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South East Asia Energy Efficiency Market report 2011



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This report provides general information only. Neither the information nor any opinion expressed constitutes an offer or an invitation to make an offer, to buy or sell any securities or other investment or any options, futures or derivatives related to such securities or investments.

It is not intended to provide investment advice and it does not take into account the specific investment objectives, financial situation and the particular needs of any specific person/entity who may receive this report. Interested investors should seek financial advice regarding the appropriateness of any investment strategies discussed or recommended in this report and should understand that statements regarding future prospects may not be realized.

While comparisons have been made between countries using attractiveness scores, it should be emphasized that due to the different weightings and parameters used, these cross-comparisons are of a narrative nature only and that there is significant variation between business analysts' forecasts and views on each market.

1. Executive Summary

This South East Asia Energy Efficiency Market Report compares the potential of six countries in the South-East Asian region as possible destinations for investments in Energy Efficiency projects. This report will be useful to financial investors interested in making investments in the Energy Efficiency sector in the region, to equipment manufacturers, services providers and consulting firms operating in the Energy Efficiency sector by helping them identify attractive markets to expand into and to policy makers or industry bodies interested in understanding the prevailing situation of the Energy Efficiency sector in South-East Asia.

The six countries considered are Singapore, Malaysia, Indonesia, Philippines, Vietnam and Thailand. The analysis is restricted to the industrial and commercial sectors in these countries as the other sectors (for example transportation) have very unique investment requirements and challenges that make them less conducive for near-term, commercially-driven investment.

A country's attractiveness as an investment destination depends not just on the investment potential for Energy Efficiency projects (EEPs) in the country (defining the market size), but also on the degree to which these efficiencies can be captured and realised for the investors (quantified in this report in terms of Payback Period). In addition, as in any other business sector, it is also important to assess these financial returns against the general investment climate in the country, i.e. the regulatory and legislative support for the intended investment and supply-side dynamics (in this case the maturity of the ESCO sector). The report identifies a number of key points for those looking to enter this market:

Market Profitability

The underlying premise for attractive energy efficiency investments is that they are more profitable where energy costs are high. Those countries which employ fuel subsidies may attract energy intensive industries but this low cost energy is counter-intuitive where there is also pressure to increase energy efficiency – it neither encourages energy savings nor offers significant investment returns where improved efficiency is considered.

Regulatory Environment

The role of the Energy Service Company (ESCO) and the ability to succeed with some form of “shared savings” contracts requires that countries have an appropriate and robust regulatory framework. This varies throughout the region and while not necessarily a deterrent, does reduce the relative attractiveness of those countries where regulation is less developed. The immaturity of local ESCOs may well offer opportunities or participation in evolving markets.

Country Ranking

Based on the analysis of the market it is suggested that Singapore, Philippines and Vietnam, offer the most attractive market profitability, while Malaysia, Indonesia and Thailand have the largest gross market size. However, Indonesia and Vietnam are considered to be less attractive as investment destinations given the less favourable environment for Energy Efficiency projects.

Key Results

Key Result 1: Market Size as measured by Investment Potential

Size of the economy is important, but the extent of industrialization, development of commercial space for offices, hotels and shopping malls and the exchange rate of the local currency are also equally important in determining Investment Potential.

From a pure market sizing standpoint, the report identifies Malaysia, Indonesia and Thailand as the countries with the largest investment potential in the region.

However, the rankings within the industrial and commercial sectors when considered separately are different, as shown in the table below.

Investment Potential seeks to quantify the dollar value of the investments required to implement all potential Energy Efficiency projects in a country, defining the **GROSS** market size.

As would be expected, in comparing the demand within any country for Energy Efficiency investments there is a broad correlation with the size of the economy, the degree of industrialization and the development of the commercial sector. The larger the degree of industrialization, the larger is the energy footprint of the economy itself, and therefore, the potential market for Energy Efficiency projects.

For the industrial sector, the determinants are the degree of industrialization of the economy and the presence of energy intensive industries within the sector. For the commercial sector, the determinants are the category of commercial space that is most developed (for example, the Hotel sub-sector generally has greater investment potential than the Commercial office sub-sector).

Investment potential rankings (1=Highest; 6= Lowest)

	Industrial sector Ranking	Commercial sector Ranking	Overall Ranking	Economy size ranking¹
Singapore	3	3	4	4
Malaysia	2	1	1	3
Philippines	6	5	6	5
Thailand	4	2	3	2
Indonesia	1	4	2	1
Vietnam	5	6	5	6

Key Result 2: Profitability as measured by Payback period

Payback period is dependent mainly upon prevailing energy tariffs, but also, to some extent, upon the energy intensity of the dominant industry sub-sectors and the exchange rate of the local currency

In the industrial sector, Philippines and Singapore offer the shortest Payback period.

In the commercial sector, Vietnam offers shortest paybacks even though energy tariffs in Singapore and Philippines are higher. This is because the commercial sector of Vietnam is dominated by the Hotels sub-sector, which offers the shortest payback period among all categories in the Commercial sector, whereas, Singapore and Philippines have a more even presence of all the other categories. The energy intensity and the potential for realizing energy savings in Hotels is much higher than other sub-sectors in the Commercial sector because of certain special characteristics that the sub-sector has, such as 24*7 operational and hot water requirements, wasteful habits of guests etc. Vietnam's large Hotels sub-sector, therefore, propels Vietnam's commercial sector to the top of the rankings.

An analysis of the Payback period provides an estimate of the return investors could earn on money invested in Energy Efficiency projects. The shorter the pay-back period, the more profitable projects will be for the investor.

