of an ESCO model widely recognized and accepted by the main market actors, the absence of standard contract models and energy saving M&V methodologies, the mistrust in the ESCO business model by financing institutes, the presence of the following obstacles to ESCO market development in the private and in the public sector can also be pointed out. Large private energy end-users give generally low priority to energy efficiency investments because of the relatively low energy prices and because managers are not yet fully convinced of energy efficiency benefits. Moreover the concept of energy performance contracting is still relatively new and quite unknown in Indonesia and private companies' executives often just see energy efficiency investments as an additional debt in their balance sheets. In the public sector ESCO projects implementation is made more complicated by restrictive procurement rules based on the selection of the lowest offer and on the publication of two different bids for the part related to project designing and for the part related to project implementation. The employment of capital budget to reduce operating costs is still difficult to be achieved in the public sector and, last but not least, banks and private companies do not generally like to work with public administrations.

Conclusions, future expectations

The economic growth rate of Indonesia has been the second-highest rate in the group of G-20 economies during the first semester of 2013 and its potential energy efficiency market volume in the industrial and in the commercial sector is estimated to be around USD 4 billion, the largest potential market in the countries of South East Asia. So far the government interest seems to have been mainly focused on subsidising energy consumption and this policy approach has very probably plaid a role in making Indonesia the country with the lowest ESCO capacity in this geographical area.

Despite the basic policy and market instruments needed to build trust in the ESCO market are not yet or have just recently been implemented, it is not unlikely that significant progresses will be registered in the next years. This thesis can be somehow supported based on a series of measures that will be implemented during the next one-two years. These measures will most probably include a regulation for the stimulation of the ESCO industry, the establishment of a body for ESCOs' accreditation, the issuing of a Central Bank decree on energy efficiency projects financing, the creation of an energy efficiency trust fund, the implementation of demand side management programs and the implementation of a series of actions to inform and raise awareness on energy efficiency investment opportunities (Priyanto, 2013).

Key drivers

- highly subsidized energy prices have dampened ESCO market development
- the regulatory framework has not yet or has only recently provided the basic instruments needed for a proper ESCO market operation
- financing of ESCO projects by financial institutes has been very scarce

Number of ESCOs	16 (4 state-owned companies a+ 12 private companies)
ESCO market size and potential	No information available on current ESCO market size. The estimated energy efficiency market potential is around USD 4 billion (Langlois & Hansen, 2012)
ESCO market trend	Few ESCO activities. Probable ESCO activity intensification following the policy measures that will be implemented in 1-2 years (Priyanto, 2013)
ESCO association	Apkenindo
Typical ESCO projects	ESCO projects mainly implemented in the industrial sector and often consisting in the installation of single technologies, like variable speed drives, automation systems, efficient refrigerators, process chillers.
Main type of contract	EPCs with energy performance guarantees are the only EPC type so far stipulated. ESCOs tend to stipulate contracts that are more similar to traditional sale contracts for the sale and installation of energy efficient equipment.

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ESCO market in Japan 2013

The ESCO industry started officially in Japan with the establishment of the ESCO advisory committee by the Ministry of International Trade and Industry (MITI) in 1996. This industry grew markedly up to 2003 thanks to government supports. The market volume generated by projects implemented by ESCOs either for the provision of energy services (consisting in installation, operation and maintenance of energy plants plus possible energy supply), or for the generation of energy by end-users, or for the implementation of other energy efficiency projects under energy performance contracts could exceed USD 310 million in 2003 (JAESCO & Jyuri, 2013). The yearly market volume increase stopped after this year and the size of ESCO investments started oscillating achieving another maximum in 2007 (USD 356 million). The lowest market volume was registered in 2009 (USD 101 million) mainly because of the financial crisis and the following economic recession. Investments started raising again after 2009 and the market volume achieved about USD 370 million in 2011 mostly thanks to a significant increase in the provision of energy services supplied without energy performance contracts in the industrial and commercial sectors (NEDO & Jyuri, 2013). After the earthquake of March 11, 2011 and the following nuclear power plants accidents, the government ordered large facilities served by power companies affected by the accidents to reduce their peak weekday electricity consumption and urged people to save energy. This situation of electricity scarcity, however, has not stimulated a lot of additional activity in the ESCO market compared to the previous years (Langlois & Hansen 2012).

Current size, trends and features of the market

The most recent quantitative information available on the characteristics of the Japanese ESCO market dates back to 2011. Experts interviewed by a survey performed by the JRC between 2012 and 2013 mentioned that the number of ESCOs operating on this market was between 20 and 30 in 2011 and that this number has not changed significantly during the previous 10 years. According to the interviewees, these ESCOs are mainly local/national companies as it is not very easy for foreign companies to start a business in Japan. All of these ESCOs come from the private sector and do not mostly have the provision of energy services as a core business. They are mainly building manufacturers, facility management and operation companies, consulting/engineering firms, equipment manufacturers and suppliers or companies having energy supply as main business. These market actors basically cover all the stages of the energy service value chain by providing information and advice on energy efficiency investment opportunities, performing energy audits, implementing energy efficiency measures, taking care of optimisation and operation of implemented solutions as well as of energy saving measurement and verification. JAESCO is the main association of Energy Service Companies in Japan. It counts 102 members, most of which are large companies and utilities active on the Japanese market. The ESCO market has so far developed in the commercial⁶⁹ and the industrial sector with the commercial sector representing about 47.4% of the total ESCO market volume in 2011. Energy performance contracts (EPCs) have been stipulated particularly in the commercial sector. In 2011, EPCs stipulated in the commercial sector represented about 43% of the total ESCO market volume with 26.7% of the market volume being generated by EPCs with shared savings and 16.2% by EPCs with guaranteed savings. Only 7.6% of the total market volume could instead be generated by EPCs stipulated in the industrial sector with 5.5% of the total volume related to EPCs with shared savings and 2.1% with guaranteed savings (JAESCO & Jyuri, 2013). EPCs with guaranteed savings seem however to be the most widely adopted contract type. Out of the 214 ESCO projects totally implemented in Japan in 2011, 159 were indeed realised by

⁶⁹ Statistics available put public offices, public hospitals, schools and universities under the commercial sector.

stipulating EPCs with guaranteed savings. Investments for single projects so far implemented have been largely higher in case of projects related to the provision of energy services including energy supply and facilities operation and maintenance (about USD 17.7 million were invested on average per each of these projects, whereas just USD 1.7 million were invested on average for each project implemented by EPCs in 2011). However most of the energy savings generated between 1998 and 2011 by ESCO projects comes from projects implemented under EPCs. The amount of annual energy savings generated by these projects has increased constantly during this period and achieved the level of 25,800 TJ saved in 2011. Overall, energy savings generated in the industrial sector in this time span represented 65% of the total (4% having been achieved by EPCs with guaranteed savings and 55% by EPCs with shared savings). In case of energy savings generated by ESCOs' projects in the commercial sector (i.e. 35% of the total savings), EPCs with guaranteed savings generated 14% of the total savings obtained between 1998 and 2011, whereas EPCs with shared savings were responsible for 18% of these savings. The cost of energy savings generated between 2002 and 2012 has ranged between 0.35 USD cents/MJ in case of EPCs with shared savings implemented in the industrial sector to 0.95⁷⁰USD cents/MJ in case of EPCs with shared savings implemented in the commercial sector. EPCs with guaranteed savings have had a duration of about 5 years, whereas EPCs with shared savings have lasted on average for about 10 years. In case of contracts other than EPCs, the contract duration has ranged instead between 12 and 14 years. The simple payback periods of investments has ranged on average between 5 and 9 years for ESCOs projects implemented under EPCs (JAESCO & Jyuri, 2013).

Types of projects

The Japanese ESCO market does not seem to be very well developed in the school sector (primary and secondary schools, universities) and is practically not existent in the residential sector. On the contrary it seems to have already achieved a satisfactory level in the demand sectors of local administration, health, hotels, offices, retail and industry.

Technologies and field of applications for ESCOs projects implemented in the commercial sector relate mainly to energy efficient air conditioning, heating, lighting and electric equipment, building management systems, energy demand controllers. The installation of fan and pump inverters for air conditioning seem to represent by far the preferred energy efficient solution installed by ESCOs projects in this sector in the period between 2002 and 2011. Energy efficient chillers, inverters for lighting systems and systems for buildings energy management and demand control represent the other measures more often installed. When it comes to the industrial sector, the installation of co-generation plants is the measure mostly preferred. This measure is then followed by the installation of inverter controls for air conditioning, efficient chillers, inverters for lighting systems and LED in the ranking of the most preferred technologies. Statistics available indicate that the ESCOs projects requiring the largest investments in the commercial sector have been so far implemented for schools and universities, hospitals and buildings dedicated to exhibitions. Public offices have prevailed over private ones, whereas private hospitals have prevailed over public ones in terms of investments required for each of the projects so far implemented in this sector. Most of the energy savings so far generated in the commercial sector have come from measures implemented for halls and exhibitions in buildings and in the demand sectors connected to sports and leisure activities or represented by hospitals and hotels.

⁷⁰ In case of contracts different from EPCs, this cost has ranged between the 1.31 USD cents/MJ registered for projects implemented in the commercial sector and the 1.95 USD cents/MJ registered for projects implemented in the industrial sector.

Regulatory factors

As already mentioned, ESCOs have been promoted by the Japanese government at least as of 1996. Besides ESCOs market promotion, a series of measures and regulations have been put in place to stimulate energy efficiency improvements. Although these measures do not directly target ESCOs they can be considered as indirectly stimulating the ESCO market.

A law concerning the rational use of energy (the Energy Conservation Act) has been put in place in 1979 and has been revised many times since then. This law has allowed achieving very important energy consumption reduction targets in the industry sector as well as in the building and in the transport sector. It obliges big factories and buildings owners to appoint an energy manager, to periodically report about their energy consumption and to submit energy plans. It also provides specific criteria for energy efficiency improvement in factories, buildings and equipment. Moreover it has adopted the Top Runner program as of 1998 in order to further stimulate the improvement of the energy efficiency of products installed in the residential and commercial sectors. Obligations for energy suppliers and equipment retailers to inform about and promote energy efficiency have been also progressively included in the Act. As of 2006, it has imposed obligations in the sector of freight and person transportation and has reinforced existing measures addressing the residential sector as of 2009 (Shiel et al., 2011). The Energy Conservation Act has been underpinned by a loan programme with special interest rates for enterprises undertaking energy efficiency improvement actions. Tax exemptions and special depreciations for SMEs purchasing energy efficient equipment for their activities have been also implemented together with a wide range of subsidies on energy efficiency destined to a large spectrum of market actors, from large enterprises to individual households. Important additional and more aggressive initiatives have been undertaken at the local level, for example by the Tokyo Metropolitan Government (TMG), to deal with energy conservation. The TMG has implemented a cap and trade program, a program for energy efficient buildings and a program for the reduction of CO₂ emissions by cars and transportation means with the overall aim of reducing by 25% its GHG emissions by 2020 compared to 1990.

All these measures are proving very effective in stimulating energy efficiency improvement and the ESCO market. This is also confirmed by the answers of some experts in the field (see JRC survey 2013). These experts indicated energy saving obligations, financial incentives, taxation rules and changes in public procurement rules as the most effective policy measures to stimulate the ESCO market in Japan.

Market factors

During the initial phase of the ESCO industry, EPCs with guaranteed savings were the most preferred contract option in Japan. Nevertheless the volatility of the fuel price has induced a significant change as of 2001 and has made EPCs with shared savings the preferred option for energy performance contracts until 2005. The significant crude oil prices increase registered in 2004 and 2005⁷¹ resulted in a marked increase of ESCOs' activity in the following years until the end of 2007, but the important energy price variations observed made it difficult to establish contracts based on energy price predictions. On the other hand, contracts for energy service provision (including energy supply and facilities operation and maintenance) started to be applied as of 2005, although representing a minor part of the ESCO market volume up to the most recent years. Overall, the experience so far matured in Japan seems to prove the need for a differentiated business model for companies

⁷¹ Crude oil prices went up from USD 20.8/bbl to USD 54.8/bbl from January 2004 to December 2005 (Langlois & Hansen, 2012). Considering that the energy content of 1 barrel of crude oil is approximately 6.1 GJ, these prices correspond to approximately USD cents 0.34/MJ and USD cents 0.90/MJ respectively.

addressing this market. Besides net economic savings deriving from energy savings, which represent the main driver of the ESCO market, additional factors stimulating ESCOs demand seem to be represented by the possibility of transferring equipment maintenance risks to ESCOs, the enhancement of security towards possible blackouts, the outsourcing of energy supply, reduction of the company assets' size, the opportunities to reduce operation and maintenance costs.

Information, awareness and demonstration

A series of national information campaigns has been promoted by the Japanese government through a project launched in 2005 to increase public awareness about energy efficiency improvement benefits⁷². Some of the campaigns launched under this project were the so-called Cool Biz and Warm Biz (advising people to reduce air conditioning and heating supply by better adapting their clothes to climate conditions), the Uchi-Eco (advising to buy local food and more environmental friendly products), the Energy Conservation Promotion through the year (whereby the government declared the first day of every month as the "energy conservation day", February as the "energy conservation month", the first day of August and December as the "general check-up day for energy conservation"). This project evolved into the Challenge 25 Campaign in 2010. In addition to these initiatives, the ESCO association JAESCO carries out a certain number of activities to increase awareness in the public concerning the benefits linked to ESCO projects. These activities include the organisation of an annual conference, the publication of newsletters and information on a dedicated website, the organisation of exhibitions within national fairs providing ESCOs with opportunities for information exchange.

Financing

Loan programmes with special interest rates for enterprises undertaking energy efficiency improvement actions, tax exemptions and special depreciations for SMEs purchasing energy efficient equipment and subsidies on energy efficiency are important policy instruments in place in Japan that can facilitate ESCO investments. ESCOs projects are typically implemented thanks to client internal funds and financial leases by commercial banks. Sometime ESCOs finance their projects with own capital (equity and corporate debts). This allows more flexibility and swiftness in project development, but increase credit exposure risks. Some ESCOs team up with financial institutions (e.g. leasing companies) to facilitate financing.

Barriers

Indications concerning existing barriers to the ESCOs market have been mainly derived by national experts' interviews performed by the JRC survey performed between 2012 and 2013. The present bad economic conditions and the consequent clients' potential insolvency are indicated as one of the main barriers presently impeding further ESCO market development in Japan. On the regulatory side, complexity and scarce adaptability of public procurement rules and ESCO projects' incompatibility with existing contractual regulations and definitions are mentioned as important obstacles to the ESCOs business. Authorities and regulators seem sometime still unable to understand the nature of energy services and their difference from goods' sales. Mistrust among ESCOs' client generated by the risk that energy efficiency improvement actions may negatively affect companies' business, the aversion to outsource energy management and to stipulate long term energy service contracts seem also to hinder ESCO market development. Potential clients appear also to generally give low priority to energy efficiency improvement investments. Moreover lack of consumption data is indicated as one of the factors not allowing to establish reliable consumption

⁷² The name of this project was "Team Minus 6" (Shiel et al. 2011)

baseline and to accurately estimate existing potential energy savings. The absence of suitable financing portfolios by commercial banks is indicated as an important financial barrier to ESCO investments. High transaction costs and the small project size of the implementable projects are finally mentioned as another relevant obstacle to the exploitation of an important part of the energy saving potential existing in the commercial and in the residential sector.

Conclusions, future expectations

All in all, the ESCO market situation in the last two-three years has not developed significantly compared to the period 2008-2010 in Japan. Some experts indicate that this market is going through a period of stagnation. The earthquake of March 2011 has put the Japanese government under pressure. Although the present situation can potentially determine a favourable push for the ESCOs' business, no concrete actions of market stimulation have been so far undertaken at the policy level. The current economic crisis and the energy prices' volatility have probably had a part in determining this lack of reactivity. According to some of the experts interviewed, a wider adoption of energy supplier obligations and emission trading systems could stimulate energy efficiency improvement actions implementation at energy end-users and ESCO activities could benefit from them. The public sector has still important and not yet fully exploited potentialities. A simplification of public procurement rules together with measures facilitating the adoption of ESCO contracts in the public sector are seen as very important measures to be undertaken to allow an expansion of the ESCO industry in the future.

Key drivers	
-	The Energy Conservation Act
-	Loan programmes, tax exemptions and subsidies in place for end-users implementing energy efficiency improvement actions
-	Future energy prices
-	Energy market situation following the earthquake of March 2011
-	Information campaigns and wider application of energy supplier obligations

Number of ESCOs	Between 20 and 30
ESCO market size and potential	Market Size: USD 374 million in 2011. ESCO market potential estimated at more than USD 20 billion in 2011 (JAESCO & Jyuri).
ESCO market trend	Stagnation.
ESCO association	JAESCO (113 members, mostly large utilities and ESCOs in 2013)
Typical ESCO projects	Projects related to energy efficient air conditioning, heating, lighting, electric equipment, building management systems and energy demand controllers. Installation of co-generation plants, air conditioning and efficient lighting systems in the industrial sector. Energy Services for the provision of energy supply and facilities operation and maintenance in the commercial and industry sector
Main type of contract	EPCs with shared savings (minority of stipulated EPCs in 2011) and with guaranteed savings (majority of EPCs). Contracts for the provisions of energy services including energy supply and facilities' maintenance and operation.

Information in this chapter was based on the following source:

Japan Association of Energy Service Companies (JAESCO) and Jyukankyo Research Institute (Jyuri), 2013. ESCO Market Survey. August 2013.

Joint Research Centre, 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Langlois, P., Hansen, S. J., 2012. World ESCO Outlook. The Fairmont Press. ISBN 0-88173-675-9

Leaver, L., 2013. Decomposition of ESCO market potential. A look at energy expenses and Market Opportunities. Presentation held at APEC – Cooperative Energy Efficiency Design for Sustainability (CEEDS) workshop on the promotion of ESCOs, Taipei, 26 March 2013.

Shiel, P., Jeffers, N., Dyar, M., 2011. Energy Conservation Measures in Japan. Trinity College, Dublin. Report Available at <http://transatlanticenergyefficiency.eu/sites/default/files/Energy%20Conservation%20Measures%20Japan%20R4%20PS%20Jan%2024-1.pdf>

ESCO market in Kazakhstan 2013

The ESCO market in Kazakhstan is not yet developed. Low energy prices along with lack of metering of energy consumption are serious barriers to EE investments.

Current ESCO market

There is no ESCO in operation in Kazakhstan apart from the private ESCO in Karaganda established in 2009 by the privately owned company Ergonomics LLP with the support from UNDP and Karaganda. In the framework of the UNDP/GEF Project “Removing of Barriers to Energy Efficiency in Municipal Heat and Hot water Supply” This company has implemented demonstration energy saving projects in residential multi-apartments buildings in Karaganda. (Jamet 2012)

The ESCO in Karaganda specializes in heat energy savings in residential apartments in the Karaganda region connected to the district heating system. The core of the projects involves the replacement the elevator thermal units with Automated Thermal Units (ATU) which results in average energy savings of 15-25% to the consumers. The ESCO implements the full cycle of such projects, including the design of the thermal units, equipment installation and maintenance. (Belyi et al. 2013)

Types of ESCO projects

The ESCO in Karaganda has concluded an energy performance contract with the Association of Apartments Owners (AAO) for the pilot buildings in Karaganda, in which the AAO has paid the ESCO company for the installed equipment (ATU) and for the related services from the achieved savings. The cost of the heat energy based on metered data has to be paid directly to KaragandaZhyluSbyt, the heat supply company. (Belyi et al. 2013)

The proposed business model based on the ESCO concept has been not implemented in the public buildings in Karaganda due to postponement of adaptation of the “Law on Energy Conservation and Energy Efficiency” as well as of the absence of energy performance contracts in it, (Alexander Belyi et al.2013)

Regulatory factors

The “Law on Energy Conservation and Energy Efficiency” (No. 541-IV) was adopted in January 2012. This Law replaced the first Law on Energy Savings adopted in 1997. The Law includes provisions for (Ministry of industry and new technologies of the Republic of Kazakhstan 2012):

- General requirements for energy savings and energy efficiency improvement for reconstruction of existing buildings, use of energy efficient equipment and materials for construction of new buildings and payment for heat energy based on the heat meters;
- Energy management: public entities which consume more than 1500 tons coal equivalent per year shall develop, introduce and organize energy management system pursuant to the international energy standards;
- Energy performance requirements of buildings, structures and facilities;
- Creation of the Public energy register which is comprised of entities consuming at least 1.500 tons of coil equivalents of energy resources, including heat, every year;

- Energy audit: accreditation bodies shall carry out energy audits, including suggested measures for energy efficiency improvement, at the expense of the clients based on concluded contracts. The Public energy register's entities, except for government offices, shall undergo mandatory energy audits at least once every five years.
- The state shall support the establishment of training centres for professionals involved in energy audit and energy efficiency as well as the development and introduction of an energy management system.

The “Law on Energy Conservation and Energy Efficiency” does not include provisions related to energy services or ESCOs, nevertheless the introduction of the energy audit system and energy management may serve as a starting point. Furthermore the establishment of an Energy (Efficiency) Agency, within or outside the Ministry of Energy and Mineral Resources, is being considered and evaluated by the State Energy Supervision Agency within the Ministry. (United Nation Economic Commission for Europe 2013)

In January 2012 the Government of Kazakhstan also adopted the “Comprehensive Energy Efficiency Improvement Plan for 2012-2015”, aiming at increasing the energy efficiency in all sectors and to reduce energy consumption in 2015 by 10% per unit of GDP compared to 2008. The plan prescribes the measures that shall be undertaken in industry, in the residential sector, and in heat generation, electricity production and distribution.

“Kazakhstan aims to develop a new state programme to reduce energy consumption and promote energy efficiency. The programme is called “Energy efficiency 2020”. It aims to achieve a reduction of energy intensity by 10 per cent by 2015 and by 25 per cent in 2020. The programme will incorporate nine areas, among which are energy-efficient enterprises, energy-efficient construction and transport, energy-efficient society as well as the innovative energy sector. A legislative norm for the mandatory reduction of energy consumption in industrial facilities is planned to be introduced. Additionally, the state will provide support for enterprises in the purchase of energy-saving technologies and equipment. The "Energy efficiency 2020" programme is being developed at the initiative of the President of Kazakhstan. “ (United Nation Economic Commission for Europe 2013)

Market factors

The housing sector is one of the largest consumers of heat energy in Kazakhstan, being responsible for 40% of the produced heat energy. The residential building stock is mainly composed of multifamily buildings, connected to district heating from boiler houses or cogeneration plants. Some buildings need 15-30% more heat than average buildings with normal thermal insulation. (Jamet 2012)

As a result of economic growth and the housing development policy of the government In the last decade, construction of new buildings rapidly increased and the need for heat energy has grown. According to the estimation of the government, the share of the energy consumed by the building sector will double by 2016. To compensate for the increasing energy demand investments in new cogeneration plants as well as an improvement of the existing district heating system and network are necessary. Based on the results of the ESCO pilot projects in Karaganda, energy performance contracting could contribute to this need for development in heat supply.

Information, awareness and demonstration

After realization of the ESCO pilot projects in Karaganda, the UNDP conducted a survey. The key lessons learnt during the implementation of the pilot project in Karaganda are as follows (Alexander Belyi et al. 2013):

- The extent of the time needed for the EPC to be approved by all the stakeholders including the AAO, the City of Karaganda, the heat supply company and the ARNM (Agency for Regulation and Natural Monopolies) was too long. The initial template was not approved by stakeholders mainly because the ARNM did not agree with the ESCO business model suggested under the EPC.
- Heat consumption based on meters was misunderstood by the apartment owners because the payment for heat in colder months was usually higher by 20% than the average payment had been before (based on communal heat price). The management organization of the AAO with the ESCO must inform the owners about the conditions of EPC and benefits of the energy services activities.
- Heat cost savings during the heating season of the first demonstration project were low (approximately 10 to 12 % of the baseline), which could be associated with inadequate tariff policy and heat payment system in force in Kazakhstan, and particularly in Karaganda.
- ESCOs had difficulties in marketing their services to the apartment owners.
- Apartment owners complained about indoor temperatures. Before the implementation of energy-savings measures, these owners used to the indoor temperature of 25^oC or higher. Therefore, they were uncomfortable with indoor temperatures of 20^oC, which is required by current norms.

Financing ESCO projects

Most of the energy efficiency projects in Kazakhstan (targeted mainly to the heat supply sector) have been implemented through International Institutions, such as the EBRD, the GEF, UNDP, Clean Technology Fund etc. They provide financing for projects in the form of grants, credit lines or guarantees, while there are no nationally funded special energy efficiency funds that could support energy efficiency projects (including ESCOs). Another problem is that commercial banks in Kazakhstan do not provide credit lines for EE and ESCOs because such projects would require long term financing (more than 5 years).

The EBRD launched the Sustainable Energy Financing Facility (KAZSEFF) in 2008, providing credit lines and technical assistance for private enterprises for the implementation of energy efficiency projects (75 million USD). In the first phase of the programme training of bank staff has also been organized.

Barriers

The barriers for the development of the ESCO market in Kazakhstan include the following point:

- Lack of secondary legislation for energy services and ESCOs;
- Lack of specialized EE agency, which would be responsible for the development, implementation and monitoring of and which could overtake the coordination EE activities in the country;
- Lack of national financial mechanisms for financing of EE projects;
- Low prices for heat energy. The prices are socially tailored and do not cover the production costs;
- Abundance of conventional energy sources that limits motivation for energy efficiency improvement;
- Low penetration of metering in residential and public buildings. Only 10 % of the apartments in Kazakhstan are equipped with heat meter devices. It demotivates the apartment tenants to invest in energy saving measures. Also it is impossible to set the baseline consumption and to measure energy savings without heat meters devices;

- Lack of expert's know-how and skills for preparation, implementation and evaluation of EE projects;
- Lack of information campaigns and dissemination of the results achieved through the implementation of the pilot projects in City of Karaganda;

Conclusions and future expectations

Implementation of the “Law on Energy Conservation and Energy Efficiency” and the development of legislation for energy services and ESCOs are expected to set base for the implementation of EE projects based on the ESCO model. At the same time with support of international organizations the implementation of pilot ESCO projects has started and may be continued in public buildings on the basis of EPC. To kick-start the ESCO market, should be created a national financial mechanism (for example EE Fund) to support the implementation of EE projects.

Possible break-through points

- Effective implementation of the “Law on Energy Conservation and Energy Efficiency”;
- Promotion of the ESCO market by the government through various measures, such as the ESCO law, financing mechanisms, exemplary public building projects;
- Creation of an energy efficiency agency
- Creation of an EE fund;
- Revision of the heat tariffs and rolling out heat metering devices in residential buildings connected to central district heating.
- Increased awareness raising activity for the promotion of pilot project results, such as those in the City of Karaganda

The existing tariffs for heat energy and hot water should be revised by ARNM. They have to be adjusted to cover real production and distribution costs. The government should introduce incentives for the installation of heat meter devices in residential buildings. The experience from the implemented pilot projects in City of Karaganda should be disseminated in other cities and regions in order to motivate other associations of apartment's owners to conclude EPC.

Number of ESCOs	1
ESCO market size and potential	No information
ESCO market trend	On the ground
ESCO association	None
Typical ESCO projects	Improvement of heat supply systems through installation of metering, controlling and regulatory devices, replacement of valves and pipes for heating and hot water system;
Main type of contract	Few EPC with Association of Apartments Owners (AAO)

Information in this chapter was based on the following source:

Bernard, Jamet. 2012 “Condition for Energy Service Company (ESCO) Development in Municipal Heat Sector in Kazakhstan” Final Report for the UNDP Project “Removing of Barriers to Energy Efficiency in Municipal Heat and Hot water Supply”

Alexander, Belyi, Yelena Zadvornyykh, Dimitry Andreyev, and Nataliya Druz. 2013 “Energy Saving Demonstration Zone-Pilot projects to improve the energy efficiency of the heat consumption systems of buildings: ESCO mechanism testing in Karaganda city Republic of Kazakhstan” ISBN 978-601-7313-41-8

United Nation Economic Commission for Europe. 2013 “Development of Energy Service Companies Market and Policies”

http://www.unece.org/fileadmin/DAM/energy/se/pdfs/eneff/publ/Dev_ESCO.pdf

Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Ministry of industry and New Technologies of the Republic of Kazakhstan. 2012. “**Kazakhstan 2012 – 2015 Comprehensive Energy Efficiency Improvement Plan**”

<http://www.mint.gov.kz/index.php?id=408&lang=ru&lang=en>

Ministry of industry and new technologies of the Republic of Kazakhstan. 2012 “Law Concerning energy saving and energy efficiency improvement”

<http://www.mint.gov.kz/index.php?id=276&lang=en>

ESCO market in Malaysia 2013

The merit of having introduced the ESCO concept in Malaysia has probably to be attributed to the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP) initiated in 1999 to improve the rational use of energy in the industrial sector. Before that time some consultancy company or energy efficient equipment supplier provided some energy advice, but their activity could be hardly described in terms of provision of ESCO projects or of energy performance contracts (EPCs) stipulation. The MIEEIP run until the end of 2007 with the aim of overcoming existing barriers to energy efficiency activities in the industries of Malaysia. It received economic and technical support by the Global Environment Facility (GEF) and the United Nations Development Programme (UNDP) and was implemented by the Malaysia Energy Centre (PTM). One of its components was specifically dedicated to support the ESCO concept and led to the formulation of marketing strategies for ESCOs, to the training of local engineering and consultants firms for the integration of energy efficiency in their business and to the drafting of an ESCO accreditation scheme. The MIEEIP team at the PTM managed also to create a tool named Master Energy Services Agreement (MESA) to help ESCOs and their industrial clients to set up the relevant procedures and mutual obligations for projects implementation. This tool was generally supposed to enable local companies to pass from the realization of simple energy audits to the implementation of full services under EPCs. The success of the initiatives undertaken under MIEEIP has however been quite limited. Weaknesses concerning inadequacy do address the project implementation phase have been for example identified in the MESA. Moreover the MIEEIP did not allow ESCOs to gain a wide consensus due to the fact that many involved equipment suppliers presented themselves as ESCOs without providing ESCOs service and to the fact that many planned ESCOs projects were not implemented or failed to impress potential clients from the industry sector (Akker, 2008). A first directory of Malaysian ESCOs registered at the PTM was published in 2003 and counted 28 companies as of December 2007. The number of companies in this list has moderately increased since that time, despite several energy efficiency barriers still hinder a proper development of an ESCO business in this country.

Current size, trends and features of the market

No information are available concerning the current size of the market in Malaysia. While most of the companies registered as ESCO in the country are able to provide energy audits, only a few of them can stipulate proper EPCs. The industrial sector is experiencing a rapid growth and this creates opportunities for energy efficiency improvement services that can be provided by ESCOs. So far several training workshops and building capacities activities for ESCOs have been organised in this country thanks to the assistance of local and foreign experts. However local financing institutes are not very aware about the opportunities offered by the ESCO business and are generally not convinced of the bankability of ESCOs project proposals (IFC, 2011). A new strategy is being currently applied by the Malaysian government to make the ESCO business develop in the public sector in particular. The Malaysian government intends indeed to take the lead and play an exemplary role in the field of energy efficiency projects implementation under ESCO schemes⁷³. The final objective of this strategy is that of implementing ESCO projects by stipulating Energy Performance Contracts (EPCs) with shared savings in at least 25 Malaysian Ministries' headquarters. This objective will be achieved by defining benchmarks and key performance indicators for the buildings of each Ministry, by defining suitable public tender procedures and by setting up a registration and accreditation

⁷³ It may be worth mentioning that the government's leading role in the promotion of ESCOs has been already acknowledged in Malaysia at least since the launch of the Economic Transformation Program by the Malaysia's Prime Minister in October 2010. This program includes indeed the implementation of energy efficiency projects in government's buildings through EPCs under its Entry Point Project n. 9.

scheme for participating ESCOs⁷⁴. The participation of local financial institutes will be supported and assisted by the Ministry of Energy, Green Technology and Water and by the Ministry of Finance. The Energy Commission of Malaysia will be in charge of the ESCO registration and accreditation system and of the promotion of the initiative. Together with the Public Works Department of Malaysia, it will be also responsible for measurement and verification of the final energy performances achieved by Ministries' buildings. Each of the Ministries involved will be supposed to reduce its annual consumption by about 2%, whereas ESCOs implementing energy consumption reduction actions will be supposed to be mostly repaid by the economic savings generated by the EPC projects implemented. In order to stimulate the proactivity of the Ministries involved, a mechanism to link the achievement of the energy saving targets by the various Ministries with career advancements of their personnel is currently under study. Reference energy consumption baselines to establish the absolute energy consumption reduction targets have been already estimated for 2009. Guidelines showing how Ministries can achieve their targets and a suitable ESCO registration system are currently under study in the Energy Commission of Malaysia. Other important aspects to be dealt with are represented by the creation of funds supporting ESCOs investments and by the involvement of local financing institutes e.g. through promotion and education campaigns. Experience gained with ESCO project implementation in Ministries' buildings should then be used to extend this initiative to local government buildings. The Malaysian government would like also to apply a corresponding strategy to promote the EPC concept in the private sector (APEC, 2013). These initiatives and intentions indicate that ESCOs and the ESCO market development have a quite high priority in the energy efficiency policy agenda of Malaysia. However it has to be pointed out that the energy saving targets established for Ministries' buildings do not seem very high and quite complex contracts like EPCs might not represent the best contractual arrangement to implement the simple energy efficiency improvement actions that could be selected to achieve these targets. Also the decision of focusing on EPCs with shared savings appear quite questionable if financing institutes willing to finance the ESCOs implementing the EPCs projects are not identified beforehand. Another point of attention is then represented by the expertise needed in public administrations to implement EPCs. The next years will indicate whether the approach adopted by the Malaysian government can be successful. For the time being only few ESCOs seem to have matured sufficient experience to implement EPCs. This is confirmed also by the information reported on the website of the Malaysia Association of Energy service Companies (MAESCO), the main ESCO association in Malaysia created under the above mentioned MIEEIP. Although this association counts 54 members, most of these companies limit their interventions to energy audits and implementation of energy efficiency improvement actions without taking any of the technical or financial risks associated to the energy performances of the solutions supplied. These companies are mainly local private companies. Companies that are daughters of larger international companies have started acting on the Malaysian ESCO market only quite recently (JRC, 2013).

Types of projects

As already mentioned, the main focus of projects so far implemented has been represented by the industry sector (notably cement, ceramic, food, glass, iron, steel, pulp, paper, rubber, wood). Energy audits have been also carried out in the textile and oleo-chemical industries under the MIEEIP. Technologies and fields of applications covered relate often to compressed air, electric motors and

⁷⁴ ESCOs are already required to register to the Energy Commission in order to be eligible to implement energy efficiency projects under EPCs at government's buildings as of 2012. Unfortunately the registration criteria adopted seem to be very loose and mostly focused on the presence of an energy manager in the company willing to be registered.

inverters, waste heat recovery. Ventilation and air conditioning in the building sector are other fields of applications frequently considered by ESCOs (JRC, 2013). EPCs for district cooling and EPCs including operation and maintenance services have been also stipulated by few large international companies operating in Malaysia (RexCapitalAsia, 2011).

Regulatory factors

Regulatory factors affecting the ESCO market development in Malaysia are currently being designed and implemented based also on the intents declared in the Tenth Malaysia Plan for energy efficiency covering the time period 2011-2015. This plan indicates five areas of intervention for energy efficiency improvement, including government buildings, domestic appliances and office equipment, building insulation in general, co-generation of heat and power, transport. Moreover the National Energy Efficiency Master Plan (NEEMP) of Malaysia sets a national target of 10% reduction of electricity consumption to be achieved in 2020 compared to the business as usual scenario. Besides the indirect and positive effects on the ESCO market that will be generated by this plan, already implemented regulations that have a positive impact on ESCOs are represented by the Regulation on Efficient Management of Electrical Energy enforced in 2008, by the amendments to the Uniform Building by Laws (UBBL) and by the voluntary certification scheme named Green Building Index Malaysia (GBI Malaysia). The first regulation mentioned has been implemented under the Electricity Supply Act and establishes that installations consuming more than 3 GWh per semester must appoint an energy manager responsible for monitoring electricity consumption, proposing energy efficiency improvement actions and assessing the effectiveness of the actions implemented. The amended UBBL establishes instead minimum energy performance standards for non-residential buildings⁷⁵, whereas the GBI Malaysia is an initiative to improve the energy performances of new buildings developed by the Institute of Engineers of Malaysia and the Malaysian Institute of Architects⁷⁶.

Market factors

The manufacturing sector is one of the main drivers of the Malaysian economy and has contributed to 24% of the GDP of this country in 2012. Nevertheless it is also the most energy intensive sector and the government has hence so far supported it by regulating and heavily subsidizing the energy prices. However things have changed in the last years. Also due to its increasing economy system, Malaysia is becoming a net energy importer and the costs of extracting oil and gas in the country are increasing steadily. It is for these reasons that the Tenth Malaysia Plan has the adoption of market-based energy pricing among its objectives and the government is revising its policy on energy prices with the hope that a more market oriented approach may attract the interest of foreign investors in the energy sector. This approach is being combined with a stronger push to energy efficiency in the industry sector and in commercial and residential buildings. The overall approach adopted seems to want to integrate a process of revision of energy tariffs with initiatives covering energy demand and supply side management in such a way that the impact of increased energy prices on energy end-users can be somehow balanced by the implementation of energy efficiency actions reducing their energy consumption. The impacts of this approach on the ESCO market can in principle be very positive, but it is probably too early to identify any measurable effect.

⁷⁵ Minimum energy performance standards for office buildings are set in a range between 220 and 240 kWh/m²/year (Darus & Hashim, 2012)

⁷⁶ This initiative involves a GBI certifier that is appointed before the construction of a new building and provides advice about energy efficient construction solutions that can be considered. This certifier produces also a building's assessment upon its completion. See www.greenbuildingindex.org for further information.

Information, awareness and demonstration

Whereas a large number of information and awareness raising initiatives have been undertaken to prove the energy efficiency improvement investments benefits for energy end-users, specific initiatives focused on ESCO projects are still lacking in Malaysia. Capacity building programmes on energy management like the PROMEEC have been implemented and the ASEAN Energy Management Accreditation Scheme (AEMAS) has been established for energy auditors, energy managers and government agencies. Nevertheless the initiatives undertaken by the central government and the local authorities have not generally targeted whole ESCO projects, including the phases of energy audits, energy advice, technical planning, project financing, installation of energy efficiency improvement actions and measurement and verification of energy savings. MAESCO regularly organises training activities and workshops for energy managers and represents the main promoter of the ESCO business in Malaysia⁷⁷. It is likely that the above mentioned new government strategy aiming at promoting the implementation of ESCO projects in government buildings will lead to the strengthening of information and awareness raising activities for local authorities and for the general public. However this effect has not yet been observed. An increased involvement of ESCOs in conferences and exhibitions dedicated to energy efficient products is seen as another important objective to be achieved in Malaysia together with the possible organisation of awards established by the Energy Commission to promote ESCO activities in the industry sector (APEC, 2013).

Financing

Financial measures have been taken by the Malaysian government to support companies supplying energy efficiency services/products and their clients. Companies supplying these services/products benefit from income tax exemptions⁷⁸, investment tax allowances⁷⁹ and import duties exemptions in case the possible equipment sold is not produced locally. Same types of investment tax allowances and import duties exemptions are benefitted also by companies purchasing these services or products. Owners of buildings obtaining the Green Building Index Certificate can also benefit from a tax exemption for the capital spent to obtain the certificate. Another potentially interesting financing mechanism in place in Malaysia is the so called Green Technology Financing Scheme (GTFS). It consists in subsidies on loans' interests and guarantees on loans for the purchasing of green technologies. Any product, equipment or system generally minimizing environment degradation, or reducing greenhouse gas emissions, or promoting an health environment for all forms of life, or conserving the use of energy and natural resources, or promoting the use of renewable energy sources is eligible to these soft loans. A fund of about USD 0.6 billion has been made available to finance this initiative until December 2015. Subsidies amount to 2% of loans interests and guarantees offered correspond to 60% of the risks associated to the loans. Eligible

⁷⁷ Since 2010, MAESCO regularly organizes training activities for energy managers and capacity building programmes focused on EPCs in collaboration with the Energy Commission, the Malaysian Investment Development Authority, the Federation of Malaysian Manufacturers, public universities and government's bodies.

⁷⁸ Companies classified as in a pioneer status are eligible to a 100% tax exemption on their so-called statutory income for 10 years. The statutory income equals the gross income from a project implemented minus the related operation costs and capital allowance.

⁷⁹ Companies eligible to investment tax allowances for an implemented project pay taxes only for the economic amount corresponding to the difference between the statutory income generated by this project minus the capital invested (i.e. the part of the statutory income corresponding to the amount of capital invested is exempted from taxation). This exemption applies for 5 years.

companies can be both Malaysian green technologies' suppliers/producers and users⁸⁰. Maximum loans subsidized may achieve about USD 15.5 million per company in case of green technologies' suppliers or about USD 3.1 million in case of technologies' users⁸¹. These soft loans have been so far used by 6 banks to finance 57 projects in Malaysia. Nevertheless they are not specifically targeted to ESCOs and the high guarantee level requested by banks to finance projects did not allow many ESCOs to benefit from this economic support. Energy service companies would certainly highly benefit from the creation of a fund specifically dedicated to finance or guarantee their investments. This fund could also serve to achieve a higher level of involvement in the ESCO business by financial institutes.

Barriers

Experts interviewed have indicated the lack of legislative support as the main barrier to ESCO business in Malaysia (JRC, 2013). Concerning existing legislative support, these experts also mention that the application of the Regulation on Efficient Management of Electrical Energy should be strengthened in order to further stimulate the ESCO market. Lack of financing and inexperience of actors are other important obstacles mentioned. Less important but still relevant hindrances are then the perceived financial and technical risks and mistrust on ESCO products by potential clients (JRC, 2013). Financial institutions remain sceptical about the profitability of ESCO investments partly because of their unawareness of the potential benefits of these ventures. Potential customers, notably industries, are reluctant to invest on energy efficient technologies because they do not see relevant benefits for their productivity and profit levels. This situation is also partly due to the very low energy prices and to a lack of government's incentives towards energy efficiency (IFC, 2011).

Barriers to the implementation of ESCO projects in the public sector are represented by the weak criteria currently established to be registered as companies eligible to implement EPCs at government's buildings. Companies registered are indeed not always very qualified to implement EPC projects and are hence unable to secure financing or to convince prospects to invest in these projects. On the other hand, government's bodies do not always have sufficient expertise in EPCs and in the definition and organization of public tenders for EPC projects implementation. Because of this lack of expertise, some public tenders were organised in the past by adopting too strict selection criteria (concerning e.g. contract duration, definition of shared savings amounts, implementation of preliminary energy audits at ESCOs costs, etc.) and no ESCO participated in the competitions.

Conclusions, future expectations

Malaysia is experiencing a very high economic development with a consequent marked increase in the amount of energy and natural resources consumed. So far the government has supported this trend by subsidizing energy prices and by introducing financial measures that could contribute to enhance the productivity of the country. Due to this situation Malaysia, as other countries of South East Asia, will soon become a net energy importer and the national government seems determined to face this turning point by accelerating the liberalization of energy markets while promoting policy measures that should make the economy of the country more energy efficient. Although existing studies reveal the presence of a potential for energy efficiency improvement that could generate a market volume near to USD 400 million in 2013 (Leaver, 2013), the possibility that this potential can actually be exploited will depend on a combination of factors. Whilst the expected increase in the energy prices will create favourable conditions for ESCOs' activities, the reliability of these market

⁸⁰ Eligible green technologies suppliers/producers are legally registered Malaysian owned companies for at least 70% of their capital, whereas eligible consumers are legally registered Malaysian owned companies for at least 51% of their capital.

⁸¹ See <http://www.gtfs.my/> for further information.

actors and the willingness of energy end-users and financial institutes to enter this market will depend primarily on the creation of competences and expertise on ESCO business within companies and on the establishment of the necessary instruments needed to support its development (e.g. energy performance contract models, standard procedures for energy saving measurement and verification, financing mechanisms, etc.). The leading and exemplary role being adopted by the Malaysian central government for the implementation of ESCO projects is most likely a very good starting point. Also the collaboration established among the Ministry of Energy, Green Technology and Water, the Ministry of Finance, the Public Works Department of Malaysia and the Energy Commission of Malaysia to promote the ESCO business indicates the presence of an actual determination to support ESCOs by policy makers. Nevertheless it is important to recognize that the process activated has to be gradual and that the initiatives taken have to be adapted to the local conditions. Whereas the promotion of EPC contracts is a very good option for the implementation of complex projects in countries where the ESCO market is already mature, in countries where this market is still at an embryonic stage it could be better to focus on the development of simpler and diversified solutions while working at the creation of the competences needed and at the production of suitable evaluation tools and standard procedures that can allow this market to progress and consolidate.

Key drivers

- expected increase in the energy prices
- the national government is willing to play an exemplary role in the implementation of EPCs for projects implemented at own premises.
- High economic energy saving potentials exist in particular in the industry sector

Number of ESCOs	54 companies registered as members of the Malaysian ESCO association.
ESCO market size and potential	No data available concerning the existing ESCO market size. ESCO market potential estimated at about USD 400 million in 2012 (Leaver, 2013).
ESCO market trend	Only few companies provide proper ESCOs services. The initiatives being undertaken by the government allow expecting a future intensification in the supply of ESCO services.
ESCO association	Maesco
Typical ESCO projects	Projects mainly implemented in the industry sector (notably cement, ceramic, food, glass, iron, steel, pulp, paper, rubber, wood). Technologies and fields of applications covered relate often to compressed air, electric motors and inverters, waste heat recovery. Ventilation and air conditioning in the building sector are other fields of applications frequently considered.
Main type of contract	Most of the contracts just relate to energy audit and installation of energy efficient equipment. Few EPCs (both with shared and guaranteed savings) have been stipulated by large international companies operating in Malaysia.

Information in this chapter was based on the following source:

Akker, van den, J., 2008. Final Evaluation of the Malaysian Industrial Energy Efficiency Improvement Project. Report available at <http://erc.undp.org/evaluationadmin/manageevaluation/viewevaluationdetail.html?valid=3266>

Asian-Pacific Economic Co-operation (APEC), 2013. Promotion of Energy Service Companies. Final report produced in the framework of APEC Cooperative Energy Efficiency Design for Sustainability (CEEDS); Phase 4 and available at http://publications.apec.org/publication-detail.php?pub_id=1430

Asia-Pacific Energy Research Centre (APEREC), 2011. Compendium of Energy Efficiency Policies of APEC Economies. Report available at <http://aperc.ieej.or.jp/publications/reports/compendium.php>

Darus, A., Z., MD, Hashim, A., N., 2012. Sustainable Building in Malaysia: The Development of Sustainable Building Rating System, Sustainable Development - Education, Business and Management - Architecture and Building Construction - Agriculture and Food Security, Prof. Chaouki Ghenai (Ed.), ISBN: 978-953-51-0116-1, InTech, DOI: 10.5772/27624. Available from <http://www.intechopen.com>

Joint Research Centre (JRC), 2013. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

International Finance Corporation (IFC), 2011. IFC Energy Service Company Market Analysis. Report available at <http://www.ifc.org/wps/wcm/connect/dbaaf8804aabab1c978dd79e0dc67fc6/IFC+EE+ESCOS+Market+Analysis.pdf?MOD=AJPERES>

Leaver, L., 2013. Decomposition of ESCO market potential. A look at energy expenses and Market Opportunities. Presentation held at APEC – Cooperative Energy Efficiency Design for Sustainability (CEEDS) workshop on the promotion of ESCOs, Taipei, 26 March 2013.

RexCapitalAsia, 2011. South Esia Asia Energy Efficiency Report. Report available at <http://www.reexasia.com/reports/ReEx-SE-Asia-Energy-Efficiency-Market-Report.pdf>

ESCO market in Pakistan 2013

The ESCO market in Pakistan is not yet developed. The main barrier for the development of the ESCO business is the lack of relevant legislation to regulate energy services. Secondly, the awareness in the banking sector about energy efficiency is non-existent, and as a consequence ESCOs feel uncomfortable with exposing their money in energy efficiency investments.

Current size, trends and features of the market

International donors organizations (such as USAID and GIZ) have tried to introduce the ESCO concept in collaboration with the National Energy Conservation Centre (ENERCON)⁸², through implementation of pilot projects, but the lack of legislation limits further market development. The performance contracting mechanism is present in the market through companies which conduct only energy audits. Few firms in their limited capacity are trying to introduce other types of ESCO contract types such as the shared saving model. The replication of the realized pilot projects is restricted due to the lack of an appropriate legal basis. The legal basis would remove the fear by ESCOs or energy efficient equipment/solution providers that the beneficiary/end-user/industry, where their solution is being installed, shall be bound to return the money through the savings achieved or as per the percentage settled mutually among the parties. If any dispute arises, then ENERCON can ensure the return of money thus minimizing the risk for ESCOs and the banking sector as well. Energy audits companies implement projects (namely energy audits) on the basis of small-scale EPC, meaning that the costs of the audits can be repaid through the savings in the facility.

ENERCON is the key promoter of energy efficiency and the ESCO concept at the national level. Energy Management Systems (EnMS) are being promoted in various industrial associations such as APTMA (All Pakistan Textile Mills Associations) where performance contracting has been introduced.

Types of ESCO projects

As mention above, industrial energy audits are the most commonly implemented energy efficiency projects in Pakistan. The majority of them have been implemented in the water pumping sector. USAID organized trainings for energy auditing firms for pumping stations. After that, the GIZ also supported the development of the ESCO market but most of the firms were not able to continue as an ESCO later because of a lack of demand from the market.

