

MitigationMomentum

ESCOs - A Solution to Energy Efficiency in Thailand

A Market Study

Christopher Seeley and Verena Streitferdt

Foreword

This report presents an assessment of the current status and future potential of ESCO activities in Thailand, with an acute focus on Energy Performance Contracting (EPC) for energy efficiency retrofits of existing buildings in Thailand. Based on (limited) available data and selected interviews with practitioners, key stakeholders, and experts we find that the current ESCO market has an annual turnover of around USD60 million, with about 35 active companies with the ability to deliver comprehensive EPC projects. We estimate that by addressing existing barriers, this volume could increase to approximately USD270 million per year, and the number of ESCOs offering EPCs could double, to around 70 within a period of 8 years.

Acknowledgements

The authors would like to thank Xander van Tilburg (ECN) for his editorial support and feedback, and Matt Halstead (ECN), Lachlan Cameron (ECN), James Rawlins (ECN), Monthon Kumpaengseth (GIZ), Ampawa Moonmueang (GIZ), Karun Pantong (GIZ), Milou Beerepoot (GIZ), Arthit Vechakij (EEI, Thai ESCO Association), and ESCO Fund managers for their valuable input and feedback.

Supported by:



Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

based on a decision of the German Bundestag

This report is prepared and published as part of the Mitigation Momentum project.

The contents of this publication do not reflect the views of the German Federal Ministry of Environment, Nature Conservation and Nuclear Safety.

Table of contents

1.	Introduction	2
2.	ESCOs in Thailand	3
	Existing government support	4
	Barriers faced by ESCOs	6
3.	Current market and growth potential	7
	Current market	7
	Growth potential	9
4.	Conclusion and discussion	10
	References	11

1. Introduction

The Thai economy runs mainly on fossil fuels, which make up over 80% of final energy consumption. Access to electricity is almost 100% and the grid reliability is high with only occasional brown outs. Domestic production supplies around 75% of oil and gas, but reserves are limited and imports are expected to increase. This makes the economy vulnerable to global energy price fluctuations. Politically, this is an especially pertinent issue, since over the past decades the economy has suffered from external shocks such as global and regional economic crises. In addition, the population is increasingly affected by the impacts of climate change, causing disruptive droughts and floods throughout the country. Despite efforts to increase energy efficiency, the energy intensity of Thailand's economy has remained constant over the past 2 decades with energy consumption rising at the similar rates of GDP growth. Notwithstanding relatively modest economic growth projections, the power sector is expected to double in size in the next 15 years. Security of supply and climate change awareness are the two main drivers behind the existing strategies on energy efficiency (EE), renewable energy (RE), and power sector development. There is broad consensus that in order to move towards a 'sufficiency economy', a transition to a sustainable, low-carbon energy system is needed.

One of the main pillars of the Thai plan to move to a low-carbon energy system is a reduction of energy demand through increased energy efficiency. Thailand has a strong interest in improving energy efficiency and has identified Energy Service Companies (ESCOs) to play an important part in achieving the ambitions laid out in its 20-year Energy Efficiency Development Plan (EEDP), 2011-2030. Regional experience shows that stimulating ESCO businesses, and especially those ESCOs using Energy Performance Contracts (EPC), can significantly contribute to harnessing energy efficiency potential (Halstead et al., 2015).

To support the ESCO market, the government of Thailand is developing a Nationally Appropriate Mitigation Action1 (NAMA) which aims to address specific financial and non-financial barriers. Information on the current and potential ESCO market in Thailand is fragmented and incomplete and hence it is not clear what the current size of the market is, and what a reasonable level of ambition is for the market size and composition (essential for determining the NAMA ambition). Against that background, the authors compiled existing information on the Thai ESCO market, conducted semi-structured interviews with selected ESCOs and existing customers in April-May 2015, and validated the results at a stakeholder workshop in Bangkok in June 2015. Based on this the authors have made an assessment of the current market, and the future potential that could be unleashed with the NAMA.

[1] With support from GIZ Thailand under the TGP-EEDP project and from ECN Policy Studies under the MitigationMomentum project.

This report first briefly introduces ESCOs in Thailand, followed by a look at existing public support for the ESCO industry and a discussion of existing barriers faced by ESCOs. The authors then present an assessment of the current market and possible growth potential for ESCOs, customers, and investment volumes in Thailand.