¹Economy size ranking based on GDP figures from 2008; Source: <http://www.gfmag.com/gdp-data-country-reports.html>

Not all Energy Efficiency projects implemented in different sectors generate equal Paybacks and discerning investors will choose the shorter Payback period (and therefore, higher return) sectors to invest in.

The table below illustrates the rankings of the countries by sector and overall.

Payback Periods (1=Shortest; 6= Longest)

	Industrial sector Ranking	Commercial sector Ranking	Overall Ranking	Energy tariff ranking²
Singapore	2	2	1	1
Malaysia	3	5	4	4
Philippines	1	3	2	2
Thailand	3	4	4	5
Indonesia	4	5	5	5
Vietnam	5	1	3	3

Key Result 3: Regulation and ESCO Maturity

Stable Regulatory Environment and ESCO sector development hold the key

From the perspective of the current ESCO sector development, Thailand appears to be the most advanced, with Singapore in second place. Malaysia and Philippines are tied for the third. Indonesia, along with Vietnam are considered to have an under-developed ESCO sector. It is worth noting that the relative immaturity of the ESCO market in the countries surveyed does in itself offer potential opportunities for investors / businesses that can bring these skills, or are interested in building such local capacity.

While the prospect of high financial returns is a key decision driver, it is equally important to keep in mind the prevailing regulatory environment in the investment destination and the development of supporting supply-side environment (in this case the Energy Services Companies or ESCO sector).

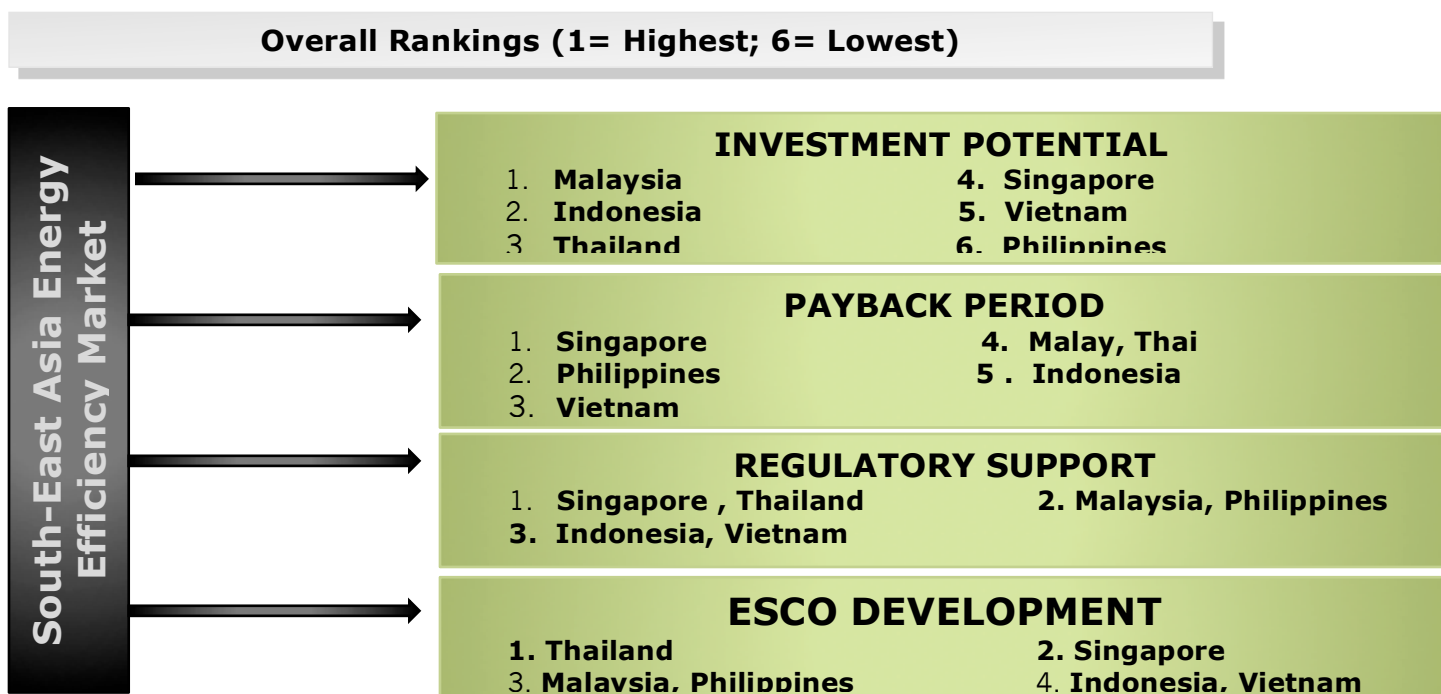
²Energy Tariff Rankings: 1= Highest energy tariffs; 6= Lowest Energy Tariffs

Based on the criteria of a supportive regulatory environment, Thailand and Singapore appear to be the top countries with Philippines and Malaysia tied for the second place. The regulatory environment in Indonesia and Vietnam is considered to be less attractive.

Specialist companies (generally referred to as Energy Service Companies - ESCOs) that can implement Energy Efficiency Projects are a critical element in the development of a mature energy efficiency market and are seen as essential to be able to realise the full returns potential. Without this essential supply-side capacity, the onus of implementing the projects falls on the end-consumers of energy, who may not have the capabilities required.