There are a few engineering service companies that provide energy services, such as energy analysis and audits, project design and efficiency upgrades, facility maintenance and operation, and monitoring and evaluation of energy savings. These companies also provide energy management solutions to diverse clients, including healthcare, education, corporate and the residential sector. The companies guarantee energy savings and/or the provision of the same level of energy services at a lower cost by implementing an EE project. The performance guarantee can take several forms.

Regulatory factors

The draft of the Pakistan Energy Efficiency and Conservation Act of 2014 has been prepared and shall be adopted after its passage in the National Assembly. The Act shall provide the basis for the

⁸² ENERCON is in charge of cooperation with international organizations to implement energy efficiency projects. ENERCON was established in 1987 and serves as the national focal point for energy conservation/energy efficiency activities in all sectors of the economy, namely industry, agriculture, transport, buildings and households. Source: National Energy Conservation Centre (ENERCON), <http://www.enercon.gov.pk>.

creation or extension of institutions and authorities and stipulate mechanisms and procedures for effective conservation and efficiency use of energy in Pakistan.

With the adoption of this act, the Federal Government shall establish the Pakistan Energy Efficient and Conservation Board (PEECB) which will consist of the Federal Secretaries of different ministries, representatives from private sector and the managing director of ENERCON. The Chairman of this Board will be the Federal Minister for Water & Power, the ministry in charge of EE. The main function of the Board among others shall be to⁸³:

- Be the custodian of national policy for energy conservation and to ensure proper utilization, planning and management of energy in all sectors of economy;
- Create awareness and disseminate information related to efficient use of energy sources;
- Approve EE standards and ensure their enforcement and compliances;
- Promote investments by the public and private sectors in energy conservation through partnership or otherwise.

The new act will regulate a reconstitution of ENERCON as an Authority called the National Energy Efficiency and Conservation Authority responsible for the implementation of the new Act, preparation and coordination of national energy conservation policy and programmes as well as for preparation of draft regulations for EE. ENERCON will be also responsible for implementation of a system for training and certification of energy auditors.

According to the new Act, the ENERCON Fund should be created for the financing EE programmes. The Fund shall be funded through allocations from the federal budget, grants from the Government, grants and other financial aids or assistance provided by foreign donors and financial institutions as well as from revenues from investments and commercially viable energy conservation projects.

The Federal Government pursuant to the draft version of the proposed act may issue energy savings certificates to qualifying consumers (typically large industrial and commercial energy users) whose energy consumption is less than the prescribed norms and standards in accordance with procedures as may be prescribed. Consumers, whose energy consumption remains above the prescribed norms and standards shall be entitled to purchase the energy savings certificates to remain compliant with energy standards, thus creating an EE credits market in the country.

Provincial Governments may also establish their own EE funds for financing of EE programmes at the local level.

Market factors

Pakistan suffers from the inefficient use of its energy sources. Most of Pakistan's industries suffer from high specific consumption compared to international average practices.

The industrial sector is responsible for the biggest share on the national energy consumption (43%) closely followed by the transport sector (28%) and the buildings sector (23%). The energy savings potential in Pakistan has been estimated as 5 billion USD per year and it is divided by sectors as follows⁸⁴:

- industry 25%
- building sector 30%
- transportation sector 20%
- agriculture 20%

⁸³ Source: National Energy Conservation Centre (ENERCON) <http://www.enercon.gov.pk>

⁸⁴ Source: National Energy Conservation Centre (ENERCON) <http://www.enercon.gov.pk>

Over the last decade, energy prices in Pakistan have increased dramatically, due to rising international oil prices, a declining exchange rate of the Pakistan rupees against USD, depleting natural gas reserves in the country, and a gradual withdrawal of government subsidies from the sector. This increase in prices has significantly enhanced the attractiveness of EE projects and investments in Pakistan.

Information, awareness and demonstration

ENERCON has a very important mandate for the promotion of energy efficiency in Pakistan, which was largely unmet due to institutional constraints, a lack of supportive legal and policy framework, and an absence of a coherent long-term national strategy for commercializing energy efficiency services and products.⁸⁵

Small and short-term awareness raising programmes have been undertaken from time to time by ENERCON, under its national awareness campaign on energy and environmental conservation, or ACE, from 2003 to 2010. These have had limited impact, due to their modest scale and short duration. Much more effective was the initial five-year assistance provided by USAID to ENERCON which included comprehensive sector-wise training programmes, workshops, audits, technical manuals, efficiency codes and compliance guidebooks, and outreach activities which could not be continued by ENERCON after the withdrawal of USAID support in 1990. Since then, as mentioned previously, it has been commercial interests, natural technological progress, driven by increasing energy tariffs, which have helped raise consumer awareness about energy efficiency as a means of combating higher energy bills. Therefore, as example, the market for efficient compact fluorescent lamps (CFLs) has risen sharply, to the extent of displacing all local production in Pakistan of inefficient incandescent bulbs.

ENERCON has teamed up with the Pakistan Engineering Council (PEC) to impart energy audit courses to engineering students across the country. Energy audit, a study of energy flows to and from a building or system in order to reduce energy input without degrading output, is not usually offered as a subject at local engineering universities. Over 2,000 undergraduate engineering students at 25 Pakistani universities have so far benefitted from the technical sessions on “Energy Audit Tools and Techniques” conducted by the National Experts on Energy Efficiency.

According to the draft of the Pakistan Energy Efficiency and Conservation Act, the Pakistan Energy Efficient and Conservation Board (PEECB) shall create awareness and disseminate information related to efficient use of energy sources as well as direct ENERCON in preparation and realization of demonstration projects and national programmes for energy conservation.

Financing projects

The National Energy Conservation Fund (ECF) can be one of the sources for financing of EE projects realized on ESCO concept. The ECF was established as a part of the UNDP/GEF project implemented between 1996 and 2005, which allocated US\$3 Million out of the total grant of US\$7million for a Revolving Loan Fund to promote EE investments in tuning up equipment. An agreement to provide financial solutions for EE equipment through leasing, utilizing funds extended to ECF to SME Leasing Limited (SLL) was signed to promote the use of EE equipment. As agreed by both entities, ENERCON/ECF through SLL, was to extend credit for lease financing (at below market rates) for the equipment to be used for increasing efficiency. Preference was to be given by SLL to those clients

⁸⁵ Source: National Energy Conservation Centre (ENERCON) <http://www.enercon.gov.pk>

who have already availed finance facilities with satisfactory repayment behaviour or at least good repayment history with other financial institution(s).The proposed exposure/credit risk against the prospective client was to be covered by obtaining additional collateral. Lease/Finance Facility is provided by SLL to its customers /clients/lessees at preferential mark-up rate of 10% per annum. SLL was to determine the quantum of equity participation by the customer /client/lessee as deemed fit. The customer/client/lessee would bear all pertinent costs including inter alia installation & insurance of Energy Efficient Equipment. The financing limit (restrictions on the size of the entity) was fixed at Rs.3 Million.⁸⁶

Energy Conservation Fund (ECF) is calling expression of interest from local AA and above rated banks to become partners in promoting Energy Efficiency and the principle amount is going to be given by Energy Conservation Fund. ECF also plans to organize training programs on Energy Efficiency for banking officials. ECF has been involved in realization of the project related to development of Energy Auditing Firms/ESCOs registration criteria.

Barriers

The barriers for development of the ESCO market in Pakistan are as follows (EC JRC 2012):

- Lack of appropriate legislation for energy services and ESCOs;
- Lack of energy data and measurement of energy consumption;
- Low awareness for energy services and ESCOs
- Lack of financial products for ESCOs
- Lack of policies for promoting EE markets, such as product standards and labelling, mandatory compliance regulations, fiscal incentives, service concession areas, etc.

Conclusions and future expectations

The new Pakistan Energy Efficiency and Conservation Act of 2014, if passed by the National Assembly, would be an important milestone for the development of Pakistan's ESCO market, particularly in terms of setting a legal basis for ESCOs and for securing EE investments. ENERCON, and the revived Energy Conservation Fund, shall be revitalized under the proposed Act and, if appropriately resourced and operated, could be used for the financing of EE projects implemented by ESCOs. Additional support structures, financing, and market conditions would also need to be created to truly promote the establishment of ESCOs in the country and to raise awareness amongst energy users of their services and benefits.

ENERCON Certified Energy Auditors/Managers in the market would be engaged by ESCOs for their projects and the clients shall have more confidence on their recommendations given in energy audit reports and the banks shall feel more comfortable in financing EE projects on the basis of their reports. Nationally Appropriate Mitigation Action (NAMA) proposal for Efficient Lighting which Pakistan has submitted to UK-GERMAN NAMA Facility also focuses on strengthening of ESCOs dealing in EE Lighting Sector.⁸⁷

Possible break-through points

-New “Energy Efficiency and Conservation Act”;

⁸⁶ Source: ENERCON: http://www.enercon.gov.pk/index.php?option=com_content&view=article&id=35&Itemid=35

⁸⁷ <http://ccap.org/resource/pakistan-energy-efficient-lighting-in-residential-commercial-industrial-and-outdoors-sectors/>

- Additional supportive policies, regulations, and facilities for the promotion of an ESCO market;
- Increased awareness raising activity for promotion of EE project implemented on ESCO concept;
- ENERCON certified Energy Auditors/Managers mechanism;
- ESCO's accreditation mechanism;

The huge energy saving potential in industry and building sectors, in particular, can be a driving force for the ESCO market in Pakistan, given the rising costs of oil, gas and electricity in the country. It can attract foreign and domestic investors to invest in EE.

Number of ESCOs	No information
ESCO market size and potential	No information
ESCO market trend	On the ground
ESCO association	None
Typical ESCO projects	Energy audits in textile and other industrial enterprises, water pumping
Main type of contract	No EPCs contracts

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

ESCO market in Philippines 2013

The ESCO concept started spreading in the Philippines immediately after the acute energy crisis registered in the early 1990s. At that time ESCOs operating in the Philippines were generally meant as companies aggregating energy services and providing financing for energy efficiency projects. It could also happen that trading companies supplying energy efficient technologies or engineering companies designing energy efficient systems might designate themselves as ESCOs. The first ESCOs were mostly international manufacturers of energy efficient technologies (e.g. Schneider Electric, Danfoss, Honeywell, Johnson Controls) supplying their products under energy performance contracts. Later on, electric utilities like MERALCO and CESTCO also started setting up their own ESCOs to implement their demand side management activities. Around the year 2000, some equipment manufacturers changed their market strategies and stopped providing financing while establishing partnerships with trading companies, utilities' ESCOs or engineering companies. The first attempt to create an ESCO association⁸⁸ in the Philippines dates back to 2005, but this association has remained basically inactive due to problems of leadership and lack of co-ordination (Langlois & Hansen, 2012). After the launch of the National Energy Efficiency and Conservation Program (NEECP) in 2004, the Philippine Department of Energy (DOE) identified four providers of public energy audits and 16 ESCOs. This Department setup an ESCOs' accreditation system that allowed also to better define the ESCO concept in 2008. During the same and the following year, the DOE implemented an ESCO demonstration project in collaboration with the UNDP and local financial institutes (LFIs) and managed to successfully improve the energy efficiency of the lighting systems in two industrial firms. A Super ESCO⁸⁹ operating through a loan from the Asian Development Bank (ADB) was created in 2009 in the framework of the Philippine Energy Efficiency Plan (PEEP) with the aim of providing technical and financial support to ESCOs operating in the public and in the private sector. The program run by this company was however abandoned one year later because of new elections in the country and new positions taken on the objectives of the company. In the last years the International Finance Corporation (IFC) has continued supporting the ESCO market in the private sector and has established partnerships with private Financing Institutions (FIs) under the Sustainable Energy Finance (SEF) program. The IFC services included a guarantee facility to private FIs lending to sustainable energy investments in the private sector (Langlois & Hansen, 2012).

Current size, trends and features of the market

Twelve companies are currently certified as ESCO under the DOE accreditation system⁹⁰ in the Philippines⁹¹. The ESCO market of this country is generally seen as promising, although still immature. The very high electricity prices applied by the government⁹² in this country should in principle represent an important stimulus to ESCOs activities, although companies do not generally seem very interested to improve their energy performances. Another important driver is

⁸⁸ This name of this ESCO association is ESCOPhil.

⁸⁹ This Super ESCO was a subsidiary of the Philippine National Oil Company (PNOC) (Langlois & Hansen, 2012).

⁹⁰ See <http://www.doe.gov.ph/energy-efficiency/energy-service-companies-escos-accreditation/list-of-doe-accredited-energy-service-companies-escos> for further information.

⁹¹ According to the available information the number of certified ESCOs was eight in 2012 (JRC, 2013). This allows deducing that four companies have probably received the ESCO certification between 2012 and 2013.

⁹² Whereas electricity prices are regulated in the Philippines, other energies' prices are market based.

represented by the highly increasing energy demand. Available forecasts indicate that the total energy demand of Philippines is destined to double in the period between 2007 and 2030 with an average annual increase rate of 4% to which the residential sector is supposed to contribute with a 6.5 % annual increase, the commercial sector with a 5.7% annual increase and the industrial sector with a 4.7% annual increase (Mukherjee & Sovacool, 2012). Existing companies accredited as ESCOs are mainly building and control systems manufacturers, facility management and operation companies, consulting and engineering firms, energy suppliers and energy efficient equipment's manufacturers, suppliers or installers (JRC, 2013). These ESCOs are often small companies with less than 50 employees and do not have energy service provision as a core business. Energy performance contracts are not stipulated very frequently and the predominant contract type adopted seems to be similar to "chauffage" contracts used in the European Union (JRC, 2013). The information available indicate an ESCO market volume below USD 1 million in 2012 (Leaver, 2013).

Types of projects

ESCO activities so far implemented have almost exclusively focused on the industrial and the commercial sector (including schools and hospitals). As happening in many Asian countries in the tropical region, projects implemented in buildings relate often to the energy efficiency improvement of air conditioning systems. Energy efficiency improvement of lighting systems is another important field of application of the energy services supplied by the ESCOs both in the industrial and in the commercial sector. Demonstration projects like the Philippine Energy Efficiency Project (PEEP) implemented by DOE between 2009 and 2013 has represented an interesting example of energy efficiency improvement activities related to lighting systems and buildings where an ESCO market could potentially develop. However, most of the ESCOs projects so far implemented have not been realised under energy performance contracts. Energy performance contracting is almost inexistent in the Philippine, excepting a few projects that have been funded internally by multinational companies (RexCapitalAsia, 2011). These few projects have been mostly financed by EPCs with shared savings. ESCOs typically receive loans from banks to finance their clients' investments under these contract types, whereas banks' loans are typically asked by clients when they invest under EPCs' with guaranteed savings. Considering that ESCOs have a limited amount of collaterals to guarantee for the loans received, this implies that they could probably have stipulated a much higher number of EPCs with guaranteed savings if these latter contract types would have met the favour of ESCOs clients.

Regulatory factors

Recent regulatory factors that can affect the ESCO market development can be identified within the National Energy Efficiency and Conservation Plan (NEECP) launched by the Philippine government in 2004 to support the Philippine Energy Plan covering the period between 2011 and 2030. The NEECP consists of nine program components including, among others, the promotion of energy management and energy audits through continuous capacity building of energy managers and auditors as well as the introduction of the ISO 50001 on energy management. It is worth mentioning that the implementation of the ISO 50001 is being made possible by the financing of about USD 27.2 million that is made available by the Global Environment Facility (GEF), UNIDO, DOE and local banks in the period between 2011 and 2017. This funding is supposed to be used also to facilitate the optimisation of process systems in industry and the capacity building of energy managers, local consultants and energy service providers. Another important but less recent piece of legislation is the DOE circular issued in 1993. This provision obliges establishments of the industrial, commercial and transport sectors consuming more than 2 million litres of oil equivalent (LOE) per year to regularly submit a quarterly energy consumption report and annual energy conservation program reports. However the impacts of this regulation on ESCOs activities have been very limited so far.

The recent creation of the Green Building Certification System (a unified rating system for the energy performances of buildings), could also have a positive impact on the ESCO industry. This rating system has been implemented by the Philippine Green Building Council as of December 2011. Finally it is worth mentioning that the DOE is working on an Energy Efficiency and Conservation (Enercon) Bill that aims at creating a stronger and more holistic approach to energy efficiency and energy conservation with the active involvement of the government and the private sector.

Market factors

High electricity prices and the significant increase in the energy demand envisaged for the next years should in principle represent an important ESCO market driver. However these market factors have so far mainly prompted Philippines' government's promotion of energy efficiency and energy generation from renewables without inducing a significant ESCO market's increase. Moreover, the government has introduced electricity price's discounts in some industrial sectors to attract foreign investments and this has discouraged ESCOs activities to a certain extent. Although industries have represented the principal ESCOs' clients in the last years, the commercial sector is now becoming a dominant ESCO market partly because this sector is probably in a higher need of ESCOs expertise to improve its energy management systems. Market facilitators also play an important role for ESCO industry development. Besides the DOE, the Energy Efficiency Practitioners Association of the Philippines (ENPAP), the ASEAN Energy Manager Accreditation Scheme (AEMAS) and the European Chamber of Commerce in the Philippines (ECCP) have promoted capacity building activities and promoted or implemented energy efficiency projects in the Philippines⁹³. The market in the Philippines is generally characterized by a low level of exports, this determining a low level of competitiveness among companies and lower attention to processes optimization and energy efficiency in the industry and in the commercial sectors compared to other countries in Asia (Langlois & Hansen, 2012).

Information, awareness and demonstration

A large series of information activities addressing the general public and informing about economic and environmental benefits of energy efficiency have been undertaken in particular by the DOE in collaboration with other subjects like the Philippine Information Agency. Training has also been a central activity of the DOE which managed for example to organize national training workshops in key cities of the country addressing representatives of industry, commerce, transport, power sectors and academia. Government offices are also targeted by the DOE and are being given energy consumption targets and energy consumption reporting tasks that allowed saving important amounts of energy since 2005⁹⁴. The DOE provides also energy audits for industry, commercial companies, manufacturing plants and other energy intensive companies. It has to be understood to what extent this activity could be better delegated to local actors in order to favour the development of an ESCO market. Another remarkable initiative is the Don Emilio Abello⁹⁵ Energy Efficiency Award. This award consists in a recognition awarded to industrial and commercial establishments and to power generating plants that give a significant contribution to government's

⁹³ Also initiatives undertaken by UNIDO for the promotion of the energy management standard ISO 50001 among companies of Philippines are worth to be mentioned.

⁹⁴ All government agencies (excepting constitutional, judiciary and legislature bodies), state colleges, universities and hospitals are implementing a government energy management program (GEMP) aiming at reducing their electricity and transportation fuel annual consumption by at least 10% compared to consumption values registered during 2004 (Reyes, 2012).

⁹⁵ Don Emilio Abello is considered as the father of the program Enercon encouraging people to take energy conservation measures at least since the 1980s.

energy efficiency and energy conservation targets. All in all, it can be probably stated that, despite several information and awareness raising activities concerning energy efficiency and energy conservation are implemented in the Philippines, the efforts spent in this area in relation to ESCOs appears generally quite scarce. More attention should be paid in particular to initiatives allowing a better understanding and diffusion of energy saving measurement and verification (M&V) protocols and contractual arrangements whereon the ESCO concept can be built in the Philippines.

Financing

The DOE can be probably considered as the main promoter of the ESCO concept in the Philippines and received government's funding that amounted to USD 581,000 in 2013 (APEREC, 2011). Tax incentives, subsidies or other forms of incentives supporting ESCO industry have not been implemented as of 2011. This is probably one of the main barriers affecting ESCO market development in the Philippines. Energy audits are mostly provided by the DOE for free, this indicating that audits are probably not yet sufficiently valued in the existing market. As already mentioned, the very few EPCs stipulated in this country are mostly EPCs with shared savings and ESCOs ask for banks' loans for the implementation of the related projects while customers pay the ESCO through the economic savings that are generated. Financial loans for ESCO projects are typically provided by local commercial banks often in co-operation with international financial institutes, like the World Bank-IFC or the ADB. The Development Bank of the Philippines (DBP) provides loans for more environmental friendly activities of SMEs and also the German bank KfW has supported the creation of a credit line to reduce electricity consumption. Other subjects providing funding for energy efficiency and energy conservation activities are the Technology Application and Promotion Institute (TAPI) and international organizations like GEF and UNIDO.

Barriers

The scarce level of products' market internationalization is generally considered as a cause of scarce attention to energy efficiency and processes' optimization in the Philippines. Nevertheless the main reasons for the ESCOs' market immaturity have probably to be found in a still insufficient level of government support to this specific type of business. This is somehow proved by the lack of any form of economic incentive to ESCOs, but also by the absence of a common understanding of the ESCO concept and by the apparently scarce government's commitment in the creation and diffusion of standard models and procedures needed for the implementation of ESCO projects. Also the difficulties met in the creation of an ESCO association are an indicator of a situation where the ESCO business is still struggling to develop. The high interest rates of loans provided by local financing institutes and the amount of collaterals needed to access these loans are another barrier to ESCO investments. On the other hand, energy efficiency does not yet seem to be perceived by energy end-users as a potentially profitable investment per se and these users usually show an interest in this investment type only when some kind of government subsidy is available. When it comes to the public sector, government public procurement rules are an important obstacle to the diffusion of EPCs. Moreover, administrative rules and government's accounting procedures impose fixed amortized payments on loans, this making impossible the variable and periodic payments that can be associated to the stipulation of EPCs (Langlois & Hansen, 2012). Overall, the scarce development of the ESCO industry in the Philippines seems hence to have to be attributed to a combination of low awareness, legal, technical and financial barriers.

Conclusions, future expectations

Available information indicate that the ESCOs' market volume has been below USD 1 million in 2012 and that this market has to be considered as still immature (Leaver, 2013; Longlois & Hansen, 2012;

JRC, 2013). Despite this situation, a series of factors lead to foresee a positive change in the market trends so far observed. These factors include the very significant increase in the energy demand expected in the next years, the high electricity prices applied in the Philippines, the government's intentions to reinforce energy efficiency policies. The ESCO market potential for 2012 has been estimated at around USD 250 million (Leaver, 2013) and the sectors which contribute mostly to this potential are the industry and the commercial one. A part of this potential is made by relatively cheap solutions, like energy management tools or automation and control technologies (JRC, 2013). The possibility to exploit the existing potential depends however on the supporting instruments that will be put in place in the next years to create a common understanding of the ESCO concept. Information, training, protocols for energy saving M&V and standard contract models are probably the first type of supporting instruments to be created or improved. Moreover actions undertaken in these areas have to be accompanied by the establishment of policy instruments like guarantee funds facilitating ESCO financing and access to credit. Finally, it seems very necessary that existing barriers impeding the implementation of ESCO projects in the public sector are removed in order to allow that this sector can be, as usually expected, the exemplary role model in the field.

Key drivers

- Expected significant increase in the energy demand
- High electricity prices
- Government policies to be implemented shortly
- Supporting financing instruments highly needed
- More suitable protocols for energy saving M&V need to be accepted

Number of ESCOs	12 ESCOs certified under the DOE certification system as of 2013.
ESCO market size and potential	Market size: below USD 1 million in 2012; Market potential: around USD 250 million in 2012 (Leaver, 2013).
ESCO market trend	The market is not yet mature. An intensification of ESCOs activities is likely to take place in the next years.
ESCO association	Attempts so far undertaken to create an ESCO association have failed.
Typical ESCO projects	Projects are mostly implemented in the industry and in the commercial sectors. These projects relate mainly to the improvement of air conditioning and lighting systems.
Main type of contract	The very few EPCs contracts stipulated in this country are mostly EPCs with shared savings. Other contracts types adopted are similar to "chauffage" contracts stipulated in the EU.

Information in this chapter was based on the following source:

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ESCO market in Singapore 2013

The island city-state of Singapore is one of the most highly industrialized and urbanized economies of South-East Asia. Given also its very small land area, Singapore has negligible indigenous energy resources and imports nearly all the fuel it requires for its energy needs. Its electricity and gas industry have been liberalized respectively in 1995 and 2008. Energy security represents a very important priority in this island and energy efficiency policies are seen as a very important instrument to guarantee this condition. The ESCO concept started spreading in Singapore already in the 1990s and operating ESCOs have now demonstrated sufficient capacity in implementing energy performance contracts (EPCs) and in delivering savings to energy end-users. ESCOs' activity has so far mainly focused on the commercial sector, whereas ESCO projects for retrofits in the industrial sector could be much more widely implemented according to market experts and analysts (RexCapitalAsia, 2011).

Current size, trends and features of the market

Singapore is a very business oriented island and its energy efficiency market has been capable of generating revenues for USD 130 million in 2012 (Frost & Sullivan, extracted from NEA, 2013). Its government has managed to attract several international ESCOs. Nevertheless specific and quantitative information related e.g. to the total market volume generated by the ESCO business, the energy end-use demand sectors mostly addressed and the fields of application for the energy services supplied are absent or quite scattered and mostly limited to the description of case studies and best practices. Eighteen companies are presently registered under the ESCO accreditation system established by the Energy Efficiency Programme Office (E2PO), a multi-agency committee created to drive energy efficiency in Singapore. Although criteria for accreditation just require the presence of one qualified energy service specialist and the availability in the company of relevant equipment to carry out energy audits, registered enterprises are often international companies (e.g. Cofely, Honeywell, Johnson Control, etc.) capable of implementing large ESCO projects. According to (Frost & Sullivan, extracted from NEA, 2013) the number of ESCOs operating in Singapore exceeds by far the number of ESCOs accredited under the ESCO accreditation scheme and achieves the value of 34. These ESCOs are mostly building and control systems' manufacturers, facility management and operation companies, consulting and engineering firms, equipment manufacturers and suppliers (JRC, 2013). The majority of them is made by private companies, although public private partnerships have been established between ESCOs and local governmental agencies⁹⁶. ESCO contracts so far stipulated have achieved a size ranging between USD 0.5 million and USD 8 million (RexCapitalAsia, 2011).

Most of these contracts are related to energy efficiency improvements in commercial and governmental buildings. Singapore is often depicted as a "living laboratory" where international firms have their regional headquarters and compete to develop and test enabling technologies around a smart grid with intelligent energy systems for commercial and industrial customers. The existing energy efficiency policy framework and funding schemes support ESCO activities in important ways and the ESCO market seems destined to grow substantially in the short term in the island. Nevertheless important barriers still hinder the exploitation of the existing market potential, especially in the industry sector.

⁹⁶ The Panasonic Corporation established for example a public private partnership with three local agencies to test a retrofit home energy management system at Punggol Eco-Town (Krishnaswamy, 2013).

Types of projects

Projects so far implemented relate mostly to air conditioning and ventilation for buildings, building automation and control systems, indoor and outdoor lighting systems, pumping systems and energy end-users behaviour. Power and heat generation systems are an important area of activity in the energy sector, whereas electric motors and drivers, waste heat recovery systems, industrial cooling and compressed air systems are the fields for application of energy services mostly addressed in the industry sector (JRC, 2013). Best practices mentioned in the existing literature relates for example to the implementation of process optimization and maintenance procedures in the power generation company Tuas Power by an accredited ESCO⁹⁷. Another example of best practice is provided by the company Hitachi Semiconductor Singapore that has implemented an energy performance contract to reduce the energy consumption of its chilled water plant by 19.5% (E2PO, 2013). An interesting project is the so-called "smart grid" pilot project being implemented by the Energy Market Authority. Whereas the first phase of this project was completed in 2011 and focused on the enabling of smart grid infrastructures, the second phase aims at installing about 4,000 smart meters whereby electricity end-users from the commercial, industrial and residential sectors can monitor their electricity consumption and improve their energy management systems by possibly implementing energy efficiency improvement measures in collaboration with ESCOs (APEREC, 2011).

Regulatory factors

The main government's bodies involved in the implementation of the regulations affecting ESCOs activities in Singapore are the Ministry of the Environment and Water Resource and the Ministry of Trade and Industry. Whilst the former Ministry leads the National Environment Agency (NEA), the latter leads the Energy Market Authority. The adoption of the regulations affecting energy efficiency and ESCOs activities in the country is facilitated by the Energy Efficiency Programme Office (E2PO), a multi-agency committee operating in all energy consumption sectors under the aegis of the NEA and the Energy Market Authority. It is this institutional framework that has produced the Singapore Sustainable Development Blueprint, the reference guide serving as umbrella for the energy efficiency policy initiatives undertaken at government level and setting overall energy intensity reduction targets of 20% and 35% to be respectively achieved by 2020 and by 2035 compared to 2005 levels. One of the most relevant and recent legislation initiatives aiming at contributing to the achievement of these targets is the Energy Conservation Act (ECA), effective from April 2013. Due to the ECA, companies consuming annually more than 54 TJ of final energy in at least two of the three years preceding 2013 are obliged to appoint an energy manager, to monitor and report annual energy use, to submit energy efficiency improvement plans⁹⁸. An Energy Efficiency Promotion Centre (EEPC) has been established to assist companies in meeting mandatory energy management requirements under the ECA. The EEPC can, among other things, support these companies in identifying ESCOs with the expertise and the know-how needed to individuate and implement the measures that can allow complying with their obligations. Other regulations that may potentially affect the ESCO business in Singapore concern minimum environmental sustainability requirements established by the Building Construction Authority (BCA) in 2008 and the Green Mark Schemes launched by the BCA

⁹⁷ This type of ESCO project allowed Tuas Power to save about USD 0.29 million per year in fuel costs (E2PO, 2013).

⁹⁸ Obligated companies are transport facility operators (e.g. airport service operators, land transport operators) and industrial corporations dealing with products' manufacturing, supply of electricity, gas, steam, compressed air and chilled water for air-conditioning, water supply and sewage and waste management. For further information see

<http://statutes.agc.gov.sg/aol/search/display/view.w3p?page=0;query=DocId%3A%2229401dd4-b617-4e46-a125-ba2daff08d72%22%20Status%3Ainforce%20Depth%3A0;rec=0>

in 2005 to rate the environmental performances of the main human-made surroundings. These schemes are actually a suite of different rating systems that can be applied to new buildings, existing buildings, building interiors (e.g. office and restaurants interiors) and structures like new and existing parks, rapid transit systems, districts, etc.. They include a Green Mark certification establishing environmental standards that all new and existing buildings, with gross floor area over 2,000 m² and undergoing major retrofits, must comply with as of 2008. The Singapore government has also established that all large new and existing public buildings undergoing major retrofits must receive special Green Mark ratings by 2020⁹⁹ (APEREC, 2011). All these regulations provide an indirect incentive to ESCO market development. Nevertheless they cannot be considered as regulations targeting ESCOs directly. Regulatory measures that are not yet in place and that could be highly beneficial for the ESCO market relate for example to the standardization of energy performance contracts and of the methodologies applied to measures and verify the energy savings, to estimate the baseline consumption, the investment payback periods or the minimum amount of savings that can be guaranteed to the clients. These measures could, among other things, effectively allow to increase the interest of investors and to reduce technical and financial risks associated to ESCO projects.

Market factors

Singapore is one of the most densely populated countries in the world¹⁰⁰ and is one of the most industrialized countries of South East Asia. Despite the absence of energy resources in its territory, it is the world's third largest oil products trading place. Its energy markets are completely liberalized and its energy intensity has markedly decreased since 1990 also thanks to the adoption of more energy efficient technologies in the energy generation and energy end-use sectors. Its total annual energy consumption per capita is currently around 6.6¹⁰¹ toe, whereas its annual electricity consumption per capita is being at around 8,100 kWh since 2005 after a significant annual increase pace of 4% registered during the previous 15 years. The high energy consumption levels, the very lively economy and the dependence on energy imports have been important stimuli to the implementation of energy efficiency policy measures in this country. Moreover energy efficiency is seen by policy makers as an important means to address climate change, improve air quality and increase economic competitiveness. Nevertheless, energy efficiency investments and ESCO projects remain often not very attractive for market actors because of the long investment payback periods, complexity of projects, lack of awareness and information about existing opportunities and a general lack of confidence in the ESCO market. ESCO activities have mostly developed in the building sector and have left the important potentials existing in the industrial sector almost untapped. The main reasons for this are probably the risks associated to the interruption of business activities caused by the implementation of ESCO projects, the higher complexities and the tendency to implement energy efficiency improvement actions by in-house resources in the industrial sector. Moreover companies often carry out energy audits because of the economic incentives in place in Singapore to perform energy assessments without exploiting the outcomes of these audits to implement energy

⁹⁹ New public sector buildings and existing public sector buildings undergoing major retrofits over an air-conditioned area above 5,000 m² have to obtain the Green Mark Platinum rating, whilst existing public buildings with an air-conditioned area above 10,000 m² are required to attain a Green Mark Gold Plus rating by 2020.

¹⁰⁰ With its 7,793 persons per km² Singapore is actually the third most densely populated country in the world after Macau (20,497 p/km²) and Monaco (15,255 p/km²).

¹⁰¹ Notice however that total annual per capita energy consumption raises to about 12.0 toe when marine bunkers (i.e. deliveries of oils to ships for consumption during international voyages) are included in the calculation because Singapore is the largest marine bunkering centre in the world. This value is the highest in the world (see <http://www.lowcarbonsg.com/tag/energy-consumption-per-capita/> for further information).

efficiency improvement actions. Another important market factor affecting the ESCO business is obviously the price of energy. Existing energy price forecasts predict a very likely and significant energy price decrease as of 2016. This decrease would be caused by the construction of Singapore's first liquefied natural gas (LNG) terminal and the associated construction of new combined-cycle gas turbines supposed to supply 3 GW of additional power capacity¹⁰² to Singapore's energy end-users. Expected future energy price signals will hence probably not provide additional incentives to ESCO investments in the near future in this country.

Information, awareness and demonstration

The Singapore's government has been undertaking a long list of initiatives aiming at informing and creating awareness about the opportunities offered by energy efficiency investments. Most of them focus on energy efficiency opportunities in general and affect ESCO activities indirectly. A minority of these initiatives target directly ESCO investments and actors participating in the ESCO business. The list of initiatives includes the Energy Efficiency National Partnership (EENP) voluntary programme launched in 2010 and targeting industrial companies willing to improve their energy efficiency and to implement energy management practices. This programme has led to the creation of a learning network and annual awards praising the energy efficiency improvement efforts of companies and allowing best practices' sharing¹⁰³. Other initiatives include a series of outreach programmes realised by the Building Construction Authority (BCA) to increase public awareness about the benefits of green buildings. Initiatives for capacity building have been also put in place by a) the Singapore Certified Energy Manager (SCEM) programme providing training and certification in the area of energy management for industries and buildings, b) the ESCO accreditation scheme established by the E2PO, c) the Green Mark Specialist Certification Programmes providing certification courses for specialists in the area of environmental sustainability and for the measurement and verification of the efficiency of chilled-water plants. Another series of initiatives undertaken by the BCA concerns finally the promotion of international collaborations between acknowledged foreign universities and local academy to facilitate the creation of a pool of experts and specialists in the fields of sustainable buildings' design, facility and environment management, environmental sustainability, innovations in sustainable design, etc..

Financing

Government's support to the ESCO market materializes in the provision of funds of several different types for the implementation of ESCO projects in Singapore. An Energy Efficiency Improvement Assistance Scheme (EASE) has been created to fund up to 50% of costs borne by industries and building owners to hire an ESCO carrying out energy audits at their premises. Although not formally required, accreditation by the E2PO may help ESCOs in accessing EASE and increase potential customers' trust in their services. The Grant for Energy Efficient Technologies (GREET) has been instead established to provide industrial facilities with co-funding¹⁰⁴ for the installation of energy efficient equipment or technologies. Then the Investment Allowance (IA) scheme provides companies with a capital allowance consisting in a deduction against chargeable income for costs due to the purchasing of more energy efficient equipment. The Design for Efficiency (DfE) scheme provides instead up to 50% funding¹⁰⁵ to investors in new facilities integrating energy and resource

¹⁰² See <http://asian-power.com/regulation/commentary/singapore%E2%80%99s-wholesale-electricity-market-prices-set-fall> for further information.

¹⁰³ The National Energy Efficiency Conference (NEEC) is a key event organised under the EENP that also contributes to this end.

¹⁰⁴ Co-funding is capped at about USD 3.2 million per project.

¹⁰⁵ Funding is capped at about USD 479,000 per project.

efficiency improvements during the facility's design phase. The Accelerated Depreciation Allowance Scheme allows capital expenditure on qualifying energy efficient or energy saving equipment to be written off in one year instead of three. The Innovation for Environmental Sustainability Fund provides assistance through grants capped at about USD 1.6 million per project for environmental projects that can help to meet the government's environmental sustainability targets. Finally the CDM Documentation Grant has been created to co-fund qualifying costs borne by companies to engage a carbon consultant to develop a new methodology or to produce the documentation related to an existing methodology for the implementation of CDM projects.

The overview just provided shows that a consistent number of policy measures to support the implementation of energy efficiency measures is in place in Singapore. Nevertheless these measures target mostly single stages of energy efficiency projects (e.g. energy audit or implementation of energy efficiency improvement actions) and do not typically cover complete ESCO projects. Specific instruments facilitating the provision of bank loans to ESCOs for project implementation (e.g. guarantee funds) are for example financial measures that could achieve this objective and that do not seem to have been so far implemented. Single ESCO projects are mostly financed by clients as ESCO are not typically willing to take financial risks for their investments. It may be worth mentioning that it may be for this reason that EPCs stipulated in Singapore are mostly with guaranteed rather than with shared savings.

Barriers

Difficulties in capital arrangement and lack of proper financing mechanisms targeting specifically ESCOs are indicated by experts as the principal barriers to ESCO market development in Singapore. The presence of this barrier is directly linked to a diffused perception of high technical and financial risks associated to ESCO investments, this perception being particularly present in the industry sector where ESCO projects are seen as potentially capable of impacting adversely the production or operation processes and where energy efficiency improvements continue having a very low priority. Nevertheless, the low priority and the scarce attention often given to ESCO projects in all sectors is also often due to lack of information. This aspect concerns not only a lack of reliable energy consumption data that makes it difficult to establish baselines and hence provide reliable data on actual savings, but also a situation of inconsistency of information received by potential customers. Transparent and detailed information are also very important to avoid the risks of sunk costs which are often judged as very difficult to be estimated in case of ESCO projects. Long term contracts are finally another relevant aspect often preventing potential customers to engage in these types of projects in Singapore (JRC, 2013).

Conclusions, future expectations

The overview provided in the previous sections indicates that Singapore is very active in implementing energy efficiency measures and that also the ESCO business is quite well developed in this city-state especially in the buildings' sector. The government provides active support to energy efficiency investments and has put in place specific instruments aiming to stimulate the further development of an ESCO market. Nevertheless the lack of standard procedures for the stipulation of EPCs and for the assessment of related risks indicates that important steps still need to be accomplished in order to allow this market to consolidate. Moreover important market opportunities seem to not have been so far sufficiently exploited especially in the industry sector. The existing potential for energy efficiency investments in this sector for the period between 2011 and 2015 has been estimated between USD 397 million and USD 739 million (Krishnaswamy, 2013). The chemical industry has the highest electricity consumption and an important energy saving potential available, but energy efficiency improvement seems to be mainly pursued by in house

resources and without ESCOs involvement. Pharmaceuticals and biotechnology industries have another important amount of energy saving potential available in the fields of tri-generation, HVAC and plug loads (e.g. centrifuges, incubators, dryers, etc.). Electronic industry, notably wafer fabrication, has high energy intensity and relevant energy saving potentials associated to chillers and fabrication process equipment. A smaller share of energy savings is finally available in water industry, where ESCO projects addressing pumping and desalination systems could be profitably implemented (Krishnaswamy, 2013). It remains to be seen whether the government and the other existing stakeholders will manage to create the suitable conditions to overcome the existing barriers hindering ESCO projects' implementation in these market sectors.

Key drivers

- Energy dependence from foreign countries.
- Climate conditions.
- Support provided by the government.
- Economic incentives available for energy efficiency investments.

Number of ESCOs	18 ESCOs accredited by the E2PO. 34 ESCOs operating in Singapore
ESCO market size and potential	Revenues generated by the energy efficiency market estimated at around USD 130 million in 2012 (Frost & Sullivan, extracted from NEA, 2013). Potential for total energy efficiency investments in the industry sector between 2011 and 2015 estimated between USD 397 million and USD 739 million (Krishnaswamy, 2013). No specific information on the ESCO market are available.
ESCO market trend	Growth
ESCO association	Yes
Typical ESCO projects	Air conditioning and ventilation for buildings, building automation and control systems, indoor and outdoor lighting systems, pumping systems and energy end-users behaviour. Power and heat generation systems are an important area of activity in the energy sector, whereas electric motors and drivers, waste heat recovery systems, industrial cooling and compressed air systems are the fields for application of energy services mostly addressed in the industry sector (JRC, 2013).
Main type of contract	EPCs with guaranteed savings

Information in this chapter was based on the following source:

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RexCapitalAsia, 2011. South Esia Asia Energy Efficiency Report. Report available at <http://www.reexasia.com/reports/ReEx-SE-Asia-Energy-Efficiency-Market-Report.pdf>

ESCO market in Thailand 2013

Thailand is the second largest net oil importer in Southeast Asia after Singapore¹⁰⁶ and its economy is highly dependent on global oil markets. After the crude oil crisis determined by the war between Iraq and Kuwait in 1990, the Thai government implemented the Energy Conservation Promotion (ENCON) Act whereby energy audits for factories and buildings with a peak electric load above 1 MW were made mandatory. This Act also established energy efficiency targets and action plans for these facilities and set up an ENCON fund with an initial budget of USD 37.5 million to stimulate energy efficiency improvement actions. This fund was fed by a tax on petroleum products consumption and was employed to provide low interest loans for energy efficiency investments. Despite these economic incentives, ESCOs activities could start only in 1999 thanks to four pilot projects supported by the World Bank and the Global Environment Facility (GEF) and co-ordinated by the Department of Alternative Energy Development and Energy Efficiency of the Ministry of Energy (DEDE) and the Electricity Generating Authority of Thailand (EGAT). These pilot projects consisted of energy audits at industrial facilities and in the subsequent implementation of energy efficiency improvement actions (e.g. installation of CHP plants). ESCOs investments on audits were covered by the international donors involved, whereas the costs related to energy efficient solutions installation were covered by the facilities themselves. The number of Thai ESCOs has started to increase moderately since that time. Stimuli to their activities have come from the Energy Conservation (ENCON) fund and from the creation of an Energy Efficiency Revolving Fund (EERF) in 2003 and a dedicated ESCO fund as of 2008¹⁰⁷. This dedicated fund was established by the DEDE with an initial capitalization of USD 30 million and with the objective of allowing private and government's co-investments by supplying start-up capital to ESCOs and to clean energy projects developers. This fund has been well received by the private sector, although it has been mainly used to finance renewable energies rather than energy efficiency projects (Wang et al., 2013). The EERF was instead established to provide Thai banks with capital to fund energy efficiency projects at low interests and its initial size was of about USD 55 million. The take-up of this fund by ESCOs has however been relatively low because banks are required to assume all of the credit risk and ESCOs balance sheets are most often considered quite weak and their collaterals not sufficient to guarantee the loans offered (Wang et al., 2013). The number of ESCOs currently included in the ESCO registry managed by the Federation of Thai Industry (FTI) is 45 and only a minority of them supplies energy performance contracts (Limaye, 2013).

Current size, trends and features of the market

Thailand is the country of South-East Asia with the highest number of ESCOs and the highest investments in energy efficiency. With its USD 445 million of revenues generated by energy efficiency investments and 37 ESCOs operating on its territory¹⁰⁸ in 2012, this country places itself well above Indonesia, Malaysia, Singapore and Vietnam in the energy efficiency market existing in this geographical area (NEA, 2013). The number of ESCOs supplying energy performance contracts (EPCs) in Thailand is currently around 10. This number did not change significantly during the last 10

¹⁰⁶ 85% of Thai crude oil needs were satisfied by imports in 2011 (Source: U.S. Energy Information Administration).

¹⁰⁷ The EERF fund and the ESCO fund are two featured funds under the ENCON fund (see the report section dedicated to financing for further information).

¹⁰⁸ Notice that the number of ESCOs actually operating in Thailand does not necessarily coincide with the previously mentioned number of companies in the ESCO registry.

years. ESCOs operating in this country are predominantly local/national companies¹⁰⁹. The majority of them is made of manufacturers and suppliers of technologies like heat pumps, variable speed drives (VSDs), lighting systems, systems for ventilation and air conditioning. Overall, Thai ESCOs cover the whole value chain of energy efficiency services and provide information and advice on energy efficiency investment opportunities, but the number of single ESCOs that can perform all of these activities is quite limited. Thai ESCOs typically can identify the measures to be implemented, perform the technical planning, and indicate, if needed, suitable possible third party financiers to their potential customers. Moreover they can implement energy efficiency measures, can take care of operation and management of equipment installed and some of them can realise energy savings monitoring and verification (with in house professionals). Information and awareness raising activities concerning ESCO activities are typically performed by the Ministry of Energy. Between 25% and 50% of the ESCOs operating in Thailand are small companies with less than 50 employees (JRC, 2013). The biggest companies are often manufacturers of lighting systems and insulation materials that do not have energy services provision as core business. EPCs with guaranteed savings are the contract types usually stipulated by ESCOs while build-own-operate-transfer (BOOT) contracts are stipulated only by a minority of them. The ESCO business in Thailand is obviously driven by the industry situation and the prices of energy. This business has hence decreased with the start of the world economic crisis in 2008 until 2010. It has then started increasing until 2012 and has stabilized afterwards. Total ESCOs investments amounted to around USD 100-200 million in 2012 (JRC, 2013). An ESCO association named Thai ESCO Association could be created in Thailand only in 2012 (APEC, 2013), although the Federation of Thai Industry (FTI) also played the role of an ESCO association in the previous years.

Types of projects

Many ESCO projects are implemented in the industry sector (mostly in relation to energy management improvement) and for hospitals. Central government buildings have been another sector with a certain level of activity as Thai Ministries have tended to use the ENCON fund to finance EPC projects implemented at their own premises. On the other hand, schools and universities are not a demand sector stimulating a lot of ESCO investments, whereas the commercial sector could potentially develop a considerable business on energy efficient management and operation of buildings. Technologies and field of applications for energy services supplied are typically air conditioning systems, lighting systems (indoor, outdoor, public and private), energy efficient pumps, electrical motors and inverters, cogeneration of heat and power (CHP), renewable energies. ESCO activity on buildings insulation has started quite recently, whereas CHP and energy efficiency improvement actions in industrial processes seem to represent a field with a promising business potential (JRC, 2013).

Regulatory factors

Energy policy instruments and measures so far implemented to stimulate ESCOs activities mainly consist of measures for information and awareness raising (described in the following report section), creation of an ESCO fund, establishment of low interest rate loans supplied by the previously mentioned EERF fund, ESCO investments support provided by the Thailand Board of Investment (BOI) through tax incentives, support actions implemented by different government agencies.

The ESCO fund is administered by Energy Conservation Foundation of Thailand and the Energy for Environment Foundation. It can be used to provide ESCOs and factory owners with equity

¹⁰⁹ Many of the ESCOs with foreign origin operating in Thailand have they headquarters in Japan (Murakoshi & Nakagami, 2009).

investment, credit guarantees, venture capital and to facilitate equipment leasing as well as to support project development in general. The programme for ESCO fund administration envisages also the provision of technical assistance on energy efficiency and renewable energy projects to their developers. The EERF is instead administered by DEDE and provides 11 Thai banks with credit lines at zero interest to be used to finance energy efficiency and renewable energy projects at an interest rate not exceeding 4%. Loans supplied by this fund can provide investment capitals not over USD 1.25 million (per project supported), do not usually exceed 50% of total projects investments and must be repaid in no more than seven years. Unfortunately the ESCO fund has so far mostly supported renewable energy projects, and the number of energy efficiency projects financed by this fund has been practically equal to zero until April 2010. Also the success of the EERF in the stimulation of the ESCO market has been so far very limited, as it has been so far used to finance a very low number of ESCO projects (Wang et al., 2013).

Tax deductions that cannot exceed USD 64,000 per year per company are also available for enterprises that can demonstrate to have spent money for energy efficiency improvements. Start-ups in the sector of energy efficient technology manufacturing can benefit from 100% corporate income tax and import duty exemption for 8 operating years¹¹⁰.

Moreover government agencies like EGAT, the Provincial Electricity Authority (PEA), the Energy Policy and Planning Office (EPPO) of the Ministry of Energy, the National Innovation Association (NIA) support ESCO business by buying electricity from renewables at high rates or by selling gas for CHP at low rates¹¹¹. A demand side management programme based on competitions to reduce energy consumption has also been created. The company winning these competitions receives USD 0.05 per each kWh of electricity and USD 2.34 per each MMBTU of thermal energy saved (Langlois & Hansen 2012).

It is finally worth mentioning that the LEED certification for buildings and energy labels for air conditioning and lighting systems have been adopted in Thailand. These policy instruments provide very useful benchmarks that ESCOs can leverage to demonstrate the added value of their services and expand their business. Also the ESCO registry managed by the FTI contributes to this end, as potential clients and financial institutes can be guaranteed that the company they have selected in this registry provides actual ESCO services.

Market factors

So far the ESCO business has mainly developed in the industry sector. Small projects implying investment costs between USD 161,000 and 1.3 million contribute to most of the total investments and typically relate to boilers or chillers replacement, heat pumps installation, usage of ozone for laundry and energy management systems. Large projects ranging from USD 3.2 million to 32.3 million are implemented for the installation of CHP plants, wasted energy recovery and generation of energy from renewables. Large projects are usually the ones for which EPCs can be stipulated and are the ones probably requiring more funding by policy makers. On the other hand these projects are also typically the most complex ones and require careful and detailed procedures for risks assessment and management.

Information, awareness and demonstration

¹¹⁰ This percentage is lowered to a 70% income tax exemption for three years in case of existing companies.

¹¹¹ Being focused on the supply of renewable energies, this kind of support can however be considered only as an indirect support to the implementation of energy efficiency projects by ESCOs.