2. ESCOs in Thailand

There are different definitions of what constitutes an ESCO and in Thailand the term is used loosely to describe companies providing services that range from basic energy consulting, product sales, and more comprehensive energy efficiency project development and implementation. In this report we are primarily interested in the current market and growth potential for 'performance-based energy services' hence we define ESCOs as '*a company providing energy efficiency and/or renewable energy related services guaranteed by energy performance contracts'.*

There are generally two approaches to performance contracting explained in Box 1: guaranteed savings (GS), and shared savings (SS) contracts.

Box 1: Energy Performance Contracts

An Energy Performance Contract (EPC) is a contract in which the ESCO is paid based on the realisation of energy or cost savings and transfers certain risks away from the customer. There are two common forms of EPCs: *Shared Savings* and *Guaranteed Savings*. Under a Shared Savings contract, the ESCO guarantees a certain level of energy savings from the energy efficiency project, dividing the corresponding energy cost savings between the ESCO and the customer according to a pre-agreed percentage and over a pre-agreed period of time. One essential characteristic of a shared savings contract is that the ESCO takes on the responsibility for financing the project (with a third-party financial institution if necessary). Under a Guaranteed Savings contract, the ESCO guarantees a certain level of *energy savings*, as opposed to cost savings, and the customer arranges the financing for the project. Figures 1 and 2 show the relationship between the parties involved in these two types of EPCs.

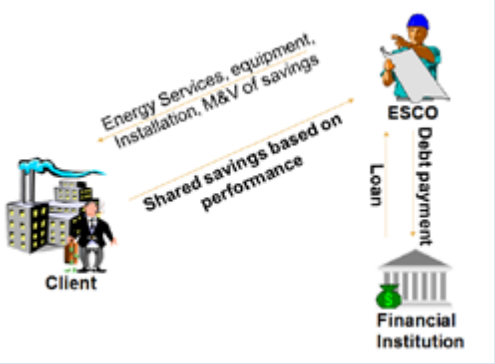


Figure 1: Shared Savings
[Source: IFC, 2011]



Figure 2: Guaranteed Savings
[Source: IFC, 2011]

At the end of 2012, with support from the Ministry of Energy, an industry association was established called the "Thai ESCO Association". Currently (March 2015) it has 25 registered members and it focuses on activities such as training, capacity building, and initiatives to increase the development of the overall Thai ESCO market. Over the past years the market has shown modest

growth especially during recent volatile financial and economic circumstances. As a result of this slowed growth, we have observed a cautious approach taken by some of the larger international ESCOs in Thailand.

Although there have been ESCO-related activities in Thailand for over 15 years, the market remains at relatively early stages of development. Currently ESCOs mainly operate within a business model where the customer finances the EE investment directly (Guaranteed Savings) and thus far the alternative business model, where the ESCO finances the investment (Shared Savings) is hardly used. This can be primarily attributed to the fact that ESCOs face a variety of barriers to accessing appropriate levels of finance. Not all customers are willing or able to finance the EE investments, for simple reasons relating to risk aversion, low capitalization, or competing budget requirements. Government support facilitating access to and availability of funds to finance these EE investments is expected to accelerate the realisation of a substantial potential for energy savings in Thailand.

Existing government support

The basis for the Thai government strategy on energy efficiency is the 20-year Energy Efficiency Development Plan of 2011, which provides long-term national policy guidance on energy conservation. In 2013, the Energy Efficiency Action Plan was approved, in which the explicit goal to reduce energy intensity by 25% by 2030 compared to 2010 levels is formulated (see Figure 3). The EEDP includes an ESCO support programme, and the Energy Efficiency Action Plan (under measure # 8) includes support for ESCO activities to enlarge the ESCO Fund and to develop ESCO resources. The main implementing agency of these objectives is the Department of Alternative Energy Development and Efficiency (DEDE).

Thai government support for energy efficiency is based on the Energy Conservation Act (1992) which outlines three areas for conservation programmes: 1) A compulsory programme for large energy users comprising 4500 commercial and industrial facilities, 2) A voluntary programme for smaller businesses offering capacity and technical support, and 3) The Energy Conservation Promotion (ENCON) Fund. In 2003 the DEDE launched two sub-programmes under the ENCON Fund: a subsidy scheme and the Energy Efficiency Revolving Fund (EERF) providing low-interest loans for energy efficiency investments through commercial banks.