Summary of Key Results

The key results are summarized in the following illustration:



Conclusions from Key Results

As might well be expected, the four countries that have the most favourable regulatory environment (Singapore, Malaysia, Thailand and Philippines) also have the best supply-side situation in terms of ESCO development. Since these two factors have the most influence on the risk profile, and, therefore, the feasibility of the investment opportunity, it is recommended that investors first focus on these four countries and gradually expand their focus into the other two countries (Indonesia and Vietnam)³

The table below illustrates the top 3 sub-sectors in both industrial and commercial sectors that are considered to have the largest investment potential for Energy Efficiency investments in the short listed countries:

Top 3 sub-sectors, by country (US\$ million)

	Market Size Industrial sector	Top Sub-sectors	Market Size Commercial sector	Top Sub-sectors
Singapore	521	Pharma, Semi-con, Petrochem	582	Commercial offices, Hotels, Retail Malls
Malaysia	530	Inorganic Chems, Rubber and Food, Beverage & Tobacco	907	-same-
Thailand	417	F&B, Automobile manufacture, Textiles	706	-same-
Philippines	294	F&B, Chemicals, Textiles	499	-same-

NOTE: Not surprisingly, energy intensive industry sectors like Pharmaceuticals, Semi-conductor and Chemicals in Singapore and Philippines have the greatest investment potential. However, it has to be noted that Energy Efficiency projects can be difficult to implement in these sectors because of high risk of operational disruption and the short pay-back period requirements of end-users in these sectors because of the cyclical nature of their businesses. It might be easier to start with a sector such as F&B or Textiles in the Philippines even though it might have a slightly lower investment potential than Pharma or Semi-conductor.

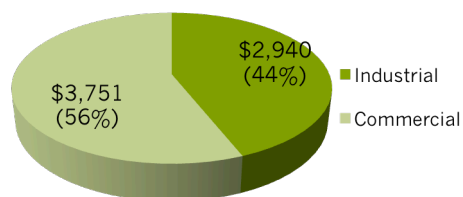
³Indonesia offers one of the largest markets for Energy Efficiency investments but it has to be noted that the Indonesian government has repeatedly publicised perhaps unrealistic goals for economic development, for the improvement of the regulatory environment. and its energy conservation goals. Because the regulatory objectives frequently change and decision makers do not demonstrate enough consistency, investors might benefit from deferring their investment in this market.

Brief Analysis of Key Results

Investment Potential (Market Size)

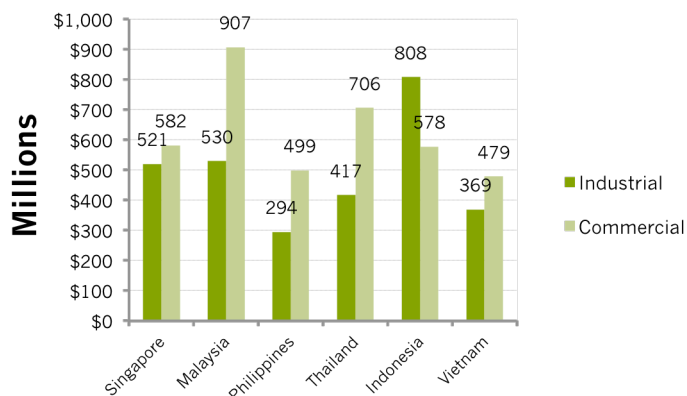
Investment potential refers to the total dollar value of the Energy Efficiency projects in the region or country. It has to be noted that the investment figures are restricted to the industrial and commercial sectors in these countries as the other sectors (for example transportation) have very unique investment requirements and challenges that make them less conducive for near-term, commercially-driven investment.

Total Investment Potential (in US\$ million)



The total market size for all the six countries together is about US\$6.7 billion; Industrial sector opportunity is US\$2.9 billion or 44%; Commercial sector is US\$3.7 billion or 56%

Investment Potential, by country (in US\$ million)



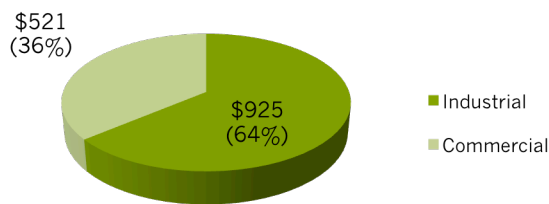
The industrial sector opportunity appears to be comparable to that of the commercial sector in all countries; Malaysia, Indonesia and Thailand are the top 3 countries with the largest market size.

Payback Periods (Profitability)

As discussed earlier, not all Energy Efficiency projects have equal Payback periods and discerning investors will choose the shorter Payback and, therefore, higher return projects.

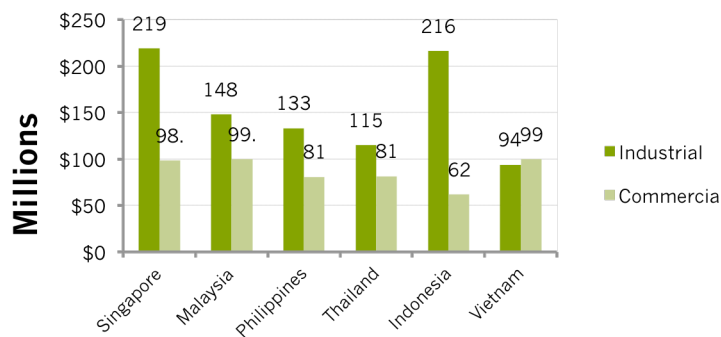
Payback period determines the break-even time for an investor to recoup his investment. Paybacks are calculated by comparing the **Savings potential** with the Investment potential. Savings potential refers to the absolute dollar figure realizable through energy savings arising out of Energy Efficiency investments

Savings potential (in US\$ million)