The FTI has created an ESCOs' information centre under the DEDE sponsorship and the support of the Thai ESCO association with the objective of facilitating information exchange among ESCOs, financing institutions and ESCO clients. This centre and its related website are also supposed to ensure that industry can have access to information concerning the EPC concept, to collect data and information on ESCOs experience, to produce guidelines for expanding the ESCO business. An annual award for the best implementers of the ESCO concept has been instituted by the FTI in order to stimulate an improvement in the quality of services supplied. National and regional annual fairs dedicated to ESCOs are also organized together with seminars allowing networking among the main stakeholders involved in this market. It has also to be mentioned that the Thai government invest a considerable amount of money for the promotion of energy efficiency through the media. Most of the activities related to information, awareness raising, capacity building and demonstration undertaken as of 2013 are the result of a market promotion strategy jointly developed by the Thai ESCO Association, the DEDE and the FTI. Within this strategy, the Thai ESCO association has mainly taken the commitment of contributing to the development of competent ESCOs and suitable financing schemes for these companies. DEDE is instead in charge of providing economic support and implementing policy instruments stimulating ESCO market development and capacity building, whilst the FTI is supposed to facilitate ESCOs in reaching their target customers by undertaking market promotion activities and by managing databases and registries related to the ESCO business in Thailand (Vechakij, 2013).

Financing

ESCO clients usually borrow the money needed for their investments from banks directly. It is indeed quite unusual that ESCOs directly finance the investment of their clients as it is generally assumed that this would increase ESCOs investment risks too much. However banks are generally willing to provide ESCOs with the low interest loans activated e.g. by the EERF created by the government. The main problem from Thailand seems to be represented by the fact that ESCOs cannot provide sufficient guarantees to the banks for these loans. The quality of companies as determined by sufficiently solid balance sheets, availability of collaterals needed to activate the credit lines and the quality of service provided seem to represent a major point for a future market development in Thailand. Bank's asset-based evaluation of ESCOs represents in particular an important obstacle to small-scale business development and to market activity by newcomers.

Barriers

Existing barriers can be basically grouped into financial, technical and management ones. Concerning financial barriers, lack of appropriate forms of finance does not seem to be the major problem in Thailand. As already mentioned, financing barriers are mainly generated by the ESCOs' difficulties in meeting the eligibility criteria established by banks. Technical barriers are instead mainly generated by a lack of competency on energy services often due to the fact that some companies providing these services are quite new to the ESCO market. Unfortunately a series of bad experiences concerning this aspect seem to have been already registered (Langlois & Hansen, 2012). Another problem in this area is represented by the fact that most of the energy efficient technologies installed are imported from other countries. This often complicates or makes the provision of any service including operation and maintenance of technologies quite difficult. The main problems arising on the management side are instead due to the fact that energy services do not represent the core business of many of the companies supplying these services in Thailand. This sometimes implies that human resources invested in this business are not sufficient, that the quality of available consultants is sometimes poor and the competencies on projects implementation are lacking. The lack of confidence often manifested by potential customers in the services supplied by ESCOs appears then not fully unjustified in this country. Another important issue that is worth to be

mentioned is the lack of accepted standards and protocols for energy savings measurement and verification. Finally, barriers due to the lack of experience in the stipulation of ESCO contracts in the public sector are another obstacle to the expansion of the ESCO business in Thailand.

Conclusions, future expectations

The ESCO market existing in Thailand is the most developed in South-East Asia. Overall, this market has received and is still receiving substantial government support and the market opportunities created by ESCO projects so far implemented indicate promising development trends. These projects have been mostly implemented in the industrial sector where important economic saving potential are still untapped. ESCOs activities in the commercial and the public sector are instead not well developed. Experts seem to indicate that the Thai ESCO market needs to scale-up to larger and more complex projects compared to those so far implemented (JRC, 2013). If, on the one hand, this should allow a larger diffusion of EPC contracts, on the other hand the implementation of these projects requires an increase in the number of qualified experts having the technical expertise needed, the production of suitable protocols and methods for energy saving measurement and verification as well as an increased trust by customers in ESCO products. The creation of more expertise in the assessment of risks associated to EPC contracts could in particular allow to improve the administration of the existing ESCO fund and to increase the economic support provided to EPC projects of higher quality. In the public sector public procurement processes should be improved to facilitate ESCOs contracting by creating templates of bidding documents, suitable ESCO selection procedures, capacity building and information activities on ESCO business. The DEDE could in particular provide useful support to create the competences needed to engage in ESCO projects and to deal with the public bidding process and the procedures for energy saving measurement and verification. In the private sector the adoption of a voluntary code of conduct and the development of a more formal accreditation system could help energy end-users in overcoming the existing difficulties in the identification of qualified ESCOs (APEC, 2013). An improvement in the quality of the equipment installed and the reduction in the risks of clients' insolvency are other points of attention signalled by representatives of the supply side (JRC, 2013). Finally it is worth mentioning that the utilization of the ESCO fund to establish a guarantee fund could serve to further leverage private investments. This, however, would probably require the implementation of specific training activities for ESCO fund managers (Wang et al., 2013).

Key drivers

- There is a large potential for energy efficiency improvements
- The government has considerably supported the ESCO market
- ESCO projects initially implemented have been quite successful

Number of ESCOs	About 45 ESCOs registered in the FTI registry. About 10 of these ESCOs supply EPCs.
ESCO market size and potential	Market size around USD 100-200 million in 2012. Market potential around USD 500 million in 2012 (Leaver, 2013).
ESCO market trend	Growing
ESCO association	Thai ESCO Association
Typical ESCO projects	Projects mainly implemented for industry. Technologies and fields of application: pumps, electric motors and inverters, CHP, lighting, air

	conditioning.
Main type of contract	EPCs with guaranteed savings, BOOT contracts (not very frequent)

Information in this chapter was based on the following source:

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 JRC, 2013. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

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Vechakij, A., 2013. Policies to Promote ESCO Industry in Thailand. Presentation held during the 2nd Workshop on APEC Cooperative Energy Efficiency Design for Sustainability (CEEDS) Phase 4, Chinese Taipei, 26-28 March, 2013.

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ESCO market in Vietnam 2013

The ESCO concept has started spreading in Vietnam since the beginning of 2000s thanks to the interest by the Vietnamese government. ESCOs are judged by this government as capable to effectively contribute to the achievement of its national energy efficiency targets as set, for example, in the framework of the Vietnam National Energy Efficiency Program (VNEEP). Support to the ESCO market has been provided in the past by governments' collaborations with and funding from international organizations. The two main examples that can be mentioned in this respect are the Commercial Energy Efficiency Pilot (CEEP) program and the project Promoting Energy Conservation in Small and Medium Enterprises (PECSME). The CEEP program could be implemented in the period between 2005 and 2009 thanks to a grant received from the Global Environment Facility (GEF) through the International Bank for Reconstruction and Development (APERC, 2011). This program was focused on financing and capacity building in government's agencies and private enterprises for the implementation of energy efficiency and energy conservation measures. These measures were implemented through local project agents acting as energy service providers. Thanks to this initiative 333 public administrations received training and USD 4 million were invested for the implementation of 98 energy efficiency projects as of March 2009. The PECSME project was instead implemented in two phases between 2002 and 2010 in collaboration with the UNDP. The second phase of the PECSME started in 2006 and led to the implementation of 500 energy efficiency projects with the participation of 25 energy service providers. Companies involved in these initiatives were expected to converge to an ESCO model. Nevertheless only one of the companies that participated in the PECSME project managed to stipulate an energy performance contract (EPC) for a project implemented in the industry sector (Langlois & Hansen, 2012).

Current size, trends and features of the market

The most recent information on the Vietnamese market indicate around 20 companies that could potentially act as an ESCO in this country (Langlois & Hansen, 2012; RexCapitalAsia, 2011). Nevertheless the majority of these companies is made of engineering firms or vendors of energy efficiency equipment or energy services with limited experience in the provision of energy audits and in the implementation of energy efficiency projects¹¹². Most of the projects so far implemented have targeted the industry sector due to the large amount of energy intensive industries operating in Vietnam. Industries are indeed responsible for about 36% of total energy consumption of this country, whereas the residential achieves about 39%, the transport sector energy consumption amounts to about 20% of the total energy consumption, the commercial sector achieves just 4% and the agriculture sector consumes the remaining 1% (Toan et al., 2011). Although the government, notably its Ministry of Industry and Trade (MOIT), is apparently giving high priority to the development of ESCO industry, it cannot be said that a proper ESCOs market exists in Vietnam. A series of interviews to local companies (RexCapitalAsia, 2011) have indicated that the number of companies with capabilities in providing EPCs is probably one or two in this country and the information available do not allow establishing their market volume. Moreover there are not ESCO associations operating in Vietnam. The main initiatives related to ESCO industry being currently undertaken seems to be originated by the VNEEP. The VNEEP's phase I that run between 2006 and

¹¹² During the first months of 2013 a Danish Vietnamese consulting company (RCEE-NIRAS) conducted a survey with the aim of analysing the situation concerning emerging energy service providers and ESCOs in Vietnam. A questionnaire was distributed among 100 companies potentially operating as ESCOs on the Vietnamese market and 72 out of these 100 companies filled in and returned their questionnaire. Unfortunately, information available do not allow establishing how many of these respondents can be considered as an ESCO.

2010 has mostly provided capacity building, information and analysis for the implementation of energy efficiency and conservation (EE&C) measures in all sectors (APEREC, 2011). The VNEEP's phase II, that started in 2011 and will run until 2015, includes instead a specific component dedicated to the development of Energy Service Providers (ESPs). This component aims, among others, to providing technical assistance to analyse the emerging market of ESPs, to developing best practices for EPCs, to stimulating the transformation of ESPs into ESCOs and the implementation of ESCO projects. Actions envisaged in this program are mostly focused on energy intensive industries like cement, iron, steel, chemical, pulp and paper industries. The Vietnam Clean Production and Energy Efficiency Project (CPEE) is in particular one of the initiatives implemented to achieve many of the VNEEP phase II objectives. This project is being carried out through a co-operation among the MOIT, the World Bank (WB) and GEF. It was approved by the WB Board of Executive Directors in April 2011 and has so far allowed auditing and establishing energy consumption benchmarks of chemical plants in the subsectors of rubber processing, fertilizers manufacturing and paint factories¹¹³. The steel sector is another industrial sector where energy efficiency investments are being intensively realized and where the ESCO activities could hence potentially develop. The Embassy of Denmark is another institution active in recruiting competences to support the Vietnamese government and the MOIT¹¹⁴ in the achievement of their energy efficiency objectives. It remains to be seen whether experts hired by international organizations and foreign institutes to assist the MOIT will manage to trigger the development of a self-sustaining ESCO market.

Types of projects

The few actual ESCO projects so far implemented have been three demonstration EPC projects carried out in food processing facilities. EPCs stipulated were EPCs with shared savings whereby ESCOs have got 100% of the economic savings generated until their project costs – including their profits – have been repaid¹¹⁵. These projects were implemented with the technical and financial support of the PECSME project between 2009 and 2010 (Langlois & Hansen, 2012). Considering that the average payback period was around one year it may be argued that energy efficiency solutions installed have been quite simple and low cost. A certain number of projects have been also implemented with the aim of analysing energy consumption in industrial sectors related to thermal power generation, cement, ceramics, coal exploitation, metallurgy. These projects have led to the formulation of proposal for energy efficiency improvements but it can be hardly stated that they have so far generated an ESCO business.

Regulatory factors

The most recent and relevant regulation that could potentially stimulate ESCOs' activities is the Law on Energy Efficiency and Conservation approved in June 2010. The Law has introduced energy efficiency requirements for energy intensive industries, public administrations and establishments dealing with transportation. Energy intensive industries, in particular, are required to implement energy audits and to produce energy consumption plans. Energy managers have also to be appointed to implement energy saving measures and to regularly report to government authorities about the

¹¹³ See <http://vietnambreakingnews.com/2013/08/energy-efficiency-solutions-for-green-effective-economy/> for further information.

¹¹⁴ The Energy Efficiency & Conservation Office (EECO) under the General Directorate of Energy of the MOIT is government body designated to co-ordinate and to implement projects relate to EE&C including information and awareness raising activities.

¹¹⁵ This variant of EPCs with shared savings is commonly known as *first-out* approach.

energy consumption of their companies. A road map for the implementation of energy efficiency standards and energy labelling of equipment and appliances has also been prepared in the framework of the VNEEP phase II. Moreover, energy efficiency building codes are in place since 2005¹¹⁶ and require the compliance with minimum energy performance standards for envelopes of retrofitted and new buildings, indoor and outdoor lighting systems, air conditioning and ventilation systems (APEREC, 2011). No regulation directly addressing ESCO activities is currently in place in Vietnam.

Market factors

Vietnam economy is growing very fast since economic production and exchange have been liberalized in 1989. Since that time its GDP has been steadily increasing with an average annual rate well above 6% and with the contribution of the industry sector well above this average. Although Vietnam has currently a surplus in primary energy supplies, such high GDP's increase rates are expected to transform this country into a net energy importer by 2015 (Toan et al., 2011). It is for this reason that policy makers have started focusing on the development of new energy sources (e.g. renewables and nuclear) and on energy efficiency. Per capita commercial energy consumption grew by 9.3% per year between 1990 and 2007 and is still growing at an impressive rate. Per capita electricity consumption grew even faster at a rate of 12.8% in the same period thanks also to a national program of electrification of cities, towns and villages. Although a competitive power market has started being gradually introduced with the electricity law of 2004, state owned power companies are still regulating the electricity price that was around USD 7 cents per kWh before August 2013. Despite the government has recently increased this price by 5%, the still very low electricity sale prices generate government's debts when coal and gas have to be bought to generate electricity. This situation generates, among others, risks of increasing brownouts and blackouts in the electricity network. If augmented electricity prices could allow higher state's investments and could attract foreign investments in energy generation and energy efficiency, policy makers remain concerned that these prices could also increase the cost of living for the poorest people and determine social unrest. This situation is probably one of the main brakes to energy efficiency and ESCO market development in Vietnam. When it comes barriers to the ESCOs acting within the existing energy efficiency market, a problem represented by existing competition between energy service providers (ESPs) and state-owned agencies delegated to implement government's programmes. Whereas the Energy Efficiency and Conservation Office (EECO) of the MOIT promotes and implements government programmes at the national level, state-owned Energy Conservation Centres provide indeed support in carrying out these programmes at the local level. These centres play an important role for the concrete implementation of energy efficiency improvement actions, but are seen as competitors and as an obstacle to ESCO market development by private ESPs (Langlois & Hansen, 2012).

Information, awareness and demonstration

Information and awareness raising on energy efficiency investments and related opportunities have been among the main targets of the VNEEP Phase I. Several projects have been implemented in this area especially in the period between 2007 and 2009 (ARPEC, 2011). Training courses on energy auditing, capacity building for energy efficiency and conservation centres, training courses in construction and design of energy efficiency buildings and energy management in industries have been widely implemented. Nevertheless information activities focused on ESCO business have been lacking so far. Also the creation of contract's standard models and protocols for energy savings'

¹¹⁶ See Circular n. 40/2005/QD-BXD and the new building code QCVN 09:2013/BXD in force as of 15 November 2013.

measurement and verification seem to have so far gained scarce attention in the energy efficiency policy agenda. Moreover, competence and expertise on ESCO project implementation appears generally still very scarce in Vietnam. It remains to be seen whether the VNEEP Phase II will manage to fill the existing information and competence gap and create a common understanding of the ESCO concept in this country.

Financing

It has not been possible to gather any information concerning possible tax schemes or low interest loans for ESCOs investments in place in Vietnam. Subsidies and budgetary measures seem to have been so far mainly available for programmes implemented at the government level. International organisations have been supporting several ESCO related activities, although these activities have not materialized in ESCO contracts. Several energy efficiency investments have been partly financed by loans from private banks to SMEs but, again, it can be hardly stated that these investments represented some sort of ESCOs' activity. As already mentioned, the very few ESCO projects implemented were financed by the economic savings generated by the energy efficient solutions installed due to the lack of suitable financing mechanism that could cover all the phases of projects' implementation.

Barriers

The energy market situation represents, as mentioned, an important barrier to ESCO market development and it remains to be seen if the on-going energy market liberalization process will be realized in the short term and if this will have an effect on the activities of ESCOs. There is a general lack of experience on ESCO business in Vietnam and most of the basic instruments needed to support it have still to be created. Economic incentives or taxation systems favouring this kind of business are not in place in this country and the government seems to rely more on voluntary agreements and initiatives by industries than on the allocation of funds for the stimulation of this market. On the contractual side, accounting systems need to be adjusted to include the possibility that EPCs with investments off the balance sheets can be considered.

Conclusions, future expectations

The remarkable increase pace in energy demand being registered will soon transform Vietnam in a net energy importer. This evolution is very likely to accelerate the on-going energy market liberalization process and to determine an increase of investments in energy generation with a subsequent increase in the energy prices. In principle this situation creates favourable conditions for an ESCO market development. However the concrete possibility of such development depends heavily on the extent to which the government will be committed to accompany energy generation with measures supporting energy efficiency investments and ESCOs' activities in particular. Such commitment seems to have been already partly proved by the specific energy efficiency programmes so far implemented. However government investments should probably become more targeted to stimulate private ESCOs initiatives and to increase local companies' capacity to implement ESCO projects. Actions dedicated to create a higher interest in ESCO projects by local financing institutes could also be highly beneficial in this respect. The experience from other Asian countries shows that international financing institutes could provide a lot of support to this aim, for example by providing funding for loans that could be administered by local financing institutes. Moreover, an intensification of initiatives allowing that a common understanding of the ESCO concept can be established, while promoting capacity building and the diffused adoption of standardised contracts and protocols for energy savings measurement and verification (M&V) would certainly be highly beneficial. The Vietnamese government is presently engaged in making energy

audits at industrial sites and in allowing identifying profitable energy efficiency improvement measures that could be implemented in this sector. These activities represent already a very important opportunity for local energy service providers, but it remains to be seen whether industries will actually implement the identified measures by ESCO services. A commitment by industries is needed to this end, but concerted actions involving the government, financing institutes and local energy service providers are also necessary.

Key drivers

- Increasing energy demand will probably be an important driver
- Increasing energy market liberalization will create more opportunities for private ESCOs
- Intensification of initiatives aimed at capacity building are needed
- Financial measures (e.g. tax credits, subsidies) and national and international credit institutes involvement are other important drivers not yet exploited
- A wider adoption of standard ESCOs' contract models and protocols for energy savings M&V is also needed.

Number of ESCOs	About 20 existing companies could act as ESCO, but only two/three of them have implemented ESCO projects so far. A survey performed in 2013 indicates however that the number of Vietnamese ESCOs could be higher.
ESCO market size and potential	No information available.
ESCO market trend	There is an increased focus on ESCOs' business in the government policy but it is not possible to define a market trend as proper ESCO market did not yet start
ESCO association	Not existent
Typical ESCO projects	Demonstration EPC projects carried out in food processing facilities. There is an important potential for ESCO project implementation in energy intensive industries (cement, iron, steel, chemical, pulp and paper industries)
Main type of contract	EPCs with shared savings (first-out approach).

Information in this chapter was based on the following source:

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Oceania

The ESCO business in Australia is relatively new and the abundance of energy sources does not create the best conditions for a stimulation of the ESCO market in this country. Nevertheless, the increase in the energy prices being observed in the last years, partly due to the increase in the energy demand both at the national and the international level and partly due to the impacts of a carbon tax, can in principle create the right pre-conditions for higher ESCO investments. The number of companies offering energy performance contracts (EPCs) in this country was around 15 in 2013. These companies have been able to stipulate EPCs with a value around AUD 75.6 million in the 2013-2014 financial year. ESCOs operating in this market are mainly partners or daughter companies of large international companies and do not have the provision of EPCs or energy efficiency services as their core-business. Their projects have been so far mostly implemented in public buildings (higher education facilities and hospitals in particular). Typical technologies and fields of application addressed relate to the installation of energy efficient lighting solutions (e.g. LED, efficient T8 fittings, lighting control devices, etc.), Heating, Ventilation and Air-conditioning (HVAC) solutions (e.g. efficient space and water heaters, occupancy and timer controls, variable speed drives for air conditioning, efficient building management solutions). Co-generation and tri-generation plants are other technological solutions implemented in the commercial and in the industry sectors. The experience of companies involved in the ESCO business on the supplied side is sometimes quite limited, whilst on the demand side potential clients do not yet completely understand the opportunities offered by ESCO investments or mistrust ESCO offers. The Australia government has put in place model contracts and implementation guidelines to be used in the public sector; nevertheless the low interest/demand for energy efficient retrofits projects remains the major barrier to ESCO projects especially in the private sector. The growing demand for energy efficient buildings stimulated by an energy efficiency certification and rating schemes introduced by the government are also creating some business for energy service companies. Despite the Australian business has historically paid scarce attention to energy efficiency, there is now a generally higher awareness concerning the opportunities offered by the ESCO business model and for the environmental benefits associated, as proved by the increased volume of ESCO activities registered since 2008-2009. The main push to this business comes however from the state and federal governments who until recently have supported and in some cases mandated the ESCO model for energy efficiency projects to be implemented in the public sector. The interest in this model seems slightly reduced in the last year. Nevertheless, this is likely to be a temporary faltering given the generally higher awareness of existing opportunities and the good level of experience already matured by a number of companies operating as ESCO in this country.

New Zealand has instead just a relatively small number of energy consulting and energy service companies. This is predominantly made up of companies that are service providers for ESCO projects, and do not bear risks related to the energy performance of EE projects. There are approximately three to five companies that offer performance guarantee contracts. Largely these guarantees are in response to requirements by the Energy Efficiency and Conservation Authority (EECA, the Government Agency tasked with promoting energy efficiency), to meet energy improvement targets for the projects receiving grants. These targets are normally set at 90%, i.e. the energy efficiency improvements realized in a project receiving grants must achieve at least 90% of the estimates made at the start. The number of projects of an ESCO nature is around 75 either implemented in the year to March 2014 or still offering guarantees on this year for a total investment of NZ\$18 million (US\$ 15,67 million). The majority of implemented projects offer a performance guarantee to EECA and the risk is that a proportion of the government grant is held back unless certain performance measures are met. Many of these projects are lighting redesign and HVAC controls. In terms of true ESCO projects the number is less than 10 with a combined

investment of NZ\$8 million (US\$ 7million). According to experts, the ESCO market can grow slowly in New Zealand, unless something changes the status quo. Continuation of EECA granting, implementation of EPCs, development of financial products dedicated to ESCOs could give impetus to development of ESCO market. Also the Emission Trading Scheme existing in this country could in principle stimulate ESCOs if it will start having more influence on energy prices.

ESCO market in Australia 2013

Nineteen-ninety-six is most probably the year when the ESCO concept started being used in Australia. During that year the Sustainable Energy Development Authority (SEDA) was established by the New South Wales (NSW) Government to reduce energy related greenhouse gas emissions in Australia¹¹⁷. In that same year, this Authority launched the Energy Smart Government Program whereby it provided government agencies with assistance for the implementation of energy efficiency projects at own premises through the stipulation of Energy Performance Contracts (EPCs). An EPC industry association named Australasian Energy Performance Contracting Association (AEPCA) was formed in 1998 to promote industry, set standard procurement processes, develop tools and guidelines for customers and establish an accreditation system for ESCOs. The Energy Smart Government Program led to the completion of 23 EPC projects as of April 2004¹¹⁸ (Passey et al., 2004). It was financed by a loan fund established by the New South Wales Treasury and a streamlined financing framework created for government agencies implementing energy efficiency upgrades. As of 2004, EPCs were adopted also by the Queensland and South Australian Governments as a delivery method for the achievement of the energy efficiency improvement targets established for their government agencies. These contract types were nominated as the preferred delivery mechanism also for improving energy efficiency of Victoria Government facilities as of 2006. Six major ESCOs could already operate in Australia during this year¹¹⁹, although only three or four companies were actually active in the supply of energy efficiency services. In 2009 the Australasian Energy Performance Association was incorporated by the Energy Efficiency Council (EEC)¹²⁰ which has a broader focus than AEPCA and promotes a wide range of energy efficiency and cogeneration services and products in the non-residential sector. Despite the initiatives undertaken in some states of Australia to stimulate the stipulation of EPCs and the ESCO business, this market has been so far mostly limited to the public sector, as detailed in the sections below.

Current size, trends and features of the market

According to some information sources, the number of company operating or being prequalified as ESCOs in Australia has most probably remained unchanged since the financial year of 2008-2009,

¹¹⁷ The SEDA was integrated with the Department of Energy, Utilities and Sustainability (DEUS) as of 1 July 2004. This department was abolished in April 2007 and activities related to energy efficiency funding have been transferred to the Department of Environment, Climate Change and Water (NSW Government Gazette No.56, Special Supplement, 20 April 2007, p.2435), which was subsequently abolished and its functions moved into the Department of Premier and Cabinet (DPC) as the "Office of Environment and Heritage". This office has been recently moved from DPC into the Department of Planning and Environment.

¹¹⁸ An annual AUD 20 million interest-free loan fund was established to provide a financing amount typically above AUD 500,000 (1 AUD equals approximately 0.92 USD whilst this report is being written). This amount had to be used for projects with a minimum internal rate of return (IRR) of 12% and implemented through EPCs. The Energy Smart Government Program included also a Government Energy Efficiency Investment Program (GEEIP) using the same loan fund and employed to help agencies to invest in smaller projects not suitable for EPCs.

¹¹⁹ These ESCOs were Energy Conservation Systems, Total Energy Solutions (TES), Honeywell, Siemens, Trane, AGL, Energex.

¹²⁰ The EEC is sponsored by Philips, Origin, Siemens, Honeywell, Dalkia Energy Services, Schneider Electric, AGL and its membership is open to market organisations or companies active in the field of energy efficiency services and products for energy end-users as well as in the field of co-generation and tri-generation systems. NGOs, government agencies, local governments or academic institutions with an interest in energy efficiency can also be members (see <http://www.eec.org.au> for further information).

although active ESCOs have overall increased their investments' volume in the EPC sector, as summarized in the table below¹²¹.

Year	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013	2013-2014
Number of ESCOs	12	12	12	12	12	12
Total Contract Value of EPCs implemented	\$16,750,935	\$33,501,870	\$22,334,580	\$44,669,161	\$39,085,516	\$72,587,386
Savings per annum of implemented projects (\$)	\$2,045,069	\$4,090,139	\$2,726,759	\$5,453,518	\$4,771,829	\$8,861,967

The table above shows also the value of the EPCs signed in the financial years from 2008-2009 and the amount of annual economic savings generated by the related projects¹²². The economic amounts reported in the table indicate that the EPCs market size has not always increased in the time period covered. Nevertheless, values related to the period 2013-2014 are markedly higher compared the corresponding values registered five years before. It is also worth mentioning that the impacts of the global financial crisis has not been as significant as those registered in many other countries of the world and do not seem to have affected the energy service market of the country. According to other information sources, however, the number of ESCOs actually offering EPCs was 3-4 in 2009 whereas other six were prequalified as ESCOs in the same year, although they never tendered or delivered EPCs. The number of ESCOs with experience on EPCs would have then passed to eleven with fifteen companies actively offering EPC services during 2013-2014¹²³. ESCOs operating in this market are mainly partners or daughter companies of large international companies and do not have the provision of EPCs or energy efficiency services as their core-business. Companies that have started supplying EPCs come typically from a background related to the provision of energy audits, or to the provision of mechanical and maintenance services, or to the provision of building automation systems. These companies include, for example, TES and Honeywell, technology and controls companies like Siemens and Schneider Electric, retailers like Origin, mechanical contractors like AG Coombs and companies like Carbonetix, Genesis Now, Ecosave. Energy retailers like AGL are also active in the EPC sector and dominate the market segment associated to co-generation and tri-generation (Langlois & Hansen, 2012). Most of the recent ESCO business in Australia has been generated by a programme run by the Department of Treasury and Finance (DTF) in the state of Victoria and aiming to reduce the energy use of government buildings and infrastructures. To achieve this objective, the Victorian government created a funding source (a Treasury Loan fund) and mandatory project milestone targets to be met by stipulating EPCs for the retrofitting of their departments and agencies buildings. In 2009, Victoria created a panel of pre-qualified ESCOs who are supposed to have demonstrated required expertise in implementing energy efficient retrofits under EPCs. In 2013-14, NSW reinvigorated its EPC program which was established in 1998 but was largely unutilised since 2006 and has aimed to adopt policy and program elements used in Victoria. Established in 2009, the Victorian programme was named Greener Government Buildings (GGB)

¹²¹ Personal communication of the interim results related to an EPC market size assessment performed in Australia by the Energy Efficiency Council (economic values are reported in AUD).

¹²² Notice that the value for contracts is specified in the year that they are signed and that they might take several years to be completed.

¹²³ Information kindly provided by the Department of Treasury and Finance of Victoria State in 2014 for the purposes of this study.

program and is the only one that saw EPCs to proceed so far. To date, it has facilitated 25 EPC projects with an aggregated investment of AUD 125 million and net present value of AUD 106 million while reducing GHG emissions by 153,000 tonnes per annum (an average reduction of 36% for the 573 buildings included)¹²⁴. On March 2014, the Victorian government has decided to replace this program with a new initiative named Efficient Government Buildings program. This new version of the GGB program has generated several concerns among involved stakeholders as it removes the DTF as funding source and establishes that capital requirements have to be funded either internally or through a budget capital bid by participant government departments and agencies¹²⁵. The new program also lacks any mandatory requirement for participation, or targets for departments.

ESCO projects are implemented also in the Queensland State where the government Department of Climate Change has stipulated EPCs for the energy efficiency improvement of its buildings, but the level of investment has been decreasing since the early 2000s (Langlois & Hansen, 2012). This Department has not initiated any new project since the 2012 election, after which program resources were cut by the new Queensland government. Whilst the ESCO market in the public sector is quite developed, the number of ESCO projects implemented in the private sector has been so far very limited. Major EPCs have been stipulated in the commercial sector by the General Property Trust (GPT) for the improvement of the energy performances of its buildings (Crittenden, 2013). Overall, there seems to be a quite good capability to implement EPCs in Australia. However, experts claim the need for an ESCO accreditation scheme in order to allow the qualifying and the monitoring of new companies and individuals entering the ESCO market. An accreditation scheme has been actually launched only in December 2013 by industry associations representing energy service providers, the Energy Efficiency Council in collaboration with DTF, Sustainability Victoria¹²⁶, NSW, Queensland, the Commonwealth Government and representatives of private building owners. This scheme provides a certification process for individuals implementing 'integrated building energy retrofits' (IBER) projects, including EPCs¹²⁷.

Types of projects

ESCO projects have been so far mostly implemented in public buildings (higher education facilities and hospitals in particular) where some funding for energy efficiency improvement has been made available. ESCO activities at local and central government buildings have been generally quite limited (JRC, 2013). Some local governments and municipalities are trying to foster energy efficiency improvements in private buildings (see e.g. the "1,200 buildings" program in the City of Melbourne) but it is hard to say whether these initiatives can be a stimulus for the ESCO business. ESCO activities in the tertiary and the industrial sector are also rather limited, whilst the residential sector is not covered at all. A number of EPC projects have been tendered by water authorities under the Victorian GGB and include energy efficiency improvement actions in water treatment plants, pumping stations and main water authorities' office buildings. However, the technical complexity of these projects and the risk averse nature of the water sector (being an essential service with considerable regulation) has seen only one water sector EPC project fully implemented so far. Typical technologies and fields of application addressed by ESCO projects relate to the installation of energy efficient lighting solutions (e.g. LED, efficient T8 fittings, lighting control devices, etc.), Heating, Ventilation and Air-conditioning (HVAC) solutions (e.g. efficient space and water heaters, occupancy and timer controls, variable speed drives for air conditioning, efficient building

¹²⁴ Information provided by Victoria State DTF in 2014 for the purpose of this study.

¹²⁵ See <http://www.thefifthstate.com.au/archives/60739/> for further information.

¹²⁶ Sustainability Victoria is a Victorian government statutory authority established in 2005 and delivering programs on integrated waste management and resource efficiency.

¹²⁷ Information provided by Victoria State DTF in 2014 for the purpose of this study.

management solutions). Co-generation and tri-generation plants are other technological solutions addressed by ESCOs in the commercial and in the industry sectors (DTF, 2013).

Regulatory factors

Until recently, the overall policy framework for the promotion of energy efficiency in Australia was represented by the National Strategy for Energy Efficiency (NSEE) released in 2009. This 10 years strategy envisages the implementation of energy efficiency measures in all sectors and aims at addressing the main barriers that prevent the optimal up-take of energy efficiency opportunities¹²⁸. The main legislative measures presently driving the ESCO market in Australia are however the two previously mentioned programs run in the Victoria State and NSW to improve the energy efficiency of government buildings. Implementation guidelines together with procurement tools and a panel of pre-qualified ESCOs are provided to participating departments and agencies. Central support teams for program participants have been also created respectively in the DTF of Victoria State and in the Office of Environment and Heritage (OEH) of NSW. Whilst these two programs target directly ESCO activities, a series of legislative measures implemented at the federal level in Australia could potentially stimulate the ESCO market indirectly. These measures include, for example, the Energy Efficiency Opportunities Act of 2006, the National Greenhouse and Energy Reporting (NGER) Act of 2007 and the Building Energy Efficiency Disclosure Act of 2010. The Energy Efficiency Opportunities Act requires large energy users¹²⁹ to periodically perform and publish the results of an energy efficiency improvement assessment concerning own facilities and has so far managed to stimulate the implementation of a consistent amount of savings by reducing information gaps existing at these users¹³⁰. The program implemented by this act seems however to have already achieved the targets initially set by the government and will be closed as of 29 June 2014¹³¹. The NGER Act sets instead the national framework for annually reporting and disseminating information concerning greenhouse gases emissions, energy consumed and energy produced by large energy users¹³². This act has formed the basis for determining the liability of companies to a carbon tax introduced in July 2012 by the Australian Federal Government for entities emitting annually more than 25 Kt of CO₂ equivalent. This carbon tax was expected to significantly cut Australian emissions while providing an important push to the implementation of energy efficiency improvement measures and a stimulation of ESCO activities. Nevertheless, the recognition of its effects by policy makers remains controversial and the Australian Government intends to abolish it from July 2014, given, among others, the substantial compliance costs for the around 370 liable entities¹³³ and its alleged stifling effects on the Australian economy. Finally, the previously mentioned Building Energy Efficiency Disclosure Act requires sellers and lessors of office with a net lettable area above 2,000 m² to disclose a building energy efficiency certificate including the NABERS rating for the building, an assessment of building lighting power density and indications for energy efficiency improvements. NABERS is the acronym of National Australian Built Environment Rating System. This scheme was

¹²⁸ The NSEE seems however to have lost part of its potential impact capacity after the government changes that took place in the Victoria State and NSW respectively in 2010 and 2011 and after the federal government change occurred in 2013.

¹²⁹ Large energy users are defined in the regulation as corporations' groups consuming in total more than 0.5 petajoules/year.

¹³⁰ According to an existing evaluation, participants in an assessment exercise identified improvement opportunities totally corresponding to annual energy savings of 164.2 PJ and consequently implemented or intended to implement actions generating annually 88.8 PJ of savings in the period between 2006 and 2011 (EEO, 2013).

¹³¹ See information available at <http://energyefficiencyopportunities.gov.au/>

¹³² As of the 2010-11 financial year, corporations must report this information if their group consumes more than 200 terajoules/year or if a facility in their group consumes more than 100 terajoules/year.

¹³³ See <http://www.environment.gov.au/climate-change/repealing-carbon-tax> for further information.

launched in 2006 and can represent an important driver of ESCO activities in the private sector. Many new buildings, notably in the office sector, are indeed required to achieve high ratings under the NABERS in Australia and these requirements are often established in builders' contracts¹³⁴. Also the GreenStar rating system created by the Green Building Council of Australia to promote the design and the construction of sustainable buildings can potentially determine some impetus to the ESCO business. Both the NABERS and the GreenStar systems reward cogeneration and tri-generation plants that are often installed by ESCOs under build-own-operate-transfer (BOOT) contracts, given their high capital costs and operational risks (Langlois & Hansen, 2012). Another series of legislative measures that could somehow be connected with the ESCO business relates to a number of budgetary measures for the improvement of energy efficiency at federal and state level. An example of these initiatives is given by the Low Carbon Communities including the Community Energy Efficiency Program, the Low Income Energy Efficiency Program and the Local Government Energy Efficiency Program. All these programs provide grants to support local councils, operators of community facilities or low income households to implement energy efficiency upgrades (APEREC, 2011).

Other policy instruments that could in principle stimulate the ESCO business are then implemented at the state level in Australia. These instruments are, for example, the energy saving obligations established for electricity and gas suppliers in the states of NSW, Victoria¹³⁵ and South Australia. However, it has to be noticed that energy efficiency improvement actions implemented at the energy end-users to comply with these obligations have so far mostly consisted of very cheap and easy to implement measures which are not very attractive for ESCO investments. Nevertheless, the Australian Government is presently committed to investigate the merits of a National Energy Savings Initiative¹³⁶ (NESI) that could be established at the national level based on the experience gained in the states where energy savings obligations have been already implemented. The implementation at a national level of an energy saving obligation scheme with the possible trading of certificates associated to implemented energy savings actions could in principle stimulate ESCOs to enter this market-based mechanism so providing a stronger boost to their business. Clearly, this would depend on how this mechanism would be designed, on the magnitude of economic incentive that this mechanism could provide for the implementation of energy efficiency improvement actions and on the type of actions that could benefit from its implementation¹³⁷.

Market factors

Australia is endowed with a very abundant stock of energy resources. The reference literature indicates for example that Australia held 38% of uranium resources, 9% of coal resources and 2% gas resource available in world in 2010 (Geoscience Australia and ABARE, 2010). During this year, the Australian energy sector accounted for 5% of gross industry value-added and 20% of total export value. Despite this abundance of energy sources, energy prices applied on its territories have rapidly increased in the recent years and are certainly not low compared to other countries in the world.

¹³⁴ The highest achievable NABERS rating is 6 stars. A 5 star rated building consumes half the energy of a 2.5 stars building. Building owners typically require their buildings to achieve at least 4.5 stars.

¹³⁵ The Victoria government has recently announced that energy saving obligations in place in the Victoria State will cease on 30 June 2015 (information kindly provided by Victoria State DTF).

¹³⁶ See information available at

<http://www.innovation.gov.au/Energy/IndustrialEnergyEfficiency/NationalEnergySavingsInitiative/Pages/default.aspx>

¹³⁷ The higher the up-front investment needed for the implementation of these actions and the higher the economic incentive provided by the trading of associated certificates, the better for an active participation of ESCOs in this mechanism.

Existing estimates indicate for example that the average household electricity prices have been among the highest in world ranging around 24.8 Australian cents/kWh in 2012 (Mountain, 2012). Energy prices for households increased on average by 72% for electricity and 54% for gas in the 10 years before June 2013¹³⁸. In case of manufacturing business, the electricity and gas prices' increases have instead respectively been of 60% and 29% during the same time period. If the very high increases of 14% and 13% registered for electricity and gas prices in the period between June 2012 and June 2013 have been attributed to the carbon tax in force in this period, the general prices augmentation observed in the longer term is mostly attributed by the government to investments in the network components due, among others, to increased capacity. Nevertheless, it is very likely that the increased demand in international energy markets and the role of energy exporter played by Australia in these markets have also contributed to the observed trends. Australia is e.g. the only country in the world that allows international oil companies to access and export natural gas without prioritising local supply and this situation put the national gas demand in direct competition with the international one while determining a high volatility of gas prices¹³⁹. If, on the one hand, the recent increase of energy prices can be a stimulus to energy efficiency improvement also in a country that has historically paid scarce attention to this aspect, on the other hand, the existing situation of energy price high volatility does not create the right preconditions for ESCOs investments. Another peculiar aspect of the Australian energy sector is given by the high carbon intensity of electricity supply. Coal is indeed the main fuel used for electricity generation and this situation is not expected to change markedly in future, despite a large number of projects is underway in this country to increase the contribution of gas-fired plants and renewable energies (wind and solar in particular) to electricity production. However, the increased attention being paid by Australia to renewable energy and reduction of its carbon emissions can certainly create business opportunities for ESCOs. Overall, the general impression is that a proper ESCO market founded on pure commercial bases does not yet exist in this country and that fundamental steps still need to be undertaken by policy makers in order to possibly create the right conditions for its development. Also in states and regions where a significant effort has been spent to assist this market, e.g. through the GGB scheme run in the Victorian State, the achieved impact in terms of ESCO investments stimulation has not been as high as expected. Few EPC projects to be implemented through this scheme have been actually finalised, and several EPCs are presently on hold due to the removal of the funding source provided by the government.

Information, awareness and demonstration

A wide range of information on energy efficiency opportunities is available to energy end-users through a series of website administered by Australia, State and Territory governments¹⁴⁰. There are no general energy efficiency awareness raising campaigns undertaken at the country level, although some states may have their own awareness raising campaigns or specific initiatives have taken place for specific products (e.g. energy efficiency lighting systems). The NSEE includes a series of measures promoting capacity building for industry and providing support in addressing barriers to energy efficiency improvements and a National Energy Efficiency Skills Initiative has been

¹³⁸ For further information see for example

http://www.aph.gov.au/About_Parliament/Parliamentary_Departments/Parliamentary_Library/pubs/Briefing_Book44p/EnergyPrices

¹³⁹ It is worth mentioning that the faster increase in the gas price (compared to electricity price) makes cogeneration solutions less viable and may have an important impact on EPCs addressing these solutions.

¹⁴⁰ See e.g. the Energy Efficiency Exchange Website (www.eex.gov.au), the Energy Made Easy Website (www.energymadeeasy.com.au) or the Australian Green Vehicle Guide Website (www.greenvehicleguide.gov.au).

implemented at the national level. Moreover, the Energy Efficiency Opportunities program has led to the accomplishment of a significant number of capacity building activities for companies and has produced a series of guidance material, case studies and workshops on energy efficiency improvement opportunities and energy management (APEREC, 2011). The main body presently focusing on information and capacity building for ESCOs is however the Energy Efficiency Council (EEC). The EEC supports the Certified Measurement & Verification (M&V) Professional program run by the Efficiency Evaluation Organisation (EVO) for professionals who want to be qualified on existing M&V methods associated with energy efficiency projects. Besides, it has developed a set of standard contractual agreements (e.g. standard EPCs and standard facility study agreements) to support the ESCO market. A series of case studies on M&V for the retrofitting of commercial buildings and on the implementation of co-generation and tri-generation projects has also been made available on its website. Concerning demonstration activities, EPC projects implemented at government buildings can clearly serve as a showcase of energy efficiency opportunities, although they are probably not sufficient to spread information and increase knowledge concerning energy performance contracting. In general, further and more intensive activities aiming at improving the understanding of the EPC model are certainly needed in Australia.

Financing

The main financing support for most of the EPCs so far implemented in Australia has come from the government in the framework of the three programs implemented in the states of Victoria, Queensland and NSW for the improvement of the energy performances of government buildings. This support has consisted in loans for capital investments and has been provided in some cases by the related DTFs at zero interest¹⁴¹ for projects implemented under EPCs with a payback period no longer than seven years. As already mentioned, this financing mechanism has been however recently interrupted in the Victoria State where participating agencies and government departments are now required to fund their projects internally. In some cases EPC projects (notably small and simple projects as e.g. lighting systems upgrades) have been funded directly by clients. In other cases clients have received bank guarantees on the expected energy performances. ESCOs implementing projects under the three aforementioned government programmes must be part of a panel of pre-qualified ESCOs and have to participate in a public tendering process. This process involves three competing ESCOs that are supposed to perform competitive energy audits. Participating ESCOs are requested to provide details of costs and energy savings associated with the identified measures while guaranteeing at least 80% of energy savings estimated during the audit phase. Energy audits have then to be followed by a detailed facility study where saving need to be declared with 100% accuracy. If guaranteed savings are not realised during the M&V phase¹⁴², the ESCO has to reimburse its client to the degree of the shortfall. Some kind of indirect and limited financing to ESCO investments can in principle come from energy saving obligations like those currently established for electricity and gas suppliers in the states of NSW, Victoria and South Australia or from the energy saving obligation to be implemented at the national level currently under study in Australia. In principle, energy suppliers may indeed contract ESCOs to implement the energy efficiency projects needed to comply with their energy saving obligations. Moreover, these market-based mechanisms may be designed in such a way that certificates are issued for the energy savings generated by ESCO projects and are traded with energy companies having to comply with their obligation. An important financing source is finally represented by the Environmental Upgrade Agreement (EUA) programs recently established in the Victoria State (through Melbourne's 1200

¹⁴¹ Zero interest rates have been applied only in the Victoria States. Queensland and NSW have instead applied an interest rate around 6% (information kindly provided by Victoria State DTF for the purposes of this study).

¹⁴² M&V is typically performed on an annual basis until the end of the contract, which usually lasts for a number of years corresponding to the investment payback period.

Buildings program) and NSW. Up to AUD 80 million have been made available through the National Australia Bank (NAB), the Clean Energy Finance Corporation (CEFC) and Eureka Funds Management to finance energy efficiency retrofits of commercial buildings. The EUA finance is available for projects with associated investments above AUD 250,000. These programs allow building owners to tie the finance to the property (i.e. loan liability stays with the building rather than with the owner), whereas loan repayments are made through a local council charge on the land. Building upgrades are supposed to deliver cost savings offsetting upfront investment costs and building owners and tenants may share the upgrade costs where additional upgrade costs are offset by resulting reductions in the tenants' energy and water bills. These new programs could potentially overcome a number of barriers to energy efficiency projects uptake and assist significant EPC projects to be undertaken by private sector building owners¹⁴³.

Barriers

The ESCO business in Australia is relatively new. This implies that the experience of companies involved in this business on the supplied side is sometimes quite limited, whilst on the demand side potential clients do not completely understand the opportunities offered by ESCO investments or mistrust ESCO offers. Financial and technical risks associated with ESCO projects as perceived by energy end-users are consequently rather high and generally discourage private sector investments, despite most major banks show a significant interest in this business in Australia. The general situation of limited familiarity with ESCOs, and with EPCs in particular, increases also transaction costs and overheads for involved stakeholders. The Australia government has put in place model contracts and implementation guidelines to be used in the public sector; nevertheless the low interest/demand for energy efficient retrofits projects remains the major barrier to ESCO projects especially in the private sector. Also in the public sector, however, the procurement process for the implementation of EPCs results sometimes overcomplicated and the associated tendering process is not always very compatible with the EPC concept. In general, public awareness and attention towards energy efficiency improvement opportunities is not very high. The recent increases in energy prices observed in Australia will probably contribute to change the situation, although evidence of this has not yet been observed.

Conclusions, future expectations

The abundance of energy sources in Australia does not create the best conditions for a stimulation of the ESCO market. Nevertheless, the increase in the energy prices being observed in the last years, partly due to the increase in the energy demand both at the national and the international level and partly due to the impacts of a carbon tax established in this country, can in principle create the right pre-conditions for higher ESCO investments. The very high carbon intensity of the electricity supplied in this country can also determine opportunities for ESCO investments related e.g. to gas-fired co-generation of tri-generation. The growing demand for energy efficient buildings stimulated by the energy efficiency certification and rating schemes introduced by the government are also creating some business for energy service companies. Despite the Australian business has historically paid scarce attention to energy efficiency, there is now a generally higher awareness concerning the opportunities offered by the ESCO business model and for the environmental benefits associated, as proved by the increased volume of ESCO activities registered since 2008-2009. The main push to this business comes from the state and federal governments who until recently have supported and in some cases mandated the ESCO model. The interest in this model seems slightly reduced in the last year. Nevertheless, this is likely to be a temporary faltering given

¹⁴³ For further information on the EUA programs see e.g.

http://www.cleanenergyfinancecorp.com.au/media/76243/cefc-factsheet-nab-cefc-ef_eua_lr.pdf.

the generally higher awareness of existing opportunities and the good level of experience already matured by a number of companies operating as ESCO in Australia.

Key drivers	
- energy prices;	
- government support;	
- high carbon intensity of electricity generation;	
- carbon tax (probably abolished by July 2014);	

Number of ESCOs	12
ESCO market size and potential	\$72,587,386 (total value of EPCs implemented in the financial year 2013-2014); no information available on the existing market potential.
ESCO market trend	Slightly decreasing in the last year
ESCO association	Energy Efficiency Council (EEC)
Typical ESCO projects	Public buildings (higher education facilities and hospitals in particular). Typical technologies and fields of application addressed: installation of energy efficient lighting solutions, HVAC solutions. Co-generation and tri-generation in the commercial and industrial sector.
Main type of contract	EPCs with guaranteed savings, BOOT contracts, chauffeage contracts

Information in this chapter was based on the following source:

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<http://www.ceem.unsw.edu.au/sites/default/files/uploads/publications/GovEnManagmentReport.pdf>

ESCO market in New Zealand 2013

New Zealand has a small number of energy consulting and energy service companies. These specialist services can assist firms with energy analysis and improvement. (Ministry of Economic Development 2011)

Current size, trends and features of the market

The number of companies involved in the broader ESCO market is estimated to be in the range of 20 to 30, based on the membership of the Energy Management Association of New Zealand Inc. (EMANZ).

This is predominantly made up of companies that are service providers for ESCO projects who do not bear risks related to the energy performance of projects to improve energy efficiency. There are approximately three to five companies that offer performance guarantee contracts. Largely, these guarantees are in response to requirements by the Energy Efficiency and Conservation Authority (EECA, the Government Agency tasked with promoting energy efficiency), to meet energy improvement targets by projects receiving grants. These targets are normally set at 90%, i.e. the energy efficiency improvements realized in a project receiving grants must achieve at least 90% of the estimates made at the start (EC JRC 2012).