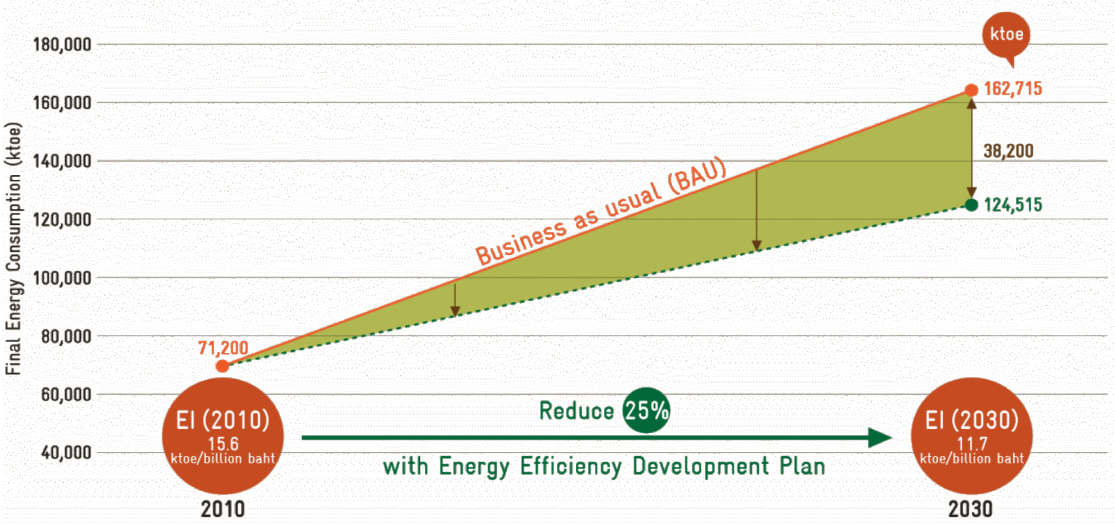


Figure 3: Energy efficiency ambition in the Energy Efficiency Development Plan 2011-2030 [Source: GIZ, based on EPPO, 2011]

Since 2005, the Thai government has actively supported the ESCO market via technical and financial assistance (e.g. tax incentives and the Thai ESCO Fund). The ENCON Fund currently has around USD500 million available to support energy conservation activities and sources between USD140 and USD190 million annually from a levy on fuel (UNDP, 2012). The Thai government receives technical and financial support from several international development organisations; notably from the German Institute for International Cooperation (GIZ) as part of their Thai-German Cooperation Programme (GIZ, 2015).

The ENCON fund provides financing to several initiatives including the Energy Efficiency Revolving Fund (EERF) and the ESCO Fund:

Energy Efficiency Revolving Fund (EERF) (2004-2012; 2015): This fund provided soft loans to banks to on-lend to energy efficiency customers. It is interesting to note that since the EERF ended in 2012 only 1 of the initial 11 participating banks still provides EE lending programs. Failure to shift the underwriting process of the banks away from collateral toward cash flow seems to have been the main problem (Streitferdt & Chirarattananon, 2015). A new phase of the EERF has been approved recently with a total allocation of USD50 million, and is expected to be available for disbursement in early 2016.

ESCO Fund (2008 -2014; 2015): The ESCO Fund provides funds at preferential terms by way of equity investments, venture capital, equipment leasing, and credit guarantee facilities. Overall project investment via the ESCO Fund was USD150 million and data from two initial phases (E for E, 2012) indicated that:

i. The majority of projects used equipment leasing as the preferred financing mechanism for EE projects,
ii. ESCOs were the primary beneficiary in only 6 of the 38 projects financed (many renewable energy projects instead of energy efficiency projects were funded).

iii. Most of the funds were used to finance renewable energy projects, and
iv. The fund was undersubscribed. However, in June 2015, an additional phase of the ESCO Fund was launched with a budget of USD11 million allocated.