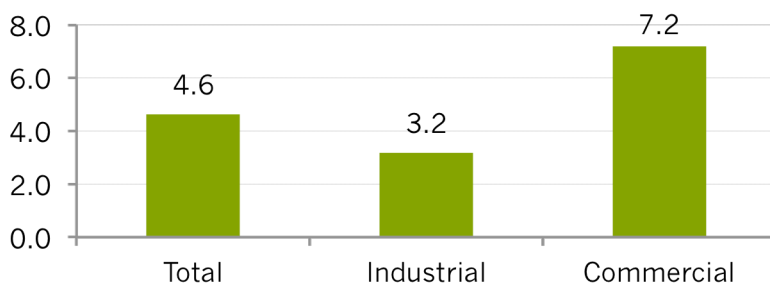
The dollar value of the annual savings potential for the 6 countries together is about US\$1.4 billion; 64% from the industrial sector; 36% from the commercial sector

Savings potential, by country (in US\$ million)



Clearly, the industrial sector offers much higher savings potential than the commercial sector; Indonesia, Singapore and Malaysia offer the highest savings potential

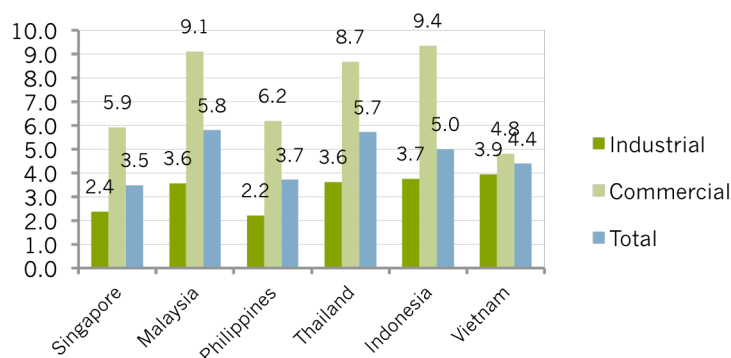
Payback period (in years)



On an average, Energy Efficiency projects in the region offer payback of 4.6 years; 3.2 years for industrial and 7.2 for commercial

Clearly, the industrial sector offers shorter Payback periods and, therefore, higher returns in all countries. Overall, Singapore, Philippines and Vietnam appear to offer the best Paybacks for Energy Efficiency projects. If just the industrial sector is considered across all countries, Singapore, Philippines, Malaysia and Thailand offer the shortest payback period, while if only the commercial sector is considered, Singapore, Philippines and Vietnam appear to offer the best Paybacks.

Payback period, by country (in years)



Best Paybacks Overall:
Singapore, Philippines,
and Vietnam;

Best Paybacks Industrial: Philippines,
Singapore, Malaysia and
Thailand;

Best Paybacks Commercial: Vietnam,
Singapore, and
Philippines

Regulatory Support

While financial feasibility is undoubtedly the most important investment decision driver, it is critical to assess the regulatory and policy environment in each country to determine the type of risks involved in the investment process.

The report analyses the regulatory environment in each country, also under four major themes. Thailand and Singapore are jointly tied for the first place, offering the best regulatory framework for investors to operate in. Malaysia and Philippines are jointly tied for the second place. Interestingly, apart from Thailand, which has put in place a mature financing scheme for Energy Efficiency, and Malaysia, which operates a loan scheme, none of the other countries have any form of focused financing mechanism for the sector.

Regulatory Environment, by country

	<u>Energy Subsidies</u>	<u>Incentives</u>	<u>Financing</u>	<u>Ranking</u>
Singapore	No	Yes	No	1
Malaysia	Yes	Yes	Yes	2
Philippines	No	No	No	2
Thailand	Yes	Yes	Yes	1
Indonesia	Yes	No	No	3
Vietnam	Yes	No	No	3

ESCO Development

From the ESCO sector development perspective, Thailand appears to have the most mature ESCO industry; followed by Singapore. Malaysia and Philippines tie for the next place. It should be noted that in the region the term energy service company (ESCO) can refer to a broad spectrum of potential service providers and does not specifically reflect the common international definition of ESCOs which work under performance and shared-savings contract mechanisms.

Key Sub-sectors

The next table lists the investment and return levels associated with the top sub-sectors from the short-listed countries.

The table highlights that the Semi-conductor industry sub-sector in Singapore and the Chemicals sub-sector in the Philippines offer the best returns of 44% and 49% respectively and represent the best investment opportunities in the region. On an average, Singapore and Philippines offer the best returns on an aggregate basis for all sectors.

Key sub-sectors, Industrial Sector

	<u>Market Size (US\$ million)</u>	<u>Paybacks (years)</u>
Singapore		
Pharmaceuticals	99	3.0
Semi-conductors	81	2.3
Petrochemicals	46	3.0
Malaysia		
Inorganic Chemicals	61	4.0
Rubber & Related	60	2.7
Food, Beverage & Tobacco	48	2.5
Thailand		
Food & Beverage	127	3.2
Automobile manufacture	99	3.4
Textiles	82	5.9
Philippines		
Food & Beverage	109	2.6
Chemicals	42	2.0
Textiles	31	3.1

In the commercial sector, the Hotels sub-sector in Singapore and Philippines represent the best opportunities for investors in terms of Paybacks generated. Interestingly, the same two countries are considered as the best investment destinations for the industrial sector also. This is because energy prices in these economies are market based, whereas energy prices in many of the other four countries reflect heavy subsidies, discouraging the growth in energy savings through a natural demand for highest efficiencies.