The number of projects of an ESCO nature are around 75 either implemented in the year to March 2014 or still offering guarantees on this year for a total investment of NZD18 million (\$ 15.19 million). In terms of true ESCO projects the number is less than 10 with an investment of less than NZD 8 million (\$ 15.67 million). (EC JRC 2012)

The Energy Efficiency and Conservatory Authority (EECA) is the entity set up by the New Zealand government to encourage, support and promote energy efficiency, energy conservation and the use of renewable energy sources. EECA run a number of working programmes to promote energy efficiency in partnership with the private sector, community groups, industry associations and central and local government.¹⁴⁴

The Energy Management Association of New Zealand (EMANZ) is a membership based industry group that represents ESCO interests in New Zealand, sets standards for them (e.g. model energy performance contracts, good practice guides, ESCO criteria etc.).¹⁴⁵ EECA works with EMANZ and a range of other industry and sector groups on a number of programmes to improve New Zealand's energy performance.

Types of ESCO projects

The majority of implemented projects offer a performance guarantee to EECA and the risk is that a proportion of the government grant is held back unless certain performance measures are met. Many of these projects are lighting redesign and HVAC controls. In terms of true ESCO projects the number is less than 10 with a combined investment of NZ\$8 million (US\$ 7million). (JRC Survey.2012-2013)

¹⁴⁴ Source: Energy Efficiency and Conservatory Authority (EEAC) <http://www.eeca.govt.nz>

¹⁴⁵ Source: Energy Management Association of New Zealand <http://www.emanz.org.nz/energy-performance-contracting>

EPC contracts have only been used on the true ESCO projects. They include boiler and chiller upgrades and general mechanical services. For the rest of the projects, the contracts are mainly commitments to EECA in order to receive grant funding. There are not commitments from the services providers to the facilities company (EC JRC 2012).

Regulatory factors

The Government has set a target for a 50% reduction in New Zealand's greenhouse gas emission from 1990 level by 2050. New Zealand is willing to commit to reducing greenhouse gas emission between 10% and 20% below 1990 levels by 2020, if there is a comprehensive global agreement and certain conditions are met. (Ministry of Economic Development 2011)

Governmental policies that will reduce energy greenhouse emission include (Ministry of Economic Development 2011):

- The New Zealand Emissions Trading Scheme (NZ ETS);
- Facilitating greater investments in RE and in EE and energy conservation;

The New Zealand Energy Efficiency and Conservation Strategy 2011 -2016 (NZECS) is the third strategy prepared under the Energy Efficiency and Conservation Act 2000 to give effect to the Government's policy on the promotion of energy efficiency, conservation of energy, and the use of renewable energy. It does not contain a full list of Government energy efficiency initiatives. NZECS is a statutory document with a five-year life. The Government's energy efficiency target is for New Zealand to continue to achieve a rate of energy intensity improvement of 1.3% per year. (Ministry of Economic Development 2011)

The economy-wide target is shared between four key sectors: transport, business, residential and products. Targets have been set also for the public sector, for direct use of woody biomass and geothermal heat and electricity production from renewable energy. The greatest areas of potential improvements are the transport and business sector, followed by the residential sector. (Ministry of Economic Development 2011)

The Emissions Trading Scheme (NZ ETS) puts obligations on certain industries to account for the greenhouse gas emissions that result from their activities. Legislation sets out which sectors are participants in the ETS. The sectors that currently have obligations to surrender emission units under the NZ ETS include the forestry, transport fuels, electricity production, synthetic gases, waste and industrial processes sectors. The NZ ETS participants from the industrial processes sector are large-scale businesses emitting carbon dioxide from producing iron, steel, aluminium, clinker, burnt lime, glass, and urea, or per fluorocarbons from producing aluminium. (Ministry of Economic Development 2011)

Market factors

The targets for business and residential sectors set by the Government will be a driving force for implementation of EE measures. ESCOs provide a model for achieving them.

The business sector uses 70% of New Zealand's total energy. Improvement of business energy use creates a number of benefits including increasing of productivity and competitiveness, and puts a downward pressure on energy price rises. Assisting the business sector to improve its energy efficiency is a high priority for the Government. The New Zealand's Government acknowledges the value of energy efficiency innovations (such as more efficient lighting and motor systems) being supported into the market. (Ministry of Economic Development 2011)

Commercial buildings in New Zealand account for 9% of total annual energy consumption and 21% of electricity use, worth around \$800 million. EECA estimates around 20-25% of this could be saved, particularly in areas such as: heating, ventilation, air conditioning and lighting in offices, retail, hospitality and education.¹⁴⁶

In the residential sector energy efficiency is not just about cost savings- energy efficiency measures can make an improvement to people's quality of life. Many New Zealand homes are cold and damp. Investment in EE can make them warmer and comfortable, resulting in health benefits. The Government is committed to improving home insulation and clean heating levels in existing homes.(Ministry of Economic Development 2011)

Information, awareness and demonstration

EECA provides information and advice for business and residential sectors related to energy efficiency and energy conservation through the ENERGYWISE website and through EECA BUSINESS website.¹⁴⁷

EECA in partnership with the Energy Management Association of New Zealand (EMANZ) are running seminars and online webinars focussed on improving EE and energy management practices. The seminars are designed for processing and manufacturing managers, energy managers and engineering leaders who are working in an industrial manufacturing or processing plant.¹⁴⁸

Financing

The majority of the projects have been funded by client companies (the company that is beneficiary of the project) with a component of government grant provided through EECA programmes. The government grant is relatively small (~15%) in some cases enabling projects to fit within the acceptable payback periods demanded by companies (EC JRC 2012).

EECA has helped numerous businesses invest in technology or system improvements that have provided real efficiency and sustainability benefits. The support provided includes¹⁴⁹:

- Group wide energy management grants which assist business to put in place energy management plans across their sites or across industry groups;
- Technology demonstration grants which encourage the uptake of new technologies, and showcase what is possible;
- Training courses and webinars to educate business and support capacity development of service providers community.

EECA helps businesses make capital investments by providing funding through project grants for energy-saving technology or renewable energy projects. The grants are only a proportion of the final project costs that helps bring the payback time of the projects into realm of what business consider for their policy (EC JRC 2012).

The maximum amount of the industrial project's grant is 40% of the cost of implementing the project, to a maximum of USD 100,000 per site. The actual amount of any grant approved is

¹⁴⁶Source: Energy Efficiency and Conservatory Authority (EEAC) <http://www.eeca.govt.nz>

¹⁴⁷Source: Energy Efficiency and Conservatory Authority (EEAC) <http://www.eeca.govt.nz>

¹⁴⁸ Source: Energy Management Association (EMANZ) <http://www.emanz.org.nz/training>

¹⁴⁹ Source: EEAC Business <http://www.eecabusiness.govt.nz/services-and-funding/commercial-buildings/commercial-project-grants>

dependent on EECA's assessment of the economics of the project and the barriers to its implementation¹⁵⁰.

Projects must deliver a guaranteed level of cost-effective energy savings. The level of EECA funding will usually be sufficient to ensure the project meets investors' criteria. Generally, EECA doesn't fund projects with a payback of less than two years¹⁵¹.

Barriers

Barriers for development of ESCO market in New Zealand are (EC JRC 2012):

- A lack of awareness by New Zealand businesses of their energy costs and the opportunities to improve efficiency, or lack of trust in the opportunities being presented,
- Short term business horizons, resulting in business only being interested in options that have very short payback times, sometimes down to a single year or less;
- Relatively low energy costs. Commercial and industrial electricity prices in New Zealand have been subject to downward pressure with a lack of growth caused by the GFC (global financial crisis);
- Companies do not like to pay other companies for energy services; they think it should be done in house to fully capture the benefits;
- Lack of understanding of EP contracts;
- Lack of understanding of energy efficiency, often seen as simply a just getting the best energy prices;
- Immature market, little in the ways of offers, competition, marketing and consumer awareness;
- Lack of relevance to core business and aversion to change. For example landlords do not want to bother tenants with change and potentially perceived impacts on tenant comfort;

Conclusions and future expectations

According to experts, the ESCO market can grow slowly in New Zealand, unless something changes the status quo. Continuation of EECA granting, implementation of EPC contracting, development of financial products dedicated to ESCOs would give impetus to development of ESCO market (JRC Survey, 2012-2013).

Key drivers

- Emphasizing of ESCO in governmental strategies and policies;
- EECA grants (continuation);
- Financial products developed for ESCOs;
- Standardization and implementation of EPC;
- Influence of the Emission Trading Scheme on energy prices;
- Awareness raising campaigns for promotion of ESCO business;
- Capacity building and training for ESCO;
- Increased awareness raising activities for the promotion of EE projects and of the ESCO concept;

¹⁵⁰Source: EEAC Business <http://www.eecabusiness.govt.nz/services-and-funding/industrial/project-grants>

¹⁵¹Source: EEAC Business <http://www.eecabusiness.govt.nz/services-and-funding/commercial-buildings/commercial-project-grants>

The Emission Trading Scheme should also stimulate ESCOs when it starts having more influence on energy prices. (EC JRC 2012).

Number of ESCOs	20-30
ESCO market size and potential	n/a
ESCO market trend	Slow increasing
ESCO association	Energy Management Association of New Zealand (EMANZ)
Typical ESCO projects	lighting redesign and HVAC controls; boiler and chillers upgrades and general mechanical services
Main type of contract	EPCs with guarantee savings or EPC with shared savings

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Ministry of Economic Development. 2011. "Developing our Energy Potential" ISBN 978-0-478-35893-3 <http://www.eeca.govt.nz/sites/all/files/nz-energy-strategy-2011.pdf>

Middle East

The ESCO markets in almost all Middle East countries are under-developed, although the first ESCOs in some countries as Jordan were established in nineties. The main barriers are lack of appropriate legislation for ESCO, absence of financial instruments, lack of trust for ESCO business and subsidized energy prices, especially for electricity.

The number of ESCO in Middle East countries cannot be exact determinate since many of the companies are registered with an ESCO prefix in the name, but in reality they do not implement full scope of activities as real ESCOs. These companies only sell products or install energy efficiency equipment.

The Industrial and public sectors are the main clients for the energy services in almost all of the countries. In Israel have been published tenders for Implementation of EE in public buildings (hospitals). The projects should be realised on basis of guarantee savings contracts. International ESCOs have been also invited to take part on these tenders, in order to transfer their know how and experience.

The ESCO companies in Middle East can finance small scale projects with credits taken from commercial banks or leasing company as well as through own internal financial resources. They conclude contracts (in some cases EPC contracts) for services, but for the most of the projects the costumers pay fix fee for the energy services. The EPC contracts are based on guarantee savings or on shared savings.

However, in the last two-three years the countries from this region have started to developed energy policies and strategies for improvement of EE, which can be solid ground for ESCO growth. Jordan and Lebanon with support from MED-ENAC project have prepared NEEAPs. The NEEAP of Jordan highlights a measure aimed to help ESCOs and to provide them with financial, fiscal, and technical incentives to remove barriers and promote energy services. Also it aims to develop a model contract template and Guidelines for Energy Service Companies (ESCOs).

Although the size of the ESCO market in Dubai currently is very small, it is anticipated a large growth of ESCO business in the coming years as there is a strong high level political leadership provided in that direction for the Emirate of Dubai. In February 2014 has been launched a regulatory framework for energy service companies developed by the Regulatory and Supervisory Bureau (RSB) to enhance the performance of energy contracts in Dubai. The regulatory framework includes: Accreditation scheme for ESCOs, Standard contracts models for use by ESCOs and their clients, Protocol for measurement and verification of energy and water savings and tailored approach to resolve disputes. The Etihad Energy Services Company (ETIHAD ESCO) was created by Dubai electricity and water authority (DEWA) in 2013. As a super ESCO, it should enable the energy performance contracting market in Dubai by developing EE projects targeting more than 30.000 buildings that have been estimated as suitable for an ESCO retrofit. The investment volume is estimated to reach the size of around €600 million in total by 2030.

Mainly the ESCO projects have been financed by ESCOs through own funds or funds received from commercial banks. International donors have also financed some EE demonstration projects. In some cases also the clients have financed the projects. Some of Governments are trying to stimulate financing for the ESCO business through creation of EE and RE funds.

International organization (USAID, GIZ) and International financial institution (World Bank, European Bank for Reconstruction) in framework of the Energy Efficiency programmes and projects carry out activities for promotion of energy services and ESCOs.

ESCO market in Egypt 2013

The establishment of several ESCO companies in Egypt was the result of EE programs for the development and promotion of EE investments and ESCOs implemented by UNDP and USAID. The business opportunities of these ESCOs were limited because of the difficulties in accessing financial resources. The lack of clear organizational, institutional and regulatory framework to support EE activities and programs in Egypt is restrictive (Razavi 2012).

Current size, trends and features of the market

Very few companies have experience with the full range of EE products and services conveniently leading them to be outsourced subcontractors of specific products or services only for the larger energy efficiency companies. Egyptian and other multinational service providers are simply comfortable supplying EE products with limited skills estimating technical performance. The inability of the Egyptian ESCO industry to implement EPC agreements under current market conditions remains a formidable challenge. (ECONOLOER 2011)

The Egyptian Energy Service Business Association (EESBA), an NGO representing the ESCO industry, has been established as part of the USAID Egyptian Environmental Policy Program (EPPP). The mission of EESBA is to promote energy services companies on the Egyptian market as well as to facilitate the expansion of the EE market opportunities.

Types of projects

The currently active EE companies provide services, such as:

- consultancy and training;
- preparation of feasibility studies;
- energy audits;
- project management;
- installation and maintenance of equipment.

Egyptian EE companies do not provide guarantee based ESCO projects and do not conclude agreements based on energy savings and energy performance.

In the framework of the Energy Efficiency Improvement and Greenhouse Gas Reduction Project (EEIGGRP) realized by the Egyptian Electrical Holding Company (EEHC), Ministry of Electricity and Energy (MOEE) and supported by the grant of the Global Environmental Facility with UNDP as an implementing agency have been carried out training of energy auditors (60 experts) and realized 220 energy audits out of which 19 projects were implemented. In addition, 200 audits were implemented in governmental buildings on EE and lighting. (van den Akker 2010)

Market factors

Egypt is the largest energy consuming country in Africa. The latest statistics show that the industrial sector accounts for 39% of the final energy consumption. Transport and residential/service sector account 34% and 27% respectively. (Razavi 2012)

The public sector of Egypt consumes only 5% of final energy. The share of gaseous and liquid fuels in the current energy consumption is very high. The residential, transportation and industrial sectors

use petroleum products and increasingly natural gas, in consequence of a substitution policy of government.¹⁵²

According to energy experts, the energy consumption growth will continue [and energy consumption in 2022](#) will be double compared to 2008 or higher, depending on continuous population growth, expected growth per capita and limited increase of energy efficiency.¹⁵³

It is expected that increasing energy consumption will lead to an energy supply deficit, which can reach 30 – 50 million toe in the period 2022 – 2050, i.e. about 24%-35% of the total energy demand. (Hegazy et al. 2013)

The Supreme Council of Energy has taken a decision to develop EE programs on the National level in residential, public utilities, governmental buildings and street lighting. ESCOs are taken in consideration for implementation of EE projects.

The residential sector is the largest electricity consumer and accounts for 41% of the total electricity consumption out of which 34% is used only for lighting. The Ministry of Electricity and Energy in order to reduce energy consumed by lighting equipment has started an ambitious program for the implementation of EE lighting in the residential sector. The UNDP/GEF project “Improving Energy Efficiency for Lighting & Building Appliances” is a part of this program. The Loan Guarantee Mechanism should be used as a source of financing of this project. ESCOs will take part in realization of EE projects for lighting. (Hegazy et al. 2013)

Regulatory factors

Egypt is among the first Arabic countries that ratified the United Nation Framework Convention on Climate Change (UNFCCC) in 1994 and the Kyoto Protocol in 1999.

There is no EE legislation, nor a dedicated regulatory frame work for ESCOs The draft Electricity Law includes several clauses to support the improvement of EE. Pursuant to the draft Electricity Law consumers with high capacity (above 500kW) will have to hire energy management professionals and have to keep energy consumption records. (Razavi 2012)

The USAID Egyptian Environmental Policy Program, administrated by the Egyptian Energy Service Business Association (EESBA), has resulted in training and certification of 300 Certified Energy Managers since 2000.¹⁵⁴

The Egyptian NEEAP for the period 2012 – 2015 was approved by the Ministries meeting No.26 with Resolution No.26/07/2012/9 on 11.07.2012. The NEEAP declared a target of 5% electricity saving in 2015 compared to the baseline consumption equals the average consumption of the last five years. The NEEAP includes many measures in public, residential and commercial (tourism) sectors. The Ministry of Energy and Electricity is responsible authority for implementation of NEEAP.(Kraidy 2011) The Supreme Energy Council (SEC) is the highest forum for energy policy in Egypt and is in charge of developing and monitoring energy polices and strategies for Egypt through a Ministerial Committee guiding and overseeing the energy sector in Egypt. (Hegazy et al. 2013) It is the ultimate authority for approving regulations and rules for EE and RE.

¹⁵² Source: Egyptian German Join Committee on RE and EE <http://www.jcee-eg.net/reee.asp?sublinkID=22>

¹⁵³ Source: Egyptian German Join Committee on RE and EE <http://www.jcee-eg.net/reee.asp?sublinkID=22>

¹⁵⁴ Source: Association of Energy Engineers <http://www.aeecenter.org/files/certification/CEMArticle092210.pdf>

The Energy Efficiency Unit (EEU) was established in the Cabinet of Ministers (COM) in 2009. The EEU gives policy and technical support to SEC to strengthen the linkage between policies and market implementation. It shall draft legislation as well as to create strategic policy papers related to EE and RE. (Hegazy & Yassin 2013) However this unit has no executive or implementation authority and has not taken a leading role. (Razavi 2012)

Information, awareness and demonstration

The Regional Centre for Renewable Energy and Energy Efficiency (RCREEE) in the framework of its projects together with the EU founded MED-ENEC project organized several regional workshops for member countries related to preparation and implementation of NEEAPs. Presentations of ESCOs have been included in the programs of the workshops in order to promote energy services as a model for financing and implementation of National policies.¹⁵⁵

Financing ESCO projects

Like in many other developing countries, in Egypt exists a general perception that EE projects are riskier than other investments because the benefits are not clearly tangible, implementation is rather complex, and the project preparation time and expense is too high relative to the size of the projects. (Razavi.2012)

The Credit Guarantee Company (CGC) is an Egyptian joint-stock company privately owned by 9 Egyptian banks and working with around 30 banks. CGC guarantees a certain percentage of loans and credit facilities offered by these banks to small and medium-sized enterprises (SMEs) without requesting any collateral, thus encouraging banks to deal with SMEs.

The CGC was involved in financing projects that were realized through the Loan guarantee mechanism in the framework of the Energy Efficiency Improvement and greenhouse Gas Reduction Project. 37 projects have been implemented with a total loan amounting to EGP 46.25 million (around \$ 4.77 million) of which EGP 15.37 (around \$2.15 million) was guaranteed (December 2009 figures, provided by CGC). Thus the leveraging by the Fund was in a ratio of about 1 to 3. Seven ESCOs took part in these EE projects. Eleven projects have been completed and there is no defaulting reported so far. CGC has added non-EEIGR money in addition (with a total value of \$ 9.32 million) with credit provided at the amount of \$ 1.99 million (of which 50% is guaranteed). Management cost of the Fund is reported to be covered from its own operations and interest gain of the initial capital. (van den Akker. 2010)

Barriers

Barriers for the development of the ESCO market in Egypt are as follows (EC JRC 2013):

- Lack of legislative support for ESCO and lack of regulatory framework to promote EE. The governmental procurements guidelines are very rigid and not include preference for EE for purchased equipment or services;
- Energy prices are low and do not encourage energy savings;

¹⁵⁵ Source: Regional Center for Renewable Energy and Energy Efficiency (RCREEE)

<http://www.rcreee.org/content/regional-workshop-%E2%80%9Cnecap-development-arab-region-monitoring-and-evaluation-methodology%E2%80%9D>

- Lack of appropriate forms for finance. There are no dedicated funds or other financial mechanisms and incentives to support EE activities;
- Lack of specialized body (EE agency) for coordination of activities and promotion of EE;
- Lack of reliable data and information of energy use by subsectors, key industries, equipment and appliances;
- Lack of mandatory EE building codes, no benchmarking for industries;
- Lack of awareness about energy services and ESCOs in relevant sectors (financial, public, etc.);

Conclusions and future expectations

The creation of the EE fund is expected to enable Egypt to mobilize the rather abundant international (financial and technical) resources currently available in the country. The fund will be used as a most important facility for financing different EE projects. The creation of this specialized fund will also provide the strongest political signal for the importance of EE. (Razavi 2012)

Possible break-through points	
-Development of legislation for ESCO;	
-Creation of an EE Fund;	
-Creation of an EE agency or similar implementing body;	
-Increased awareness raising activity for promotion of benefits of EE project and of ESCO concept	

Specialised Energy Efficiency agency or a similar body will take a function as a country hub for the promotion of EE including energy services and ESCOs. It should have an overall strategic responsibility for the implementation of energy audits and survey, enforcing EE standards and labelling programs, promoting R&D and dissemination of advanced technologies, facilitating market penetration and commercialization of high –efficiency equipment, and mobilizing financial support for EE projects. (Razavi 2012)

Number of ESCOs	no exact information
ESCO market size and potential	no information
ESCO market trend	On the ground
ESCO association	One - Egyptian Energy Service Business Association (EESBA)
Typical ESCO projects	Energy audits, indoor and outdoor lighting;
Main type of contract	No EPC agreements

Information in this chapter was based on the following source:

Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Razavi, Hossein. 2012. African Development Bank Clean Energy Development in Egypt”
<http://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Cata%20Energie%20Anglais.pdf>

ECONOLOER. 2011 “IFC Energy Service Company Market Analysis” Final Report for the International Finance Corporation
<http://www.ifc.org/wps/wcm/connect/dbaaf8804aabab1c978dd79e0dc67fc6/IFC+EE+ESCOS+Market+Analysis.pdf?MOD=AJPERES>

van den Akker, Jan. 2010. “Energy Efficiency Improvement and Greenhouse Gas Reduction Project” Final Evolution of the project
http://www.google.bg/url?sa=t&rct=j&q=&esrc=s&source=web&cd=3&ved=0CDYQFjAC&url=http%3A%2F%2Ferc.undp.org%2Fevaluationadmin%2Fdownloaddocument.html%3Fdocid%3D4123&ei=0DY5U_2sEenJ4ATB_YGoDA&usg=AFQjCNFxFxJVGcA9JLDC3okAXIUkAYMjlaw&bvm=bv.63808443,d.bGQ

Kraidy, Ashraf. 2011. “Policy and Regulatory Framework for EE” Presentation on the WS “National Energy Efficiency Action Plan – Monitoring and Evaluation” Yemen, 11.012.2012
<http://www.slideshare.net/rcreee/policy-and-regulatory-framework-for-ee-arab-ee-guideline-and-subsequent-neeap-yemen-dec-2012>

- Anhar, Hegazy, Ibrahim Yassin. 2013. “Towards a More Sustainable Energy Economy” Presentation in Jordan 2013
<http://www.iea.org/media/workshops/2013/semedmenaroundtable/Session2IbrahimYassin.pdf>

ESCO market in Iran 2013

The ESCO market in Iran is still in the developing phase. Iran has huge potential and a large capacity for cost-effective energy savings in the industrial and the building sector, as well as in transport.

Current size, trends and features of the market

As of 2014, there are five energy service companies (ESCOs) in Iran. They are private companies (engineering companies, energy suppliers and equipment installer companies) that can provide different kind of energy services as follows (EC JRC 2012):

- Energy audits;
- Technical planning and identification of EE and RE measures;
- Optimisation of technical operation;
- Implementation of selected solutions suggested in design and analysis;
- Operation and maintenance including system management during contract period;
- Information and energy advise;
- Measurement and verification of energy savings.

The Iranian industry grew by more than 10% per year over the last 15 years. Energy intensity of many industrial installation is still significantly (30%) above world average, due to low energy prices, lack of capital for investment in new or more efficient machinery and poor energy management of industrial plants (Supersberger et al. 2009).

The Iran Energy Efficiency Organization (IEEO –SABA) is in charge for certification of ESCOs, which are divided in three categories:

- Industry;
- Buildings;
- Power plants;

The SABA register of approved companies includes: 14 companies for the industry sector, 11 for the building sector and 3 companies for the power plants sector (EC JRC 2012).

Types of projects

The commercial, public and agricultural sectors have great potential for energy savings, and thus serve as good targets for ESCOs. Public buildings - and in particular hospitals - have extremely high energy consumption in Iran. For existing public buildings, an average savings potential of 35% over the next 25 years has been assumed to be feasible by a systematic upgrading of existing buildings (Supersberger et al. 2009).

Currently ESCOs carry out energy audits in buildings and in industry. ESCOs typically conclude EPC with shared savings, where the ESCOs also take the financial risk. The Ministry of Petroleum has developed a model contract based on EPC, which will be used in the most of the industry sectors in Iran (EC JRC Survey 2012)

Regulatory factors

A number of policies and measures that foster the ESCO market and EE in Iran have been developed and adopted in recent years, including:

- Targeted Subsidies Reform Act for the “Rectification of Energy Consumption”, the content of which is described below;
- Government’s permission for implementing EE projects in the value of up to BUS\$100 per year in the framework of Buy- Back contracts (which are similar to the concept of EPC contracts in that the Contractor will finance the project and will be paid back from the consequences of the project);
- Preparation of a model EPC contract by the Ministry of Petroleum;
- Development of supporting regulations for ESCO companies

According to the “Rectification of Energy Consumption” Act, energy intensity should be reduced by 33% till 2016 and it should be reduced by 50% till 2021 compared to the energy intensity in 2011. As a result the cumulative energy saving in the country is estimated to reach around 6600 MBOE (Millions Barrels of Oil Equivalent) which is approximately 4 times the primary energy supplied to the country in 2009. The potential of energy efficiency only in energy intensive industrial sector in Iran is estimated to be around 159 million barrels of crude oil equivalent (about 0.44 MBOE per day) based on the official statistics released by the Ministry of Petroleum.

Market factors

In March 2010, the Iranian parliament ratified the Targeted Subsidies Reform Act calling for gradual increase of energy prices within a five years period (2010 -2015). The retail prices of petrol and oil LPG are required to increase to not less than 90% of Persian Gulf free on board price. Natural gas retail prices are also envisaged to increase to at least 75% of average export process after deducting transmission costs and export taxes. For electricity and water, the prices are set to increase to cover full cost price. The rise of prices for natural gas in industrial and production sector was among the highest. The electricity price was increased especially for public-government sector, but also for the industrial sector (The international Institute for Sustainable Development 2012).

Energy price increases, together with the reduction of subsidies, are expected to make energy efficiency investments more attractive, with energy savings compensating high up-front costs of these investments (Supersberger et al. 2009).

At the moment EE projects in the building sector have not been financed since the return of investment is not attractive with the current prices of energy. The government has proposed a policy to financially support the building sector for the reduction of shortage of gas consumption in the winter (which results in fuel switching on power plants from gas to liquid fuel and has adverse environmental and financial consequences).

Due to the fact, that the transport and building sectors consume about 65% of the total energy in Iran, the Ministry of Petroleum has focused its efforts on these sectors and has signed agreements with the Ministry of Interior and Ministry Transportation and Urban Development to implement projects for the reduction of energy consumption in these sectors. Also after raising the energy prices for the second time recently, the Ministry of Industry, Mine and Trade has announced that it will offer grants to industrial enterprises, to compensate by reducing their energy consumption. This is expected to create a new market for ESCOs services especially if the government allows more involvement of private sector in energy efficiency projects.

Information, awareness and demonstration

There is a lack of information and awareness activities as well as demonstration projects for promotion of energy services and ESCOs.

Financing ESCO projects

UNIDO is in the process of implementation of supporting projects in the industrial sector in the framework of an UN-GEF project with a focus on the reduction of greenhouse gases through energy efficiency. This framework provides a grant of \$5 million for supporting projects. This will cover one-third of the required finance for each project. Petroleum ministry has committed to finance \$5 million and \$4 million is committed by industry sector.

UNIDO has foreseen that these EE projects should be facilitated through ESCO companies as they would support the other two-third finance required for the projects. At the moment two projects are approved: one in cement industry has been starting and one in steel industry is in process of starting.

Barriers

The main barriers to the development of the ESCO market in Iran are as follows (EC JRC 2012):

- Lack of appropriate legislative background for the ESCO market. In particular procurement rules are too complex and inflexible;
- Lack of appropriate forms for finance: ESCO projects are not profitable without state grants. Commercial banks do not have appropriate portfolio;
- Low trust from clients;
- Lack of awareness for energy services and ESCOs in different sectors (financial, public, etc.);
- Low energy prices due to state subsidies for energy prices;
- Perceived business and technical risks;
- Lack of reliable energy consumption data and knowledge of M&V;

Conclusions and future expectations

ESCO as a model for financing and implementation of EE projects can be introduced in industry and in the public and commercial building sector if the legislation related to ESCOs and public procurement rules could be improved.

Possible break-through points

- Development of the legislation for ESCOs;
- Implementation of the model EPC in the industrial sector;
- Capacity building and training;
- Increased awareness raising activity for promotion of benefits of EE project and of ESCO concept.

There is also a need for capacity building of ESCOs for EPC contracting and project management and energy auditing & accounting. The government shall promote energy services and ESCO in order to increase awareness of all involved parties in the ESCO market (industrial enterprises, financial institutions, public authorities).

Number of ESCOs	5 active ESCOs (28 registered in SABA)
ESCO market size and potential	n/a
ESCO market trend	Slow growth
ESCO association	None
Typical ESCO projects	Energy audits, installation of EE&RE equipment (HVAC,PV), waste and heat recovery, installation of CHP; outdoor lighting;
Main type of contract	EPCs with shared savings

Information in this chapter was based on the following source:

Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Supersberger, Nicolaus, Stefan Lechtenboehmer, Dieter Seifried, and Saeed Mashiri. 2009. "The role of energy efficiency in the development of the Iranian energy system-energy scenario analysis" http://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2009/Panel_1/1.060/paper

The international Institute for Sustainable Development. 2012. "Recent Development in Iran's Energy Subsidy Reforms" http://www.iisd.org/gsi/sites/default/files/pb14_iran.pdf

ESCO market in Israel 2013

Although several projects have been realized based on the ESCO concept in the last few years, the lack of ESCO legislation hampers the faster development of the ESCO market in Israel.

Current size, trends and features of the market

There are 43 companies that provide different kinds of energy services Israel. Most of them are small private companies with up to 50 employees. They can be divided according to the types of core business (EC JRC 2012) as:

- Facility management and operating companies;
- Consulting and engineering companies;
- Energy services and energy providers;
- Equipment installers.

Although some of them are registered with an ESCO prefix in the name, in reality they do not implement the full scope of activities related to ESCO projects, but rather sell products based on the concept of shared saving contracts. Nevertheless, there are also companies that operate as real ESCOs. These companies use a system for M&V for energy savings based on International IPMVP system, which is accepted by the Ministry of Energy (EC JRC 2012).

Industry and public sectors are the main clients for energy services. Municipalities have published tenders for street lighting based on guaranteed savings contracts. Israel's army is also considering to conduct ESCO contracts to increase EE of their facilities.

The potential size of the ESCO market (total value of possible EE projects in the building and industry sector with a possible payback period of up to 10 years) is estimated at USD 1-1.5 billion. (EC JRC 2012).

The Ministry of National Infrastructure, Energy and Water Resources has tried to promote the ESCO model in Israel Since 2005. The Ministry organized workshops and prepared an ethic code for ESCO companies. Therefore the Ministry issued a call for registration of ESCO companies. Unfortunately, the criteria were not particularly straightforward, and while 43 ESCO companies have been registered, not all of them are active in the ESCO market (Bet-Hazavdi 2012)

Types of ESCO projects

The Ministry has tried to introduce the ESCO concept in public buildings using the guaranteed savings model. Several ESCO international tenders for public buildings were published by the Ministry of Health and Ministry of Finance - Accountant General.

In 2010 the of the Ministry of Finance, which is responsible for Public Procurement and Maintenance of all public buildings, initiated a tender for 6 courthouses, an educational campus and the offices of the Ministry of Finance. The tender was not developed well due to the inexperience of the tender committees, and was not able to create a wide scale interest. At the end only one ESCO company applied for the tender documentation (Langlois et al. 2012)

The Ministry of Health has planned EE projects in 19 hospitals (11 governmental and 8 which belong to the largest health fund) based on the ESCO concept. It was decided to develop a project under the shared savings model. In 2011 the prequalification document for this project was issued, with expectation that a few of the experienced international companies would participate. (Langlois et al. 2012)

There are not much data about the potentials for the ESCO business in the private sector. There are a number of projects reported using the shared savings model and some using a "chauffage" type of contract for the purchase of energy or hot water. (Langlois et al. 2012)

The Ministry of National Infrastructure, Energy and Water Resources initiated a programme for the implementation of “micro projects” in 2008. Energy Performance Contracting was incorporated in this programme. “The micro-projects program was quite a success-it averaged 35 projects a year, consistently exploiting the available budget fully”. (Langlois et al. 2012)

Market factors

According to the electricity demand forecast, the rise in the demand for electricity is expected to continue, and consumption will double in the next 20 years, as a result of the following key factors:¹⁵⁶

- Population growth: annual population growth in Israel is higher than in western countries, due to the relatively high birth rates and waves of immigration at various times in the country's history.
- Rising living standards: in some sectors of the population in Israel, living standards are still too low, and expected to improve. Rising living standards manifest itself in the purchase of additional electrical appliances (such as dishwashers and dryers) and increases electricity consumption.
- Climatic changes: the greenhouse effect evidently contributes to extreme climatic fluctuations, resulting in increased electricity consumption for cooling and heating purposes. Peak demand for electricity often occurs on the hottest or coldest days of the year, and because electricity is not an easily storable product, building up and maintenance of an excess power generation capacity is required to prevent the collapse of the electricity grid during peak demand.

The Ministry of Natural Infrastructure, Energy and Water Resources takes steps to increase the efficiency of, and promotes competition in the electricity sector, in order to prepare for the additional increase in demand expected as a result of ongoing economic development and population growth.

Regulatory factors

On September 18th 2008 the Israeli Government adopted the National Energy Efficiency Program for Reducing Electricity Consumption in the period 2010-2020. Key objectives of this national EE programme are (Bet Hazavdi 2012):

- Reducing 20% of electricity consumption in 2020;
- Reducing national expenditures on electricity;
- Ensuring electricity supply;
- Reducing CO2 emission;

The following actions should be taken for a successful realization of this programme ¹⁵⁷:

¹⁵⁶ Source: Ministry of Natural Infrastructure, Energy and Water resources
<http://energy.gov.il/English/Subjects/Electricity/Pages/GxmsMniElectricitySector.aspx>

¹⁵⁷ Source: Ministry of Natural Infrastructure, Energy and Water resources
<http://energy.gov.il/English/Subjects/EnergyConservation/Pages/GxmsMniECDivision.aspx>

- Invest in select demo projects across all sectors (industry, hotel, commercial-public, domestic, municipal, etc.) in order to achieve energy efficiency,
- Increase awareness about advanced technologies in the field, and
- Refine methodologies.
- Promote standards, regulations, enforcement, education programs and advertising relating to energy efficiency.

The Ministry considers development of the business sector in energy services as a vitally important solution for institutional and private consumers, and to this end, provides assistance by means of economic measures, including grants and tax benefits. The government budgeted ILS 2.2 million (around USD 0.6 million) for the implementation of the programme.

The Accountant general office of the Ministry of Finance established an inter-ministerial tender committee to execute energy efficiency projects (for electricity savings) in the governmental facilities. The committee's goals are to reduce electricity consumption according to the limitations of energy resources available in Israel, to disseminate the results of these actions, to increase effectiveness of the governmental spending, and to develop and encourage a market of energy suppliers companies¹⁵⁸.

Information, awareness and demonstration

The MED-ENEC Program on Energy Efficiency in the Construction Sector in the Mediterranean is aiming to boost energy efficiency measures and the use of renewable energies in the construction sector. The Program is funded by the European Union. The MED-ENEC 2 was intended to advance the concept of ESCOs as a method for financing and engineering of EE projects. In the framework of this programme studies about ESCOS as well as several workshops on ESCOs were realized in order to promote and to increase knowledge for energy service contracting in the Mediterranean region.¹⁵⁹

Financing projects

Governmental subsidies have been the main sources of financing ESCO projects in the public sector. Grants were provided for ca. 200 projects in the past. (Eddie Bet-Hazavdi.2012) In 2011 USD 20 million was available to support ESCO projects. (EC JRC 2012)

“Under the National Energy Efficiency Program, the Ministry submitted a proposal to the Government to establish an energy efficiency fund with an annual budget of ILS 220 million (app. USD 61.5 million), to be financed by raising electricity rates by one percent. The fund moneys will be given back to the public through various incentives, and the fruits of the conservation will be felt in the wallet by virtue of the lower energy bills that we will all pay.”¹⁶⁰

ESCO projects have been also financed through ESCOs own equity or through clients' internal funds. ESCO projects in Israel are small sized projects, with relatively high transaction costs. The local banks are reluctant to finance ESCO project, because they do not understand well the repayment by

¹⁵⁸ Source: Accountant General – Ministry of Finance

http://www.ag.mof.gov.il/AccountantGeneral/AccountantGeneral_eng/AccountantGeneralTopNav/AGAbout/General/HatvatNechasim.htm

¹⁵⁹ Source: MED-ENEC http://www.med-enec.eu/sites/default/files/user_files/downloads/MED-ENEC_ESCO_study.pdf

¹⁶⁰ Source: Ministry of Natural Infrastructure, Energy and Water resources

<http://energy.gov.il/English/Subjects/EnergyConservation/Pages/GxmsMniECAbout.aspx>

savings and the banks do not like to give partial recourse. The other problem for the local banks and for the clients is absence of a system for M&E&V of achieved energy savings. It creates mistrust for clients and scepticism for banks.

There are a few ESCOs that implement projects with loans taken from commercial banks. (EC JRC 2012)

Barriers

The barriers to the development of the ESCO market in Israel are as follows (EC JRC 2012):

- Complexity and inflexibility of public procurement rules are among them.
- Lack of appropriate and commercial based financial sources. The ESCOs financed projects with own funds. Commercial banks are reluctant to finance ESCO projects and do not have appropriate products. Realization of larger projects needs financial support from state;
- Lack of trust from the potential clients;
- Small sized projects and high transaction costs;
- Low and fluctuating energy prices;

Conclusions and future expectations

The Israeli government has introduced actions to improve the conditions for ESCOs. The Ministry for National Infrastructure, Energy and Water Resources and Ministry of Finance initiated tenders for ESCO projects in public buildings. It is expected that inclusions of foreign companies can bring experience and know-how for ESCO.

Possible break-through points

- Implementation of National Energy Efficiency Program for Reducing Electricity Consumption in period 2010-2020;
- Creation of Energy Efficiency Fund;
- Development of ESCO legislation and improvement of public procurement rules;
- Taxation rules/rebates;
- Increased awareness raising activity for promotion of EE project implemented on ESCO concept;

Number of ESCOs	43
ESCO market size and potential	USD 1-1.5 billion
ESCO market trend	Increasing (compared to 2008-2011)
ESCO association	none
Typical ESCO projects	In-door lighting retrofit, street lighting retrofit, improvement and installation of heating and cooling systems, building automation and control systems; industrial system optimization,
Main type of contract	EPC with shared savings, “chauffage”

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Langlois, Pierre, Shirley J.Hansen. 2012. "World ESCO Outlook" The Fairmont Press. ISBN 0-88173-675-9

Bet Hazavdi, Eddie. 2012. "Israel's National Energy Efficiency Programme Reducing Electricity Consumption 2010-2020" presentation on Workshop on ESCOs-Energy Service Companies, Ramat Rachel. Presentaion held in Jerusalem 28-29.03.2012

<http://energy.gov.il/English/Subjects/EnergyConservation/Documents/ESCO/NationalEnergyEfficiencyProgramx.pdf>

ESCO market in Jordan 2013

Although the first ESCO companies started to operate already in 1991, the ESCO business in Jordan is still unknown and has been slowly growing during the last decade.

Current size, trends and features of the market

As of 2013, there are 11 ESCO companies in Jordan. They are small companies that provide different kinds of energy services, such as (Nezhad et al. 2014):

- Installation of equipment;
- Engineering design;
- Detailed energy audit;
- Consulting and training of staff;
- Procurement of equipment;
- Operation and maintenance;
- Business development and financing of projects.

The ESCO companies can finance small scale projects with credits taken from banks or from a leasing company, or from their own internal financial resources. In some cases EPC contracts have been concluded, but for most of the projects the customers pay fix fee for the energy services. The concluded EPC contracts are based on guaranteed savings or on shared savings. The ESCO companies in Jordan have been established as private or public-private joint venture companies (EC JRC Survey 2012).

The industry and the service sector have the highest market potential for ESCO projects. These two sectors consume around 30% of the primary energy and 41% of the electricity and have large potential for energy savings. In the service sector the most relevant clients are hotels, hospitals, shopping malls and office buildings. (Hamed Nezhad et al.2014)

Furthermore, the water pumping sector, which consumes 14% of the total electricity has become a very important client for ESCO services during the last years. Therefore the Ministry for Water and Irrigation launched a project for energy conservation in one of the largest water pump station in Jordan.

Types of ESCO projects

The mainly EE measures implemented by ESCOs in Jordan are (Nezhad et al. 2014):

- Improvement of HVAC systems;
- Improvement of lighting systems;
- Replacement of pump systems, motors and motor systems;
- Installation of building's automation and control equipment;
- Installation of PV and solar water heaters;

Some of these companies provide performance contracting to their clients through loans from commercial banks, leasing companies or through their own internal funds. The most common type of contract used is one which the ESCOs finance the whole projects (including the costs of energy audit) against a share of the actual savings achieved. This type of contract was necessary at the beginning of development of the market in order to convince clients to proceed with EPC by

making it more attractive to them. Typical share of savings to the ESCO were in the range of 50-70% of monthly savings and contract period was usually 4-6 years.(Langlois et al. 2013)

Currently ESCOs are trying to find more secure investments that are still attractive to their potential clients, such as asking the client to pay the cost of the study. (Langlois et al. 2013)

Regulatory factors

The most important legal act is the Renewable Energy and Energy Efficiency Law adopted in 2010 and revised in 2012 (Law No.13 of 2012). This Law regulates the share of electricity produced by renewable energy technologies, and it also includes provisions for the improvement of EE. Subsequently, 73 bylaws were issued in 2012 related to energy efficiency. The bylaw for energy audit was prepared and reviewed in 2012 and it is still waiting for adoption. The Ministry of Energy and Mineral Resources (MEMR) will be the regulating entity for ESCOs in the future. The Jordan Renewable Energy and EE Fund (JREEEF) was established in accordance with the provisions of this Law and the first project was implemented in collaboration with the Jordan River Foundation for distributing ca. 5200 Nos solar water heaters among seventy Community Based Organization (CBOs). (EC JRC 2012)

Jordan adopted its first NEEAP for the period 2013 -2015 (developed with support of MED-ENEC project) in June 2013.¹⁶¹

The first NEEAP puts forward a measure “Development of energy service sector (ESCO)” as one of the cross-sectorial measures. This measure aims at assisting ESCOs with financial, fiscal, and technical incentives to remove barriers and to promote energy audit activities. Also it aims to develop a model contract and Guidelines for Energy Service Companies.

The development of ESCOs, as foreseen by the NEEAP should be achieved through:

- Creation of an institutional framework for third-party financing and operational matters pertaining to energy service companies;
- Development of an appropriate system for the recognition of qualifications, certification and/or accreditation of ESCO;
- Conclusion of contracts guaranteeing efficiency (savings and renewable energy sources) with medium-term duration of 5-15 years;
- Maintenance and operation of energy interventions and monitoring of the energy savings resulted from EPC;
- Financial incentives: grants for stakeholders through energy service companies (ESCO) for the procurement of equipment.

In order to follow up and coordinate related activities (especially stipulated by the Energy Efficiency Roadmap and the NEEAP), the Minister of Energy and Mineral Resources and the Minister of Environment decided to establish an Energy Efficiency Office (EEO).

One of the critical steps identified in the Energy Efficiency Roadmap is the establishment of a comprehensive monitoring, evaluation and verification (MEV) system including a baseline that will serve to identify potential savings and measure progress. The establishment of the baseline will be part of a project to set up an energy database on energy data (indicators) and state-of-the-art information on energy technology.

¹⁶¹ Source: <http://www.rcreee.org/content/summary-national-energy-efficiency-action-plan-jordan-neeap>

Market factors

Jordan imports 95% of the total energy needs and therefore has a particularly high energy dependence on neighboring countries. In the last ten years electricity consumption has more than doubled (from 6392 GWh in 2001 to 14274 GWh in 2012). Electricity consumption growth has been especially evident in the commercial (2427 GWh) and in the residential sectors (6126 GWh). In 2012 they consumed three times more electricity than in 2001. (Ministry of Energy and Mineral Resources 2013)

Jordan puts efforts to reduce current energy dependence through construction of new power plants as well as through investments in renewable energy and energy efficiency. The government and the Ministry of Energy and Mineral resources as a responsible authority, recognizes the ESCO concept for financing of EE and RE projects and started with tenders for ESCO projects in public buildings and pumping stations. The government of Jordan has taken a decision in 2008 to exempt EE & RE equipment from sales tax and custom fees.

Information, awareness and demonstration

The government of Jordan has plans to launch a National Energy Efficiency Awareness Campaign aiming at minimizing the knowledge and awareness gap between the different target groups and to raise a sense of responsibility and community ownership.

International organization (USAID, GIZ) and international financial institution carry out activities for promotion of energy services and ESCOs.

Financing projects

ESCO projects in Jordan have been primarily financed by ESCOs through own funds or funds received from commercial banks, or from donors. In some cases the clients have financed the projects. (Nezhad et al.2014)

ESCO projects can be financed through the Fund for Renewable Energy Sources and Energy Efficiency which was established by the Law. The fund is managed by the Management Committee. The sources for financing of the fund are (Ministry of Energy and Mineral Resources):

- Amounts allocated in the General Budget;
- The fund revenues and investment proceeds;
- Aids, gifts and donations and grants;
- From sales of Certified Emission Reduction Carbon Credits for energy projects;

Barriers

Beside the lack of legislation for energy services and ESCOs other barriers related to development of the ESCO market in Jordan are as follows (EC JRC 2012):

- Lack of appropriate ESCO legislation;
- Difficulty of access funds at affordable rates and terms;
- Low awareness of the benefits of ESCOs;
- Lack of database for energy consumption and thus difficulty in setting up baseline consumption;

Conclusions and future expectations

Growth of electricity demand and the increasing price for electricity and gas will exert pressure on the public and private sectors to invest more in RE&EE in the following years. The ESCO concept is recognized by the government and the ESCOs have been supported through various implemented or planned measures.

Possible break-through points

- Effective legislation for EE and ESCO;
- RE&EE Fund;
- Rigorous implementation of the first NEEAP;
- Capacity building of ESCO for EPC;
- Increased awareness raising activity for promotion of benefits of EE project;
- implemented on ESCO concept

The development of ESCO market will depend on how fast the government will develop and implement an effective EE and ESCO legislation as well as financing of ESCO projects through THE RE&EE fund.

There is also a need for capacity building of ESCOs for EPC contracting and project management and energy auditing & accounting. (Nezhad et al.2014)

Number of ESCOs	11
ESCO market size and potential	no information
ESCO market trend	Slow growth
ESCO association	none
Typical ESCO projects	Energy audits, installation of EE&RE equipment (HVAC,PV), improvement of water pumping station, improvement of EE in industry.
Main type of contract	Small sized EPCs with shearing or guarantee savings

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Nezhad,Hamed, Isam Mustafa.2014. USAID "Survey of Energy Services Industry in Jordan"
Langlois, Pierre, Shirley J.Hansen. 2012. "World ESCO Outlook" The Fairmont Press. ISBN 0-88173-675-9

Ministry of Energy and Mineral Recourses.2013. "Energy Facts and Figures Report.2013"
<http://www.memr.gov.jo/LinkClick.aspx?fileticket=vblQv7AybK8%3D&tabid=253>

ESCO market in Lebanon 2013

In 2002 only one ESCO was known in Lebanon. However, in 2010 8 active ESCO companies were identified. Nowadays, the ESCO market has grown slower and there are not more than 2-3 ESCOs. (EC JRC 2012)

Current size, trends and features of the market

The ESCOs in Lebanon are typically small private companies with up to 50 employees. They are facility management or engineering/consulting companies that provide different kinds of energy services, such as installation of equipment, design, maintenance and operation. (EC JRC 2012)

The Lebanese Centre for Energy Conservation (LCEC) is a national organization affiliated to the Lebanese Ministry of Energy and Water (MEW). LCEC addresses end-use energy conservation and renewable energy at the national level. It supports the Government of Lebanon in developing and implementing national strategies that promote efficient and rational uses of energy and the use of renewable energy at the consumer level. LCEC is a financially and administratively independent organisation under the direct supervision of the Minister of Energy and Water. LCEC was created in 2002 as part of a project financed by the Global Environment Facility (GEF) and MEW under the management of the United Nations Development Programme (UNDP).¹⁶²

The long term objective of LCEC is to create a market for ESCOs, whereby any beneficiary can contact directly a specialized company to conduct an energy audit, implement energy conservation measures or monitor energy saving programs based on a energy performance contract. Since 2002, LCEC initiated a nationwide program on energy audits for medium and large consuming facilities. By the end of 2008, LCEC has financed and supervised more than 100 energy audits¹⁶³.

The Lebanese Association of Energy Saving and for Environment, ALMEE also supported several energy audits and performed trainings for ESCOs.