Barriers faced by ESCOs

Despite the work of pioneering companies and the support programmes (such as capacity building, training, pilot demonstration subsidies) put in place by the Thai government, ESCOs in Thailand still face barriers that prevent the market from reaching its full potential. Based on the work undertaken by GIZ and the Wuppertal Institute in their support programme for the EEDP (GIZ, 2013; Wuppertal, 2014), and a survey of a selected number of key stakeholders, we identify the following three key barriers:

Lack of Capacity

There is a limited number of ESCOs actively developing and delivering EE projects in the Thai market. The active ones are typically small in size and they lack the resources (technical and financial) required to deliver large projects. There are only a few international ESCOs operating in the Thai market, and they also have limited local capacity and often rely on regional or global resources. There is often an apparent lack of technical expertise when addressing deep retrofits, with ESCOs often only offering solutions in a single technology range (only air-conditioning or lighting). Furthermore, there is certainly a lack of Monitoring and Verification (M&V) experience and expertise within most ESCOs in Thailand – something essential to delivering a successful EPC.

The DEDE (2013) report shows that a mere 7% of all designated industrial facilities and only 3.5% of all designated commercial buildings in Thailand have actually used ESCO services despite clear mandates to address energy efficiency.

Lack of Trust

A recent survey of (potential) ESCO clients shows that over 50% have difficulty understanding the proposals put forward by ESCOs, and doubt the motivations and information communicated by these ESCOs. The fact that currently many of the ESCOs are also technology manufacturers adds to the perception that the solutions they are offering may be influenced by their own commercial interests, and not necessarily the best solution for the customer.

Access to Capital

Energy efficiency investments require relatively high upfront capital investments. This is recognized internationally and presents challenges in Thailand as well as in other markets all over the world. In Thailand, ESCOs are reported to provide technical consulting services, with only a small fraction delivering Guaranteed Savings projects (13%) and Shared Saving projects (3%) (FTI, 2013). The capitalization of ESCOs in Thailand is still very limited, and this further limits their ability to provide financing, or provide guarantees, for projects. It was discovered that 67% of ESCOs in Thailand are only able to provide guarantees of up to a maximum of USD1 million (Seeley, 2014) and do not have a strong enough balance sheet to provide sufficient collateral to enable the ESCO to take out the

loans. Hence, even the ESCO Fund has not been able to provide direct finance to ESCOs and has mainly resorted to leasing contracts as a means of providing capital.

These barriers pose serious limitations to the ability of ESCOs in Thailand to grow the market for EPC projects.

3. Current market and growth potential

As indicated in the introduction of this report, there is limited data available on energy savings potential across industries in Thailand as well as on successful EPC projects that have been developed by ESCOs. A major challenge is that the available project data consists of both energy efficiency and renewable energy projects, and encompasses projects delivered as an EPC, as well as more simple technology supply and installation projects.

Current market

The first step is to determine the number of ESCOs; i.e. those companies that offer EPC based services. The Federation of Thai Industries (2014) lists 58 companies providing energy services, of which 38 are currently active and 20 qualify as ESCOs if we use the narrow definition introduced above. Interviews with ESCOs and stakeholders indicate that between 20-40 Thai companies and 10 international ones offer ESCO based services.

The number of EPC projects and their contract value listed in publicly available sources is around 300 in the past decade (ReExCapital, 2014; FTI, 2014; ADB, 2014). Figure 4 shows that of the 233 projects using performance contracting in the period 2011-2013, 38% were in the commercial buildings sector, and 62% in industry. Figure 5 illustrates the total investment amounts for EPC projects implemented from 2011 to 2103. It is clear that projects delivered according to the Shared Savings model are significantly smaller than those using guaranteed savings (by an order of magnitude), while the investments per project in the industrial sector typically higher than those in commercial buildings.