Key sub-sectors, Commercial Sector

	<u>Offices</u>	<u>Hotels</u>	<u>Retail malls</u>
Singapore			
Market Size (in mil US\$)	99	141	342
Paybacks (in years)	5.0	3.4	8.0
Malaysia			
Market Size (in mil US\$)	70	510	327
Paybacks (in years)	9.8	6.8	15.8
Thailand			
Market Size (in mil US\$)	22	566	118
Paybacks (in years)	10.4	7.2	16.6
Philippines			
Market Size (in mil US\$)	36	168	295
Paybacks (in years)	5.4	3.8	8.7

2. Objective of Report

The objective of this report is to evaluate the market feasibility of energy efficiency investments in the following six countries: **Indonesia, Malaysia, Philippines, Singapore, Thailand** and **Vietnam**. This assessment is seen as a forerunner to the possible establishment of a purpose designed energy efficiency investment facility in the region.

A focus of the study, using the information gathered and made available, is to improve the informational transparency of the regional energy efficiency market. These objectives are to be achieved through an:

- In-depth study on the market potential of energy efficiency investments and the corresponding savings that can be achieved in each of the 6 short listed countries
- Identification of the key stakeholders within the energy efficiency environment in each country
- Assessment of the energy service companies' (ESCOs) capacity to support and sustain the energy efficiency investments in each country through effective implementation and long term operations and maintenance
- Assessment of the regulatory structure of each country and the barriers/support available in developing energy efficiency.

By making the market analyses and information available, the report aims to stimulate interest from foreign energy service companies (ESCOs) and financiers in participating in the respective country's energy efficiency market development. Besides providing the information for ESCOs and financiers, the capacity assessment undertaken in this report will highlight the areas of development and will serve as the basis for the capacity building in the later phases.

2.1 Structure of the Report

The report addresses four main areas:

1. Market Potential
2. Key Stakeholder Map
3. ESCO Industry Assessment
4. Regulatory Capacity Assessment

Building on these reviews, an overall feasibility assessment of energy efficiency investment will be made for each of the 6 countries.

2.2 Definitions

Market Potential

The market potential refers to the overall market for energy efficiency project (EEP) implementation and savings in the industrial and commercial sector of each country. The market potential provides an overview of the available market in each country (i.e. the market that qualifies for energy efficiency implementation and the corresponding savings achievable) but does not provide an estimate of the immediately penetrable market or percentage of market that has already been penetrated. The market potential in this report doesn't include potential energy savings arising out of cogeneration, and therefore, may substantially undervalue the market size in some countries.

Investment Potential

The investment potential seeks to quantify the capital investment required for energy efficiency projects in-country. It is assumed that the greater the capital investment required, the more likely it is that there would be an unmet demand for funding. The corollary is that the capital investment demanded is an indicator of the demand for energy efficiency investment. Investment potential is expressed in million US\$ in this document.

Savings Potential

The savings potential looks to quantify the annual savings (both kWh and dollar) that is potentially achievable as a result of the EEP investment committed. In turn, the savings potential is an indicator of potential returns from investments made in the market. Savings potential is expressed in million US\$ in this document.

Internal Rate of Return - IRR

The IRR from investment for each specific country and industry can be calculated using the country/industry specific demand for energy efficiency investments (Investment Potential) and the savings which can be generated as a result of EEP investments. In this study, the IRR assumes an investment horizon of 5 years, with the implicit assumption that savings from the EEP are available for 5 years and will then cease (as far as the investment analysis is concerned).

Payback

Although a 5 year horizon has been assumed for the IRR calculation, many energy efficiency retrofits have payback duration of greater than 5 years. In the analyses, the average payback for each industry is provided representing the estimated number of years required for any energy efficiency investments to break even.

Industrial and Commercial Market Potential

The market potential assessment has been split into separate components based on the two targeted industries: the **Industrial sector** and the **Commercial Sector**. Due to the distinct characteristic of the two sectors, the methodology and information fields used in calculating the market potential are different. A separate assessment of the two sectors is carried out below.

3. Industrial Sector Market Potential

3.1 Key Findings for the Industrial Sector

The industrial sector has been noted to be responsible for one third of primary energy use⁴; in 2007, the International Energy Agency published a report which estimates that should proven technologies and best practices be implemented worldwide, industrial energy use could be further reduced by 25 to 30 percent⁵.

The industrial sector market potential calculation (expressed in million US\$ in all cases) has identified the following industry sectors as key energy efficiency investment targets for the region:

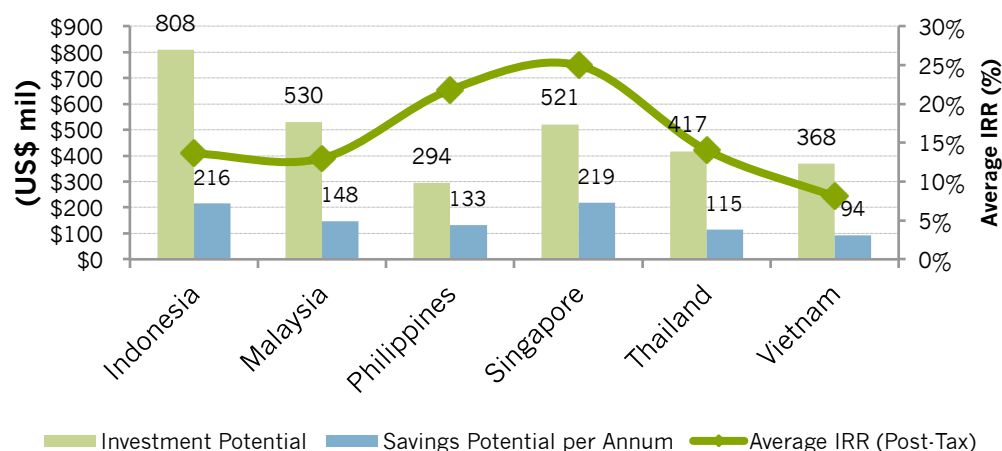
- Petroleum
- Chemicals and chemical products
- Food products and beverages
- Non-metallic minerals⁶
- Motor vehicles