Types of ESCO projects

The main types of energy efficiency measures implemented by ESCOs in Lebanon are (EC JRC 2012):

- Improvement of HVAC systems;
- Building envelope insulation;
- Improvement of lighting (indoor and outdoor) systems;
- Improvement of replacement of pump systems, motors and motor systems;
- Energy auditing and energy management;
- Influencing user behaviour/staff training;
- Installation of PV and solar water heaters;

The majority of EE projects have been implemented in (JRC Survey 2012):

- public buildings, such as hospitals, universities and public offices;
- commercial buildings, such as hotels , commercial offices and shopping centres;
- industry;

¹⁶² Source: Libanese Centre for Energy Conservation (LCEC) <http://www.lcecp.org.lb/aboutus.php?i=1>

¹⁶³ Source: Libanese Centre for Energy Conservation (LCEC) <http://www.lcecp.org.lb/aboutus.php?i=1>

The EE pilot project for the North Hospital Centre Zgharta in Lebanon received the National Energy Globe Awards for 2008¹⁶⁴. This pilot project was implemented by the ALMEE¹⁶⁵ in the framework of MED-ENEC (Energy efficiency in the Construction Sector in the Mediterranean) and was selected as winner from 769 EE projects from 111 countries.

Most of the contracts for EE projects are either consultancy or supply and installation contracts. Performance contracting is still not being envisaged by Lebanese ESCOs. (EC JRC 2012)

Regulatory factors

In Lebanon there is no legislation dedicated strictly to the regulation of ESCO services.

The “Policy Paper for the Electricity Sector” of Lebanon by the Ministry of Energy and Water and adopted by Council of Ministries in June 2010, has identified the following objectives related to demand side management and EE (Ministry of Energy and Water 2010):

- Adoption of the Energy Conservation Law;
- Institutionalization of LCEC;
- Setting up the National Energy Efficiency and Renewable Acton (NEEREA) as a national financing mechanism and development of the ESCO business dealing with energy audit applications;
- Encouraging the use of energy savings in public lighting.

The development of the ESCO market has been supported by the initiative No.13: “Paving the Way for Energy Audit and ESCO Business”, which is included in the first “Lebanese Energy Efficiency Action Plan (NEEAP) 2011 -2015” approved by the Ministry of Energy and Water and by the Council of Ministers in December 2011. This initiative aims to support the development of ESCOs that provide energy audits and to provide ESCOs with financial, fiscal and technical incentives. The implementation of this initiative includes (LCEC 2011):

- Organization of trainings, workshops, conferences on energy audits and procedures,
- Creation of a platform for coordination between existing ESCOs and Lebanese commercial banks,
- Finalization of the draft law on Energy Conservation.

The overall target of the first Lebanese NEEAP is achieving a 5% reduction of energy growth in three key sectors that are industry, buildings and governmental (public) sector by 2015.

Market factors

Electricity tariffs for final consumers are still subsidized by the Government and do not reflect market prices (JRC Survey.2012). Electricity tariffs for the service sector (public and commercial) are higher than for households or for the industry, and the tariffs are differentiated in three categories: night rate, daytime rate and peak rate. The peak rate is much higher than for other sectors. (Dynamic 2014)

However, according the Policy Paper for Electricity, the policy for electricity will be gradually restructured, the tariffs are planned to be increased in order to eliminate the financial deficit in the electricity sector, to establish a balanced budget for the Electricity Company of Lebanon (EdL), and

¹⁶⁴ Source: <http://www.english.globalarabnetwork.com/20090506586/Energy/med-enec-projects-receive-energy-globe-awards.html>

¹⁶⁵ Source: http://issuu.com/worldenvironment/docs/we_1/78

to reduce the financial burden for the citizens caused by the utilization of costly private generators.(Ministry of Energy and Water 2010)

The growth of electricity tariffs is expected to increase the demand for energy services. In the same time ESCOs will have more interest to conclude contracts based on energy savings, since the payback period will be shorter.

Information, awareness and demonstration

The Ministry of Energy and Water, LCEC and UNDP launched national an awareness campaign on solar water heaters, energy audit and residential EE. This campaign incorporates seminars and awareness raising activities in schools, universities and other public institutions.

In the same time the Arab EE Campaign has been realised through financing from the EU through MED-ENEC project.

Financing projects

The National Energy Efficiency and Renewable Energy Action (NEEREA) is a national financing mechanism initiated by the Central Bank of Lebanon (BDL) in cooperation with the Ministry of Finance, Ministry of Energy and Water, UNDP, the European Union (EU) and LCEC. In 2013 alone, LCEC has approved loans of more than 100 million USD under NEEREA. In the first 2 months of 2014, loans of more than 40 million USD were approved. LCEC expects that the loans under NEEREA will be above 250 million USD by the end of 2014. (El Khoury 2013)

NEEREA allows private sector entities (individuals, SMEs or corporate bodies) to apply for subsidised loans for any type of EE and/or RE projects. NEEREA covers loans by any Lebanese commercial bank with 0.6% interest rate and repayment period of up to 14 years, in addition to a grant amount realised after the project is implemented. The EU has offered BDL a grant of €12 million to encourage SMEs in applying for NEEREA. LCEC is the technical consultant to BDL, and as such reviews loan applications, and designs monitoring criteria. UNDP has offered technical support to BDL through training and awareness raising activities. (El Khoury 2013)

Pursuant to the first NEEAP of Lebanon the NEEREA should also provide financing for ESCOs.

Barriers

The barriers to the development of the Lebanese ESCO market are as follows(EC JRC 2012):

- Lack of dedicated legislative framework for the ESCO business;
- Complex and inflexible public procurement rules;
- Lack of awareness about the benefits of EE projects implemented on ESCO concept.
- Highly subsidised energy prices;
- Lack of financial products by commercial banks for ESCOs;

Conclusions and future expectations

The development of the legislative framework for energy conservation as well as for ESCOs is key enabling factors for the growth of the ESCO market. At the same time the implementation of the Policy Paper for Electricity and the NEEAP is expected to eliminate some barriers that constrain faster growth of the ESCO market.

Possible break-through points

- Development of legislation for EE and ESCO;

- Adaptation of public procurement rules;
- Implementation of energy policies: NEEAP and Policy Paper for electricity;
- Capacity building of ESCOs;
- Increased awareness raising activity to promote the benefits of the ESCO concept;

Number of ESCOs	2-3
ESCO market size and potential	market size \$200.000 (in 2012)
ESCO market trend	Growing at a slower rate
ESCO association	none
Typical ESCO projects	Energy audits, installation of EE&RE equipment (HVAC,PV), improvement of water pumping station, improvement of EE in industry.
Main type of contract	

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

El Khoury, Pierre. 2013. "Results of Lebanon's National EE and RE Action(NEEREA)" Presentation on EE Policies for the SEMED/Arab Region Amman, Jordan 15 April 2013
<https://www.iea.org/media/workshops/2013/semedmenaroundtable/Session2ElKhoury.pdf>

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ESCO market in Saudi Arabia 2013

The ESCO business is new for Saudi Arabia and the ESCO market is still on the ground.

Current size, trends and features of the market

There are 5 ESCO companies in Saudi Arabia whose main profile is to perform energy audits. The value of the annual energy efficiency market in Saudi Arabia was estimated at SAR 1.2 billion (around USD 320 million) for commercial, governmental and the industrial sectors. (Alyousef et al. 2012).

The First Phase of the National Energy Efficiency Programme (NEEP) had been implemented between 2003 and 2010, with the following objectives (Alabbadi 2012):

- Promotion of energy audit of buildings and industry;
- Increasing energy efficiency information and awareness;
- Increasing the efficient use of oil and gas;
- Promotion of the Energy Service Industry;
- Development of building codes with energy efficiency requirements;
- Supporting technical and energy management training;
- Introduction of load management and time of use tariff;
- Development/promotion of product labels and standards program.

Phase II of the NEEP started in 2010 and is more focused on EE in the transport sector.

The implementation of NEEP Phase I and II has been supported by UNDP as a lead international partner in order to provide a general monitoring of the quality of the results. UNDP supports auditing in the industrial and commercial sectors, utility management, promotes the development of regulation for residential buildings, improvement of EE information exchange, prompting energy services and investments by private sector and the wider utilization of available efficient technologies. Furthermore UNDP encourages outreach and awareness building initiatives on EE through capacity building.¹⁶⁶

Saudi Energy Efficiency Centre (SEEC) was established by the Decision of the Council of Ministries 363 of 31 October 2010. SEEC's main activities are (Alabbadi 2012):

- Development of policies, rules and regulations governing EE and to support their implementation;
- Supporting the integration and coordinating of stakeholders' efforts to improve EE;
- Promotion of EE awareness at both individual and institutional levels;
- Participation in the implementation of EE pilot projects.

Types of ESCO projects

The NEEP conducted a programme of energy audits. The audits examined electric utility equipment, HVAC systems, lighting, and water heating systems. The audits have showed that energy savings of

¹⁶⁶ Source: <http://web.undp.org/comtoolkit/success-stories/ARAB-SaudiArabia-energyenviron2.shtml>

at least 15% in educational buildings, 10% in shopping malls, and 10% in industrial sector are possible. More detailed energy audits were performed at medium and large scale industrial and commercial facilities to identify specific areas in which electrical and thermal energy savings could be made. Industrial facilities included refineries, power plants, and chemical and processing plants, and commercial facilities included hotels, shopping centres, private schools, large mosques, and office buildings. In some older industrial facilities energy savings are estimated to be between 40% and 70%.

Regulatory factors

There are a few sustainable energy policies and standards at a national level, but they are not enforced by law and are not legally binding.

Market factors

Saudi Arabia has experienced rapid economic growth over recent years. Since 2000, energy consumption per capita has increased by more than 30%. Based on current trends, inland consumption of primary energy is expected to double by 2030 compare to 2008 leading to diminishing oil exports. The national government has identified EE as a key national priority, to tackle the rapid increase of domestic consumption of petroleum products, the increasing GHG emissions and the associated opportunity costs of lost export revenues. (Alyousef et al. 2012)

About two thirds of the electric energy generated in Saudi Arabia is used for operating buildings. More than 60% of this energy is used for air conditioning (cooling). This high consumption of electricity combined with escalating energy prices has created a need for the introduction of energy conservation measures in buildings. (Alyousef et al. 2012)

The ESCO concept could be a suitable approach to increase energy efficiency in buildings and in the industry, if the prices of energy increased in the coming years, and if the investment climate for EE could be improved.

Information, awareness and demonstration

Two business advisory seminars were organised in the framework of the NEEP, to address aspects of the energy service industry. The seminars gave potential ESCOs advice about how to overcome contractual and legal start up barriers, and how to identify and exploit EE opportunities on a market basis. They also provided hands-on experience in business development, marketing, customer relations, contracts, staffing, and international joint venture. (Alyousef et al. 2012)

In addition to the seminars mentioned above, trainings in various other EE disciplines have been provided in the form of workshop and seminars. Over 400 professionals attended training sessions relevant to:

- Detailed energy audits;
- EE project financing;
- Performance contracting and ESCO development;
- Technical efficiency and energy management;
- EE technologies.

The NEEP initiated an information and awareness programme to determinate current levels of awareness of EE opportunities, equipment and financing mechanisms. The first part surveyed the

energy service industry, and the second part surveyed energy end-users. The collected data will help formulate information management and distribution strategies, and will assist energy service companies in identifying and exploiting market opportunities. (Alyousef et al. 2012)

Financing projects

Commercial banks in Saudi Arabia are reluctant to take on credit risks and therefore ESCOs carry both performance and credit risks, while clients carry business risks. Despite the availability of projects with potentially 2-3 years pay-back periods, committing capital to investments in new energy technologies is still perceived as particularly risky. (Alyousef et al. 2012)

Barriers

Barriers to the development of the ESCO market in Saudi Arabia are as follows:

- Lack of legislative support for ESCO. The procurement rules are very complex and inflexible. The contractual agreements specific for ESCO projects are incompatible with national contractual regulations and definitions;
- Lack of appropriate forms for finance. Commercial banks do not have appropriate portfolio and are reluctant to finance EE projects ;
- Low trust from clients;
- Low energy prices, and low motivation for energy savings;
- Lack of reliable energy consumption data;
- Low awareness of benefit of EE and of EPC;
- Lack of expertize and know-how for ESCO.

Conclusions and future expectations

Many buildings and facilities in Saudi Arabia are old and inefficient, and although there is a clear need for energy conservation measures, the lack of expertise and initial capital are decisive. ESCOs can offer a model for financing and technical capacity to implement EE projects in order to reduce energy consumption.

Possible break-through points

- Effective legislation for EE and ESCOs;
- Capacity building of ESCO for EPC;
- Tariffs restructuring;
- Increased awareness raising activity for promotion of benefits of EE project implemented on ESCO concept;

One very important factor for development of the ESCO market in Saudi Arabia is preparation and implementation of EE and ESCO legislation.

There is also a need for capacity building of ESCOs for EPC contracting, project management and energy auditing & accounting.

Number of ESCOs	5
ESCO market size and potential	no information, (Potential size of EE market USD 320 million/year)

ESCO market trend	On the ground
ESCO association	none
Typical ESCO projects	Energy audits, installation of EE equipment (HVAC,PV),
Main type of contract	n/a

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Alyousef, Y., M.Abu-Ebid.? “Energy Efficiency Initiatives for Saudi Arabia on Supply and Demand Sides” <http://www.intechopen.com/download/get/type/pdfs/id/31602>

Alabbadi, Naif. M. 2012. “Why Energy Efficiency” Presentation on 4th Industrial Forum “Renewable Energy&Energy Efficiency: Emerging business opportunities for the KSA”, 14th-15th May 2012
<http://www.chamber.org.sa/Arabic/Events/ipfin2012/Presentations%20and%20Paper%20Work/%D8%A7%D9%84%D9%8A%D9%88%D9%85%20%D8%A7%D9%84%D8%A3%D9%88%D9%84/Dr.%20Naif%20Al-Abbady.pdf>

ESCO market in the United Arab Emirates 2013

As of 2013, the ESCO market in Dubai is very small, but it is anticipated to see a significant growth in the coming few years based on a high-level political leadership. As opposed to the Emirate of Dubai, the ESCO business is unknown in the other Emirates. (EC JRC 2013)

Current size, trends and features of the market

As of 2013, there are 3-4 domestic ESCOs and a few of the big international ESCO companies. The market is limited to a few projects in the private sector, nevertheless the appearance of many new ESCOs is expected that shall embrace the market based on a new upcoming ESCO regulation (EC JRC 2013).

EtiHAD ESCO is a Dubai Electricity and Water Authority (DEWA) venture that was recently established in 2013 to make Dubai built environment a leading example of energy efficiency for the region and the world. As a Super ESCO, it enables the energy performance contracting market in Dubai by developing energy efficiency projects targeting more than 30,000 buildings.¹⁶⁷ EtiHAD ESCO aims to jumpstart the creation of viable performance contracting market for energy service companies by executing building retrofits, increasing penetration of district cooling, building capacity of local ESCOs for private sector and facilitating access to project finance. The investment volume is estimated to reach around US\$ 600 million in total by 2030.

Types of projects

It is expected that ESCO projects carried out by ETIHAD ESCO will be related mainly to building retrofits with a main focus on cooling, indoor lighting, and outdoor lighting.

In February 2014 the ETIHAD ESCO launched two calls for Expression of Interest (EOI), in relation to¹⁶⁸:

- Expression of Interest for the building retrofit project for DEWA, and
- Expression of Interest for the Outdoor lighting retrofit for DEWA

Both projects will be handled by EtiHAD Energy Services on behalf of DEWA. The projects will comprise the design, implementation, saving guarantees, measurement and verification of a comprehensive lighting retrofit as well as of a buildings retrofit.¹⁶⁹

It is expected that both types of EPC: shared and guaranteed savings contracts will be used for implementation of above projects. Shared savings with financing provided by ESCOs has been implemented in Dubai and this model is attractive for clients because it is possible to enter without upfront costs by the clients, however it is limited by the financing capacity of the ESCO. Furthermore, some larger, international ESCOs are reluctant to take financial risk and do not enter a shared savings EPC. Guaranteed savings contracts are likely to be used where the clients are well financed and more familiar with the concept of energy performance contract (EC JRC 2012).

¹⁶⁷ Source: EtiHAD Energy Services <http://www.etihadesco.ae>

¹⁶⁸ http://www.etihadesco.ae/?page_id=263

¹⁶⁹ Source: EtiHAD Energy Services <http://www.etihadesco.ae>

Regulatory factors

In February 2014, a regulatory framework for the development of the energy service market was proposed by the Regulatory and Supervisory Bureau (RSB) to enhance the use of performance of energy contracts in Dubai. This regulation is expected to contribute to the goals of the Dubai Integrated Energy Strategy, which aims to reduce energy demand by 30% by 2030.¹⁷⁰

The regulatory framework for the support of the ESCO market comprises the following elements:

- Accreditation scheme for ESCOs;
- Standard contracts models for reference to be used by ESCOs and potential clients;
- Protocol for the measurement and verification of energy and water savings;
- Tailored approach to resolve disputes.

The accreditation scheme is to give prospective clients confidence in contracting ESCOs. An accreditation body will assess applications against the criteria set out in the application process. In order to fulfil the criteria ESCOs have to have¹⁷¹:

- Appropriately qualified personal;
- Robust financial status;
- Track record of successfully implemented energy saving project in Dubai;

The members of the accreditation body come from RSB and from Etihad Energy Services. The board has the power to accredit ESCOs as well as to remove accreditation if the company subsequently fails to meet the accreditation criteria.

RSB has also designed two model contracts for energy performance contracting, one for shared savings, where the ESCO provides financing and one for guaranteed savings contract, where the client provides financing. These models are intended to exemplify a fair and balanced contract where the risks are allocated appropriately between ESCO and client.¹⁷²

The Register of accredited ESCOs will be made public and available for private and public organizations to enhance a successful selection of ESCOs. (Regulatory and Supervisory Bureau for the Electricity and Water Sectors 2014)

RSB in cooperation with the industry developed a Measurement and Verification Protocol providing a consistent method for calculating energy and water savings arising from implemented measures.

The Protocol has been tailored for Dubai based on international best practices, experiences and existing protocols. (Regulatory and Supervisory Bureau for the Electricity and Water Sectors 2014)

Market factors

¹⁷⁰ Source: Dubai Regulatory and Supervisory Board (RSB) <http://www.rsbdubai.gov.ae/esco/>

¹⁷¹ Source: Dubai Regulatory and Supervisory Board (RSB) <http://www.rsbdubai.gov.ae/esco/>

¹⁷² Source: Dubai Regulatory and Supervisory Board (RSB) <http://www.rsbdubai.gov.ae/esco/>

The Dubai ESCO market is foreseen to provide new business opportunities for joint venture, international partnership as well as to engage UAE domestic entrepreneurs through a diversified supply chain from financial institutions, technology providers and equipment manufactures to service providers across the whole value chain, including project development, management and reporting stages.¹⁷³

Information, awareness and demonstration

The task of the Dubai Etihad Energy Services company is to organize workshops and campaigns for the promotion of energy services and for financing and for preparation of bankable projects. In February 2014 the workshop “Creating Bankable Green Projects in Dubai” was organized with high level participants from banks and financial institutions. The workshop provided a forum to discuss issues related to financing EE projects in Dubai.¹⁷⁴

Financing ESCO projects

Until now, small sized ESCO projects have been financed by ESCOs’ internal funds. There are no financial products provided by a Governmental fund or by commercial banks. This problem should be solved through the creation of Etihad ESCO, which will provide financing for EE projects. ESCOs that are accredited can apply for financing incentives of their projects. Furthermore there are plans for creating a green fund in Dubai for financing EE projects (EC JRC 2012).

Barriers

Key past barriers to the development of the ESCO market in Dubai were the lack of dedicated legislation and the lack of high level political support, both of which have been dramatically changing through the development of Dubai Integrated Energy Strategy by the Dubai Supreme Council of Energy and through the adoption of the new ESCO regulation.

However many barriers have remained that constrain a faster development of the ESCO market, such as (EC JRC 2013):

- Lack of appropriate financing for larger ESCO projects – this should be improved when Etihad ESCO starts to provide project financing;
- Lack of awareness about the option of third-party financing;
- Lack of demonstration projects in the public sector –this should be removed through implementation of two retrofit programs for those Etihad ESCO already published tenders;
- Lack of knowledge and awareness about ESCOs – this should be removed through organization of trainings and workshops.
- Lack of trust from potential clients, no confidence in the calculated energy savings by ESCOs;

Conclusions and future expectations

The expected new regulation dedicated to the development of the ESCO market, the establishment of the Etihad Super ESCO, as well as a strong political support to ESCO should create a good business climate for ESCOs. Etihad ESCO is expected to facilitate access to finance for ESCOs through forming relations with financial institutions.

¹⁷³ Source: Etihad Energy Services <http://www.etihadesco.ae>

¹⁷⁴ Source: <https://e-services.dewa.gov.ae/newshist/details.aspx?id=02361461000000000000000002361461>

Key drivers

- New regulation for ESCOs to be adopted (including measures, such as the accreditation of ESCOs, model contracts, protocol for M&V of energy savings)
- Financial incentives for projects through Etihad ESCO and leveraging private funding;
- Capacity building of ESCOs for EPC;
- Awareness raising activity for the promotion of the ESCO concept.

The new regulation for ESCOs is expected to bring more confidence to potential ESCO clients, and also to extend the market for international ESCO companies.

Number of ESCOs	3-4
ESCO market size and potential	Market potential: USD 600 million in total until 2030 (only in the building sector)
ESCO market trend	Expected rapid growth in the next years
ESCO association	none
Typical ESCO projects	Retrofit of buildings (cooling and lighting systems) Retrofit of outdoor lighting
Main type of contract	Small sized EPCs with shared or guaranteed savings

Information in this chapter was based on the following source:

EC JRC 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Regulatory and Supervisory Bureau for the Electricity and Water Sectors. 2014. "Measurement and Verification Protocol" http://www.rsdubai.gov.ae/wp-content/uploads/2014/01/ref_RSB-MV-protocol_20140113.pdf

Regulatory and Supervisory Bureau for the Electricity and Water Sectors. 2014. "ESCO Accreditation Scheme" <http://www.rsdubai.gov.ae/esco-accreditation/>

UNDP. 2014. "State of Energy Report 2014"
http://arabstates.undp.org/content/rbas/en/home/library/Env_Energy/the-state-of-dubai-s-energy-and-its-path-to-green-economy/

North America

The ESCO markets in the US and Canada together with those in Germany and possibly France in Europe and Japan and South Korea in Asia are the most developed on the World. They have had continuous growth in investments since the 1990's.

The important drivers of the ESCO markets in Canada and USA are enabling federal and state policies, governmental programs for rehabilitations of public buildings, involvement of private sector for financing of EE projects.

The key policy in driving growth in US is the American Recovery and Reinvestment Act (ARRA) of 2009, to preserve and create jobs and promote economy recovery. The Department of Energy (DOE) distributed through the ARRA approximately \$35 billion to nearly 5.000 recipients, supporting thousand of clean energy projects and job across the country. The president Obama's Memorandum of November 2011 for "Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings" in the federal buildings has also increased the public and private investments in energy efficiency through ESCOs. The Federal Government shall enter into a minimum of US\$2 billion in performance-based contracts in Federal buildings.

In Canada one of the very important driving forces is the Federal Building Initiative (FBI), a voluntary program that facilitates energy efficient retrofits in Canadian government buildings since the 1990's. Projects are implemented through third-party energy performance contracts.

A very important role in creating, promoting and in advocacy of ESCOs also play the national ESCO associations as NAESCO in the US and ESA Canada in Canada. They are involved in preparation of Federal and Local legislation and programmes for improvement of EE. NAESCO promotes ESCO business through organization of events as: annual ESCO conferences, workshops and training for ESCOs, private and public sector representatives. NAESCO established in the US a system for accreditation of energy services companies. In order to get an accreditation from NAESCO, ESCOs must apply to a committee of industry experts and must undergo a rigorous examination of their core competencies and business practices.

The main clients in the US and Canada are federal, state and municipalities buildings and facilities. In USA the ESCO market penetration is highest in the K-12 schools category with an estimated 42% of total floor area in the sector addressed by performance-based contracts since 2003. Market success is also evident in the state and local government buildings, federal buildings and colleges with estimated penetration rates of 30%, 28% and 25% respectively. Although ESCO projects have been implemented in municipalities' condominiums, the penetration rate in residential sector is still low compare to federal and state buildings (schools, universities, hospitals, military bases, administration buildings etc.). In the US private sector companies still are averse to finance energy efficiency projects.

The ESCO concept has been developed with relative success in Mexico, and a number of projects in the private sector have been implemented since the early 21st century. The Mexican ESCO market is still in the process of familiarizing itself with financing investments for EE in the public sector. International Financial Institutions as: North American Development Bank, the World Bank and International development organizations as: GIZ and UNDP support the development and promotion of the ESCO market in Mexico through implementation of projects and program, which include realization of capacity building activities (training and workshops) for ESCOs as well as for public and private sector representatives.

The AMESCO is the national association of ESCOs in Mexico, established in 2011 with an aim to promote ESCO business and to represent ESCOs.

ESCO market in Canada 2013

The ESCO market in Canada is nowadays well established with performance based projects common since the early 1980's. The number of ESCOs operating in Canada has been however very limited at least until the 1990s. A proper market could start developing in this country only when the federal government launched a program for the usage of energy performance contracts in federal buildings in 1993 (IFC, 2011). Relevant initiatives that have stimulated the ESCO market growth have been undertaken also at the city level in the past. For example, the Better Building Partnership (BBP) program, created in 1996 to cut CO₂ emissions in the city of Toronto through ESCOs activities, stimulated ESCO procurement by offering soft loans and energy savings guarantees for the implementation of energy efficiency improvement actions in residential, office and commercial buildings. Other initiatives, like the demand side management (DSM) programs launched in the past by energy utilities in Canada have had instead a negative impact on the ESCO market as energy end-users preferred to benefit from grants provided by utilities rather than engaging ESCOs to improve their energy performances. Overall, only programs implemented in the public sector have so far managed to stimulate an EPC market and this sector remains the main ESCO market also today.

Current size, trends and features of the market

There are currently around 12 ESCOs in Canada. These are mainly larger multi-national companies whose energy services offerings tend to supplement other areas of their business activity. Also a few medium sized local companies can however be identified. ESCOs provide services primarily to the public sector, which currently represents more than 80% of the ESCO market¹⁷⁵ and to owners of commercial buildings. The total value of energy performance contracts is estimated at around CAD 450 million (€330 million) per annum. It has been claimed that the total amount invested in ESCO projects has created more than 4,000 direct jobs and 5,000 indirect jobs (ESA Canada, 2010). The total potential size of the ESCO market in Canada has been estimated by national experts at between CAD 2 and 4 billion (€1.5 -2.9 billion). Eight of Canada's ESCOs are members of ESA Canada, the national ESCO association. Although difficult to assess, it can be estimated that these ESCOs account for over 70% of the value of energy performance contracts stipulated nationally¹⁷⁶. The strategic objectives of ESA Canada are to develop and advocate adoption of government policy to enhance the role of performance-based contracts in achieving national climate change, energy efficiency and economic targets, and to increase the national profile of performance-based contracts and of its members. While growth in the ESCO market in Canada has been slow in 2011 and 2012, stakeholders are optimistic about growth prospects in 2015 and 2016. The financial crisis is not considered to have had a significant impact on developments in the market in recent years. One of the most active markets is the one located in the province of Quebec. Mainly focused on the health and educational sector, the provincial initiative is driven by each of the concerned ministries and involves hundreds of millions of dollars of investment each year. The concept mostly used is the guaranteed savings one and about 6 ESCOs are involved. 7 to 10 years contracts are the norm and the use of facilitators to enable the institutions to develop and support the ESCOs in project implementation and monitoring is widely done.

Types of projects

The ESCO market in Canada is mainly building oriented with a special focus on institutional building and very few projects implemented in commercial buildings and industries. ESCOs in Canada

¹⁷⁵ Information kindly provided by Mr. Pierre Langlois, ECONOLER, Canada

¹⁷⁶ Information kindly provided by Mr. Pierre Langlois, ECONOLER, Canada

undertake a range of energy services applying a range of building technologies. Indoor lighting and building automation projects are most common, with building insulation, outdoor lighting, heat recovery, and installation and retrofits of HVAC systems, motors and pumps also offered. Renewable energy projects and installation of cogeneration of heat and power (CHP) systems are less common ESCO activities. The prevalent contract type used by ESCOs in Canada is the energy performance contract (EPC) with guaranteed savings, whereby ESCOs guarantee savings and clients undertake the financial risk. EPCs with shared savings, with ESCOs and clients sharing savings and ESCOs assuming the financial risk have been so far stipulated just under the Federal Building initiative¹⁷⁷.

Regulatory factors

The separation of powers between the federal and the provincial/territorial levels of government represents an important aspect of the Canadian policy framework. Whereas Canada has no federal energy efficiency improvement target, its sub-federal governments have committed to achieving a 20% increase in energy efficiency in their respective jurisdictions by 2020. Although not directly targeting the ESCO business, all the actions undertaken to comply with this commitment can potentially and indirectly stimulate this business. Another broad framework of programs through which the ESCO activities can be stimulated is then represented by the ecoEnergy Efficient Initiative operated through the Natural Resource Canada's Office of Energy Efficiency. This initiative provides a framework of programs through which energy efficiency and energy conservation are promoted in every sector of Canadian economy. The key policy driving the growth of the market for ESCOs in Canada is however the Federal Building Initiative (FBI). The FBI is a voluntary programme that facilitates energy efficient retrofits in Canadian government buildings. The programme has been in existence since the 1990's. Projects are implemented through third-party energy performance contracts. A list is maintained of ESCOs that can provide a full range of necessary energy services and that are pre-approved to execute FBI projects (Natural Resources Canada, 2013). Since 1993, over 7,000 buildings, or about one third of all federal buildings, have been renovated under the programme. The initiative has attracted over CAD 320 million (€235 million) in private sector investments and generated around CAD 43 million (€32 million) in energy savings (Langlois & Hansen 2012). The total cost of the programme since its inception up to 2009 has been estimated at CAD 12 million (€9 million) (Hansen et al. 2009). Some important regional programmes and measures exist that promote ESCOs or may assist the growth of a market for energy services. For example, under the Ontario's New Conservation First Framework, electricity distribution companies have been assigned conservation targets which they must meet as a condition of their licence¹⁷⁸. In British Columbia the Public Sector Energy Conservation Agreement provided funding for 247 projects up to 2011 to conserve energy in public sector buildings (B.C. Ministry of Environment, 2012).

Market factors

Information on the evolution of the ESCO market in Canada is generally quite scarce due to a lack in continuous monitoring and reporting of this market. As already mentioned, ESCO activities have so far been mainly focused on the public sector. The business of ESCOs has indeed been mostly concentrated on buildings of municipalities, universities, schools and hospitals. This is due to the fact that the public sector got involved in the ESCO industry since its beginning and this situation has continued thanks to establishment of a series of public-private partnerships. The market that has

¹⁷⁷ See <http://www.nrcan.gc.ca/energy/efficiency/communities-infrastructure/buildings/federal/4481> for further information.

¹⁷⁸ See <http://www.powerauthority.on.ca/opa-conservation/conservation-first-framework-2015-2020> for further information.

been generated has never involved a very large number of ESCOs, but still it has been able to create a considerable number of direct and indirect jobs with up to 80% of the labour associated with implemented projects being local labour (Hansen & Langlois, 2012). The lack of adapted financing mechanisms makes it difficult for ESCOs to extend their business where most of the market potential is presently available (i.e. in the industry and in the commercial sectors). Nevertheless, some progress is expected in this respect thanks to recent creation of energy efficiency financing mechanisms for the private sector (see the section below dedicated to financing). According to (Hansen & Langlois, 2012) a quite relevant obstacle to a further development and application of the ESCO concept is represented by contracts established to manage buildings by competing private and public organizations. Although fees to be paid are based on a percentage of the operational expenses and hence represent an incentive to the implementation of energy efficiency improvement actions by building owners, in the public sector these contracts can be funded by capital budgets and operate outside the EPC concept.

Information, awareness and demonstration

An important source of information and promoter of the ESCO business in Canada is the Energy Service Association (ESA) of Canada. This association has the promotion of government policies and regulatory support for a more extensive use of guaranteed performance based solutions as a mission. Besides providing information on the evolution of the ESCO market and the latest news concerning initiatives and new regulations affecting this market, ESA collects and disseminates information related to best practices and success stories in the ESCO business. Although targeting the public sector only, the Federal Building Initiative also provides a series of services enhancing awareness on the opportunities connected to this business. These services include, among others, technical guides for the implementation of ESCO projects, as well as the organization of workshops and training activities through reliable industry contacts. Advice and consultation on ESCO projects implementation are other services provided through the FBI to Canada government buildings administrators. Other information and awareness raising activities worth to be mentioned are probably those undertaken under the ecoEnergy Efficient Initiative. Awareness raising elements are included for example under the ecoEnergy Efficiency for Buildings initiative providing information and benchmarking tools to improve the energy performances of existing buildings, or the ecoEnergy Efficiency for Industry initiative offering opportunities for industry to share information and identify common needs and best practices, or the ecoEnergy Efficiency for Housing initiative promoting energy efficiency guidelines for new houses. This last program includes a focus on providing home builders with the specific energy efficiency training to certify an R-2000 home¹⁷⁹ (APEREC, 2014). Despite the information and awareness raising activities above described, it has to be mentioned that lack of information about the ESCO concept is still an important barrier in Canada and that an intensification of these activities would surely be beneficial for a further development of the ESCO market.

Financing

Guarantees offered by the federal government made financing simple and easy to access for ESCOs in Canada. The use of the guaranteed savings approach, where the client is financing directly the project, has also contributed to the mitigation of the financing access barrier (IFC, 2011). Several Canadian ESCOs have access to pools of capital from private sector lenders or from their own organizations. These ESCOs were able to structure loans to be on- or off-balance sheet (with a lot more difficulties since the second part of the 2000s because of more restrictive international

¹⁷⁹ The R-2000 Standard sets out a series of house performance requirements that are in addition to those required by building codes. To receive R-2000 certification, homes must meet an energy consumption standard and incorporate certain energy efficient technologies (APEREC, 2014).

accounting rules) depending on taxation and other considerations. Other financing options were also adopted, such as municipal or capital leases (IFC, 2011). Government financing has generally represented an important leverage of ESCO activities. For example, in the province of Quebec the government has financed all the project costs in the health and education sector, requesting from ESCOs a turnkey approach and a savings guarantee. It may be worth mentioning that relatively new financing mechanisms have been recently adopted for energy end-users in Canada that could serve as a stimulus to ESCOs activities. For example, engineering companies have started establishing partnerships with financing companies to offer financing to prospective clients willing to improve the energy performances of HVAC systems in their buildings¹⁸⁰. An independent arms-length agency from the city of Toronto has started stipulating Energy Saving Performance Agreements (ESPA) whereby building owners can finance buildings upgrades without taking loans¹⁸¹. Some municipalities have instead started adopting the property-assessed clean energy (PACE) financing mechanism whereby buildings owners are loaned money by a government, or a third party working with the government, to improve the energy efficiency of their properties. The loan is then repaid through a special assessment added to the property tax bill and the obligation to repay the loan stays hence with the property at the time of sale¹⁸².

Barriers

The Canadian ESCO market is quite mature at least in the institutional sector. Nevertheless, lack of adapted financing and some important barriers still hinder the thriving of the market especially in the tertiary and industrial sectors. For example, the high leverage of grants in many provinces reduces the attractiveness of EPCs. Moreover, there is a lack of understanding of the ESCO concept in the aforementioned sectors and the bad reputation acquired by some ESCOs because of many projects failure impedes that the market can increase significantly. A disincentive to ESCO investments in the industrial sector is then represented by perceived financial and technical risks associated with these investments because of low or fluctuating energy prices, gas prices in particular. Market stakeholders believe that ESCOs offer services that overcome company-level barriers to achieve the full energy efficiency potential of an organisation. Firstly, ESCOs can offer expert services to organisations that do not have sufficient energy expertise in their staff to fully recognise energy savings opportunities and can help them understand better their energy consumption patterns. Secondly, ESCOs can give organisations the confidence that energy savings opportunities that have been identified can be realised on a sustainable basis. Thirdly, ESCOs can structure alternative funding models in a business environment where potential energy efficiency projects would otherwise have to compete for limited financial resources with other capital projects that are more closely related to the organisation's core competencies. A more massive undertaking of information initiatives capable of convey these messages would be very useful to overcome existing information barriers, especially in the private sector.

¹⁸⁰ See <http://www.greentechmedia.com/articles/read/efficiency-is-going-mainstream> for further information.

¹⁸¹ The agency pays for the improvements and is paid back over time out of the energy savings generated. See <http://www.greentechmedia.com/articles/read/efficiency-is-going-mainstream> for further information.

¹⁸² See <http://www.greentechmedia.com/articles/read/efficiency-is-going-mainstream> for further information.

Conclusions, future expectations

Market stakeholders believe that ESCO projects could be further promoted by government action. Some of them have produced a series of recommendations to improve the energy efficiency of buildings, finance renewable energy projects without requiring public funds and promote the market for performance based solutions. They also generally recommend that government and public sector agencies make greater use of energy performance based solutions in their energy management plans and that energy performance guarantees be promoted in energy retrofit projects in state owned buildings. ESA Canada suggests for the Ontario market that local distribution companies whose income is guaranteed should not be allowed to offer EPCs that compete with private companies and that renovation of apartment blocks could be more intensively undertaken by using private sector funds that would be backed by local property taxes in the event that building owners defaulted on repayments. In general, however, a real ESCO market growth can be achieved in Canada only if more effective policy instruments allowing that EPC use is extended to sectors other than the institutional one (i.e. to the commercial and the industrial ones).

Key drivers

- Governmental programme for public buildings (FBI initiative)
- Federal Government guarantees
- ESCO associations (ESA Canada)

Number of ESCOs	12
ESCO market size and potential	EPC market size: €330 million/year. Existing potential: between €1.5 -2.9 billion/year
ESCO market trend	Moderate growth
ESCO Association	ESA Canada
Typical ESCO projects	Public buildings (Indoor lighting and building automation projects are the most common projects)
Main type of contract	EPCs with guaranteed savings

Information in this chapter was based on the following source:

Asia-Pacific Energy Research Centre (APERC), 2014. Compendium of Energy Efficiency Policies of APEC Economies. Report available at <http://aperc.iecej.or.jp/publications/reports/compendium.php>

B.C. Ministry of Environment, 2012. Making Progress on B.C.'s Climate Action Plan. Report available at <http://www.env.gov.bc.ca/cas/pdfs/2012-Progress-to-Targets.pdf>

ESA Canada, 2010. Energy Services Association of Canada - promoting fiscally and environmentally responsible initiatives for Canadian organizations. Press release available at <http://energyservicesassociation.ca>

International Financial Corporation, 2011. "IFC Energy Service Company Market Analysis" Final Report prepared by ECONOLER
<http://www.ifc.org/wps/wcm/connect/dbaaf8804aabab1c978dd79e0dc67fc6/IFC+EE+ESCOS+Market+Analysis.pdf?MOD=AJPERES>

Hansen S. J., Langlois, P., Bertoldi, P., 2009. ESCOs Around the World: Lessons Learned in 49 Countries. The Fairmont Press. ISBN 0-88173-611-2

Langlois, P., Hansen, S. J., 2012. World ESCO Outlook. The Fairmont Press. ISBN 0-88173-675-9

Ministry of Energy Ontario. 2010. Ontario's Long-Term Energy Plan. Building Our Clean Energy Future. Report available at http://www.energy.gov.on.ca/docs/en/MEI_LTEP_en.pdf

Natural Resources Canada, 2013. Information published on the website of Natural Resources Canada available at <http://www.nrcan.gc.ca/energy/efficiency/communities-infrastructure/buildings/federal/4481>

ESCO market in Mexico 2013

ESCOs have been present in Mexico since the late 90's, as parts of programs implemented by the National Commission for Energy Savings (CONUEE)¹⁸³ to find financing alternatives to the growing energy-efficiency opportunities identified in Mexico for several sectors. The first efforts to promote this scheme initiated in 1997 with a conference jointly organized by the International Energy Agency and Natural Resources Canada.

To promote energy efficiency project development in Mexico, the U.S. National Renewable Energy Laboratory (NREL), a laboratory of the US Department of Energy (USDOE), in collaboration with Mexico's National Commission for Energy Savings (CONUEE), developed in 2001 a program through the US Climate Technology Partnership (CTP) to enhance project development opportunities for ESCOs. The objective of this effort was to help ESCOs from both countries form business partnerships that lead to the development of energy conservation and renewable energy projects in Mexico. (Renné et al.2003) CTP was a follow-on program to the Technology Cooperation Agreement Pilot Project (TCAPP), which originally began in 1997. TCAPP concluded in 2001.

Through this collaboration effort, NREL helped facilitating the development of an ESCO market through project in Mexico since 1999. CONUEE and NREL project focused on matchmaking clients with ESCOs and on training and capacity building for energy services. This project was supported by the North American Development (NAD) Bank, the World Bank and other international agencies (Ellis 2010)

Current size, trends and features of the market

As mentioned above, the ESCO concept has been developed with relative success in Mexico, and a number of projects in the private sector have been implemented since the early 21st century. Still, there are numerous energy efficiency opportunities for further ESCO. Currently, the opportunities are far greater than the existing companies can handle, in terms of skills, technology applications and financing.

Also, the Mexican ESCO market is still in the process of familiarizing itself with financing investments for EE in the public sector. There is an ongoing process carried out by CONUEE, with the support of German cooperation (GIZ), to develop a performance contract template for public agencies, which will be proved by conducting two pilot projects in office and hospital installations.

The number of ESCOS in Mexico is unclear, with estimates ranging from 10 to 20 companies. In addition to the established ESCOs, there are many consulting firms that have strong technical capabilities in specific areas, and generally partner with the ESCOs to provide support during the design and development stages. Small and large manufacturers and/or distributors of energy efficient equipment also provide support to ESCOs by helping identify potential projects, supplying equipment, and providing operational and maintenance services.

The association of ESCO companies - AMESCO, was founded in 2011 as a civil association by 10 companies, participating in the Mexican energy sector for over 25 years. Today AMESCO has 15 registered members.

The objectives of AMESCO are¹⁸⁴:

¹⁸³ The National Commission for Energy Efficient Use (CONUEE) is an agency within the Ministry of Energy. It was created by the Law for the Sustainable Use of Energy published in the Official Gazette of the Federation on 28 November 2008, and has as main objective to promote energy efficiency and serve as a technical body on sustainable use of energy.

¹⁸⁴ Source: Mexican Association of ESCO companies (AMESCO) <http://amesco.org.mx/acerca-de-amesco/quienes-somos/>

- To represent the Mexican ESCO's and to defend the interests of the members.
- To disseminate and to promote EE and specifically the ESCO model.
- To make familiar the members of the association through training and certification with its task regarding identifying and financing of EE. In this sense, AMESCO seeks to be a certifying body.
- To collaborate in negotiating with financial institutions to access capital for ESCO projects under competitive conditions.
- To share best practices with other national and international associations related to energy.

Types of ESCO projects

In framework of CONUEE /NREL project ESCOs carried out performance contract to implement EE and RE projects in the hotel, municipal and industrial sectors on a guaranteed savings basis in Mexico.¹⁸⁵

There are few ESCOs in Mexico that have to manage to carve out a reasonable market by undertaking small projects in the industrial, municipal and hotel sectors. One ESCO has been successful in the tourism sector working in large older hotels and is able to attract private equity funding. This company offers a whole package of EE services and also carries out water conservation and desalinations projects. It operate somewhat on performance guarantee, although the M&V protocols tend to be weaker than in developed countries, and generally offers ten years contract, in which maintenance and monitoring are included, more consistent with the outsourcing model of remuneration. (Ellis 2010)

ESCO projects on the basis of EPC have been realized in the industrial sector (improvement of lighting system, power factor correction for an automotive industrial plant), as well as in the commercial sector (Re-engineering and modification of hydraulic system of production and distribution of chilled water; Automation of the air conditioning system; Lighting Retrofit).¹⁸⁶

Regulatory factors

There is no legislation or regulation related to ESCO in place in Mexico. The legal framework for EE in Mexico consists of several laws and by-laws as follows¹⁸⁷:

- Law for the Sustainable Use of Energy from 28.11.2008. This law, which has the objective of achieving a sustainable energy use through optimal energy use in all processes and activities, also proposes the elaboration of a national program for sustainable energy use.
- Regulatory Framework of the Law for the Sustainable Use of Energy. This framework establish the basis for to set up national plans, strategies, objectives, actions and goals to achieve optimal energy use in all processes and activities related to its production, transformation, distribution and end-use. It should be approved and reviewed every second year. The methodology related to implementation of the plan should be updated every 3 years. This program includes provision about certification of buildings, but on mandatory base.
- The Federal Law on Metrology and Standards includes the mandate to implement mandatory technical standards (Mexican Official Standards or NOM). Through this law, the Mexican Ministry of

¹⁸⁵ Source: National Renewable Energy Laboratory http://pdf.usaid.gov/pdf_docs/PDACG052.pdf

¹⁸⁶ Source: Mexican Association of ESCO companies (AMESCO) <http://amesco.org.mx/en/success-stories/>

¹⁸⁷ Source: National Commission for Energy Efficient Use(CONUEE) <http://www.conuee.gob.mx/wb/Conuee/queesingles>

Energy has the mandate for energy efficiency NOMs, which is transferred to the National Commission for Efficient Energy Use (CONUEE).

The [National Energy Strategy \(ENE\) 2013-2027](#) has been prepared by the Ministry of Energy (SENER) and is a key policy paper for implementation of EE measures in Mexico.

Market factors

According to government estimates, up to 18% of Mexico's energy consumption in 2030 could be reduced through cost effective EE measures, which result in significant greenhouse gas emission reduction. (Inter-American Development Bank.2013). The transport sector accounts for 45.7% of the total final energy consumption (TFEC), showing an increase of 42% with respect to 2001. The industrial sector used 27.3% of the TFEC, with an increase of 15% compare to 2001. The consumption of residential, commercial and public sectors represented 18.6 of TFEC and showed an increase of 8% with respect to 2001. The contribution of agriculture sector on TFEC is 3.2% and increased 54% compare to 2001. In 2011 crude oil accounts for 41.4% and natural gas contributes with 42.2% of the primary energy supply. (Directorate General of Energy Planning and Information 2012)

The National Population Council (CONAPO) estimates that in the period from 2005 to 2030 the housing stock in Mexico will increase by 56%. In addition, electricity demand in Mexico is expected to grow at 4.8% a year, with the residential sector currently accounting for around 15% of total energy use in the country. Poorly built buildings are one major contributor to a significant increase in energy use in the commercial and residential sectors. Lighting, air-conditioning especially in warm climate areas of the country, and home appliances are expected to be the main growth areas of residential electricity demand in Mexico. It can be concluded that aggressive energy efficiency measures in the building sector will be a crucial element to enable the country to reach its goal of GHG emission reductions of 50% by 2050. (Inter-American Development Bank 2011)

Among the most relevant EE/RE technologies for Mexico is cogeneration. The potential for financing of cogeneration projects is estimated at higher ranges for EE in general due to the costs involved, which could have a significant impact on the balance sheet of a firm (or ESCO, if that is the entity making the investments), since energy generation does not usually constitute a core business of the end user. However, cogeneration does not make a positive business case when analysed from financial perspective. (International Finance Institution 2012)

Based on calculation from SENER the potential investments in cogeneration ranges from USD 6.5 billion to USD 8.4 billion, with estimated financing required in range of USD 3.6 billion and USD 4.7 billion with major opportunities in food, paper, and sugar industry. Due to its great complexity as compared to other EE projects, financing of cogeneration projects should include the collaboration of technical experts, specialized internal staff of financial institutions, consultants, and/or alliance with a qualified ESCO. (International Finance Institution 2012)

Information, awareness and demonstration

The promotion of ESCOs in Mexico is part of Conuee's guidelines. In particular, Conuee looks to strengthen and foster greater links between energy users and consultants, financial agencies, manufacturers and other institutions, in order to support the full development of EE markets for products and services.

In this sense and together with AMESCO, Conuee's work plan includes a set of fora and information tools to inform potential end-users on the elements of performance contracting and the advantages of this scheme for EE projects financing and implementation.