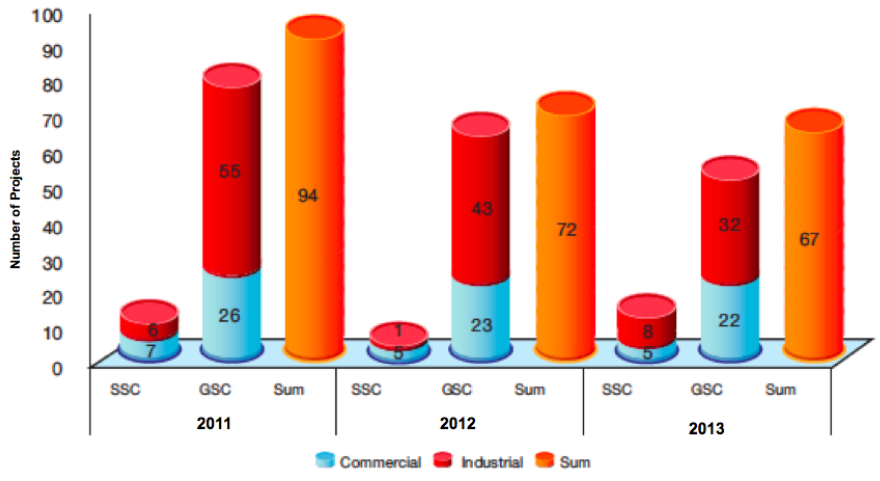


Figure 4: Total Number of EPC Projects implemented in Thailand 2011-2013 (FTI, 2014)

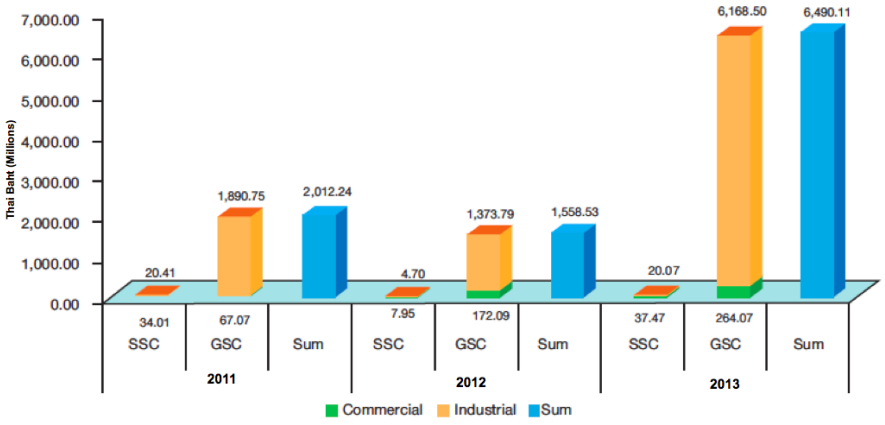


Figure 5: Total Value (THB) of EPC Projects implemented in Thailand 2011-2013 (FTI, 2014)

We have analysed project data from the first two phases of the ESCO Fund; Figure 6 reveals that many of the energy efficiency projects are relatively small in size. From the sample of 33 projects it was found that 25% were in the investment range of USD0 to USD50,000, 50% between USD50,000 to USD200,000 and only 25% had a project investment of over USD200,000 (ESCO Fund, 2015).

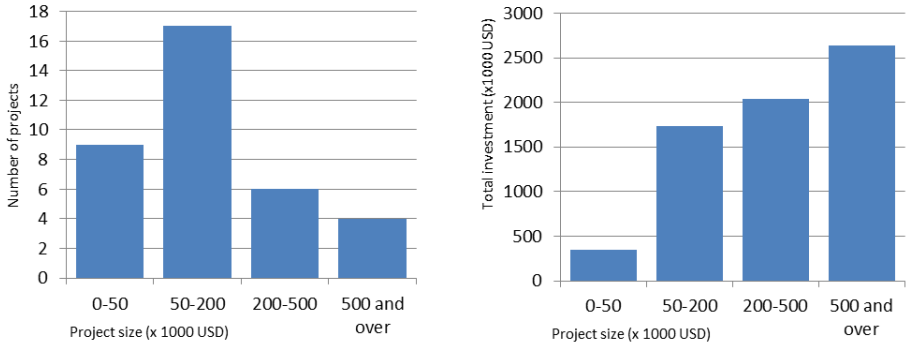


Figure 6: Energy efficiency projects from Phases 1 and 2 of the Thai ESCO Fund
[Source: Thai ESCO Fund]

Similarly, data obtained from the EU Switch Asia project working on the supply chain for the automotive industry in Thailand shows small project sizes: in a sample of 91 projects[2] over half were investments of USD5,000 or less and only 15% exceeded USD20,000. These projects were not based on performance contracting.