⁴ UN Energy Efficiency Cluster (2009), Policies and measures to realize energy efficiency and mitigate climate change

⁵ International Energy Agency (2007), Tracking Industrial Energy Efficiency and CO₂ Emissions

⁶ Non-metallic minerals include industries like: Cement, Glass and Clay

Industrial Sector Market Potential



Based on the market sizing, **Indonesia** has the largest Industrial Investment Potential of **US\$808 million** followed by **Malaysia (US\$529million)** and **Singapore (US\$521million)**. This can be attributed to the large industrial GDP output of the 3 countries⁷. In addition, the presence of large, energy intensive industries in these countries also boosts the energy efficiency investment potential. The notable energy intensive industries present in the 3 countries are:

- Basic metal mining and processing
- Non-metallic mineral products manufacturing⁸
- Wood and wood pulp manufacturing

However, the high investment potential does not automatically translate to higher potential savings. Based on the savings potential, **Singapore** and the **Philippines** have the **most attractive returns** to investment as shown by the high post-tax average **IRR**. The difference in IRR amongst the 6 countries can be attributed to the difference in economics of investment, influenced by local energy costs in particular. This is reflected in the fact that Singapore and the Philippines also have the highest electricity tariffs⁹ - reflecting real costs and noted to be at least US\$0.05/ kWh higher than the other countries in the study. This confirms previous

⁷Please refer to Appendix A for the GDP output of each of the 6 countries

⁸Includes the following industries: Cement, Glass, Clay

⁹Refer to Appendix 1

research that optimum project returns occur in countries that do not provide energy subsidies¹⁰.

3.2 Industrial Sector – Methodology

Given the lack of extensive studies on energy efficiency project (EEP) implementation across the industrial sector in the region, there are no actual figures on the potential for energy efficiency investments in this sector for the countries studied, nor is there any reliable quantification of the corresponding dollar savings resulting from the EEP investments. As a result, a reference indicator¹¹ was used to estimate the investment potential and savings potential per industry in each country.

The reference indicator used has to demonstrate a strong relationship with energy consumption and should be a common denominator across the industries and country. Findings from previous empirical studies have indicated a strong relationship between energy use, CO₂ emissions and the GDP output¹². Based on the above, the **GDP dollar output** of each industry per country was used as the reference indicator for calculation of the industry/country investment and savings potential.

3.3 Findings for Industrial sector by country

In this section of the analysis, we examine some of the key sectors within each country in terms of investment potential. Industrial sectors that have not been included consisted of activities that were too broad in scope to allow for any useful energy use description.

For each country a brief introduction of activities is provided, covering the top few industrial sectors in terms of investment potential, listing key players, and, where appropriate, providing some of the common EE recommendations for the industry.

Energy efficiency retrofit data is based on recommendations made according to “times recommended” for a specific industry sector according to the Standard Industrial Classification (SIC) code. Due to the lack of well documented energy efficiency case studies in

¹⁰United Nations Economic and Social Commission for Asia and The Pacific: <http://www.unescap.org/esd/energy/publications/finance/part1.html>

¹¹ Replacement for the actual figure - Industry dollar output

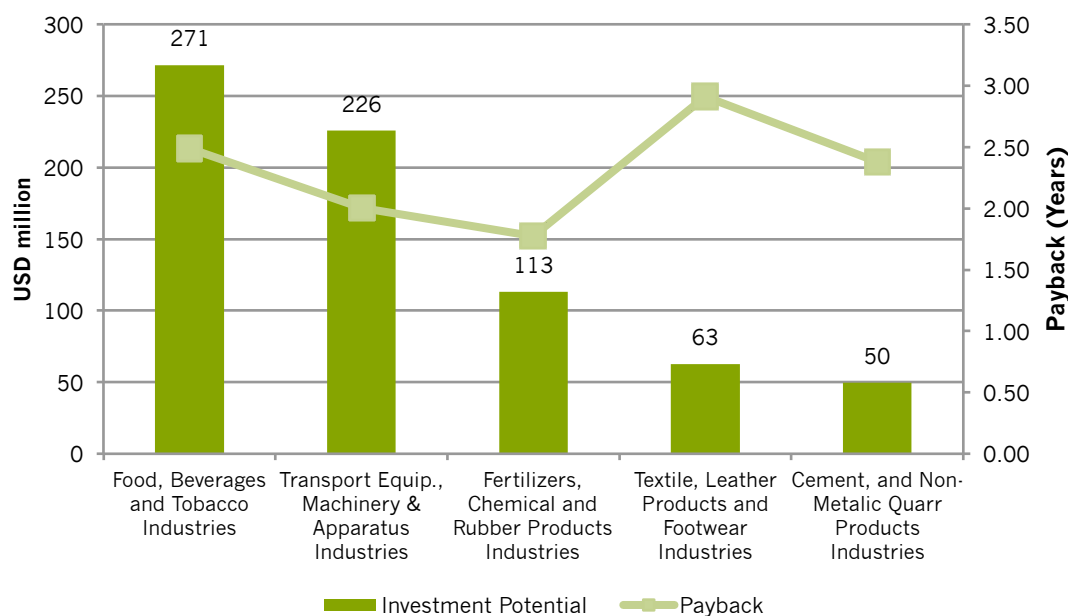
¹²Holtz-Eakin, D., Selden, T.M., 1995: Stoking the fires? :CO2 emissions and economic growth: Journal of Public Economics 57, 85–101

South East Asia, these recommendations have been drawn from the U.S Department of Energy – Industrial Technologies (IAC) Program¹³.