Also, the Energy and Climate Partnership of the Americas (ECPA), under the leadership of the Ministry of Energy (SENER) and the technical support of CONUEE, promotes cooperation activities

hosted in Mexico or in other countries of the region with national and regional participants. These cooperation activities contemplate regional capacity building through workshops, exchange of information and experiences with other initiatives on EE.¹⁸⁸

The Energy Efficiency Working Group, which is coordinated by Sener and Conuee, supports the efforts of the governments of the Americas to promote EE. Under Mexico leadership, the Working Group provides information and tools to countries in the region to promote EE and conservation in several areas including¹⁸⁹:

- Energy Service Companies (ESCOs) business model;
- Public awareness;
- Capacity building and institutional strengthening;
- Program design and implementation;

Financing

As indicated by government of Mexico, Mexico's National Development Banks (NDBs) have a potentially key role in scaling up investment in sustainable projects and delivering reduction in GHG emissions, including EE and RE. As public development institutions with a political mandate to combat climate change, Mexico's NDBs have high visibility and strong leading role in fostering investments in the market. Therefore the promotion of sustainable energy investment products and services by national development banks is necessary to reach low-carbon policy objective and targets. (Inter-American Development Bank 2011)

The Government of Mexico facilitate foreign and local investments through Multiple-Purpose Financial Institutions (SOFOMES)¹⁹⁰ into sectors such as housing, the agricultural and SME sector that are traditional short of financial resources. Most SOFOMES focus on a specific market niche e.g. housing. The financial crisis from 2008 has serious impact on SOFOMES and especially to those that are dedicated to residential building finance. The crisis led to many investors in SOFOMES recalling their investments. However, in 2010 the markets have been recovering. (Inter-American Development Bank 2011)

The North American Development (NAD) Bank owned by Mexican and United States Government started to provide lending for EE projects in the border region between Mexico and USA in 2012. The NAD Bank prepared a study with the federal government to examine ESCO market feasibility. Significant efforts were undertaken by NAD to raise interest in EE projects, particularly in street lighting in municipalities. These types of project have been chosen to be financed through loans from NAD Bank because of high electricity tariffs and very short pay period of two to three years. Although the NAD Bank offers to finance loans to municipalities, no projects have been realised because of political barriers and unwilling of municipalities to take on risk. (Ellis 2010)

The "Mexico CTF – IDB Group Energy Efficiency Program Part I" (Program) submitted by the Inter-American Development Bank (IDB) was approved by Clean Technology Fund (CTF) in May 2011. The program is a comprehensive initiative to help develop a market for private-sector financing of EE in Mexico funded by CTF and other sources, such as IDB's own resources, and local financial intermediaries. The program included €USD 22million of reimbursable resources for the envelope's projects, USD 1,415 million in non-reimbursable resources for knowledge management and technical

¹⁸⁸ Source: Energy and Climate Partnership of the Americas (ECPA)
<http://www.ecpamericas.org/Initiatives/default.aspx?id=26>

¹⁸⁹ Source: Energy and Climate Partnership of the Americas (ECPA)
<http://www.ecpamericas.org/Initiatives/default.aspx?id=26>

¹⁹⁰ According the Law on Credit Instruments and Operations General, all regulated multiple purpose financial institutions must add to their corporate name the expression "multiple purpose financial institution", or its acronym "SOFOM", followed by the words "regulated entity" or its abbreviation "E.R." The Non-regulated multiple purpose financial institutions must add to their corporate name "multiple purpose financial institution", or its acronym "SOFOM", followed by the words "non-regulated entity", or its abbreviation "E.N.R."

cooperation and USD 0,985 million in non-reimbursable resources for other purposes.(Climate Investment Fund 2013)

The Program was designed to support commercial banks in Mexico to stimulate and scale up their EE lending activity to local SMEs. However, the experience has shown that targeting only commercial banks with financial and/or technical resources is not enough to overcome the main barriers to increasing EE investments and activities in the Mexican economy. In order to have a broader impact and address the identified barriers, there was a need for the Program to focus on financial innovation also through other non-financial institutions such as ESCOs, leasing companies, multiple purpose financial institutions, investment funds and facilities.(Climate Investment Fund 2013)

The commercial banking sector is reformed, privatized and active. It is 90% foreign –owned and most banks have good levels of capitalization and liquidity. However, this success is due in part to the development of extremely conservative lending practices, which have become only more conservative in the current risk-adverse financial environment. Such caution severely restricts lending and economic growth in the market. This has been especially problematic for small and medium-sized enterprises (SMEs) which have generally higher risk profiles: only 20% to 30% of Mexican SMEs have access to bank credit. While commercial banks provide most of the lending in the country (USD€65 billion in 2008), and are well-placed to be a primary source of first-tier debt financing for EE retrofit projects, their extreme risk aversion generates an avoidance of new markets and products and they provide almost no finance to EE on a project basis. (Inter-American Development Bank 2011)

Barriers

Barriers for development of ESCO market in Mexico are:

- ESCOs in Mexico have had difficulties securing project financing, mainly because financial institutions are sceptical of energy efficiency projects, due to a lack of understanding about performance contracting and outsourcing
- Lack of policies and legislation to foster and to promote ESCO business;
- Procurement procedures for the federal government still make multi-year financing difficult, to be made in the current budget year that will result in cost savings in the future. In the case of municipalities, state congresses have to grant approval for long term contracts (that exceed 2 years) or off-balance sheet financing. (Jenifer Ellis 2010)
- Lack of awareness of benefits and profitability of EE investments and ESCOs amongst Mexican IFI's. Therefore the Mexican banks are unable to assess the potential of EE projects. They are not familiar with risk profile of EE investments and rely on assets based lending, where the loan is secured by asset of the company itself or some kind of assets belonging to the owner of the companies. Especially SMEs have lack of access to affordable financing due to lack of own assets; (Inter-American Development Bank 2011)
- Lack of knowledge and familiarity with EE investments and ESCOs. The banks are not familiar with risk profile of EE investments and therefore do not willing to provide loans;
- High transition costs. Development of new EE and unfamiliar investments cause relatively high transaction costs and higher interest rates for EE projects. It discourages potential borrowers, even when EE projects themselves may be clearly cost effective. Furthermore, energy savings are often

spread across many small investments which lead to higher transaction cost per unit. (Inter-American Development Bank 2011)

- Requirements for short pay-back period. ESCOs require long term financing, and therefore the Mexican banks are not interested in financing investments in ESCO projects in Mexico.

Conclusions and future expectations

The “Mexico CTF – IDB Group Energy Efficiency” Program should contribute to development of private-sector financing of EE in Mexico through support of commercial banks as well as of other non-bank financial intermediaries as ESCOs. The methodology, developed and standardized for identification of sustainable energy projects, is expected to have a demonstrational effect for commercial banks to then tap into new market niche, while reducing the perceived performance, provider and technology risk. The technical assistance activities implementing by Inter-American Development Bank has been focused on building capacity of selected financial institutions for investment in EE.

Key drivers	
-	Development of legislation and policies for EE and ESCO;
-	Improvement of public procurement legislation;
-	Capacity building and training of financial institutions for EE investments and ESCO;
-	Training of ESCOs for implementation of energy audits;
-	Realization of awareness campaigns and demonstration projects for EE implemented on ESCO model;
-	Implementation of the “Mexico CTF – IDB Group Energy Efficiency Program Part I”;
-	Implementation of cogeneration for medium sized industry (sugar mills, paper) in collaboration with ESCOs;

However, in order to develop sustainable EE financing market, capacity and technical building for ESCOs, that the financial institutions can support, is also very important. ESCOs can handle the technical aspects of EE investments and develop implementation of projects. (Inter-American Development Bank 2011)

The analysis of the current status of Mexico's sustainable energy market (EE and RE) carried out by International Finance Cooperation indicate a sizeable potential market for investment in wide range of EE/RE equipment, technologies and systems.(International Finance Institution 2012)

Number of ESCOs	10-20 (15 registered in AMESCO's directory)
ESCO market size and potential	No information (potential investments in cogeneration USD 6.5 billion to USD 8.4 billion)
ESCO market trend	Slow growth
ESCO association	One (AMESCO)
Typical ESCO projects	Street lighting, small cogeneration for hotels; HVAC system and indoor lighting for commercial buildings; heat recovery systems, sea water for cooling systems, street lighting for municipalities;

Main type of contract	EPC with guarantee savings;
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Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Ellis, Jenifer. 2010. "Energy Service Companies (ESCOs) in Developing Countries" study prepared for IISD www.iisd.org

Climate Investment Fund. 2013. "Amendment to the Mexico CTF Investment Plan and to the Mexico Private Sector Energy Efficiency Program"
https://www.climateinvestmentfunds.org/cif/sites/climateinvestmentfunds.org/files/Amendment%20to%20the%20Mexico%20CTF%20IP_August%202013.pdf

Directorate General of Energy Planning and Information. 2012. "Energy Balance of Mexico 2011"
http://www.sener.gob.mx/res/PE_y_DT/pub/2012/NEB_2011.pdf

International Finance Institution (IFC). 2012. "Market Study of Sustainable Energy Finance in Mexico"
<http://www.ifc.org/wps/wcm/connect/96f316004cf49988afa3eff81ee631cc/October+2012-Market+Study+of+SEF+in+Mexico-EN.pdf?MOD=AJPERES>

Inter-American Development Bank. 2011. "Proposal for Mexico CTF-IDB Group Energy Efficiency Program, Part I"
<http://www.climateinvestmentfunds.org/cifnet/sites/default/files/Mexico%20Energy%20Efficiency%20Program%20Part%20I%20-%20Approved.pdf>

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http://aceee.org/files/proceedings/2004/data/papers/SS04_Panel6_Paper24.pdf

ESCO market in the United States of America 2013¹⁹¹

Total U.S. ESCO industry revenue for 2013 was estimated at \$6.4 billion and is expected to surpass \$7 billion in 2014. The U.S. ESCO industry has grown steadily since the 1990s with a 9% annual growth rate occurring from 2009 to 2011. The latest report by the Ernest Orlando Lawrence Berkeley National Laboratory (LBNL) on ESCO market developments in the USA indicates that industry continued to grow despite a severe economic recession. However, ESCO executives expected an even higher growth rate for 2011 than was reported. The report authors found that about a quarter of all recent projects were scaled back, but not cancelled—and ~20% of state and local government projects were cancelled altogether. It is possible that project cancellation rates and scaling back activities may have been higher than normal due to the severity of the recession and this may have been a factor explaining why revenues fell short of ESCOs' expectations. (Stuart et al. 2013)

Current ESCO market

According to the LBNL report nearly 85% of ESCO revenue came from public and institutional sector projects—including the federal government. State and local government projects accounted for 24% of revenue and federal government projects for 21.4%. K-12 schools and universities projects accounted for 19.4% and 13.7% of annual revenue respectively, while public healthcare and hospitals projects constituted 5.9% of the market. Private sector projects, by contrast, accounted for only 8% of revenue in 2011. Barriers to growth in the private sector include companies' reluctance to finance energy efficiency projects and unwillingness to invest in projects with relatively longer payback times. (Stuart et al. 2013)

ESCOs reported that around 19% of state and local government projects were cancelled while 25% were scaled back in the period from 2009 to 2011 as a result of the financial crisis. However, 46% of projects were unaffected by the crisis while around 10% were scaled up. (Stuart et al. 2013)

ESCO executives also provided growth expectations for the next three years and LBNL extrapolated these values to 2020. It is estimated that revenues could increase to about \$7.5 billion by 2014, representing an annual average growth rate of 12% from 2011-2014. LBNL developed a number of growth scenarios and estimated that industry revenues will be between \$10.6 and \$15.3 billion by 2020—or double to triple the reported industry size in 2011. (Stuart et al. 2013)

ESCO market penetration is highest in the K-12 schools category with an estimated 42% of total floor area in the sector addressed by energy performance-based contracts since 2003. The state and local government sector, federal sector and universities/colleges had estimated penetration rates of 30%, 28%, and 25%, respectively. Market penetration is lowest in the private commercial sector—about 9% of floor area was addressed by ESCOs in the past decade. (Stuart et al. 2013)

There is significant remaining market potential in all sectors. The total remaining ESCO market potential in all sectors is estimated at between \$71 and \$133 billion. This market potential corresponds to a total annual energy savings potential of between 354 trillion Btu (104 TWh) and 519 trillion Btu (152 TWh). Not surprisingly, the greatest potential lies in the sector with the lowest

¹⁹¹ This section summarises findings from the latest report by the Ernest Orlando Lawrence Berkeley National Laboratory (LBNL) on ESCO market developments in the USA (Stuart et al. 2013). The report examines current industry size, recent market trends, and estimates remaining market potential. The report was based on (1) interviews conducted with U.S. ESCO executives in 2012 and (2) a large database of ESCO projects maintained by LBNL in collaboration with the U.S. National Association of Energy Service Companies (NAESCO) (e.g., see Larsen et al. 2012). The full report can be found at the following website: http://emp.lbl.gov/sites/all/files/lbnl-6300e_0.pdf

market penetration to-date; namely in the private sector, commercial buildings. The remaining market potential of ESCO projects in the private and commercial buildings sector could be between \$14 and \$34 billion. Despite the relatively high market penetration in the K-12 schools, this sector still has a significant remaining potential of between \$16 and \$29 billion. Remaining market potential in healthcare/hospital sector is also very high, estimated at between \$15 and \$26 billion. (Stuart et al. 2013)

The National Association of Energy Service Companies (NAESCO) was established in 1983. Currently 38 ESCOs are members of NAESCO. NAESCO has a leading position in promoting, developing, and advocating for the central role of energy efficiency as part of a comprehensive national energy agenda. NAESCO has been a key catalyst in creating, among federal and state lawmakers, regulators, and energy program managers, a continuing commitment to developing and implementing energy efficiency solutions. (NAESCO 2014)

NAESCO runs an accreditation scheme for ESCOs. Companies seeking NAESCO-Accredited status must apply to a committee of industry experts who are unaffiliated with any particular ESCO or any other company under consideration for accreditation, and undergo an examination of their core competencies and business practices. The committee carefully reviews the detailed documentation submitted and consults with selected customer references. (NAESCO 2014)

NAESCO offers three categories of Accreditation for companies in the energy service business: Energy Service Company (ESCO), Energy Service Provider (ESP) and Energy Efficiency Contractor (EEC).. ESCOs offer performance-based contracts (i.e., contracts that tie the compensation of the ESCO to the energy savings generated by the project) as a significant part of their business. To gain accreditation, ESCOs must demonstrate the technical and managerial competence to design and implement projects involving multiple technologies. (NAESCO 2014)

ESPs in most instances will offer all of the services offered by ESCOs (see above), and additionally offer energy supply options. EECs typically concentrate on one energy efficiency measure (e.g., lighting) or one type of service (e.g., engineering or project management), but can offer multiple measures or services. EECs typically work as subcontractors to ESCOs or ESPs. (NAESCO 2014)

Nowadays, according to the NAESCO register, 11 companies have an ESCO accreditation, 9 are accredited as ESP and 2 companies are accredited as EEC. (NAESCO 2014)

Types of ESCO projects

In 2011, performance-based contracting accounted for 69% of ESCO revenues. Design and build projects, which include services such as engineering, procurement, installation and construction, accounted for 15% of the market. 7% of revenues were earned on administration of utility programmes while consulting accounted for 3.9%. ESCOs also earned revenue (3.6%) through power purchase agreements, whereby an ESCO installs and operates an energy generation installation onsite and sells energy back to the customer. (Stuart et al. 2013)

Energy efficiency activity was responsible for nearly three quarters of all revenue in 2011, with other energy efficiency related services such as O&M contracts, commissioning, consulting and utility programme implementation, and accounting for 14.5%. It is estimated that revenue from onsite energy generation technologies amounted to 9.4% of total revenues in 2011, comprising of onsite renewable energy projects (6.4%) and other engine/turbine technologies (3%). The share of ESCO revenue attributable to onsite generation has fallen in recent years despite significant local, regional, and national interest in installing these types of technologies. It is speculated that the decrease is due to the proliferation of non-ESCO companies able to offer attractive renewables solutions and a general lack of ESCOs who specialise in designing and installing renewables. In addition, government

incentives to install renewable electricity systems have also been reduced in recent years making these types of projects less attractive to ESCOs. (Stuart et al. 2013)

Regulatory factors

Enabling policies have played an important role in the development and maturation of the ESCO industry (e.g., enabling legislation that allows long-term performance contracts in institutional markets). More recent examples include cities that have enacted building energy benchmarking and energy use disclosure policies which may help to spur energy efficiency activity in the commercial/institutional market in large urban areas, state and local governments adopting energy efficiency goals, or the possibility of federal climate-related legislation, rulemakings or policies that encourage cost-effective energy efficiency investments. (Stuart et al. 2013)

Market factors

The Federal Government owns and operates nearly 3 billion square feet (app. 27 million m²) of Federal building space. President Barak Obama issued in 2011 a Memorandum for the "Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings". The Memorandum recognises that upgrading the energy performance of buildings is one of the fastest and most effective ways to reduce energy costs, cut pollution, and create jobs in the construction and energy sectors. (The White House 2011)

The Memorandum requires executive departments and federal agencies to evaluate their facilities, identify potential savings, and appropriately leverage both private and public sector funding to invest in comprehensive energy conservation projects. The Federal Government will be increasing the pace of the implementation of energy conservation measures, and improving the results from its energy efficiency investment. (The White House 2011)

According to the President Barak Obama's Memorandum, the federal agencies shall fully implement energy conservation measures (ECMs) in the Federal buildings with a payback time of less than 10 years.. The Agencies shall prioritize ECMs with the greatest return on investment, leveraging both direct appropriations and performance contracting, consistent with guidance by the Office of Management and Budget (OMB). The Federal Government shall enter into a minimum of US\$2 billion in performance-based contracts in Federal building energy efficiency within 24 months from the date of the memorandum. Each agency shall include its anticipated total performance-based contract volume in its plan submitted pursuant to subsection (d) of this section. (The White House 2011)

Policies that increase energy and water prices (or put prices on pollution) may also stimulate demand for comprehensive retrofits. Furthermore, policies that allow public/institutional customers to address non-energy, deferred maintenance issues (e.g., roof replacement, wiring, asbestos) with performance-based contracts may also facilitate industry growth. In addition, as utility customer-funded program administrators and state regulators look for ways to meet aggressive energy-savings targets, future partnership opportunities with ESCOs should be considered. (Stuart et al. 2013)

Information, awareness and demonstration

NAESCO has a leading role in promoting of the ESCO business in USA. NAESCO has organized events as: annual conferences, workshops and meetings for its members as well as for private and public sector representatives to discuss and promote the evolving role of energy services, ESCOs and ESPs. In March 2013 NAESCO organized a workshop for "Accelerating the Use of ESPCs to Enhance Environmental, Energy and Economic Performance at Federal Facilities" with focus on what the US Federal Administration should do to more effectively leverage the capabilities of third party providers like ESCOs to generate energy savings. The federal government interest in pursuing "deep retrofits" and its implications for the ESCOS were on the agenda of the event. The ESP delivery

model, and federal procurement requirements as well as the efforts to be undertaken in order to overcome the barriers that continue to impede ESP and Utility Energy Service Contract project implementation, were also discussed.

Financing ESCO projects

Around 30% of the recent projects of medium to large ESCOs relied on some type of federal funds such as revolving funds, qualified energy conservation bonds, or programmes associated with the American Recovery and Reinvestment Act, a stimulus package designed to provide relief programmes to address the negative impact of the recession. For smaller ESCOs, around 15% of projects relied on federal funding programmes. Most ESCOs reported that some of their projects took advantage of local, state or federal tax credits during the three years up to 2011. ESCOs reported that their customers were more likely to use third party financial advisers in larger, more comprehensive projects. (Stuart et al. 2013)

ESCOs also reported information about the vehicles used to finance their projects. For federal government projects, 40% of projects are paid for with the end-user own resources, 19% used leasing arrangements, and 31% use other financing arrangements. 31% of state/local government projects were funded by state or local bonds while 23% were financed by municipal leases. For K-12 schools projects, 34% used state or local bonds while 28% use lease arrangements. (Stuart et al. 2013)

For projects in the private sector, 50% have been paid for with the end-user own resources while 16% used other types of financing. One common financing arrangement in the private sector is an energy services agreement whereby a third party enters into contract with an ESCO to deliver a project and provide on-going maintenance. The third party also enters into a contract with the building owner who pays for delivered energy and for cost savings. (Stuart et al. 2013)

Barriers

According to the LBNL report there are still a number of barriers to ESCO projects in the USA. ESCOs have reported that private sector companies in the USA are generally averse to financing energy efficiency work, as well as to allocating capital expenditures for energy projects that have relatively long payback times. One ESCO, that primarily serves private sector customers, reported that most of their projects were with publicly-held companies. These companies typically prefer to pay cash for energy efficiency projects, rather than financing them. Public procurement requirement is still a barrier to ESCO projects in the public sector. (Stuart et al. 2013)

Conclusions and future expectations

LBNL indicated that many factors will impact the ESCO industry's future growth and ability to capture a significant portion of the remaining market potential. Federal, state and local policies, (e.g., legislation and programs that facilitate or require the use of performance-based contracting in institutional markets) will continue to be an important driver of ESCO activity. In addition policy for emission reduction as well as policies that increase energy and water prices (or put prices on pollution) will also stimulate demand for comprehensive retrofits. Furthermore, policies that allow public/institutional customers to address non-energy, deferred maintenance issues (e.g., roof replacement, wiring, asbestos) through energy performance-based contracts may also facilitate industry growth. In addition, as utility customer-funded program administrators and state regulators look for additional projects to meet increasing energy-savings targets, future partnership opportunities between utilities and ESCOs could represent another important driver. (Stuart et al. 2013)

Key drivers

- Presidential Memorandum “Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings” (November 2011);
- Federal Government programs;
- Enabling federal, state and municipality policies;
- ESCO associations (NAESCO);
- Utilities program;

Number of ESCOs	45
ESCO market size and potential	\$6.4 billion (2013); Remaining market potential estimated at \$71-\$133 billion
ESCO market trend	Steady to high growth rate expected
ESCO association	NAESCO
Typical ESCO projects	Energy conservation measures (lighting, control, etc.), onsite renewable generation, other, consulting, engines/turbines
Main type of contract	Performance-based (e.g., guaranteed savings), design-build, onsite generation PPA, consulting, utility program administration, other

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

Stuart, Elizabeth, Peter H. Larsen, Charles A. Goldman and Donald Gilligan. 2013. “Current Size and Remaining Market Potential of the U.S. Energy Service Company Industry” Prepared for the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy, Weatherization and Intergovernmental Programme LBNL-6300E
http://emp.lbl.gov/sites/all/files/lbnl-6300e_0.pdf

The White House. 2011. “Memorandum for the Heads of Executives Departments and Agencies” related to implementation of the Presidential Memorandum for “Implementation of Energy Savings Projects and Performance-Based Contracting for Energy Savings”
<http://www.whitehouse.gov/the-press-office/2011/12/02/presidential-memorandum-implementation-energy-savings-projects-and-perfo>

NAESCO . 2014. The web page of the National Association of Energy Services Companies
<http://archive.naesco.org/about/default.htm>

South America

The ESCO market situation in the countries of South America appears highly heterogeneous. Important steps need in general to be undertaken before the huge and still mostly untapped potential existing in this region of the world can be exploited. Brazil, Uruguay, Colombia, Chile and Argentina are the only countries where the presence of an ESCO market or of some companies operating in an ESCO like manner or providing partial services connected to ESCO services can be registered. In Brazil the energy service business originated already in the 1990s. Although an ESCO association was already created 1997, a significant impetus to the ESCO business has been registered in this country only in the early 2000s. A regulation obliging electricity distribution companies to invest part of their operational revenues in energy efficiency projects whose implementation costs could be recovered through energy performance contracts (EPCs) has had an important part in this market push. The reminder of the countries previously mentioned has had to wait at least for the early 2000s before some ESCO activity could be detected. In Uruguay the ESCO business is presently increasing at a faster rate compared to the recent past also thanks to an energy efficiency law enacted in 2009 and establishing a guarantee fund financed by obliged energy utilities, international donors and taxes on inefficient equipment. Only a few companies that can operate in an ESCO like manner can instead be identified in Colombia and most of them are new market entrants or are still defining their business plans to start selling energy services. The ESCO market is still at an initial development stage also in Chile, mostly due to the fact that energy efficiency has become part of the public discussion only quite recently. In Argentina the market is even less developed than in the countries previously mentioned. No company operating on the Argentinian territory meets the definition of a proper ESCO and just few enterprises provide services that can be considered as partial services connected to the implementation of ESCO projects (e.g. installation of energy efficient equipment, design and implementation of energy efficiency projects, measurement of achieved energy efficiency improvements, consultancy on energy efficiency, etc.).

International donors and financing institutions often provide a noticeable support to the ESCO markets of this region. For example, in Brazil the Inter-American Development Bank (IDB) and the Global Environment Facility (GEF) have implemented an Energy Efficiency Guarantee Mechanism (EEGM) whereby ESCOs, and energy efficiency project implementers in general, can benefit from partial credit, technical guarantees and technical assistance for projects implemented in the building sector. Moreover, the German Development Bank (KfW) and the International Finance Corporation of the World Bank Group (IFC) are supporting the introduction of credit lines for energy efficiency and distributed generation projects. In Uruguay the "Energy Efficiency Project" financed by GEF has played an important role in the stimulation of the ESCO market between 2005 and 2012. In Colombia and Chile the IDB and the Multilateral Investment Fund (FOMIN) have been implementing relevant projects providing ESCOs with technical and financial support. In Argentina the "Argentina-Energy Efficiency Project" financed by GEF and implemented by the World Bank aims to stimulate the implementation of energy efficiency projects and to promote ESCOs capacity building.

The economies, the energy markets and the climate conditions in the region of South America are however highly diversified and this creates different grounds for the growing of ESCO activities. In Brazil energy prices are kept low by the government and energy efficiency improvement investments are mainly performed in the electricity sector mainly due to the fact that heating requirements for buildings are very low and that the biggest investments in energy efficiency are mostly performed by electric power utilities. Uruguay economy relies heavily on hydropower given the absence of alternative energy sources (e.g. oil, natural gas, coal, etc.) on its territory and its very

high economy growth rate makes energy efficiency improvement a priority in the national government energy policy. The relevant and steady GDP increase being observed in Colombia is instead mainly driven by the hydrocarbons sector that is nowadays booming in this country. Nevertheless, Colombia is among the countries with the highest electricity prices in Latin America and this determines market conditions potentially more favourable to ESCO investments. Most of the primary energy needs are instead fulfilled by energy imports in Chile, one of the first countries in the world having created an unbundled and privately owned electricity market in 1982. Also Chile energy prices are among the highest in the Latin American. Nevertheless, its particular geography gives this country a considerable renewable energy potential (hydropower, biomass, solar, ocean and wave energy) and its high energy prices allow renewable energy sources to compete with traditional energy sources without economic incentives. In Argentina, the very high inflation rates together with the effects of the past financial crisis negatively affect the possibly development of an ESCO market.

All the above differences are partially reflected in the type of projects that are implemented by ESCOs in the various countries. As mentioned, projects implemented to reduce electricity consumption (e.g. due to lighting systems, HVAC systems and electric motors) are mostly implemented in Brazil due also to lower investments required to end-users compared projects addressing other energy sources. The same fields of application for ESCO services are covered also in Uruguay, where the public sector (notably central and local government buildings) and building of the commercial sectors are the main ESCOs target clients. The industry sector (co-generation and tri-generation plants, optimization of industrial process) seems instead to be the main target in Colombia, despite available information concerning ESCO projects typically implemented in this country are quite scarce. Concerning Chile, ESCO activities have so far mainly focused on the commercial sector (notably large shopping malls and buildings for the retail sector) and on the industrial sector (primarily agricultural and food industries).

All in all, relevant barriers still hinder the exploitation of the existing ESCO market potential in South America. The very fast economic growth being observed in most of the countries with some ESCO activities typically induces companies to prefer investing on their core business rather than on energy efficiency. Lack of information on the ESCO concept, lack of capacity building activities, of standard contract types and methodologies for energy saving measurement and verification create often a situation of general mistrust in this business by potential clients. Linked and dependent on this issues is, either the scarce familiarity with and interest in ESCO projects financing by local financial institutions, or the high guarantees requested for loans granted for these projects. Moreover, the public sector is not always playing the expected exemplary role in the implementation of ESCO projects or in the promotion of demonstration projects and several budgetary and administration rules adopted in this sector often impede that any tendering procedure for their realization can be started.

ESCO market in Argentina 2013

Nowadays, the ESCO market in Argentina is not yet developed. It is not yet enough matured market, mainly due to the fundamentals of the economy (very high inflation rate)¹⁹², lack of financing for EE projects based on performance contracts, ESCO and EPC are not very well known due to lack of experience, and insufficient and not appropriate legislation.

Current size, trends and features of the market

None of the so-called ESCOs in Argentina meets the well-known definition of ESCO: some of them prepare only feasibility studies, other are involved in engineering, procurement, installation of equipment or in start-up and measurement of results, recovering their expenses through a performance contract. Most of the companies are just engineering companies or simple consultants. (EC JRC 2012)

The objective of the “Argentina-Energy Efficiency Project” financed by the Trust Fund Grant from The Global Environmental Facility (GEF) and implemented by the World Bank is to increase the efficient use of energy and developing a sustainable and growing market for EE services and equipment in Argentina. The project's implementation started in 2009 and will be finished in 2015.

This project consists of three components (World Bank 2008):

- Development of Argentina EE Fund;
- Development of Utility EE program focused on efficient lighting; and
- Capacity building in the area of EE, as well as support for project management;

The capacity building includes the following activities (World Bank 2008):

- Preparation of studies in order to identify and evaluate the existing barriers for development of EE market, including the identifying of necessary measures for removal of the barriers;
- Training for ESCOs;
- Information, training and dissemination programs;

Stakeholder's consultation and workshops carried out by the project in collaboration with the Argentine Industrial Union (UIA in Spanish) have received confirmation of a number of SMSs to participate in initial feasibility studies and energy audits. The first 25 studies have been already completed and additional 315 studies have been planned. This will create a pipeline of subprojects for EE investments. Training of ESCOs and demonstration effect of the project is expected to enhance a demand and development of the EE market. (World Bank 2013)

Types of projects

EE projects implemented on ESCO model do not exist in Argentina. Several companies have capacities (know how, equipment, financial) to provide different types of energy services (including consultancy), such as (EC JRC 2012):

- Energy audits of residential and commercial buildings;
- Energy audits in industry;
- Preparation of feasibility studies for industrial sector;
- Maintenance of energy facilities;

¹⁹² As high as 30% annual rate, approx.

- Preparation of financial studies;
- Evaluation of projects;
- Training of staff;
- Installation of energy equipment and plants;

Regulatory factors

In December 2007, the Government launched the National Program for Rational and Efficient Use of Energy (PRONUREE, Decree No.140/2007). This program, under responsibility of the Secretariat of Energy, aims to be a vehicle for improving EE in industrial, commercial, transportation, residential and public sectors. The PRONUREE includes short and long terms objectives to improve EE:

- 5,4% energy savings target by 2016 for industrial sector;
- 10% energy savings target by 2016 for residential sector;
- 12% energy savings target by 2016 for service sector; and
- 10% energy savings target by 2016 for public buildings;

The PRONUREE also aims to reducing the electricity consumption by 6% compared with a reference projection and to save 1,500 MW by 2016.

It also supports educational programs on EE, regulation to expand cogeneration activities, labelling of appliances, improvement of EE regulations, and broader use of Clean Development Mechanism (CDM) to support the development of EE projects.¹⁹³

The Secretariat of Energy (SE) is a responsible authority for policy setting and policy implementation.

Neither EE nor ESCO legislation is in place in Argentina to date. (JRC Survey. 2012-2013). The lower and the upper House of the Parliament have passed EE legislation, but it was stalled as a result of the economic crisis in 2002. The crisis created a loss of confidence in the financial sector and a contraction of credit for investments in new equipment especially among SMEs. The devaluation of argentine peso has increased the costs of imported equipment and goods.(World Bank 2008) Although the main economic and social effects of the crisis have been overcome, the energy policy since 2003 onwards did not take into consideration EE as a fundamental tool for being more competitive. The prices of oil by-products and electricity were maintained artificially low and were heavily subsidized, preventing from investments to be more efficient referring to energy consumption.

Market factors

Primary energy consumption has been increasing since 2002 (3.9%/year). The pace was affected over 2008-2009, by the global economic crisis of 2009, which led to a 2.8% decline. Final energy consumption followed the same trend as primary consumption. Industry accounts for about 30% of the total energy consumption. Industrial energy consumption doubled between 1990 and 2010, reaching 3.4% per year and did not decline in 2002 despite the national economic recession. The global crisis did not affect very much industry's consumption in 2009. Electricity consumption is growing by 5.4% since 2002. Industry is the largest electricity consumer (43%).¹⁹⁴

¹⁹³ Source:

[http://www05.abb.com/global/scot/scot316.nsf/veritydisplay/4f033d92415bc05048257a2300538673/\\$file/argentina%20energy%20efficiency%20report.pdf](http://www05.abb.com/global/scot/scot316.nsf/veritydisplay/4f033d92415bc05048257a2300538673/$file/argentina%20energy%20efficiency%20report.pdf)

¹⁹⁴ Source: ABB Energy Efficiency Report.2012

[http://www05.abb.com/global/scot/scot316.nsf/veritydisplay/4f033d92415bc05048257a2300538673/\\$file/argentina%20energy%20efficiency%20report.pdf](http://www05.abb.com/global/scot/scot316.nsf/veritydisplay/4f033d92415bc05048257a2300538673/$file/argentina%20energy%20efficiency%20report.pdf)

The government recognize the necessity of implementation of EE and RE, and set energy savings targets for almost all sectors, but efforts fell short of the goal. The governmental policy should have to influence the market for energy services.

The energy prices for some customers are still lower than the real market prices. Partly as a result of the past financial crisis, the prices for some sectors (as residential) are still subsidized and controlled by the government. However, the retail price of natural gas for industrial and commercial sectors has been increased from 30-90% since 2002. (World Bank 2008)

Information, awareness and demonstration

The “Argentina-Energy Efficiency Project” includes also organization of awareness campaigns, training for SMEs, energy audits, to create interest and demand for financing of EE investments. The results to be obtained from the implemented projects financed by the Argentina EE Fund (AEEF) will provide demonstration effect needed to bridge the knowledge gap and reduce risk perception associated with EE projects in SMEs. This will help to build interest among financial institutions for EE investments, which is not the case at the moment. A set of 25 energy audits conducted in SMEs as a part of this project has identified a number of additional investments in EE. (World Bank 2013)

Financing

The credit line (LOC) of US\$ 7,7 million to promote EE investments in SMEs is an activity included in the EE Project (a grant from GEF Trust Fund). The WB will disburse the funds directly to the Argentinian EE Fund (AEEF), an account set up within FONAPyME (National Fund for Development of Small and Medium-Sized Enterprises) for the line of credit (LOC). FONAPyME is the retail fund managed by the Banco Nacion (National Bank) to lend to SMEs for program purposes. Banco Nacion as trustee of FONAPyME, acts as the retail agent, entering into direct loan agreements with SMEs interested to borrowing for medium to long term investments (3 to 7 years loans) in EE and RE. The credit risk will be borne by FONAPyME. The FONAPyME is owned by the federal government and it is not a traditional financial institution. Since the annual inflation rate (2013) hovers 10%, and with administrative fee of 2%, the lending rate for long term EE should be in range of 12%. (World Bank 2013)

To confirm that the program parameters can make financially viable EE investments, a financial analyse was conducted on a sample project. This investment aims to improve energy efficiency of a compressed air system through the transformation of 4 fixed-capacity devices to a system of variable capacity. This project entails an investment on equipment of US\$100,000, co-financed with equity (30 percent; required return of 25%) and an AEEF loan for the remaining 70 % (interest rate of 9%).¹⁹⁵ The investment results in annual energy savings of 655 MWh (or over 9,800 MWh throughout the 15 years lifetime of the equipment) and a reduction of power capacity needed of 61.2 KW.(World Bank 2013)

Barriers

The identified barriers for development of ESCO market in Argentina are (JRC Survey 2012-2013):

- Low energy prices. The energy prices do not reflect the real costs. Although since 2008 the energy prices have been increased, for some customers are still subsidized by the State; this process is about to be diminished, because of fiscal deficit of the Treasury
- High inflation rate, which make very difficult or directly impede a correct economic and financial analysis of investments in the long run and so decide if a project will be profitable or not;

¹⁹⁵ Note: This capital structure is in line with AEEF's limitation to finance up to 70 %of the project.

- Lack of experience in financial institutions related to performance contracts for EE projects;
- Lack of culture in industrial and commercial companies connected to performance contraction for EE projects;
- Lack of regulatory incentives to promote EE. Even with high enough energy prices to justify investments in some sectors, the regulatory framework for electricity and natural gas often discourages utilities and many classes of costumers from making EE investments;
- High perceived risk about financing of EE project from the commercial banks;
- Relatively high transaction costs for enterprises. The large EE potential has been identified in SMEs and in residential sector where. However, in both sectors potential investment projects will be small sized;
- Lack of information and knowledge about ESCO among industrial and residential sectors;

Conclusions and future expectations

ESCOs are expected to play a key role in undertaking EE investments in SMEs. Development of real ESCOs has been foreseen as a part of the World Bank's "Argentina EE Project". However, certain market conditions should have to be created in order to increase and to attract interest in financing of EE projects, especially in industrial sector.

Possible break-through points	
-	Improvement of EE and ESCO legislation;
-	Development of for-profit ESCOs including performance contracting in the framework of "Argentina EE Project";
-	Development and implementation of EE (including ESCO) projects in SMEs through the Argentina Energy Efficiency Fund;
-	Awareness rising and implementation of demonstration projects for industrial sector (especially for SMEs) through World Bank's EE PROJECT;
-	Involving of private sector in financing of EE projects;

The World Bank Project also includes a component for creation of an Argentina EE Fund for financing of EE projects. Through this fund can be also financed projects implemented based on the ESCO model.

Number of ESCOs	0
ESCO market size and potential	n/a, should be investigated
ESCO market trend	No ESCO market
ESCO association	none
Typical ESCO projects	n/a
Main type of contract	n/a

Information in this chapter was based on the following source:

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

World Bank. 2008. "Argentina - Energy Efficiency Project - Project Appraisal Document"
<http://documents.worldbank.org/curated/en/2008/05/9543406/argentina-energy-efficiency-project>

World Bank. 2013. "Restructuring paper on a Proposed Project Restructuring of Energy Efficiency Project Grant Number TF092377"
http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/10/03/000356161_20131003131310/Rendered/PDF/804350v10PJPR00ox0379837B00PUBLIC0.pdf

ESCO market in Brazil 2013

The ESCO market in Brazil is still in the need of development. Despite the significant number of ESCOs, there is still a long way to go in order to have a consolidated and progressive market that catches on with the high existing potential compared to the neighbouring countries of Latin America. There is still a low knowledge of the potential of energy efficiency by the consumers and potential clients. Energy efficiency is still seen as a conjectural problem instead of a structural one by a good part of the society.

The issue of the financial structure of the market is one of the main barriers to the development of the ESCO market. There are some isolated projects that promote energy efficiency, but the financial sector still needs to develop expertise to evaluate and finance energy efficiency projects. The existing contracts in the Brazilian market are still very short term contracts. There are little lines of financing and banks have a scarce knowledge of the energy efficiency products and demand high warranty financing to approve energy efficiency projects.

Current size, trends and features of the market

The energy services business in Brazil originated in the 1990s. A national ESCO association was established in 1997 by 15 companies. ABESCO, the Brazilian Association of Energy Conservation Services, currently has 92 associates. Of these, 55 are ESCOs while the remaining are manufacturers, distributors or service providers in the Energy Efficiency sector (ABESCO 2013). The majority of Brazil's ESCOs are smaller independent engineering companies. There are some ESCOs (around 4) originated by the Utility Companies which have been growing more vigorously. There are also some subsidiaries of larger companies that are manufacturers of energy efficient equipment. These larger companies are more recent entrants to the ESCO market. Previous surveys have shown that over half of the main companies operating in this market had less than 10 employees with low levels of turnover (Hansen et al. 2009).

According to ABESCO the overall billing of activities concerning the management of energy efficiency, in 2012, was lower than US\$500¹⁹⁶ million while the potential of energy savings in the country that can be translated into business is in the order of US 8.781 billion.

Types of projects

Most of the energy efficiency activities undertaken by ESCOs relate to reducing electricity consumption, namely lighting projects, HVAC systems and engines replacement. Generally there is less ESCO activity addressing the energy efficiency for other fuels. The main reason for this is the very low heating requirement of buildings in Brazil and the consequent low levels of heating fuel consumption and also the fact that that the biggest investments done in efficiency come from electric power utilities. Moreover, the investments needed to the end use of electricity are lower than those required for other energy sources. This makes it easier for ESCOs that have lower capacity for contracting debt. While energy efficiency services make up the most significant part of ESCOs' services offerings, other activities not directly related to energy efficiency are also undertaken. These could include electrical contracting, installation of power factor correction equipment and standby generators and rationalisation of water consumption (Hansen et al. 2009).

¹⁹⁶ Conversion made in 23/05/2014 : 1 USD = 2.21925 BRL

The typical type of contracts being made are direct sale contracts followed by performance contracts with shared savings, even if limited to very large ESCOs. Another type of contract commonly seen in the Brazilian market are hybrid energy efficiency contracts where after three or four months of measurements, clients and ESCOs agree to a fixed payment schedule for the remainder of the contract. Nevertheless direct sales in which the client plays the totality of the investment without financing, leasing or other financial solutions represent more than 50% of the total contracts, while the rest is divided by performance contracts, instalment sales and operational leasing.

Regulatory factors

Since the late 1990s electricity distribution companies have been obliged to invest a percentage of their net operational revenue in energy efficiency. Utilities must propose and execute energy efficiency projects under the supervision of the national electricity regulator. Early in the millennium the programme was modified so that up to 50% of allocated resources could be invested in projects in which costs could be recovered through performance contracts. This led to the distribution utilities hiring ESCOs to implement their projects and the programme became the most important source of revenue for Brazilian ESCOs. However, from 2008 the programme mandated that at least a 60% share of investment should be in projects to assist low income consumers. This resulted in a drop-off in interest in projects with recoverable costs in which ESCOs could get involved. Regulatory changes made in 2013 should again increase the volume of projects executed by ESCOs within the programme. Instead of the utility choosing all the projects, there is now a competitive call for projects for important sectors. In addition, selection criteria favour proposals which include resources from outside the programme (which leverages the resources). These changes all create more opportunities for ESCOs and could improve access to commercial bank lending.

Recently (2014) the National Electricity Regulator, ANEEL, has released new guidelines for the investments to be made by the concessionaire, encouraging the development of performance contracts and demanding that these should be accompanied by a Measurement and Verification Plan, based on the International Measurement and Verification Protocol.

Market factors

Average electricity prices have been falling since about 2006. This trend was accentuated in 2013 by mandated reductions in electricity prices, which averaged about 20%, resulting from the promulgation of a legal diploma. These factors had a dampening effect on energy efficiency investments. However, it is expected the increase of electricity prices due to the high level of use of thermal generation plants, which have high costs.

Information, awareness and demonstration

Since 2011, ABESCO has been developing a qualification programme for ESCOs named QualiESCO that aims to get knowledge about the technical capacity and level of expertise in the different specialities of each ESCO entering this programme. QualiESCO aims to ease the choice of companies wanting to contract an ESCO and by the end of 2013 there were 25 ESCOs certified by the QualiESCO. To obtain the certification, the ESCO is evaluated by a specialist with an MBA on Energy Management that must not be affiliated with the ESCO subject to the analysis. This specialist evaluates the ESCO's competencies and their business practices. If the request is accepted the certification is valid for 3 years and must be renewed after this period.

Financing

A national electricity conservation programme called PROCEL has been in existence since 1985. Through the programme the government provides some support for energy audits as well as for upgrading of public lighting and energy labelling of appliances. However, there is a lack of firm data regarding historical levels of investment and energy savings achieved (De Oliveira et al. 2013). Nevertheless, very few has been done by PROCEL to promote the development of the ESCO sector.

Access to financing has long been a primary barrier for the expansion of the ESCO industry in Brazil. A first response was the PROESCO programme, which was established by the Brazilian National Development Bank (BNDES) in 2006 to provide greater access to financing for energy efficiency projects in Brazil (World Bank 2007). The programme has been criticised for being too bureaucratic, with difficult application and risk sharing procedures resulting in slow growth (International Finance Corporation 2011). PROESCO was subsequently restructured (Langlois and Hansen, 2012), but the volume of lending appears to have remained very small and was not directed towards ESCOs, though publically available information is very sparse. One of the barriers of PROESCO is the protectionism from the Brazilian government relating to national industry that does not allow the implementation of imported technology under the PROESCO programme.

More recent initiatives may improve access to financing for energy efficiency projects. The most important so far is the programme of the Inter-American Development Bank (IDB) and the Global Environment Facility (GEF), named The Energy Efficiency Guarantee Mechanism (EEGM) which provides partial credit, technical guarantees and technical assistance for projects in buildings. It began operating in 2013. The EEGM provides a US\$25 million line of credit covering approximately 200 partial credit guarantees with a maximum coverage of each partial credit guarantee of 80% of the value of the energy efficiency contract up to US\$800,000. Beneficiaries can be energy efficiency project lenders and ESCO clients. There are two Guarantee Products available, a Comprehensive Risk Guarantee that covers defaults for technical and financial creditworthiness reasons and a Technical Risk Guarantee that covers default due to technical reasons such as the lack of performance under the EE contract. The credit guarantee addresses one of the big obstacles to obtaining financing.

The German development bank KfW is working with the Caixa Econômica Federal (CEF), a large state-owned bank, to introduce credit lines for energy efficiency and small distributed generation projects. The first tranche would be € 150 million and a second tranche of the same size is expected. The credit line could be launched by late-2014 or early 2015. The CNI (National Confederation of Industries) is also proposing a mechanism whereby industries could implement EE projects without the loans appearing on their balance sheets – a widely perceived need. The World Bank and IFC (International Finance Corporation of the World Bank Group) are cooperating in the effort to define a model. As with the new credit line of the KfW with the CEF, the CNI proposal does not specifically target ESCOs. However, it could substantially increase the market for the services of these companies.

The IFC has also supported the financing of energy and water efficiency projects. The portfolio, of about \$382 million at the end of 2011, is dominated overwhelmingly by investments in the water & sanitation sector and does not appear to directly stimulate the demand for ESCO services. However, about US\$ 26¹⁹⁶ million was in the hotel sector, which is a prime market for ESCOs.

Barriers

Due to large differences between the cost of peak electricity and off-peak electricity consumers have placed greater emphasis on efforts to reduce peak demand rather than on the wider range of energy efficiency services offered by ESCOs (Econoler / IFC 2011)

It has also been pointed out that in rapidly growing markets like that of Brazil, enterprises are more likely to allocate capital to core business rather than invest in energy efficiency as the growth of the business is prioritised (Bloomberg 2012). The mentality of companies is hence in the need for change. Moreover, Brazilian Industry often wants energy efficiency costs to be in their operational expenditures instead of their capital expenditures.

The lack of knowledge of energy efficiency from the potential clients is another of the barriers in the Brazilian market. It is common for companies to develop tailor made projects internally, without the help of expert companies leading to disastrous results and the disrepute of energy efficiency as a solution for the improvement of a company's performance.

On a financial level, the few commercial banks that finance EE projects, demand very high financial warranties, leading companies to a short margin of negotiation. This is mainly due to the little knowledge of the "EE product" from the financial sector.

Conclusions and future expectations

In Brazil there is a real need for energy efficiency. The Brazilian electric grid is relatively inefficient and the drought seasons lowered hydro production creating significant blackouts in recent years. While consumption continues to grow there is the need from the government to control costs and energy efficiency projects may present themselves as a good opportunity.

Possible break-through points

- The creation of new investments guidelines from ANEEL
- Effective legislation for EE and ESCO
- Increase of energy consumption and energy prices
- Financial funding from international partners

Number of ESCOs	55 ESCOs. Mainly small companies. 4 bigger from distributors spinoffs
ESCO market size and potential	US\$ 8.781 billion
ESCO market trend	Growing
ESCO association	ABESCO
Typical ESCO projects	Energy management services, Auditing, Retrofits
Main type of contract	Direct Sales. Performance contracts with shared savings

Information in this chapter was based on the following source:

ABESCO. 2013. ABESCO website. Available: <http://www.abesco.com.br/> [accessed July 2013]

Bloomberg. 2012. Brazil May Invest \$3 Billion in Energy Efficiency as Loans Rise. Available: <http://www.bloomberg.com/news/2012-03-23/brazil-may-invest-3-billion-in-energy-efficiency-as-loans-rise.html> [accessed July 2013]

De Oliveira LS, Shayani RA, De Oliveira MAG. 2013. Proposed business plan for energy efficiency in Brazil. Energy Policy (<http://dx.doi.org/10.1016/j.enpol.2013.05.125>).

World Bank. 2007. Project to Support the Implementation of PROESCO: A Guarantee Facility to Promote ESCO Investments.

International Finance Corporation. 2011. Market Assessment for Promoting Energy Efficiency and Renewable Energy through Local Financial Institutions in Brazil. Lima.
IADB – Inter-American Development Bank website Available: <http://www.iadb.org> [accessed May 2014]

Langlois P, Hansen SJ. 2012. World ESCO Outlook: The Fairmont Press Inc.
Government of Brazil. 2013. Law approved to reduce electricity rates by 20.2%. Available: http://www.brasil.gov.br/news/history/2013/01/16/law-approved-to-reduce-electricity-rates-by-20.2/newsitem_view?set_language=en [accessed July 2013].

ESCO market in Chile 2013

It is only quite recently that Chile has started being interested in the opportunities offered by the energy efficiency market and the ESCO business. Energy efficiency has become part of the public discussion around 2005 when a National Energy Efficiency Program (PPEE) has been created for the first time by the Ministry of Economy. The economy of this country relies heavily on energy imports and its energy prices are among the highest in Latin American. This situation creates in principle the right conditions for the ESCO business to grow. A number of companies already commercialise energy services. Nevertheless, there seems to be a lack of co-ordination among ESCO market actors on the supply side and information on energy efficiency and ESCOs available for energy end-users appear still insufficient. Financial mechanisms specifically designed for ESCOs are also lacking, this slowing down the development of this market.