[2] Though it should be noted that that project focused on SMEs in the automotive supply chain, so it can be expected that the identified actions would be more modestly sized.

That leads to the question of what is the minimum investment required to make an EPC a cost effective delivery model for a project. Literature and interviews with stakeholders suggests that in Thailand investments of at least USD150,000 lend themselves favorably towards using an EPC. This is confirmed by a recent analysis of 44 EPC projects implemented in Thailand over the period 2005-2014 (Seeley, 2014) where the average investment per project was USD437,000 and only 10 projects implemented were below USD150,000. One of the large ESCOs operating in Thailand reported a portfolio of 13 projects in the investment range of USD125,000 to USD500,000 with 8 of the projects indeed under USD275,000.

Based on our analysis, and feedback from the NAMA workshop held in Bangkok in June 2015, we estimate that the total annual market size at present is around USD60 million with a total of 35 active ESCOs. Based on discussions we may also assume that 20 ESCOs could be described as 'small' and can implement EPC projects of up to USD300,000. Ten are 'medium' with the ability to deliver EPC projects up to US500,000 and at present only 5 ESCOs are able to deliver EPC projects of over USD750,000. We would like to reiterate that this is a rough estimate based on limited available data and interviews with selected ESCOs and (potential) clients.

Growth potential

Industrial energy efficiency investments typical have the shortest payback periods (around 3 years) followed by investments in commercial buildings with payback periods of around 7 years. ReEx Asia (2011) shows that within the commercial buildings sector, the highest potential for energy efficiency investments in Thailand can be found in the hospitality sector (i.e. hotels), followed by retail malls and office buildings. Another study by ReExCapital Asia (2010) shows that the hospitality sub-sector in Thailand has significantly higher savings potential than in neighboring countries. Among Thai industries, figures indicate that the food and beverage and the textile sectors harbor the largest investment potential.

According to detailed ESCO analysis by Seeley (2014) and experience in similar markets, we assume that there is a stable relationship between energy savings potential and capital invested: reduction of one giga-watt-hour (GWh) requires an investment of around USD325,000. From the market projections above this would lead to a potential for ESCOs to reduce annual energy consumption by 415 GWh per year by the year 2019 and 830 GWh per year by 2023. This could lead to an emission reduction of approximately 208,000 and 416,000 tons of CO_2e in 2019 and 2023 respectively.

The total investment potential on the other hand is significant: ReEx Asia (2011) shows that the total potential for energy efficiency investments is around USD1.1 billion in the industrial and commercial sectors combined. Expert interviews consistently mention that availability of economically viable project opportunities is not the limitation, but that the market is constrained by the number ESCOs and the barriers mentioned in the section above (especially in relation to financing). The three types of barriers are interrelated and it is difficult to assess how much addressing each one of these barriers will contribute to releasing the investment potential.

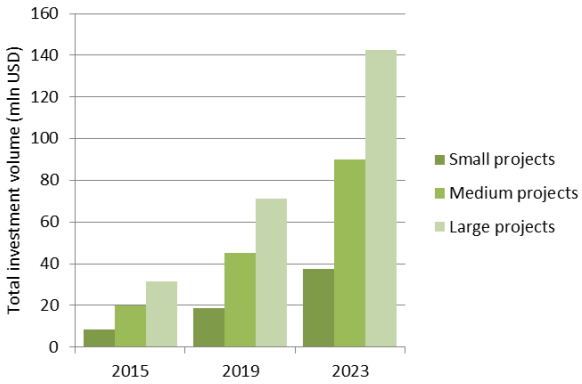


Figure 7: Estimated investment potential for EPC in Thailand [Source: Authors]

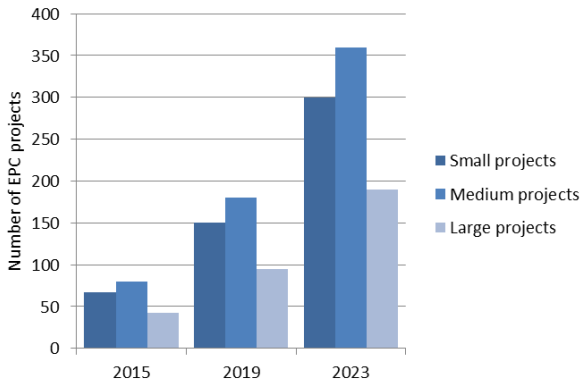


Figure 8: Estimated number of EPC projects in Thailand [Source: Authors]

In the estimates shown in figure 7, we assume that small projects are around USD125,000, each medium-sized projects are USD250,000 each, and large projects have an average investment size of USD750,000 each.