An explanation of the SIC code and a comprehensive list of industry verticals and their SIC codes may be found in the [Appendix 3](#).

3.4 Indonesia

Indonesia: Top 5 industries by Investment Potential



The **Food, Beverages and Tobacco** industry in Indonesia has the largest estimated investment potential of over **US\$271 million**. While the **Transport Equipment, Machinery & Apparatus Industry** seems to offer a faster payback and comparable investment potential, it should be

¹³ For more information on IAC database: www.iac.rutgers.edu

noted that the scope of this classification is wide, encompassing two energy-intensive industries which are operationally quite different, presenting project replication challenges.

However, it is unlikely that Indonesia's full energy efficiency investment potential can be realised, despite the significant opportunities within the country. Persistent bureaucratic delays, legal and contractual uncertainty are common in the Indonesian business environment and these factors are likely to restrict the full realization of the country's investment potential and impact the IRR of any investments.

3.4.1 Food, Beverage and Tobacco

Indonesia's food-processing industry is valued at **US\$24 billion** and has been growing at a double-digit rate since 2002. The industry includes some 4,700 medium-scale and larger businesses, ranging from family-owned enterprises to major multinational companies. The scope of the industry is attributable to the country's abundant natural resources, with commodities such as shrimp, cocoa beans, spices, coffee and tea ranking among the country's main agricultural exports.

Indonesia is the world's fifth largest tobacco producing market by volume¹⁴. The market leaders in Indonesia include both transnational and locally owned tobacco companies.

In food processing, heating and cooling systems (steam systems, ovens, furnaces, and refrigeration units) account for 75% of energy use. However, these are necessary to maintain food safety. Motor-driven systems (pumps, fans, conveyors, mixers, grinders, and other process equipment) represent 12% of the sector's energy use, and HVAC functions comprise approximately 8%¹⁵.

¹⁴BAT website,. News Release, June 17, 2009. British American Tobacco acquires control of Indonesia's Bentoel

¹⁵<http://www.epa.gov/ispd/pdf/energy/ch3-4.pdf>

3.4.1.1 Key players

Company	Subsector	Sales (US\$mn)
Indofood Sukses Makmur Terbuka	Food – miscellaneous	3,740
Unilever Indonesia	Food and beverages – dairy and tea	1,558
PT Charoen Pokphand Indonesia	Food – meat and fish	1,289
Coca-Cola Amatil*	Beverages – soft drinks	465
Mayora Indah Tbk	Food – confectionery	391
Aqua Golden Mississippi	Beverages – soft drinks	195
Ultrajaya Milk Industry Tbk	Beverages – soft drinks	136
PT Malindo Feedmill Tbk	Food – miscellaneous	169.5
PMI/Sampoerna	Tobacco	4251
Gudang Garam	Tobacco	381

3.4.2 Transport Equipment, Machinery & Apparatus

In 2009, total vehicle exports were valued at **US\$389 million**, with 2-wheel drive vehicles accounting for 74.5% of vehicle units produced in Indonesia. Exports of electrical machinery and apparatus were worth US\$ 432 million in 2009, making it the largest export within the machinery sector. Telecommunications equipment exports were the second largest at a value of US\$ 427 million¹⁶.

Due to the myriad of operations within this broad industrial group, it is not possible to provide a simple, definitive energy consumption pattern.

3.4.2.1 Key players

Company	Sub-sector	Sales (US\$mn)
PT Toyota Astra Motor	Manufacturing – Motor Vehicles	1,757
PT Suzuki Indomobil Motor	Manufacturing – Motor Vehicles	150
PT Tira Austenite TBK	Manufacturing – Machine Tools, Parts	23
PT Multipolar TBK	Diversified Conglomerates	1,316

¹⁶ Bank of Indonesia Financial Statistics: <http://www.bi.go.id>

3.4.3 Chemical and Rubber Products

After Thailand, Indonesia is currently the world's second largest rubber producer. Annual production is forecast to reach 4 million tons, or 31% of the world's total natural rubber production, by 2020.

Organic chemicals dominated chemical exports in 2009 with an export value of US\$ 281 million.

Manufacturing products from either rubber (whether natural or synthetic) requires electricity for both the manufacturing and handling equipment, as well as for various processes like heating, drying, cooling, moulding, sheeting, forming, and other common processing techniques¹⁷.

The chemical industry uses energy both to supply heat and power for plant operations and as a raw material for the production of chemicals¹⁸.