Current size, trends and features of the market

One of the first initiatives promoting the ESCO market in Chile has been undertaken thanks to the support of the Inter-American Development Bank (IDB) and the Multilateral Investment Fund (FOMIN) under the "Promotion of Clean Energy Market Opportunities" (PCEMO) project. Approved in 2006, this three years project aimed to creating business opportunities in the area of renewables and energy efficiency for small and medium enterprises (SMEs). It also led to the creation of the National Association of ESCOs (ANESCO) that nowadays counts 29 companies among its members (SustenTank, 2014). Chilean ESCOs have initially mainly focused on energy efficiency projects implemented in the commercial sector and in the industry sector (primarily agricultural and food industries) (IFC, 2011). Projects addressing the public sector have been subsequently implemented also thanks to the initiatives undertaken by the Chilean Agency for Energy Efficiency (AChEE) established in late 2010 with the objective of promoting and strengthening the efficient use of energy. These projects include, for example, five demonstration ESCO projects with a payback period of less than four years designed during 2011 and involving a total investment of USD 750,000 totally financed by the AChEE (Langlois & Hansen, 2012). Despite these demonstration initiatives, the participation of the public sector in the ESCO market appears however very limited, due also to restrictions caused by existing regulations on public budget management. During 2011, the AChEE started implementing an eight-years project named "Encouraging the Setting-up and Consolidation of an Energy Service Market in Chile", funded by the Global Environmental Facility (GEF) and by the IDB with USD 2.6 million. One of the main objectives of this project is the promotion of energy efficiency projects implemented in the industrial, commercial and public sectors through EPCs. This objective will be achieved, among others, by creating a line of partial credit guarantees established with the support of the AChEE (Langlois & Hansen, 2012). Based on the information available in the literature, fifteen companies have implemented ESCO projects based on energy performance contracts (EPCs) or "chauffage" contracts in Chile as of April 2014. Of these companies, two only have these activities as core business (SustenTank, 2014). Nevertheless, some other 25 companies result to have provided partial services connected to ESCO projects (e.g. energy efficiency projects design, energy audits, measurement and verification of energy savings, installation of energy efficiency equipment, operation and maintenance). ESCOs operating in Chile are mostly daughter companies of large international enterprises. Concerning ESCOs' activity level, it may be worth noticing that the number of ESCO projects annually implemented has always been well over one hundred in the years between 2010 and 2012 and has decreased to 89 during 2013¹⁹⁷. Costs borne by implementing companies have typically been below USD 91,000 per each of these projects and

¹⁹⁷ The number of ESCO projects implemented in 2010, 2011 and 2012 has respectively been of 113, 121, 119 (SustenTank, 2014).

have on average been lower than costs borne for the implementation of non ESCO projects implemented by the same companies. Overall, implementing companies have invested about USD 5 million for all the ESCO projects realized in the four years between 2010 and 2013 and the average investment per project has been around USD 11,000 (SustenTank, 2014). It may be finally worth mentioning that the main ESCO market facilitators in Chile are presently ANESCO, AChEE and Fundación Chile, a private no profit corporation established in 1976 to promote innovation in Chile and having the Chilean government among its associates. At the government level, the energy efficiency division of the Ministry of Energy establishes energy related policies and regulations, whereas the Superintendency of Electricity and Fuels (SEC) supervises the correct operation of electricity, gas and fuel services in terms of their safety, quality and price. In 2012, the IDB, AChEE, Fundación Chile, ANESCO, the Energy Ministry of Chile, the Chile's Renewable Energy Centre (CER) and the German Federal Enterprise for International Cooperation (GIZ) have created a permanent round table for the promotion of ESCOs in Chile ("Mesa de Fomento a las ESCOs"). This organization aims, among others, to support regulatory changes that can foster the ESCO market in Chile, to promote the implementation of the ESCO model in private and public organizations, to support the creation of expertise on the ESCO business, to provide a showcase for outstanding examples of ESCO projects and related financing mechanisms. A series of market actors are hence trying to stimulate the ESCO business in this country. Nevertheless, a lack of co-ordination and connection among the different initiatives undertaken by these actors is being registered. All in all, the Chilean ESCO market still faces a series of important limitation to its development, including lack of access to financing and potential clients' mistrust in the ESCO business, partly due to their difficulties in understanding the ESCO concept.

Types of projects

As already mentioned, ESCO activities have so far mainly focused on the commercial sector (notably large shopping malls and buildings for the retail sector) and on the industrial sector (primarily agricultural and food industries). Very few projects have been implemented in the public sector, with hospitals being the main subsector addressed. ESCOs related activities in the public sector have been often limited to the implementation of energy audits under government support. Addressed technologies and fields of applications for energy services so far supplied by ESCOs vary from installation of energy efficient heating systems for buildings (e.g. condensing boilers, thermal solar panels, etc.), heat recovery from refrigeration systems, energy efficient lighting systems for hotels, operation and maintenance of water cooling systems in shopping malls, heat and cool generation for industrial plants, energy management systems and installation of energy efficient equipment for industry. One small ESCO project has been implemented in the transport sector in order to diminish the fuel consumption of a trucks' fleet by improving the aerodynamics of its vehicles¹⁹⁸. Some business has been developed also in the residential sector where a series of EPC contracts has been stipulated for the installation of control systems for air conditioning (Langlois & Hansen, 2012).

Regulatory factors

The main framework policy document guiding government initiatives being undertaken for the promotion of energy efficiency in Chile is the National Energy Strategy for the period 2012-2030. This document establishes a 12% final energy demand reduction target to be achieved by 2020 compared to business as usual (BAU) scenarios. It proposes the implementation of a National Energy Efficiency Action Plan (PAEE20) to guide public and private sectors to realize actions contributing to energy efficiency target achievement. The PAEE20 has been adopted in 2013 and could rely on a budget of USD 15 million for the first year of its implementation (APEREC, 2012). It entails the

¹⁹⁸ See http://www.acee.cl/sites/all/modules/achee_areas/theme/medicion-verificacion/Analisis-Mercado-MV-Chile-Profesionales-sector.pdf for further information on this project.

enforcement of measures for the promotion of energy efficiency (including training and education campaigns) to be implemented for industry, mining, transportation, buildings and appliances. Other future measures and regulations that could in principle affect the ESCO business are described in the energy agenda recently produced by the Ministry of Energy¹⁹⁹. This agenda defines a new energy efficiency target for 2025 by establishing that the national energy consumption expected for that year in Chile will be reduced by 20% compared to BAU scenarios^{200,201}. According to this document, the Chilean government aims also to achieve a 30% reduction in electricity marginal costs by 2017 through the installation of new hydroelectric and thermoelectric plants, through the improvement of existing regulations of the gas distribution market and through the promotion of liquefied natural gas in substitution of diesel fuel. The energy agenda mentions also that the Ministry intends to submit to the Parliament a new law on energy efficiency including specific actions addressing the industry and the mining sector, households, small and medium enterprises (SMEs), the commercial and the public sectors. In addition, this document indicates that the Chilean Ministry of Housing and Urban Planning (MINVU) will annually deliver about USD 43 million of subsidies to improve thermal performances of existing dwellings. The energy performances of existing dwellings and public buildings dedicated to education and health are also supposed to be improved by 30% thanks to the application of a new technical norm to be introduced in the general order on built environment in place in Chile²⁰². Two hundred thousand public luminaries are then expected to be replaced in the short term in order to improve the energy efficiency of public lighting. Moreover, energy consumption generated in this sector should be further reduced thanks to a new regulation for public lighting and the creation of a national cadastre providing municipalities with the information needed to implement energy efficiency improvement measures. Finally, the energy agenda from the Ministry of Energy announces the realization of massive information training and education campaigns on energy efficiency for citizens. Concerning regulations already in place that may potentially create some business for ESCOs, minimum energy performance standards developed in Chile for energy related products and buildings²⁰³ might be worth to be mentioned. Subsidies put in place by the MINVU for improving thermal insulation in buildings of low income households or destined to social housing represent another potential business opportunity for ESCOs²⁰⁴. However, it has to be pointed out that none of the above mentioned measures has been specifically designed to directly target ESCOs. Other adopted financial measures that Chilean ESCOs can or could benefit from are described in the remainder of this chapter.

Market factors

Contrary to many of its neighbouring countries, Chile has a very limited amount of fossil energy resources and imports about 75% of its primary energy supply. Biomass, in the form of firewood

¹⁹⁹ See <http://www.minenergia.cl/ministerio/noticias/regionales/seremia-difunde-la-agenda-de-energia.html> for further information.

²⁰⁰ See <http://diario.latercera.com/2014/05/28/01/contenido/negocios/10-165506-9-ley-de-eficiencia-energetica-premiara-menor-consumo.shtml>) for further information.

²⁰¹ An Interministerial Committee for Energy Efficiency (CIEE) including the Ministries of Interior, Finance, Economy, Social Development, Public Works, Housing and Urban Planning, Transportation, Environment and Mines, has been recently created in order to define the tasks that each Ministry will be supposed to accomplish in order to allow achieving this target (see http://www.estrategia.cl/detalle_noticia.php?cod=97147 for further information).

²⁰² Ordenanza General de Urbanismo y Construcciones (OGUC)

²⁰³ The first regulation on minimum energy performance standards of energy related products has been elaborated in Chile in 2013 and relates to non-direction lamps for general lighting. The first regulation on the energy performances of buildings' envelopes went instead into effect in 2007 (APEREC, 2012).

²⁰⁴ See "Decreto Supremo N° 255, (V. y U.), de 2006 D.O. de 25.01.07" and information available at http://www.minvu.cl/opensite_det_20110502134513.aspx

used for heating and cooking, accounts for 57% of total energy consumption in the residential sector with potentially negative effects on health and the environment. Chile's particular geography has given this country a variety of climates, ranging from desert climate in the north, to Mediterranean climate in the centre, to north European climate in the south. On the other hand, this geography provides a considerable renewable energy potential covering hydropower, biomass, solar, ocean and wave energy (IEA, 2009). Chile has been one of the first countries creating an unbundled and privately owned electricity market in 1982²⁰⁵. Chilean energy policy has always seen the state playing a subsidiary role and limiting its presence and role in entrepreneurial activities. This approach has probably contributed to the impressive Chile's economic growth observed since 1990²⁰⁶. Nevertheless, the energy crisis registered in 2004²⁰⁷ and the electricity system stress registered in 2007/2008²⁰⁸ have proved that Chile government should at least strengthen its co-ordination role in the formulation of the national energy policy. Nowadays, Chile energy prices are among the highest in Latin American and gas prices are highly volatile. If this high energy price situation is quite difficult to be managed by energy end-users, it makes also Chile one of the few countries where renewables can compete with traditional energy sources without incentives and creates important economic energy efficiency potential. However, it has to be pointed out that energy prices are not the same across the country and consumers in the north of the country (mainly large mining companies) pay higher prices due to high demand and reliance on natural gas²⁰⁹. Moreover, local Chilean banks are being very slow in investing in the energy efficiency sector, this not allowing exploiting opportunities created by present energy market trends. The increased government's commitment in supporting energy efficiency is giving the right signal to companies operating in the energy efficiency market. Nevertheless, this support is only rarely focused on ESCOs.

Information, awareness and demonstration

Lack of information and awareness concerning the ESCO business and related opportunities for energy end-users are among the main obstacles to a further development of the ESCO market in Chile. Information campaigns implemented for energy end-users have so far mostly related to the energy labelling schemes in place for domestic appliances. The Ministry of Energy is working with the MINVU to the implementation of a voluntary energy labelling scheme that could create market opportunities for ESCOs and stimulate energy efficiency improvements by disclosing information on the energy performances of existing buildings (APEREC, 2012). International fairs dedicated to energy efficiency have been organized with the Chilean government support²¹⁰ and have contributed to increase awareness on energy efficiency opportunities while stimulating networking activities

²⁰⁵ See the *General Law of Electric Services* of 1982.

²⁰⁶ Per capita income has almost doubled in the period between 1990 and 2009 (IEA, 2009). This growth has been commodities export driven, with copper being the main economy's driver.

²⁰⁷ This energy crisis was generated by gas imports shortage caused by Argentina's quick gas demand increase immediately after its economic crisis of 2002.

²⁰⁸ This stress was caused by a loss of gas imports from Argentina combined with a drought that determined the lowering of electricity supply coming from hydropower (hydropower normally accounts for 50% of electricity generation in Chile; IEA, 2009).

²⁰⁹ See Bloomberg New Energy Finance, "Climate Scope 2012: Assessing the Climate for Climate Investing in Latin America and the Caribbean," pp. 47.

²¹⁰ See for example the third "Energy Efficiency Exposition" held in 2013 and featuring almost 80 stands and 60 participating companies. International fairs for the promotion of energy efficiency are organized annually by the AChEE (see <http://www.expoeficienciaenergetica.cl/> for further information).

among involved professionals. Moreover, a series of training opportunities for professionals working on energy efficiency has been offered by universities and engineering associations operating in Chile. Furthermore, the AChEE has regularly organized certification courses for professionals whereby these professional have learnt to use software for clean energy projects analysis²¹¹, or have participated in the Certified Measurement & Verification Professional program (CMVP)²¹², or have received a certification for energy managers (CEM), among others. Concerning demonstration on ESCO business opportunities, the implementation of eight demonstration projects have been promoted by the AChEE during 2011 in order to prove the feasibility of the ESCO concept. Out of these eight projects, five have been implemented in the public sector and three have instead related to energy efficiency improvements in the industry sector²¹³ (Langlois & Hansen, 2012). Other initiatives concerning information on ESCO business, training of experts and implementation of demonstration projects had been previously undertaken thanks to the financing support made available by the previously mentioned PCEMO project during the three years following 2006²¹⁴. Overall, all these initiatives have however not been sufficient to fill the information gap still existing in this country in relation to ESCO activities. An important lack in the available information relates also to energy consumption data of companies and of buildings in the public sector. The further promotion of energy audit campaigns by the Chilean government could partly serve to overcome this barrier, although the establishment of proper systems and procedures for energy management in private companies and public administrations are probably even more necessary in order to create awareness about economic opportunities linked to energy efficiency improvements and stimulate their implementation. Nevertheless, information and awareness raising concerning ESCO business opportunities can be duly promoted among energy end-users only once companies operating or willing to operate as ESCOs have averagely achieved a good level of expertise and competence concerning this type of business, once standard contracts and procedures for the measurement and verification (M&V) of energy savings have been applied on a large scale by these companies and once a sufficiently large number of best practices and success stories have been generated. If these preconditions are not met, it is unlikely that information actions addressing energy end-users can be founded on solid bases and determine actual and long lasting improvements in the ESCO market. As mentioned in the previous sections, the energy agenda recently diffused by the Ministry of Energy indicates that intensive and massive information and training campaigns on energy efficiency will be undertaken during the next years. It remains to be seen to what extent these initiatives will be focused on the aspects previously mentioned.

Financing

Supporting mechanisms specifically dedicated to ESCO business financing have started being designed or implemented only very recently in Chile. The economic support so far provided by the government to stimulate energy efficiency investments has indeed very rarely focused on the ESCO concept. A direct subsidy to finance energy efficiency consulting services was created by the "Programa País Eficiencia Energética" (PPEE) and the Productive Development Agency of Chile (CORFO) in 2006. CORFO covered up to 70% of consulting services with a maximum of USD 10,000 for enterprises wanting to quantify their energy saving potentials. This program allowed launching

²¹¹ RETScreen (CRU) is the name of this software.

²¹² 57 professionals have received a CMVP certification in Chile as of end of 2013. For further information see <http://consultores.verificatee.cl>

²¹³ It may be worth mentioning that the AChEE has been also in charge of energy saving M&V activities associated to the implementation of these demonstration projects.

²¹⁴ For further information see <http://www.iadb.org/en/projects/project-description-title,1303.html?id=ch-m1009>

192 energy audits as of January 2009²¹⁵. In 2008, CORFO launched also an energy efficiency credit line to finance investments up to USD 1 million for enterprises optimizing their energy use²¹⁶. Other forms of government support have been made available through subsidies for the purchase of energy efficient motors ranging from 1 to 10 horsepower in the years between 2009 and 2010²¹⁷. In January 2013, the Energy Ministry and CORFO have launched a call for renewable energy projects implemented under the ESCO model. The Energy Ministry has awarded CORFO with USD 10 million for the implementation of this program and CORFO will finance up to 50% of investments for each project selected with a maximum amount of financing per project of USD 1.05 million²¹⁸. The AChEE has instead worked at the designing of a guarantee fund for energy efficiency (FOGAEE) to be used for ESCO projects and supports R&D activities on energy efficiency by a dedicated fund as of 2013 (AChEE, 2013). The FOGAEE has been designed in the framework of the project "Encouraging the Setting-up and Consolidation of an Energy Service Market in Chile" previously mentioned. This fund will allow guaranteeing credits delivered by local financial institutions to ESCOs implementing projects under EPCs with shared savings or will be used to guarantee ESCO clients' investments for projects implemented under EPCs with guaranteed savings. Projects to be implemented will have to receive a technical validation from the AChEE in order to be eligible for a guarantee. Suitable intermediate companies (Sociedades de Garantía Recíproca – SGR)²¹⁹ will instead be supposed to issue the financial guarantees that ESCOs with AChEE validated projects will have to use to get bank credits for EPCs with shared savings. These same SGR will issue technical guarantee certificates for ESCOs with validated projects that will want to use the FOGAEE guarantee for clients stipulating EPCs with guaranteed savings. Economic resources made available by GEF and IDB allowed the AChEE to transfer USD 2.157 million into the FOGAEE. Projects supported will have a maximum investment size of USD 320,000 and their maximum payback time will have to be of 6 years (AChEE, 2013). Information available does not however allow establishing how many ESCOs have already applied to get FOGAEE support. It may be finally worth mentioning that, even in case of demonstration ESCO projects receiving substantial economic support by the government, companies operating as ESCOs have generally met difficulties in identifying private customers available to stipulate the related EPC contracts (Langlois & Hansen, 2012). It remains to be seen whether the FOGAEE will manage to mobilize private investments in EPC projects. The main existing barriers are represented by a lack of market confidence in this investment model, ignorance and high perceived risks by energy end-users, limited experience of companies operating on the supply side in closing negotiations concerning EPCs stipulation. "Chauffage" is the ESCO contract type mostly stipulated in Chile, this indicating that ESCOs and related clients still prefer to focus on the quality of the energy services supplied rather than on the financing opportunities that may be associated to the energy savings that these services can generate. When EPCs are stipulated, these contracts are often EPCs with shared savings, this confirming that ESCO clients' trust in this type of business is not very high, or is at least not as high as it would be in case they would bear all up-front investment costs of projects.

²¹⁵ Enterprises eligible to these subsidies had not to exceed USD 30 million in their annual net sales. For further information see <http://www.emb.cl/electroindustria/articulo.mvc?xid=734&edi=41> and the analysis documents produced in the framework of the project named "Encouraging the Setting-up and Consolidation of an Energy Service Market in Chile" (Langlois & Hansen, 2012).

²¹⁶ Enterprise eligible to these credit lines had not to exceed USD 33 million in their annual net sales.

²¹⁷ http://ccap.org/assets/CCAP-Booklet_Chile.pdf

²¹⁸ Applications to this program were supposed to be submitted by April 2013 and selected projects are supposed to be completed within 24 months. For further information see <http://www.bnamericas.com/news/electricpower/chile-looks-to-escos-model-to-promote-renewables>

²¹⁹ These intermediate companies were established in Chile through the law 20.179 issued in 2007. Their core business consists in providing guarantees for credits that small and medium enterprise (SMEs) can ask to banks, retailers or to the state. For further information see <http://www.economiaynegocios.cl/noticias/noticias.asp?id=44776> or http://www.sbif.cl/sbifweb/internet/archivos/publicacion_6001.pdf

Barriers

Most probably, the existing deficit of information on energy efficiency investment opportunities is still one of the main barriers impeding the thriving of the ESCO market in Chile. Barriers on the demand side associated with or depending on lack of information on the ESCO business cause ESCO clients' scepticism about actual energy savings achievable, mistrusts in energy savings M&V procedures, difficulties in understanding the ESCO concept. Companies of the industry sector often see the implementation of energy efficiency improvement projects as a potential threat for their production processes. In addition EPCs are often perceived as not compatible with the accounting procedures existing in companies. The ownership of energy efficient equipment is frequently another aspect that might be difficult to deal with in case e.g. of leasing or build-own-operation-transfer (BOOT) contracts. Moreover, lack of information on consumption data often impedes energy performance comparisons among competitor companies. In the public sector, the trust barrier has probably been partly overcome. Nevertheless, difficulties to be faced in making EPCs compatible with budget and public tender administration procedures frequently discourage public administrations from entering this market. Actual and more numerous good practice examples and success stories need to be generated and promoted in order to increase potential customers' confidence in this business. At the same time, capacity building activities have to be more intensively promoted and standard procedures for energy saving M&V need to be more widely adopted. There is also a need for more standardised contracts that are validated by the government and a need for a better co-ordination of the different stakeholders involved in this business. Suitable supportive legislative measures could also be very useful to stimulate an extensive application of standardized contractual arrangements and M&V procedures. The lack of a suitable certification scheme for ESCOs is then another indicator of a situation of low ESCO market development. Finally, difficulties in getting local financial institutions involvement in this market are another relevant obstacle. These difficulties are a consequence of the high perceived risks still associated to ESCO investments. At the same time, the lack of knowledge and expertise on ESCO contracts observed in these institutions gives an additional explanation for their scarce participation in the energy efficiency market. Most of the financial support to ESCO investments has so far been provided by the initiative of international donors. The guarantee fund being designed by the Chilean government can certainly represent an important progress towards a higher participation by local financial institutions. However, the possibility of obtaining advancements in the ESCO market development will ultimately depend on an increased energy end-users' trust in the ESCO business.

Conclusions, future expectations

Chile's ESCO market is at an initial development stage. A reason for this is probably that the energy efficiency market is also generally quite young in this country. Current energy prices and general energy market conditions can certainly stimulate a further development of the ESCO business, although the significant energy prices' volatility being registered may be an obstacle to energy efficiency investments. A series of national and international facilitators have already undertaken relevant promotion and demonstration initiatives and the Chilean government seems to be determined to implement potentially effective financial support mechanisms. Presently, its attention seems very much focused on the application of the ESCO model in the implementation of renewable energy projects, given the relevant amount of renewable energy sources existing in the country. Energy end-users, however, cannot yet develop a coherent picture of the ESCO concept and of the related opportunities because market stakeholders are probably not yet sufficiently co-ordinated. ESCO projects so far implemented have generally been of relative small size and local banks do not seem yet ready to invest in this business, despite the support being provided by international

donors. The existing ESCO market investment potential is huge compared to the actual investments so far realized. Current estimates indicate that this potential was around USD 350 million in 2013 with the industrial sector contributing to the largest part of it (Leaver, 2013), whereas total investments for ESCO projects implemented between 2010 and 2013 amounted just to USD 5 million (SustenTank, 2014). The guarantee fund being designed by the AChEE looks promising in terms of possibility of ESCO investments' stimulation. However, important steps have still to be undertaken in order to increase potential ESCO customers' trust in this business and reduce the perceived risks associated with it.

Key drivers	
- energy prices	
- initiatives undertaken by international donors and facilitators	
- guarantee fund being designed	
- high economic energy saving potential	
- abundant renewable energy sources available	

Number of ESCOs	15 implemented ESCO projects as of April 2014. Of these companies, two only had these activities as core business. Some other 25 companies result to have provided partial services connected to ESCO projects.
ESCO market size and potential	USD 5 million totally invested by ESCOs for projects implemented between 2010 and 2013 (SustenTank, 2014). ESCO investment potential around USD 350 million in 2013 (Leaver, 2013)
ESCO market trend	Moderate growth
ESCO association	ANESCO
Typical ESCO projects	Projects mainly implemented in the commercial sector (notably large shopping malls and buildings for the retail sector) and in the industrial sector (primarily agricultural and food industries). Main addressed technologies and fields of applications: energy efficient heating systems for buildings, heat recovery from refrigeration systems, energy efficient lighting systems for hotels, operation and maintenance of water cooling systems in shopping malls, heat and cool generation for industrial plants, energy management systems and installation of energy efficient equipment for industry.
Main type of contract	Chauffage

Information in this chapter was based on the following source:

AChEE, 2013. Reporte AChEE 2013: Súmate al Desafío por la Eficiencia Energética. Report available at <http://www.acee.cl/acerca-de-achee/reportes-anuales>

Asia-Pacific Energy Research Centre (APEREC), 2012. Compendium of Energy Efficiency Policies of APEC Economies. Report available at <http://aperc.ieej.or.jp/publications/reports/compendium.php>

International Energy Agency (IEA), 2009. Chile. Energy Policy Review 2009. Report available at <http://www.iea.org/publications/freepublications/publication/chile2009.pdf>

International Finance Corporation (IFC), 2011. IFC Energy Service Company Market Analysis. Report available at

<http://www.ifc.org/wps/wcm/connect/dbaaf8804aabab1c978dd79e0dc67fc6/IFC+EE+ESCOS+Market+Analysis.pdf?MOD=AJPERES>

Langlois, P., Hansen, S. J., 2012. World ESCO Outlook. The Fairmont Press. ISBN 0-88173-675-9

Leaver, L., 2013. Decomposition of ESCO market potential. A look at energy expenses and Market Opportunities. Presentation held at APEC – Cooperative Energy Efficiency Design for Sustainability (CEEDS) workshop on the promotion of ESCOs, Taipei, 26 March 2013.

SustenTank, 2014. Analisis y Propuestas Para la Consolidacion de Empresas de Servicios Energeticos en Chile. Report prepared within "Mesa de Fomento a las ESCOs" for the Chilean Agency for Energy Efficiency (AChEE) and the Secretary of Energy. April 2014.

ESCO market in Colombia 2013

The abundance of energy sources, the existing regulations for the energy sector and a situation of social and political instability have until recently impeded that energy efficiency and ESCOs investments could become an interesting business for stakeholders operating in Colombia. Starting from the mid-1990s, a series of regulatory reforms have however taken place in energy industry in order to increase the participation of private actors and to make this sector more attractive for foreign investors. The associated process of progressive energy market liberation has so far caused an energy production increase and higher attention to energy efficiency. The first services supplied by companies acting as an ESCO started being provided in this country only around 2003-2004²²⁰.

Presently, major barriers still hinder the take-off of a proper ESCO market. Nevertheless, observed economic trends and new regulations on energy efficiency create expectations for a market growth.

Current size, trends and features of the market

The ESCO market in Colombia is at a very preliminary development stage and the number of companies operating on the supply side is still very low. Eight companies are presently implementing ESCO projects and another handful of enterprises are willing or have the capability to enter this business. Overall, these market actors can be grouped into four major categories (ECONOLER & SMARTEEC, 2014). These categories include ESCOs that are daughter companies of energy suppliers, ESCOs having the sale of energy efficient technologies as core business, ESCOs focusing on operation and maintenance of energy efficient solutions and ESCOs being engineering or energy consultant companies. Colombian companies falling under the first group are interested in ESCO contracts mainly because of the linked possibilities to increase their customers' loyalty or to augment their sales of energy (as happening e.g. when gas suppliers provide energy services consisting in a fuel switch to gas). Of the existing companies falling under this category, only one is familiar with energy performance contracting (EPC) and protocols for energy saving measurement and verification (M&V). Some of them have been active in the supply of energy audits or services aiming to improve the quality of the energy supplied (e.g. by including energy efficiency improvement measures in the services provided). Others have instead just indicated their willingness to stipulate ESCO contracts linked to energy supply contracts or are already developing business models focusing on the provision of energy services including the improvement of energy efficiency²²¹. Only a couple of technological companies that operate as an ESCO in Colombia can be instead identified. One of them installs systems for distributed energy generation and cogeneration. It operates in an ESCO like manner by stipulating build-operate-own-transfer (BOOT) contracts and is used to provide financing (through leasing) for the plants installed. Another is instead focused on automation and energy management systems for industry and buildings. Energy services provided by this company can include energy audits and project financing. Coming to companies focused on operation and maintenance of energy efficient solutions, the main enterprise falling under this category and interested in the ESCO business in Colombia has already established a number of contracts for efficient operation and maintenance of public lighting systems in a series of municipalities of the Caribbean Coast and would like to extend its activities to Colombia. Finally, engineering and energy consulting companies somehow active in the ESCO business include a company that sells energy generated by cogeneration plants through "Chauffage" contracts whereby it establishes an energy sale contract with energy end-users while taking care of all aspects related to the implementation

²²⁰ Information kindly provided by Dr. A. González-Hässig; Rege-neración Ltda., Colombia

²²¹ EPM is for example an energy supply company that is currently analysing the ESCO market in Latin American to evaluate the opportunity of creating its own ESCO.

and the financing of projects leading to cogeneration plants' installation. Another company belonging to this category is instead focused on projects for SMEs and has established agreements with a series of financing institutions for their implementation. Besides providing the necessary economic support, these financing institutions are supposed to approve the specific contracts established with company's clients (whether these contracts are EPCs, or leasing, etc.). Another company has finally specialized in projects for the tertiary sector implemented under contracts that guarantee the amount of energy savings that will be achieved. A series of engineering and consulting companies is then active in providing energy audits and technical planning for the implementation of energy efficiency improvement measures.²²² Although potentially interested, these companies have not yet established any ESCO contract (ECONOLER & SMARTEEC, 2014). On the government side, the "Unidad de Planeación Minero Energética" (UPME) is the administrative unit of the Colombian Ministry of Mines and Energy (MME) and one of its branches is presently the main government body indirectly supporting the ESCO business by promoting technical studies on existing energy efficiency investment opportunities. This Ministry is advised by the Efficient Energy Use Committee (CIURE) in the co-ordination of policies for the rational use of energy implemented in the country. A quite relevant organization gathering stakeholders in the energy efficiency sector and providing support to the ESCO business is then the Colombian Council for Energy Efficiency (CCEE). This is a non-profit organization created in 2010 with the purpose of fostering activities related to energy efficiency as well as creating the awareness and knowledge within the country that can lead to a more efficient and rational use of energy in all sectors. It includes energy services companies (ESCOS), independent energy consultants, and other companies whose activities are related to efficient energy use²²³. Nevertheless, no proper ESCO association representing the specific interests of energy service companies and supporting the development of an ESCO market has been so far established in Colombia. A series of networking activities on energy efficiency is however in place in this country. In this respect, it may be worth mentioning that some important energy and engineering companies have organised within a network of technological partners providing integrated services including energy supply and energy efficiency improvements²²⁴. Overall, the situation of social and political instability and the low energy prices that could be observed until recently have not created the right preconditions for a thriving market in Colombia. The government of this country is probably not providing the necessary support and has not fully taken a leading role in the promotion of energy efficiency and of the ESCO business, as demonstrated, among others, by the scarcity of ESCO projects implemented in the public sector despite its relevant economic energy saving potential²²⁵. Existing scenarios of increasing energy prices and the high profitability of the ESCOs projects that might be implemented (especially in the industry sector) are probably not yet sufficient to counterbalance the mistrust in this business by potential ESCOs clients and the high perceived risks

²²² Examples of companies providing these services are given by CAIA, GENELEC, GERS, APPLUS, CREARA, EMEELH Ingeniería, Supernova Energy, etc.

²²³ See www.ccee-colombia.org for further information.

²²⁴ Isagen is, for example, at the centre of a network of technological partners providing these kinds of service. Partners belonging to this network are Anter, Applus, Centro Nacional de Producción Más Limpia, CIDET, Colturbinas, EQUITEL, Esfera Ingeniería, GECOLSA, GENELEC, GERS, INDISA, INELEC, IEB, INSTELEC, INSUELECTRIC, OAG Ingeniería, P&Q Ingeniería, PROING, Schneider Electric, Siemens, TRADELCA, TRACOL, TRANSEQUIPOS, SUNTEC, GRUPO UNION. This network includes also universities like Universidad Autónoma del Occidente, Universidad de los Andes, Universidad del Norte and Universidad Pontificia Bolivariana (ECONOLER & SMARTEEC, 2014).

²²⁵ The lack of the ESCO projects implemented in the public sector is due also to an existing regulation on governmental budgets administration. This regulation would impede that the implementation of energy efficiency improvement actions in the public sector can be partly or totally financed by the economic savings generated by these actions (information kindly provided by Dr. A. González-Hässig; Rege-neración Ltda., Colombia).

associated with it. Due to these reasons, financing institutions, notably local ones, are not very active in providing economic support for ESCO investments.

Types of projects

A characterization of the ESCO market in terms of typical projects implemented is quite difficult to be performed, given the low development level of this market. Information available is indeed quite scattered and may not lead to a picture that reflects the actual situation. The most relevant projects seem to have been so far implemented in the industry sector. Energy companies are probably the most active actor in this sector. They have so far mostly focused on energy management systems based on the standard ISO 50001, on the installation of efficient industrial boilers, refrigerators and compressors, on the installation co-generation and tri-generation plants and on the optimization of industrial processes (E2, 2011). Some projects have been implemented by ESCOs also in hotels and in the public sector²²⁶ where public lighting attracts particularly the interest of energy service companies. Information about specific actions implemented and technologies installed in these sectors are however not available. Finally, engineering and consulting companies active in the ESCO related market have specialized in the provision of energy audits for buildings, industries and public lighting. They have also expertise in energy saving measurement and verification (M&V) activities and in energy management systems for companies.

Regulatory factors

The first legislative act somehow related to ESCO activities is probably the law 697 of 2001 defining the rational use of energy as an objective of social and public interest for a proper energy supply in the country. Although encouraging research and education on rational energy use and renewable energies, this act did not provide any kind of concrete support for the development of these activities. The subsequent decree n. 3683 issued in 2003 still regulates the policies for the rational use of energy and has established the Efficient Energy Use Committee (CIURE) in charge of defining policy guidelines for the development of energy efficiency and renewable energies. This committee includes representatives of the UPME, the IPSE (a public institute providing structural energy solutions to rural communities), the CREG (the Colombia's Energy and Gas Regulator), COLCIENCIAS (a public administrative body in charge of co-ordinating public policies related to scientific research, technology and innovation) and the DNP (the National Planning Department of Colombia). However, its role in the promotion of energy efficiency in Colombia has been so far very limited. A national action plan for the rational and efficient use of energy and of renewable energy sources (PROURE) was published in April 2010 and is the first policy document establishing indicative national energy efficiency targets for the country²²⁷. Until May 2014, PROURE was also the only framework policy document indicating the setup of some form of economic incentives for the promotion of energy efficiency. These incentives presently consist mainly in VAT exemptions and tax credits generated by the implementation of energy efficiency projects. They have been concretely put in place by the 2012 Resolution n. 0186 of the Ministry of the Environment and the MME²²⁸ and by the 2012

²²⁶ EPM is currently contributing to the implementation of a district cooling project for some public buildings in Medellin in cooperation with *Confédération Suisse, Ministerio de Ambiente y Desarrollo Sostenible de Colombia* and the *Agencia Presidencial de Cooperación Internacional de Colombia* (information kindly provided by Ms. Elizabeth Mesa Munera, EPM).

²²⁷ For further information, see the text of the action plan as available at http://www.minminas.gov.co/minminas/downloads/UserFiles/File/ENERGIA/URE/Informe_Final_Consultoria_Plan_de_accion_Proure.pdf

²²⁸ See the text of this resolution as available at <http://www.alcaldiabogota.gov.co/sisjur/normas/Norma1.jsp?i=46257> for further information.

Resolution n. 0563 of UPME²²⁹. The Resolution 0186 of 2012 establishes specific national energy efficiency targets to be achieved by 2015 and indicates programs and actions whereby these targets will be met. With this resolution, the Colombia government commits to reduce its total final energy consumption by 4.01 % by 2015 compared to a business as usual (BAU) scenario. This ambitious target is supposed to be met by energy efficiency improvement actions to be implemented in the industry and the transport sectors²³⁰. Actions implementers can be eligible to the previously mentioned tax exemptions as long as they provide the UPME with the documentation indicated in the 2012 Resolution n. 0.563. This resolution establishes that the UPME performs the technical assessment of the projects submitted and the National Environmental Licensing Authority (ANLA) possibly transmits the associated request for tax incentive to the tributary entity. National stakeholders complain, however, that the PROURE and the associated resolutions should be reinforced and take a more relevant role in the national energy strategy, for example by including mandatory energy efficiency targets for the public sector that is currently not covered (ECONOLER & SMARTEEC, 2014). Finally, a new law regulating the integration of not conventional renewable energies²³¹ in the national energy system has been published on May 2014²³². This law establishes a fund for not conventional renewable energies and the efficient management of energy (FENOGE) that will be regulated by the MME and can be used to finance energy efficiency improvement actions including micro-cogeneration and energy efficiency projects implemented in the residential sector²³³. The law also establishes that all public administrations will have to define energy efficiency improvement targets to be achieved in their buildings within a time horizon of maximum ten years by implementing suitable energy management measures. It also indicates that the MME will delegate the CREG for the definition of regulatory measures promoting demand side management. All in all, these regulatory measures can certainly have a positive impact on the ESCO market. Nevertheless, none of them has ESCOs activities as a direct target. A lack of regulations directly addressing ESCOs is indeed generally registered. Moreover, some existing regulations often create obstacles to ESCO investments. For example, tender procedures in the public sector do not yet include energy efficiency as a selection criterion and tend to select the offers with lower upfront investment costs so hindering ESCO contracting. It is also worth mentioning that existing regulations on energy tariffs provide sometime incentives to higher energy consumption, notably in the gas sector where a regressive tariff structure is in place, so making ESCO investments less attractive. In case of cogeneration systems for self-consumption, existing regulations seem to complicate the sale of excess energy creating problems to energy service companies making business with these systems (ECONOLER & SMARTEEC, 2014).

²²⁹ See the text of this resolution as available at <http://www1.upme.gov.co/sala-de-prensa/secciones-de-interes/resoluciones/resolucion-0563-de-2012> for further information.

²³⁰ Electricity savings in the industrial sector are supposed to reduce total final energy consumption by 3.43% in 2015, whereas other energies savings are supposed to reduce this consumption by 0.25% in the industrial sector and by 0.33% in the transport sector during 2015. The target for not electric end-uses is established based only on existing estimates of energy saving potentials in the industrial and transport sector mostly because no estimates of the energy saving potential in other sectors (e.g. the public and tertiary sectors) are available. In order to have a rough indication concerning the absolute amounts of energy involved, it may be interesting to observe that national total final electricity consumption amounted to 43,116 GWh in 2008 and corresponded to 15.3% of total final energy consumption registered during this year. For further information, see the text of the PROURE as available at http://www.minminas.gov.co/minminas/downloads/UserFiles/File/ENERGIA/URE/Informe_Final_Consultoria_Plan_de_accion_Proure.pdf

²³¹ Not conventional renewable energies are wind, geothermal, biomass, waves and solar energy

²³² Ley 1715 de 2014.

²³³ Preliminary studies, energy audits and administrative costs for the implementation of energy efficiency projects can also be financed through this fund.

Market factors

The hydrocarbons sector is one of the main drivers of the growing Colombian economy. The progressive liberalization of the national energy market has contributed to this growth since the mid-1990s and the hydrocarbons sector is nowadays booming²³⁴. Excepting the period of deep political crisis during 1999, the national GDP has increased steadily in this country. As of 2000, it has averagely increased by 4.2%/year²³⁵. Nevertheless, the national transport infrastructure appears severely underdeveloped also due to the conflicts between the Colombian government, paramilitary groups and guerrillas afflicting the country since mid-1960s. The Colombian government is investing a significant amount of money to improve the road infrastructure in order to attract foreign investors and stimulate industrial activities by increasing efficient transport²³⁶. Private motorized transport is expected to increase by 80% by 2030²³⁷. Concerning the contribution of the different sectors to the economy growth, the industrial sector constitutes around 15% of the total GDP and its contribution to this GDP in absolute terms has doubled during the last decade. Nevertheless, this contribution has started declining during 2011 and 2012 compared to the values registered in the previous year due to the global economic crisis and to a decrease in the internal demand for commodities²³⁸. The tertiary sector makes instead approximately 44.6% of the total GDP²³⁹ and its contribution in absolute terms has annually increased by 4%-6% during the last three years. Most of the national final energy consumption comes from the transport sector (39%), followed by industry (25%) and the residential sector (20%). The tertiary and the public sector are together responsible for just 6% of the total final energy consumption in the country²⁴⁰. Concerning energy prices, the electricity market is made of a regulated and a not regulated part. Regulated clients (i.e. clients consuming less than 55 MWh/month and with maximum power input below 100 KW) pay around 0.14 USD/kWh in the industry sector and 0.18 USD/kWh in the commercial sector. Electricity prices for not-regulated clients are negotiated with electricity sales companies and vary between 0.11 USD/kWh and 0.20 USD/kWh depending on the sale company, the geographical region where electricity is supplied and the maximum power input of the clients (ECONOLER & SMARTEEC, 2014). These prices put Colombia among the countries with the highest electricity prices in Latin America. Also the gas market includes a regulated and a not-regulated part established based on the maximum amount of gas consumed by end-users per day²⁴¹. Gas prices of the regulated market can exceed those of the not-regulated market by 30-40%. Overall, these prices represent roughly the average gas prices applied in Latin America²⁴². The very high rate of economic growth being registered in Colombia and the relative high energy prices indicate that energy efficiency can become an important leverage factor for companies having to compete on this market. The major ESCO market potential is in the industry sector. It has however to be mentioned that the fact that electricity and gas price for regulated end-users can be significantly higher compared to not-regulated ones can make the profitability of ESCO projects implemented at hospitals, hotels and

²³⁴ Oil reserves amounted to 1.9 billion barrels and oil production amounted to nearly one million barrels per day in 2013 (Source: AEGIS Advisory).

²³⁵ Source: DANE - Dirección de Síntesis y Cuentas Nacionales y Banco de la República, Estudios. The GDP increase has been estimated by assuming constant prices and 2005 as reference year for these prices.

²³⁶ The national infrastructure agency (ANI) announced plans to tender up to USD 20 million in road infrastructure projects in late 2012 (Source: AEGIS Advisory).

²³⁷ Source: <https://www.climateinvestmentfunds.org/cifnet/?q=country/colombia>

²³⁸ Source: Balance 2013 y perspectivas 2014- ANDI, December 2013

²³⁹ Of this 44.6%, 13.4% comes from the commercial sector, 16.6% comes from social services and 15% from the financial sector. Source: Departamento Administrativo Nacional de Estadística (DANE)

²⁴⁰ Source: UPME, 2011.

²⁴¹ Gas prices for end-users consuming less than 100,000 ft³ per day are regulated.

²⁴² Source: ECONOLER & SMARTEEC, 2014. Gas prices applied in the city of Bogotá vary between 0.50 and 0.52 USD/m³ depending on the maximum amount of gas consumed per month.

clinics higher compared to projects implemented at industrial sites. Nevertheless, the possibility of exploiting existing potentials depends first and foremost on the opportunities of accessing financial resources to be invested on energy efficiency that will be offered to involved market actors. This point will be further discussed in the following sections.

Information, awareness and demonstration

A series of programs dedicated to education, information and public awareness raising on energy efficiency opportunities have been indicated in the national action plan PROURE. Nevertheless, information available does not allow establishing to what extent the intentions declared in the action plan have materialized in concrete initiatives. The UPME regularly organizes seminars and initiatives dedicated to education on rational use of energy. It has also created a system of information on energy efficiency and alternative energies (SI3EA) through a dedicated website²⁴³. This website includes guidelines on energy audits, guides to implement energy efficiency improvement projects in different sectors (e.g. hospitals, public lighting, specific industry subsectors, etc.), tools for energy diagnoses, etc. Interesting information and capacity building initiatives on energy efficiency have been undertaken at the international level by the Inter-American Investment Corporation (CII). Some of these initiatives are those included in the GREENPYME program that started in Colombia at the end of 2009 and provided small and medium enterprises (SMEs) with support in the implementation of energy efficiency improvement projects. Companies fulfilling pre-established eligibility criteria have been selected based on their energy saving potential and have received assistance at zero costs for the realization of energy audits and technical analyses for the installation of energy efficient technologies. These companies could also benefit from credit lines made available by the bank BBVA Colombia to SMEs participating in this three years program. Another similar initiative is represented by the OPEN ([Promoción de Oportunidades de Mercado para Energías Limpias y Eficiencia Energética](#)) program. This recently concluded three years program has been implemented in Colombia through the support of the Inter-American Development Bank (IDB) and the Multilateral Investment Fund (FOMIN). It has led to the implementation of good practices on energy efficiency by the 180 SMEs involved and to the promotion of ESCO activities. The IDB and the FOMIN are currently working on the design of another relevant project to activate an energy efficiency fund that can facilitate the development of the ESCO market in Colombia²⁴⁴. This project, expected to be approved by the IDB in the second half of 2014, will include country-wide capacity development and technical assistance programs for ESCOs and their clients, to support the development of demand for, and supply of, energy efficiency services. The USD 20+ million Colombian Energy Efficiency Facility to be created through the project will be co-financed by the IDB, FOMIN and the Clean Technology Fund (CTF) of the Climate Investment Funds (CIFs). The Facility will be operationalised through 2015 to provide attractive loans and partial credit guarantees to ESCOs and their clients for the development of energy efficiency projects. Based on two preliminary studies analysing the Colombian energy efficiency market, the project has also led to the organization of two workshops and of a series of bilateral meetings with all main stakeholders of the ESCO market. Moreover, it has allowed identifying a series of ESCO business opportunities and a pipeline of 49 ESCO projects that can be financed through the previously mentioned energy efficiency fund (ECONOLER & SMARTEEC, 2014). It is finally worth mentioning that the Colombian Council for Energy Efficiency (CCEE) is another actor promoting networking and knowledge exchange among stakeholders in the energy efficiency market. This association has recently signed a Memorandum of Understanding with the Association of Energy Engineers (AEE)²⁴⁵ for the organization of specialized trainings destined to its members and dedicated to energy management

²⁴³ See <http://www.si3ea.gov.co/> for further information

²⁴⁴ Project reference: FOMIN/SCF- CO-M1095

²⁴⁵ AEE is a no profit association promoting energy industry and sustainable development in 90 countries (see <http://www.aeecenter.org> for further information).

and energy audits and to protocols for energy saving M&V. Overall, capacity building activities specifically dedicated to ESCOs are highly needed in Colombia. More extensive education programmes to prepare professionals that can act on the ESCO market with sufficient expertise would certainly be beneficial and the diffusion of standard contract models for ESCOs and standard methodologies for energy saving measurement and verification would contribute to foster this market. At the same time, information campaigns for energy end-users on the ESCO business could allow to increase consumers' trust in ESCO investments.

Financing

The main form of stable financial support that Colombian ESCOs may benefit from is probably given by VAT exemptions and tax credits that can be claimed for the implementation of energy efficiency projects. As already mentioned, these fiscal incentives have been put in place by the 2012 Resolution n. 0186 of the Ministry of the Environment and the MME and by the 2012 Resolution n. 0563 of UPME. They apply to the installation of highly energy efficient motors and to the implementation of energy efficiency projects for the exploitation of residual heat generated in combustion processes in the industry sector and to measures promoting sustainable transport (including trains, electric and hybrid vehicles)²⁴⁶. An additional financial support is expected to come from the recently published law regulating the integration of not conventional renewable energies in the national energy system²⁴⁷. As already mentioned, this law establishes a fund to finance investments on not conventional renewable energies and on the efficient management of energy (FENOGE). Another relevant resource currently available to finance the ESCO business is given by the already mentioned Clean Technology Fund (CTF). This fund is part of the Climate Investment Funds created through the economic contribution of Australia, Canada, France, Germany, Japan, Spain, Sweden, United Kingdom and United States to support low-carbon and climate-resilient development in 48 developing countries of the world by scaled-up financing channelled through Multilateral Development Banks (MDBs). The Colombian government has developed an investment plan using USD 150 million from the CTF to finance urban transport and energy efficiency projects²⁴⁸. This investment plan has been designed in co-ordination with the IDB, members of the World Bank Group (IBRD, IFC) and key Colombian Stakeholders. Monies available from the CTF are used, among others, to provide technical and financial assistance and support to ESCOs activities through projects specifically designed to this end²⁴⁹. Investment funds to be used to provide soft loans and credit guarantees to ESCOs and their clients are also created by the IDB thanks to the CTF. This fund is also used to implement pilot projects, energy audits and training courses on ESCO related activities. Concerning financial support coming from local financial institutions, the low development status of the Colombian ESCO market does not determine the most proper conditions to allow a wide number of local banks to finance ESCO projects through the economic savings that these can generate. Bank credits are usually assigned based on ESCOs and/or ESCO clients' assets and equity rather than on projects profitability. Moreover, ESCOs have often a limited credit capacity and their clients (typically SMEs) have generally a limited knowledge of the credit market in Colombia (Langlois & Hansen, 2012). Very few banks have developed financial products specialised in energy efficiency projects in Colombia²⁵⁰ and these products are generally more complex and require more guarantees compared

²⁴⁶ 22 applications for these fiscal incentives to be issued for energy efficiency improvement actions implemented in the industrial and in the transport sectors have been received by the UPME as of December 2013. These applications corresponded to total investments for USD 337.1 million and to USD 87.8 million solicited in the form of incentives (Source: IFC).

²⁴⁷ Ley 1715 de 2014.

²⁴⁸ See <https://www.climateinvestmentfunds.org/cifnet/?q=country/colombia> for further information.

²⁴⁹ See for example the project FOMIN/SCF- CO-M1095 being implemented by IDB and the FOMIN mentioned in the previous section.

²⁵⁰ These banks include Findeter, Bancoldex and Bancolombia (ECONOLER & SMARTEEC, 2014).

to traditional ones, this often discouraging energy efficiency investors from using them. High technical and financial risks are associated with ESCO projects and this contributes to significantly lower their profitability. Of the existing ESCOs in Colombia, E2 seems to be the one with more familiarity with the stipulation of energy performance contracts (EPCs); EPCs with shared savings being the EPC type usually stipulated.