4. Conclusion and discussion

Ideally, and over time, all of the existing barriers need to be addressed in order to accelerate the market transformation for increased energy efficiency in Thailand. For now, we make the conservative assumption that with an increased and concerted effort by the government, combined with international support, the number of energy efficiency retrofit projects implemented can be doubled within the next 4 years, reaching a total volume of USD135 million without requiring a drastic increase in the number of ESCOs in Thailand. In the coming eight years, the total number of ESCOs has the potential to double from the current 35 to an estimated 70 (with a similar size distribution) and EPC contracts representing a total of approximately USD270 million per annum. In Thailand, the market is characterized by a proactive government with extensive policies supporting energy efficiency, especially ESCOs. At the same time, there is a track record of retrofit projects delivered by ESCO using EPCs. This experience, coupled with the availability of energy efficiency technologies and a strong local technical expertise, has the potential to shift the needle in the right direction. Finance (the availability and ease of access to) will be a fundamental part of the formula that must be addressed if the market is to achieve its true potential. However, with continued international support, and collaboration with key stakeholders, Thailand remains one of the best-placed countries in the region to lead the much-needed shift towards an energy efficient, and sustainable economy.

References

ADB (2013) *Energy Efficiency Finance*, ADB Private Sector Operations Department, Bangkok, 2013.

CCAP (2012) Case study: Thailand's Energy Conservation (ENCON) Fund, Washington DC, October 2012.

FTI (2013) *ESCO Business Annual Report* (in Thai), Federation of Thai Industries, Bangkok, 2013.

GIZ (2013) Assessing Framework Conditions for ESCOs – in developing and emerging countries guideline, Zellner and Saravanja (eds), Eschborn, June 2013.

GIZ (2013) Project Brochure Thai German Programme in support of the Energy Efficiency Development Plan 2011-2030, Bangkok, 2013.

GIZ (2014) ESCO Market Development with GIZ – experiences from emerging and developing countries, presented by Simon Zellner, Seoul, October 2014.

Goldman, Hopper, and Osborn (2005) *Review of U.S. ESCO Industry Market Trends: An Empirical Analysis of Project Data*, LBNL Berkeley, January 2005 [link].

IFC (2011) Energy Service Company Market Analysis, revised version, 2011.

Ministry of Energy (2011) Thailand 20-year Energy Efficiency Development Plan 2012-2021 (AEDP), Bangkok February, 2011.

Ministry of Energy (2012) Renewable and Alternative Energy Development Plan 2012-2021 (AEDP), Bangkok April, 2012.

ReExCapital (2011) South East Asia Energy Efficiency Market report 2011, Singapore, 2011.

Roland Berger (2011) Market Potential of Energy Efficiency in Southeast Asia, Singapore, November 2011

Seeley, C., (2014) Analysis of the Thai ESCO market (not public), Bangkok, 2014.

Streitferdt and Chirarattananon (2015) Energy Efficiency Finance Support in Thailand - Lessons Learned from the Energy Efficiency Revolving Fund, Journal of Sustainable Energy & Environment 6 (2015) 13-16.

UNDP (2012) *Climate Public Expenditure and Institutional Review Thailand*, Bangkok, June 2012 [link].

Wuppertal (2014) Energy Service Companies (ESCOs) - Task 5 report of the ESCO TGP-EEDP programme, Wuppertal, January 2014.

Thai ESCO Association (2015) Study to analyze and assess the market potential of ESCOs in Thailand (in Thai), Bangkok, February 2015.

Contact

www.mitigationmomentum.org

Supported by:

Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety

based on a decision of the German Bundestag

Xander van Tilburg
Senior Researcher
ECN Policy Studies
M: +62 (0) 812 8266 8876
vantilburg@ecn.nl

Katja Eisbrenner
Unit Manager International
Climate Policies, Ecofys
M: +49 (0) 172 2973 731
k.eisbrenner@ecofys.com