Barriers

A series of barriers hinders the development of the ESCO market in Colombia. Financial, cultural, regulatory and technical barriers are in place in this country (ECONOLER & SMARTEEC, 2014; Langlois & Hansen, 2012). According to available information, financial and cultural are the most important ones. As already mentioned, SMEs (i.e. one of the main ESCO clients in Colombia) have limited access to credit for the implementation of energy efficiency projects. Moreover, they do not seem to have sufficient knowledge of the Colombian bank credit system. On the other hand, very few banks have created new products specifically designed to finance ESCO projects and these products generally appear too complex and require more guarantees compared to traditional ones. Usually, energy savings and energy efficient equipment installed are not accepted as a guarantee for ESCO investments. Overall, technical and financial risks associated with ESCO projects are probably too high to allow the take off the ESCO market and the profitability of these projects is usually not very high also because their size in terms of investments needed is generally not sufficiently large compared to the transactions costs they can generate. Trust in ESCO products by potential ESCOs' clients is quite low because they meet difficulties in understanding the ESCO concept, do not have sufficient internal expertise to implement ESCO projects and sometimes have received contradictory messages concerning these products or have had bad experiences. At the regulatory level, ESCO market stakeholders claim that mandatory energy efficiency improvement targets should be established in particular in the public sector and for large energy users. In addition, incentives in place for the promotion of energy efficiency and ESCO business are very few and mostly limited to the fiscal incentives described in the previous sections. In the public sector, the tender procedures adopted are not suitable for the stipulation of ESCO contracts or disadvantage ESCOs participating in the bidding process by proposing energy efficiency improvement measures. Moreover, existing regulations on public budgets administration impede that the implementation of energy efficiency improvement actions can be financed by the economic savings generated by these actions. Energy tariff schemes in place (especially for gas) constitute another regulatory barrier, as they stimulate higher energy consumption. Moreover, co-generation and energy generation for self-consumption are not sufficiently incentivised by the regulations in place. Finally, the so-called landlord-tenant dilemma often impedes the implementation of energy efficiency improvement projects in the private sector. In general, the existing regulatory structure for the promotion of energy efficiency and ESCOs appears quite disarticulated and market stakeholders claim that a proper energy agency should be established in order to co-ordinate the various market actors and support them in complying with existing and future regulations on energy efficiency. Concerning technical barriers, ESCOs blame a general lack of data on clients' energy consumption for the difficulties they meet in implementing their projects. In addition, reliable suitable methodologies for energy saving M&V are not available and standard M&V protocols are missing in the public sector.

Conclusions, future expectations

The ESCO market in Colombia is still at a very preliminary development stage. There are basically only eight companies that can operate as an ESCO in this market. Most of them are new entrants or are still defining their business plan in order to start selling energy services. Their target clients are mostly large and small and medium enterprises of the industrial sector. Nevertheless, the Colombian economy is booming, energy prices and energy demand are increasing and the present regulatory

framework of the country appears quite favourable to ESCOs, as demonstrated by the recent enforcement of a law on energy efficiency and renewable energies that establishes a fund for the promotion of energy efficiency improvement activities. A relevant energy efficiency market potential has been identified in the industry, tertiary and public sector (public lighting systems in particular). Existing estimates indicate an energy efficiency market potential of USD 838 million/year, USD 498 million/year and USD 116 million/year for the industry, tertiary and public lighting sectors respectively (ECONOLER & SMARTEEC, 2014). The Colombian government has developed an investment plan of USD 150 million to finance urban transport and energy efficiency projects and a series of studies are underway under the co-ordination of the IDB in order to design an energy efficiency fund and a financing facility that can be used to stimulate ESCO investments. These studies have also already allowed identifying a pipeline of 49 projects in the previously mentioned sectors that could be implemented by ESCOs and generate investments around USD 159 million (ECONOLOER, 2014). The same studies stress however that a market transformation program has to be implemented in order to overcome existing barriers. An ESCO association is necessary in order to promote ESCOs interests, facilitate collaborations among ESCOs and increase potential customers' trust in the ESCO business. More intensive information and awareness raising activities are needed in order to increase the knowledge of opportunities offered by the ESCO market and of related ESCO contracts and projects implementation methodologies. The organization of a program of training courses for financial institutions, ESCO clients and energy companies themselves is also needed. Standard ESCO contracts that can be stipulate in the Colombian market should be developed by experts in this field and the public sector should take the expected leading role in the promotion of this market. Experts are probably also needed to provide technical assistance to new market entrants and a large series of demonstrations projects should be implemented in order to prove the potentialities and increase the visibility of ESCO activities. A certification scheme for ESCOs and for technicians involved in energy saving M&V would also be highly beneficial. Technical support would also have to be provided to regulatory bodies in such a way they can implement suitable measures for ESCO market promotion. Moreover, intensive marketing and communication activities should be undertaken in order to increase energy end-users' trust in this business. These are the main recommendations produced by Colombian market's analysts. It remains to be seen whether policy makers and stakeholders involved will endorse these points.

Key drivers

- economy growth
- increasing energy prices
- increasing energy consumption
- new regulation on energy efficiency
- financial support from international organizations

Number of ESCOs	8
ESCO market size and potential	USD 1,452 million/year (ECONOLER & SMARTEEC, 2014)
ESCO market trend	Growing
ESCO association	Not existing
Typical ESCO projects	Projects implemented mainly in the industry sector including improved energy management of companies, installation of efficient industrial boilers, refrigerators and compressors, installation of co-generation and

	tri-generation plants, optimization of industrial processes.
Main type of contract	Chauffage, EPC, BOOT contracts

Information in this chapter was based on the following source:

E2, 2011. Mecanismos Financieros de las ESCOs para la Implementación de Sistemas de Gestión Energética. Experiencias en Colombia. E2 Energía Eficiente S.A.E.S.P. Presentation held during the a seminar dedicated to financing mechanisms and instruments for energy efficiency projects in Colombia, organized in Bogotá, Colombia on 12-13 May 2011.

ECONOLER & SMARTEEC, 2014. Estudio de Mercado para la caracterización y priorización de los sectores económicos con mayor potencial para proyectos de servicios energéticos en Colombia. Report produced by ECONOLER for the Multilateral Investment Fund (FOMIN), a Member of the Inter-American Development Bank (IDB).

Langlois, P., Hansen, S. J., 2012. World ESCO Outlook. The Fairmont Press. ISBN 0-88173-675-9

ESCO market in Uruguay 2013

In 2013 the ESCO market in Uruguay approaches an economic viability and increases at a faster rate compared to the period 2008-2010. The volume of the realized energy efficiency projects as well as the number of ESCOs increased as a result of the implementation of the “Energy Efficiency Project” in the period from 2005 to 2012. The financial crisis had no heavily impact on ESCO business. (EC JRC 2012).

Current size, trends and features of the market

The Energy Efficiency Project has been implemented by the National Department of Energy of the Ministry of Industry, Energy and Mining (MIEM) and the public utility company, and has been financed from resources provided by the Global Environmental Facility (GEF) through the World Bank and local counterparts. In the framework of the project's component “Energy Efficiency Market Development” policies and legislation for promotion of EE including ESCOs have been developed and enforced. The Uruguayan Saving and Energy Efficiency Trust (FUDAEE) was also created to facilitate financing of EE projects.

Registration of the qualified ESCOs is carried out by the National Directorate of Energy (DNE), which published the list in their website at www.dne.gub.uy. The DNE register includes companies that provide different type of energy services. Currently, out of more than 80 registered entities, 15-20 companies provide energy services based on the ESCO model. The other registered entities are providers and installers of RE installation and equipment or energy consultants. There are two categories of ESCOs: A and B. The ESCOs registered in category A may participate in projects involving energy efficiency guarantees by the FUDAEE with an amount up to \$ 100,000, and the ESCOs registered in category B may participate in projects involving energy efficiency guarantees issued by the FUDAEE with an amount up to \$ 35,000. Initially all ESCOs have been integrated in Category B.²⁵¹

Most of the ESCOs in Uruguay are private small sized companies with up to 50 employees (EC JRC 2012).

The potential size of the ESCO market (total value of possible EE projects in the building sector and industry, with pay-back time of up to 10years) is estimated in \$250 million (EC JRC 2012).

ESCO's applications for registration will be accepted by DNE only if they fulfil certain technical criteria. The DNE has the right to permanently delete the registration of an ESCO for example if it misuses the funds from FUDAEE or if it is not acting in compliance with the national policy or legislation. The registered ESCOs, regardless of the status, shall provide information on a semi-annual basis on achieved savings in the implemented EE projects guaranteed by FUDAEE.

Types of projects

ESCOs have implemented most of the projects in the public sector (central governments and local administration buildings) and in the commercial sector's buildings (offices, retails). The industry sector is also covered by ESCOs. The implementation rate is low in the residential sector and in the public buildings as: hospitals, universities, schools, social housing.

The fields of application covered by ESCOs in Uruguay are (EC JRC 2012):

²⁵¹ Source: <http://www.eficienciaenergetica.gub.uy/index.php/registrar-esco>

- Heating systems, hot water preparation systems;
- Air conditioning;
- External and public lighting;
- Indoor lighting;
- Building automation and control systems;
- Renewable energy sources project;
- Industrial process optimisation;
- Industrial cooling and
- Staff and user behaviour training

Building envelope insulation, improvement of pump systems and installation of electrical motors are rarely covered by ESCOs.

The EPC with shared savings (ESCOs and clients share the energy savings) are the most common contracts in Uruguay.

Regulatory factors

The Government recognized that the existence of an appropriate institutional legal framework has a significant role in establishing energy efficiency as a component of a long-term energy policy. Therefore series of laws and decrees have been developed and approved (Juárez 2011)

The Energy Efficiency Law (No.18.597) was enacted in September 2009. This Law is a legal and institutional framework for the country's energy sector and generates mechanisms for promoting efficient use of energy sources. The Law entrusted the Ministry of Economy and Finance (MEF) and Ministry of Industry, Energy and Mining (MIEM) to create the Uruguayan Saving and Energy Efficiency Trust (FUDAEE) with the aim to provide funding for technical assistance in EE, promote EE, finance EE projects implementation, promote research and development in EE and act as contingency fund in crisis junctures of the energy sector.

The Energy Efficiency Law established a mechanism for energy savings certificates, and authorizes the Ministry of Industry, Energy and Mining (MIEM) to issue EE Certificates to all those implemented EE projects which demonstrate energy savings according regulation. The certificates have a value in energy saving units. The savings result from the sum of the estimated energy savings over the project's life based on relevant technical parameters and saved energy that the MIEM set according to the type of project.

The Decree No. 232/ 012 adopted on 20 July 2012 regulates the article 12 from the Law No. 18.860, regulating the implementation of a subsidy scheme for the public lighting systems and promotion of energy measurement.²⁵²

The Decree for promotion of equipment and/or implementation of process related to efficient use of energy as well as for services provided by ESCOs (No.354-009 from 03.08.2009) established a specific fiscal benefit for services provided by ESCOs registered in MIEM's Energy Directorate (DNE) and classified under category A.²⁵³

²⁵² Source: <http://www.eficienciaenergetica.gub.uy/index.php/institucional/marco-legal>

²⁵³ Source: http://www.eficienciaenergetica.gub.uy/archivo/documents/marco_juridico/decretos/Decreto354-009.pdf

Market factors

Uruguay is a country without "traditional" energy sources and has no proven oil, natural gas or coal reserves and at the same time Uruguay has approached its maximum capacity for energy production from hydropower.²⁵⁴

Meanwhile, in recent years the Uruguay's economy has been growing continuously at a very high rate. For example the growth of GDP in 2010 was 8.5%.²⁵⁵ This situation demands more and more energy, to meet the needs of industry, transportation and the residential sector.

In this context, in 2008 the Council of Ministers adopted an Energy Policy for the period 2008 – 2030 with a long term perspective. This overall strategy incorporates a multidimensional approach that includes economic and technological, but also environmental, cultural, ethical and social elements. The Policy was ratified by the actual Government and by the Parliament committee including all Political Parties in 2010.²⁵⁶

The Energy policy includes (Juárez 2011):

- 4 strategic guidelines (Institutional, Supply, Demand and Social);
- Short, medium and long term goals;
- Over 30 action lines;

EE is one of the four axes of the Policy and is presented through the Demand guideline that should enforce EE implementation in all sectors (transport, industry and residential). The Energy Policy set as a target the reduction by 20% of the energy consumption compared to the baseline scenario in 2010. The goals for 2030 include that Uruguay should be a paradigmatic example of a green economy. The short term goal set by the Energy Policy is contribution of RE to 50% of the primary energy mix by 2015.²⁵⁷

Expected Investments (2011-2015) for implementation of the Energy Strategy are USD 7.2 billion (17% of annual GDP):

- USD 2.4 billion in public sector;
- USD 4.8 billion in private sector or public-private partnership;

The implementation of the Energy Policy 2008 – 2030 has resulted with a growth of demand for different types of energy services as well as with increase of the number of energy service and efficient equipment providers. It is expected that this trend will continue also in the next years, since the achieved results are already visible.

Information, awareness and demonstration

Capacity building events and awareness campaigns have been organized during the implementation of the Energy Efficiency Project. Capacity building courses for energy audits were organized for ESCOs. The ESCOs have been trained for performing of energy audits. Fifteen energy audits were organized for demonstration in the public sector and ten in the private sector.

In the framework of this project a dedicated website for EE and RE (www.eficienciaenergetica.gub.uy) has been developed. The website includes all necessary

²⁵⁴ Source: <http://www.eficienciaenergetica.gub.uy/index.php/institucional/politica-energetica>

²⁵⁵ Source: FNI, World Economic Outlook. April 2011

²⁵⁶ Source: <http://www.eficienciaenergetica.gub.uy/index.php/institucional/politica-energetica>

²⁵⁷ Source: <http://www.eficienciaenergetica.gub.uy/index.php/institucional/politica-energetica>

information regarding EE legislation, FUDAEE, ESCOs, financing of EE etc. and has a direct link to the register of ESCO companies.

Financing

The Uruguayan Saving and Energy Efficiency Trust Fund (FUDAEE) was created as a guarantee fund for EE according to the Energy Efficiency Law in 2009. Until 2012 the FUDAEE has been operated by two commercial banks and it guaranteed only one project. In March 2012 (with the Decree No. 86/12) the Fund was incorporated to the National Guarantee System, to be operated through all commercial banks and making it more attractive (World Bank, 2012). The FUDAEE is administered by the National Development Corporation (NDC) within the framework of the National System of Guarantees in accordance with the Financial Intermediary Institutions (IIFs), interested in development of EE loan.²⁵⁸

According to the provisions of the EE law, the FUDAEE has the following competencies related to the ESCO business:

- To manage transaction with Energy Efficiency Certificates and to ensure market transparency of Energy Efficiency Certificates.
- To act as a guarantee fund for financing facilities related to energy efficiency projects;
- To finance the costs associated with operation of the FUDAEE, audits and control of EE Certificates issued by the MIEM;

The Ministry of Industry, Energy and Mining (MIEM) in compliance with the National EE Plan set the annual energy saving targets for all sectors and reference prices for EE certificates.

FUDAEE has been funded through energy utility companies, international grants or loans, additional taxes for inefficient equipment and extraordinary budget funds. The utility companies shall pay 0.13% of their annual energy sales (taxes are not included) realized on domestic market in the previous year. Also any private or public entity which plans to start with new or to extend existing power generation capacity with fossil fuels as energy source shall pay 1% of the total investment to the budget of FUDAEE.

According the Energy Efficiency Law, FUDAEE should allocate 60% of the annual budget for fulfilment of annual energy savings target, 7% of the annual budget as guarantees issued for EE projects, 3%-5% for financing of energy audits and energy monitoring and 15% for financing R&D in EE and RE .

Two guarantee lines are established in FUDAEE:

- Technical Assistance Guarantee Line;
- Guarantee Line for Investment Projects;

The Technical Assistance Loans guarantee financing provided by the financial institutions to cover the costs for preparation of feasibility studies and other studies necessary for EE projects. This line does not require any risk analysis or repayment capacity of the applicant and must comply with appropriate operating procedures as detailed in the FUADEE manual. Under this scheme, the financial institution may request guarantees (Aval) from the FUADEE issued in its favor and in U.S. dollars for up to 100 % of the credits granted for preparation of EE projects that meet the following criteria²⁵⁹:

²⁵⁸ Source: <http://www.eficienciaenergetica.gub.uy/index.php/institucional/fee>

²⁵⁹ Source: <http://www.eficienciaenergetica.gub.uy/index.php/component/content/article/18-institucional/10-lineas-de-financiamiento>

- that funding is granted to finance the preparation of investment projects aimed to improved EE presented by an ESCO;
- the financed amount does not represent more than 67% of the total cost of the study, and remaining 33% must be paid by a beneficiary, a project company or an ESCO;
- the study is performed by a qualified ESCO registered in category A or B;
- the financing not exceeding 12 months;
- that the study is not performed by a supplier of equipment

The Bank Guarantee (Aval) Line for investment projects covers partially guarantees for financing the implementation of approved EE projects, that have to be presented by ESCOs or directly by credit applicants. The avals may be issued up to an amount of USD 100.000 depending on the category of the ESCO that presents a project in the front of an financial institution. Financial institutions may request from FUDAEE avals for up to USD 35.000 in case if the project is implemented by an ESCO registered in category B, or up to USD 100.000 if the project is realized by an ESCO registered in category A. The credit application can be submitted to financial institutions by an ESCO if it presents a signed contract with the end user of services (company where an EE project shall be implemented) or as a combination of both agreed parties (ESCO and end user) and presented by ESCO²⁶⁰.

The guarantees can be issued only for credits that meet following criteria:

- that the project is qualified as Energy Efficiency project under the definitions established for this purpose.
- the repayment period of the loan does not exceed 6 years.
- that the project is carried out by a qualified ESCO, registered in A or B, and has a statement issued by ESCO in accordance with the provisions.

The common sources for financing of the ESCO projects are the commercial banks or the ESCOs own equity.

Barriers

The most common barriers to ESCO projects in Uruguay are (EC JRC 2012):

- Mistrust from the (potential) clients;
- Small sized projects and higher transaction costs;
- Perceived business and technical risk. The companies have aversion to outsource the energy management;
- Inexperienced actors;

Conclusions and future expectations

The Uruguay ESCO market should remain stable in the next years. The implementation of energy certificates schemes shall have impact on ESCO business in regards to the industry.

Key drivers

- Implementation of energy certificates schemes;
- Implementation of energy management in industry;
- Taxation rules/rebates;

²⁶⁰ Source: <http://www.eficienciaenergetica.gub.uy/index.php/component/content/article/18-institucional/10-lineas-de-financiamiento>

Number of ESCOs	15-20
ESCO market size and potential	US\$ 250 million, potential size in next 10 years
ESCO market trend	Increased at faster rate
ESCO association	none
Typical ESCO projects	Heating systems recovery; indoor and outdoor lighting(including street lighting); air conditioning, industrial process optimization; industrial cooling; building automation; staff training;
Main type of contract	EPC with shared savings;

Information in this chapter was based on the following source

EC JRC. 2012. Joint Research Centre. 2012. Survey performed during 2012 and 2013 by the Joint Research Centre of the European Commission.

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http://www.encyclopedia-germany.info/ENEFF/Redaktion/DE/Downloads/Publikationen/Praesentationen/2011_iv_uruguay_ua_1.pdf?__blob=publicationFile&v=4

World Bank. 2012. "Implementation Completion and Results Report on a Global Facility Grant to the Republic of Uruguay for an Energy Efficiency Project" http://www-wds.worldbank.org/external/default/WDSContentServer/WDSP/IB/2013/01/29/000333037_20130129183339/Rendered/PDF/NonAsciiFileName0.pdf

Conclusions

The present report has presented the most up-to-date description of the ESCO industry in several countries outside Europe. It is not possible to draw general conclusions given the large different in the market developments as well as the regulatory framework.

Below it is a summary of the major findings per continent and in relation to specific issues, such as regulatory framework, financing, etc.

United States of America and Canada are one of the most developed and largest ESCO markets in the world. The ESCO market in the USA has grown steadily since the 1990s. In USA the highest ESCO market penetration is in the k-12 schools, as well as in the state and local government buildings, federal buildings and colleges. However, according to LBNL analyses, the greatest potential lies in the sector with the lowest market penetration to-date; namely in commercial buildings. The potential value of ESCO projects in the private and commercial buildings could be between \$14 and \$34 billion. The key drivers of the ESCO market in USA and Canada are enabling state and federal policies and programmes.

During these past three years (2011-2013) the ESCO markets have grown in several countries in Asia (China, India, Thailand and South Korea) as a result of the implementation of governmental programme and policies for improvement of energy efficiency and growth of investments in energy efficiency. For example in China ambitious energy efficiency targets have been established in the 12th Five-Year Plan for the period between 2011 and 2015. This Plan aims at further reducing China energy intensity by 16% for that period through energy conservation. As a result of the implementation of this plan the ESCO market volume on EPCs increased by about 23% just between 2011 and 2012 going from USD 6.73 billion in 2011 to USD 8.25 billion in 2012. This dramatic rate of increase is being registered at least from 2007 and has recently included a 14% growth in the number of persons employed by ESCOs. This number has indeed passed from about 378,000 in 2011 to 435,000 employed units in 2012 (ERI-NDRC, 2013). In Japan in the past two-three years the ESCO market is in stagnation as a consequence of the economic crisis and the earthquake in 2011. Thailand is the country of South-East Asia with the highest number of ESCOs (37) and the highest investments in energy efficiency (USD 445 million of revenues generated by energy efficiency investments). The ESCO market will continue to grow in India in the future because of the expected increasing of the energy demand due to demographic and economic factors. India is a market (after China) with the highest potential for ESCO business in Asia. As a result of the market growth the number of ESCOs increased in China (to 2339 registered ESCOs) and in South Korea (from 126 in 2009 to 227 in 2012). India is a market (after China) with the highest potential for ESCO business in Asia.

In South America the ESCO market development has been promoted by the International Financial Institutions and Donor Organization as: Global Environmental Facility (GEF), World Bank, Inter-American Development Bank (IDB) and the Multilateral Investment Fund (FOMIN). The growth of the ESCO market has been high in Brazil and Chile, medium in Uruguay and Colombia and still very low in Argentina and other countries.

The ESCO market in Brazil has a very high potential compared to other neighbouring countries. However, there is still lack of knowledge about this potential in energy efficiency by the potential clients. The policy of subsidized by the state energy prices is one of the main barriers that constrain faster development of ESCO market and has had a dampening effect on energy efficiency investments.

In Uruguay the volume of the realized Energy efficiency projects as well as the number of ESCOs increased from 0 to 20 in the period from 2005 to 2012 as a result of the implementation of the "Energy Efficiency Project". One of the first initiatives promoting the ESCO market in Chile has been undertaken thanks to the support of the Inter-American Development Bank (IDB) and the Multilateral Investment Fund (FOMIN) under the "Promotion of Clean Energy Market Opportunities" (PCEMO) project. However, a similar project has been not so successfully implemented in Argentina, due to the economic crisis and high inflation rate.

The ESCO markets remain significantly underdeveloped in the in Middle East and North African Countries (MENA region) compared to Europe, North America and elsewhere. The lack of capacity, lack of a suitable regulatory framework, limited commercial financing, subsidized energy prices, and low awareness of ESCO represented important barriers to their development. The international organization as: UNDP, USAID, GIZ, World Bank try to improve the energy efficiency in these countries primarily through technical support of the governments in preparation of legislation and policies. In the framework of an initiative focusing in the improvement of energy efficiency in the construction sector in the Mediterranean (MED-ENEC project), implemented by GIZ and financed by the European Union, the national energy efficiency action plans have been prepared for most of the MENA countries. ESCOs are indicated in many of the NEEAPs (e.g. of Lebanon, Jordan and Tunisia) as key actors, and a major catalyst for improved energy efficiency. The NEEAPs also detail the policy commitment to improve the market situation for ESCOs. The market for energy service companies (ESCOs) has been created in Tunisia through the implementation of an EE Project realized by World Bank and financed through the Global Environmental Facility (GEF). Mandatory energy audits, supported by profitable financial arrangements and capacity building of ESCOs resulted in establishment of several full operational ESCOs. The framework for ESCOs was set with adaptation of the first energy efficiency law in 2004. Israel is also on a good way to introduce the ESCO business in the public sector. EE programmes for the public hospitals and university realized through international ESCOs should indeed bring necessary know-how and experience.

Positive trends in the development of the ESCO market are identified in two researched Gulf Countries (the United Arab Emirates and Iran), where a process for the creation of suitable market preconditions for introduction of energy services started in the last two years. As of 2013, the ESCO market in Dubai was very small, but a significant growth in the coming few years is expected due to a high-level political commitments. Etihad ESCO, a venture company of the Dubai Electricity and Water Authority (DEWA) was established in 2013 in order to enable the energy performance contracting market in Dubai by developing energy efficiency projects targeting more than 30,000 buildings.

The ESCO market is much more developed in South Africa compared to other African countries, where no so many ESCO activities have been registered. However, the ESCO market in South Africa is in stagnation since the biggest energy provider-utility company Eskom decided to put on hold the financing of all of EE Projects to be implemented through its IDM programme, which has been the greatest facilitator of ESCO market in the period 2008 – 2013.

Slightly decrease has been indicated for the ESCO markets in Australia and New Zealand in the last year. The ESCO business is however relatively new for both countries.

The main market factors which influence the development of the ESCO business in Asia, South America and Africa are: the growth of the prices for natural gas, electricity and oil, very high energy dependence and much higher energy intensity compare to the developed countries. In some countries (e.g. India) the expected growth of population will lead to an increase of the energy demand in the next years. These factors can open the ESCO market for more investment in Energy

efficiency especially in the industry and in commercial sector. ESCOs are mainly focused on realization of EE projects in the industry sector in Asia (e.g. China, India, South Korea, Thailand etc.). However, the public sector remains the sector where most of the ESCO projects have been realized in MENA countries. Israel is trying to introduce energy services in public buildings (as for example in hospitals) through the initiation of open calls for international ESCOs.

Financing of energy efficiency projects and ESCOs is one of the main issue addressed by the experts who took part in the JRC Survey carried out in 2012 and 2013. The development of the ESCO business depends heavily on the readiness of financial institutions to fund EE projects. In most of the countries the commercial banks are reluctant to place loans for ESCOs or to the ESCO clients due to lack of experience and knowledge for EE and ESCO or issue loans with very high interest rates and collateral. The banks also generally consider ESCO projects as not attractive, with high transaction costs and high risk. Therefore for example energy efficiency projects in MENA countries are mainly financed by ESCOs or by clients through own equity.

In Asian countries as China, Thailand, South Korea and Singapore, the ESCO markets are well developed, thanks to the financing provided by EE and ESCO Funds, EE schemas and programmes as well as by tax incentives. In order to facilitate the development of the ESCO markets, international financial and development organizations have very often supported the creation of EE funds and programmes during their initial development stages.

An Important financing mechanism established in South Korea relates to international financing for GHG mitigation projects implemented by ESCOs. In this case a local bank typically prepares a package of ESCO projects and collects funds for projects' implementation from foreign investors. South Korean ESCOs then implement these projects and sell the payment stream to the local bank, whereas foreign investors get CO2 credits and/or part of the profits generated by these projects.

In Thailand, energy policy instruments and measures implemented to stimulate ESCOs activities mainly rely on the creation of an ESCO fund, the establishment of low interest rate loans supplied by the EERF fund, ESCO investments support provided by the Thailand Board of Investment (BOI) through tax incentives and support actions implemented by different government agencies. The EERF provides 11 Thai banks with credit lines at zero interest to be used to finance energy efficiency and renewable energy projects at an interest rate not exceeding 4%.

Government's support to the ESCO market materializes in the provision of funds of several different types for the implementation of ESCO projects in Singapore. An Energy Efficiency Improvement Assistance Scheme (EASe) has been created to fund up to 50% of costs borne by industries and building owners to hire an ESCO carrying out energy audits at their premises.

In Chile, one of the Countries with a quite well developed ESCO market in South America, a direct subsidy to finance energy efficiency consulting services was created by the "Programa País Eficiencia Energética" (PPEE) and the Productive Development Agency of Chile (CORFO) in 2006. In 2008, CORFO launched also an energy efficiency credit line to finance investments up to USD 1 million for enterprises optimizing their energy use²⁶¹. In January 2013, the Energy Ministry and CORFO have launched a call for renewable energy projects implemented under the ESCO model.

In Tunisia, the Guarantee Fund for Energy Efficiency (GFEE) was created in the framework of the Project for Energy Efficiency in Industry (PEEI) and is intended to guarantee loans granted by credit

²⁶¹ Enterprise eligible to these credit lines had not to exceed USD 33 million in their annual net sales.

institutions to the Industrial Enterprises or the Energy Service Companies (ESCOs) to finance energy efficiency measures. GFEE was financed by the GEF through the World Bank.

In 2009 the Uruguayan Saving and Energy Efficiency Trust Fund (FUDAEE) was instead established in Uruguay in order to provide guarantees for facilities for financing EE projects through ESCOs.

In USA most of the ESCO projects have been financed through the federal funds such as revolving funds, qualified energy conservation bonds, or programmes associated with the American Recovery and Reinvestment Act. Some of the ESCO projects took advantage of local, state or federal tax credits during the three years up to 2011.

The subsidised energy prices remain one of the crucial barriers for ESCO business in the MENA countries, in China and in the some countries in South America (Argentina, Uruguay). However the energy prices have been increased for the industrial and commercial sector since 2008-2009, but the prices for electricity and heating of households still are subsidised by government. For example in Kazakhstan, where almost 60% of the households are connect to district heating systems, subsidized energy prices together with the absence of metering devices in apartments, is one of crucial barriers for development of ESCO business in residential sector.

Lack of confidence to ESCOs and limited knowledge and information for ESCO concept constrain the development of ESCO market in the most of the MENA countries as for example Israel and Egypt. This is mainly because some companies have been registered as ESCOs, but in fact they are equipment providers or consulting companies and not provide full range of energy services. In order to give prospective clients confidence in ESCO contracting, the Emirate of Dubai has introduced the accreditation system and set an accreditation body for ESCOs. The accreditation body will assess applications against the criteria set out in the application process. The Emirate of Dubai has introduced the concept of Super ESCO through the creation of the Etihad ESCO.

ESCO associations have a very important role in promotion of ESCO business, capacity buildings for ESCOs and set up of system for ESCO accreditation. In South Korea the ESCO association - KAESCO plays a very important role as ESCO market facilitators both at the national and at the international level. KAESCO has organized many information and raising awareness events and collaborated with national universities for the organisation of training courses for ESCO professionals. The Thai ESCO association has mainly contributed to the development of competent ESCOs and suitable financing schemes for these companies. National associations of ESCO companies as: NAESCO in USA and ESA in Canada play also a significant role in promotion of ESCO business. For example NAESCO is involved in creation of federal and state laws for EE, but also provides advocacy for its members. NAESCO developed and introduced a system for accreditation of ESCOs. A very important driving factor for ESCO business in Brazil and Chile are the ESCO associations like ABESCO in Brazil and ANESCO in Chile. ABESCO has been developing a qualification programme for ESCOs named QualiESCO.

Another important issue that is worth to be mentioned is the lack of accepted standards and protocols for energy savings measurement and verification. This problem exists in both undeveloped and developed ESCO market, although the IPMVP exist since 10 years. It has been not used universally.

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Claudio Carpio consultant

Jorge Ignacio Andreotti consultant

Australia

Sam Burke Department of Treasury and Finance of Victoria State, Australia

Paul Bannister Exergy Australia Pty Ltd, Australia

Rob Murray-Leach Energy Efficiency Council, Australia

Brazil

Alan Poole Expert Consultant on Brazilian Energy Market

Matthew McClymont IADB - Inter-American Development Bank

Maria Cecilia Amaral CTC Experts, Brazil

Rodrigo Aguiar ABESCO, Brazil

Canada

Pierre Langlois ECONOLER, Canada

Peter Love Energy Services Association of Canada, Canada

Chile

Natalia Arancibia Aros Chilean Agency for Energy Efficiency (ACH EE)

Mónica Gazmuri Del Curto ANESCO, Chile

China

Zhang Jianguo Energy Research Institute of the National Development and Reform Commission, China

Thomas K. Dreessen Energy Efficiency Project Investment Company, Limited, China.

Li Pengcheng China National Institute of Standardization

Chinese Taipei

Teng-Yaw YU Taiwan Green Productivity Foundation

Yen-Yen Lin Taiwan Green Productivity Foundation

Chung-I Chen Taiwan Green Productivity Foundation

Colombia

Filippo Berardi	Inter-American Development Bank
A. González-Hässig	Rege-neración Ltda., Colombia
Elizabeth Mesa Munera	EPM, Colombia
Clara Inés Pardo Martínez	School of Administration University of Rosario, Colombia
Enrique Ciro Quispe Oqueña,	Grupo de Investigación en Energías GIEN, Colombia

Egypt

Florentine Visser	MED-ENEC Project
-------------------	------------------

India

Satish Kumar	Schneider Electric, India
Amit Chadha	Schneider Electric
Sandeep Garg	UNDP
Priyaranjan Sinha	Energ Engineering Projects Limited, India
Pradipta Panigrahi	G-ON ENERGY CONTROLS, India

Indonesia

Christophes Zamora	ASEAN Centre of Energy, Indonesia
--------------------	-----------------------------------

Iran

Mohamed Farrokh Foghani	DANA Energy Service Co.(DESCO), Iran
Sojdei Faraz	DANA Energy Service Co.(DESCO), Iran
Ali Khodamoradi	DANA Energy Service Co.(DESCO), Iran
Farzad Jafarkazemi	Islamic Azad University, Iran

Israel

Eddie Bet-Hazavdi	Ministry of Energy&Water , Israel
Dan Bar Mashiah	ESCO E2E,Israel

Japan

Chiharu Murakoshi,	Jyukankyo Research Institute, Japan
Tetsuya Maekawa	Japan Facility Solutions, Japan
Marco Yamaguchi	Mitsubishi UFJ Lease & Finance

Jordan

Muhieddin Tawalbeh	National Research Centre, Jordan
Samer Zawaydeh	consultant
Hameed Nezhad	Metropolitan State University, USA

Kazakhstan

Alexandr Belyi	PROON Project, Kazakhstan
Nadejda Khamrakulova	UN Economic Commission for Europe
Oleg Dzioubinski	UN Economic Commission for Europe

Lebanon

Nader Hajj Shehadeh	Lebanese Centre for Energy Conservation (LCEC)
Pierre El Khoury	Lebanese Centre for Energy Conservation (LCEC)
Ziad el Zein	Lebanese Centre for Energy Conservation (LCEC)
Adel Mourtada	Ecotech, Lebanon

Malaysia

Mok Kam Meng,	Schneider Electric Malaysia
Indra Mahlia	University of Malaya, Malaysia
Zaini Abdul Wahab	CNS Group and Maesco, Malaysia
Mohd Zaidi Ilamdin	Jana Tanmia (M) Sdn Bhd, Malaysia
Dixon Chai	CNNS Technasco Sdn Bhd, Malaysia
Ananad Pande	Infolliance SDN BHD Malaysia

Mexico

Sergio A. Segura Calderón	Comisión Nacional para el Uso Eficiente de la Energía, Mexico
---------------------------	---

Morocco

Amal Haddouche	Ministry of Energy, Mines, Water and Environmental, Morocco
Dieter Uh	German International Cooperation (GIZ)

New Zealand

Martin Brown-Santirso	Energy Efficiency and Conservatory Authority of New Zealand (EEAC)
Evan Gebbie	Energy Management Association of New Zealand
Bill Brander	Energy Efficiency and Conservation Authority of New Zealand (EECA)

Pakistan

Fiza Farhman	Buksh Energy Pvt.Ltd, Pakistan
Jamil Masud	Hagler Bailly,Pakistan
Asad Mahmood	ENERCON,Pakistan

Philippines

Homer Martin Ilagan	Schneider Electric Philippines
Noel N. Verdote	International Finance Corporation (IFC), Philippines
Homer Ilagan	Schneider Electric
Rehan Kausar	Asian Development Bank

Republic of Korea

Sung-hwan Cho Jeonju University, South Korea

Saudi Arabia

Nasser A. Al Ghamdi Saudi Energy Efficiency Program (SEEP), Saudi Arabia

Singapore

Sau Khong, Soong Johnson Controls Singapore

South Africa

Dieter Krueger BB Energy, South Africa

Derik Coetzer South African National Energy Development Institute (SANEDI),
South Africa

Frank Spencer Emergent Energy

Johan Pieters Bigen Africa Services

Denis van Es Carbon & Energy Africa (Pty) Ltd, South Africa

Taihland

Arthit Vechakij President of Thai ESCO Association, Thailand

Dilip R. Limaye SRC Global Inc., USA

Phong Luangsangthong B.T.M. Engineering Co., Ltd.

Tunisia

Safi Mohamed Ali l'Agence Nationale pour la Maîtrise de l'Énergie (ANME), Tunisia

Chabchoub Jalel Econoler

Lihitheb Kawther MED ENEC Project

United States of America

Peter Larsen Lawrence Berkeley National Laboratory, USA

Marty Skolnick Siemens Industry, Inc.

Dilip Limaye SRC Global Inc., USA

United Arab Emirates

Eric Beranger-Fenouillet Bain & Company, UAE

Stephane Le Gentil Etihad Energy Services Co. LLC, UAE

Uruguay

Ernesto Elenter SEG Ingenieria, Uruguay

Martin Garmendia MCT ESCO, Uruguay

Vietnam

Ha Dang Son RCEE-NIRAS JRC, Vietnam

Acronyms and abbreviations

AAO – Association of Apartments Owners (Kazakhstan)
AChEE - Chilean Agency for Energy Efficiency
ADB - Asian Development Bank
ADEREE – Agency for Renewable Energy and Energy Efficiency Development (Morocco)
AEEE - Alliance for Energy Efficient Economy (India)
AEMAS - ASEAN Energy Manager Accreditation Scheme
AEPAC - Australasian Energy Performance Contracting Association
AMESCO – Asociación mexicana de empresas ESCO (Association of Mexican ESCOs)
ANESCO - Asociación Nacional de Empresas de Eficiencia Energética (Chilean National Association of ESCOs)
ANME – National Agency for Energy Management (Tunisia)
APEREC - Asia-Pacific Energy Research Centre
ASEAN - Association of Southeast Asian Nations
b – billion
BAU –business as usual
BCA - Building Construction Authority (Singapore)
BEE - Bureau of Energy Efficiency (India)
BOE – barrel of oil equivalent
BOOT - build-operate-own-transfer
CAD – Canadian Dollar
CCEE - Colombian Council for Energy Efficiency
CGC – Credit Guarantee Company (Egypt)
CHP - cogeneration of heat and power
CO₂ – carbon dioxide
CEEP - Commercial Energy Efficiency Pilot (Vietnam)
COLCIENCIAS - Departamento Administrativo de Ciencias, Tecnología e Innovación (public administrative body of Colombia in charge of co-ordinating public policies related to scientific research, technology and innovation)
CONUAEE - Comisión Nacional para el Uso Eficiente de la Energía (Mexican Commission for Energy Savings)
CIURE - Efficient Energy Use Committee (Colombia)
CREG - Comisión de Regulación de Energía y Gas (Colombia's Energy and Gas Regulator)
DEWA – Dubai Electricity and Water Authority
DNP - National Planning Department of Colombia
DOE - Philippine Department of Energy
DBP - Development Bank of the Philippines
E2PO - Energy Efficiency Programme Office (Singapore)
EASe - Energy Efficiency Improvement Assistance Scheme (Singapore)
EGP – Egyptian Pound
EBRD - European Bank for Reconstruction and Development
EC – European Commission
EEA - European Economic Area
EEC - Energy Efficiency Council (Australia)
EECA – Energy Efficiency and Conservation Authority of New Zealand
EECCHI - Energy Efficiency and Conservation Clearing House Indonesia
EED - Energy Efficiency Directive, 2012/27/EC
EEFP - Energy Efficiency Financing Platform (India)
EEIGGRP – Energy Efficiency Improvement and Green Gas Reduction Project (Egypt)

EERF - Energy Efficiency Revolving Fund (Thailand)
 EEPC - Energy Efficiency Promotion Centre (Singapore)
 EESL - Energy Efficiency Services Limited (India)
 EGAT - Electricity Generating Authority of Thailand
 EIB - European Investment Bank
 EMANZ – Energy Management Association of New Zealand
 EMCA - Energy Management Company Association (China)
 ENCON - Energy Conservation Promotion (Thailand)
 ENPAP - Energy Efficiency Practitioners Association of the Philippines
 ENRCON – National Energy Conservation Centre (Pakistan)
 EPC – energy performance contracting
 EPRP - Energy Performance Related Payments
 ESA Canada - Energy Services Association of Canada
 ESC – energy supply contracting
 ESCO – energy service company
 ESP – energy service provider
 EEC –energy efficiency provider
 FBI - Federal Building Initiative in Canada
 FEEED - Framework for Energy Efficient Economic Development (India)
 FOMIN - Multilateral Investment Fund
 FTI- Federation of Thai Industry
 FUDAEE - Fideicomiso Uruguayo de Ahorro y Eficiencia Energética (Uruguayan Energy Efficiency Trust Fund)
 GEF – Global Environmental Facility
 GFEE –Guarantee Fund for Energy Efficiency (Tunisia)
 GIZ – Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
 GTZ - Deutsche Gesellschaft für Technische Zusammenarbeit GmbH (the precursor of GIZ until 2010)
 HVAC - heating, ventilation, and air conditioning
 IADB – Inter-American Development Bank
 IBRD - International Bank for Development and Reconstruction
 IDC – Industrial Development Corporation
 IDM –Integrated Demand Management
 IEC – Integrated Energy Contracting
 IFC – International Finance Corporation
 IEEO –SABA - Iranian Energy Efficiency Organization
 ILS – Israeli Shekel
 IPMVP - International Performance Measurement and Verification Protocol
 JAESCO – Japan Association of Energy Service Companies
 JRC – Joint Research Centre
 KAESCO - Korean Association for ESCOs
 KEMCO - Korean Energy Management Corporation
 KfW – Kreditanstalt für Wiederaufbau (KfW Bankengruppe)
 LBNL - Lawrence Berkeley National Laboratory
 LCEC – Lebanese Centre for Energy Conservation
 LED - light-emitting diode
 m – million
 MAESCO - Malaysia Association of Energy service Companies
 MBOE –millions of barrel of oil equivalent
 MED-ENEC – Energy Efficiency in the Construction Sector Project in the Mediterranean
 MENA – Middle East and North Africa
 MIEEIP - Malaysian Industrial Energy Efficiency Improvement Project

M&V - measurement and verification
 NABERS - National Australian Built Environment Rating System
 NAESCO - National Association of Energy Service Companies (USA)
 NDRC - National Development and Reform Commission (China)
 NADB – North American Development Bank
 NEEAP – National Energy Efficiency Action Plan
 NEEP – National Energy Efficiency Programme (Saudi Arabia)
 NMEEE - National Mission for Enhanced Energy Efficiency (India)
 NREAP - National Renewable Energy Action Plan
 NREL – National Renewable Energy Laboratory (USA)
 NSW - New South Wales
 NZD – New Zealand Dollar
 O&M - Operation and Maintenance
 PAEE20 - National Energy Efficiency Action Plan of Chile
 PECSME - Promoting Energy Conservation in Small and Medium Enterprises (Vietnam)
 PEEI – Energy Efficiency in Industrial Sector Programme (Tunisia)
 PEEP - Philippine Energy Efficiency Project
 PPP – public-private-partnership
 PROURE – Programa de Uso Racional y Eficiente de Energia y Fuentes No Convencionales en Colombia (Energy Efficiency and Renewable Energy Programme of Colombia)
 PTM - Malaysia Energy Centre
 RCREEE – Regional Centre for Renewable Energy and Energy Efficiency
 RE, RES – renewable energy (sources)
 SABA – see also IEEO –SABA
 SAAEs – South African Association of ESCOs
 SAR – Saudi Arabian Riyal
 SEAP - Sustainable Energy Action Plan
 SEDA - Sustainable Energy Development Authority (Australia)
 SEEC – Saudi Energy Efficiency Centre
 SMEs – small and medium sized enterprises
 TAESCO - Taiwan Association of Energy Service Companies
 TES - thermal storage systems
 TESA - Taiwan Energy Service Association
 TGPF - Taiwan Green Productivity Foundation
 UNEP - United Nations Environment Programme
 UNIDO - United Nations Industrial Development Organization
 UNDP - United Nations Development Programme
 UPME - Unidad de Planeación Minero Energética (Colombia)
 USA - United States of America
 USAID – United States Agency for International Development
 USD – United States Dollar
 VAT - value added tax
 VNEEP - Vietnam National Energy Efficiency Program
 WB – World Bank
 ZAR –South African Rand

Table 1. Number of companies and market volumes in the Non EU countries.*

	number of ESCOs in 2013	market size in 2012/2013	market potential estimated in 2013
Africa			
Morocco	3-4	n/a	n/a
Tunisia	10	US\$16 million	n/a
South Africa	50	n/a	US\$1 billion
Asia			
China	2339	US\$ 8,25 billion	US\$14,5 billion
Chinese Taipei	Around 200	US\$ 760 million (in 2010)	US\$3,3 billion
India	114	US\$ 140 million	US\$2,8 billion
Indonesia	16	n/a	n/a
Japan	20-30	US\$ 374 million (in 2011)	US\$20 billion(in2011)
Kazakhstan	1	n/a	n/a
Malaysia	54	n/a	US\$400 million
Pakistan	n/a	n/a	n/a
Philippines	12	below US\$1 million	US\$250 million
Republic of Korea	226	n/a	n/a
Singapore	34	n/a	n/a
Thailand	45	US\$ 100-200 million	US\$ 500 million
Vietnam	2-3	n/a	n/a
Oceania			
Australia	12	AU\$ 72,5 million	n/a
New Zealand	20-30	NZ\$ 8 million	n/a
Middle East			
Egypt	n/a	n/a	n/a
Iran	5	n/a	n/a
Israel	43	n/a	US\$ 1-1,5 billion
Jordan	11	n/a	n/a
Lebanon	2-3	n/a	n/a
Saudi Arabia	5	n/a	n/a
United Arab Emirates	3-4	n/a	US\$ 600 million (only in the building sector)
North America			
Canada	12	US\$ 440 million	
Mexico	10-20	n/a	n/a
USA	Around 40	US\$ 6,4 billion	US\$ 71-133 billion
South America			
Argentina	0	n/a	n/a
Brazil	55	n/a	US\$ 8.78 billion
Chile	15 (29 ?) ²⁶²	US\$ 5 million (2010-2013)	US\$ 350 million
Colombia	8	US\$ 1,45 million/year	n/a
Uruguay	15-20	n/a	US\$ 250 million

Note: please refer to the chapters related to the specific countries for the content of these values. They are quite robust but rarely comparable because of the different content – in case of the number of ESCOs differences are due to the definition of these companies in the given context, and in case of the market sizes, sources include different parts of the value chain and/or calculate or estimate these sizes in a variety of ways

²⁶² Whereas 29 companies are registered as members of the national ESCO association only 15 result to have implemented ESCO projects as of April 2014

Table 2. The development status of the ESCO markets in 2013

Development status in 2013	
Africa	
Morocco	Preliminary
Tunisia	Moderate
South Africa	Moderate (Good)
Asia	
China	Good
Chinese Taipei	Good
India	Moderate
Indonesia	Moderate
Japan	Very good
Kazakhstan	Preliminary
Malaysia	Moderate (Good)
Pakistan	Preliminary
Philippines	Preliminary
Republic of Korea	Developed/Good
Singapore	Good
Thailand	Good
Vietnam	Preliminary
Oceania	
Australia	Good
New Zealand	Moderate
Middle East	
Egypt	Preliminary
Iran	Preliminary
Israel	Preliminary
Jordan	Preliminary
Lebanon	Preliminary
Saudi Arabia	Preliminary
United Arab Emirates (data for Dubai)	Moderate
North America	
Canada	Very Good/Developed
Mexico	Moderate
USA	Developed
South America	
Argentina	Not exist
Brazil	Good
Chile	Moderate (Good)
Colombia	Moderate
Uruguay	Moderate

Note

Table 3. Drivers of ESCO markets in the Non EU countries

	driver* (D-demand; S-supply; F-facilitators)	association (year of establishment if known)	engagement of utility (supply, distribution, etc.) companies
Africa			
Morocco	S&D	No	Yes, starting
Tunisia	D&F	No	Yes, starting
South Africa	S	Yes, one (SAAE est.2004)	Yes
Asia			
China	F&D	Yes, one (EMCA est.2010)	
Chinese Taipei	F	Yes, two (TAESCO and TESA)	No
India	D&F	Yes two(AEEE est.2007& EESL est.2009)	No
Indonesia	F	Yes, one (Apkenindo)	No
Japan	D&F	Yes, one (JAESCO est.1999)	No
Kazakhstan	D&F	No	Yes, starting
Malaysia	D	Yes one (MAESCO est.2000)	No
Pakistan	F&D	No	No
Philippines	D&F	No	No
Republic of Korea	D&F	Yes one (KAESCO est.1999)	Yes
Singapore	D	Yes, one	
Thailand	D&F	Yes, one (Thai ESCO Association est.2012)	No
Vietnam	D	No	No
Oceania			
Australia	D&F	Yes, one(Energy Efficiency Council - EEC)	
New Zealand	F	Yes, one (EMANZ)	Yes, starting
Middle East			
Egypt	F	Yes, one	No
Iran	S	No	No
Israel	D	No	No
Jordan	D	No	Yes starting
Lebanon	F and D	No	No
Saudi Arabia	F&S	No	No
United Arab Emirates (data for Dubai)	S	No	Yes, starting
North America			
Canada	D&F	Yes, one ESA Cnada	Yes
Mexico	D	Yes, one (AMESCO est.2011)	No
USA	D&F	Yes, one (NAESCO est.1983)	Yes
South America			
Argentina	F	No	No
Brazil	S&D	Yes, one (ABESCO est.1997)	Yes
Chile	F&D	Yes, one(ANESCO est.2009)	No
Colombia	D	No	No
Uruguay	D&F	No	Yes, Starting

* The market players (such as energy service supply or demand sides or independent facilitators) that act as the main actors or drivers of the ESCO market growth/transformation are indicated in this column. They are mostly found to successfully perform promotion, information dissemination or other activities with a positive effect on the market.

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