3.4.3.1 Key players

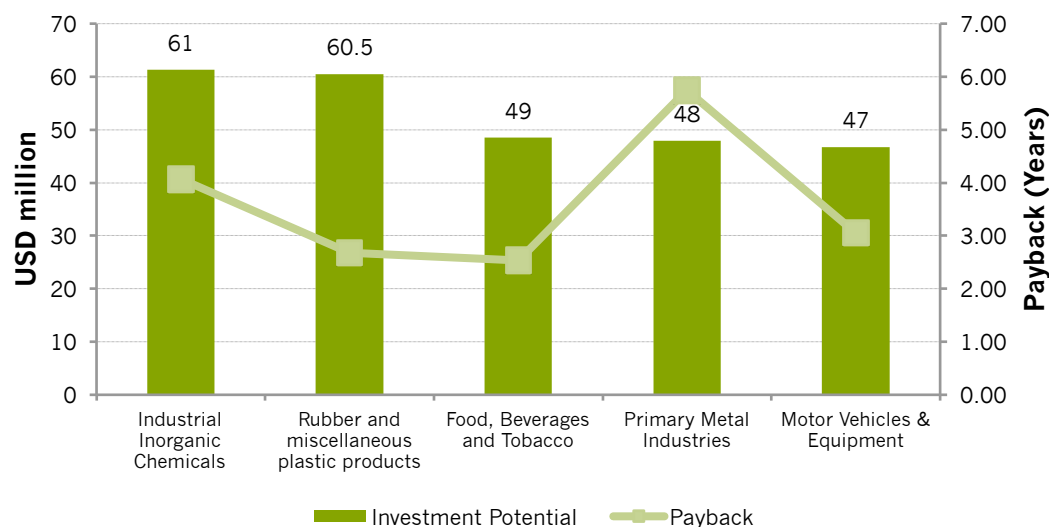
Company	Sub-sector	Sales (US\$mn)
PT Unilever Indonesia TBK	Consumer Goods	1,758
PT Kalbe Farma TBK	Pharmaceutical	858
Gajah Tunggal TBK	Manufacturing – Tyres	765
PT Tri Polyta Indonesia TBK	Chemicals – Plastic & Rubber	457
PT Tempo Scan Pacific TBK	Pharmaceutical	433.5

¹⁷<http://www.epa.gov/sustainableindustry/pdf/greenhouse-report.pdf>

¹⁸<http://www.epa.gov/ispd/pdf/energy/ch3-3.pdf>

3.5 Malaysia

Malaysia: Top 5 industries by Investment Potential



Amongst the manufacturing industries in Malaysia, the **Industrial Inorganic Chemicals** sub-sector is expected to present the greatest investment potential. However, the expected payback on such projects is about 4 years, which is longer than the payback expected for the **Rubber and Plastics** industry. As a rubber producing nation, Malaysia's large Rubber and Plastics industry has an investment potential of about **US\$60.5 million**. The payback of this industry is also the 2nd fastest among the top 5 industries at 2.68 years. The **Food, Beverages and Tobacco** industry is expected to yield the **fastest payback** of **2.53 years**.

Despite a competitive tax rate of 25%¹⁹, fuel subsidies in Malaysia will continue to affect project paybacks – resulting in one of the slowest expected paybacks in the region.

3.5.1 Inorganic Industrial Chemicals

The Malaysian chemicals and chemical products industry is the second largest contributor to the manufactured exports sector. This sector covers the production of chlor-alkali, acids and some specialty chemicals, e.g.: silicates, oxides, hydroxide, acids, electronic chemicals, catalysts and waste treatment chemicals.

¹⁹ Malaysian Investment Development Authority: www.mida.gov.my/en_v2/index.php?page=company-tax

Malaysia is self-sufficient for these chemicals and is also a net exporter of hydrochloric acid, sodium silicate, phosphoric acid and titanium dioxide²⁰. Imports of these chemicals do occur but are mainly for special grades which are not produced locally.

The chemical industry uses energy both to supply heat and power for plant operations and as a raw material for the production of chemicals²¹.

3.5.1.1 Key players

Company	Sub-sector	Sales (US\$mn)
Chemical Company of Malaysia Sdn Bhd	Chemicals – Pharmaceuticals & Healthcare	448
W.R. Grace & Co.	Chemicals – Basic Inorganic Chemicals	2,825

3.5.2 Rubber industry

Malaysia is the fourth largest producer of rubber in the world, the fifth largest rubber consumer and among the world's largest exporters of rubber products. There are more than 300 companies producing a range of rubber products in Malaysia, which are exported to more than 60 countries. The major natural rubber consuming industries for 2007 were rubber gloves 63.8%, rubber thread 13.0% and tyres and tubes 11.8%.

Manufacturing products from either rubber (whether natural or synthetic) require electricity for both the manufacturing and handling equipment, as well as for various processes like heating, drying, cooling, moulding, sheeting, forming, and other common processing techniques²².

²⁰http://www.cicm.org.my/index.php?option=com_content&task=category§ionid=11&id=85&Itemid=53

²¹<http://www.epa.gov/ispd/pdf/energy/ch3-3.pdf>

²²<http://www.epa.gov/sustainableindustry/pdf/greenhouse-report.pdf>

3.5.2.1 Key players

Company	Sub-sector	Sales (US\$mn)
Top Glove Corporation Bhd	Rubber Products	432
Hartalega Holdings Bhd	Rubber Products – Latex Gloves	76
FELDA Rubber Industries	Forest Products – Rubber	3
The Guthrie Group	Diversified Conglomerates	291

3.5.3 Food, Beverage and Tobacco

Malaysia's food and drink industry is substantial, with an estimated sales value of US\$12.5 billion in 2008 and represents around 3,500 businesses. Local industry products dominate the markets for snack foods, poultry, dairy products, eggs, tropical fruits and vegetables, soft drinks and beer. The largest manufacturing segments include edible oils, dairy, confectionery, soft drinks, seafood, biscuits, baked goods, cereals and flour.

In food manufacturing process heating and cooling systems (steam systems, ovens, furnaces, and refrigeration units) account for 75% of energy use. However, these are necessary to maintain food safety and can only be reduced where appropriate safety margins can be maintained. Motor-driven systems (pumps, fans, conveyors, mixers, grinders, and other process equipment) represent 12 percent of the sector's energy use, and HVAC functions comprise approximately 8 percent²³.

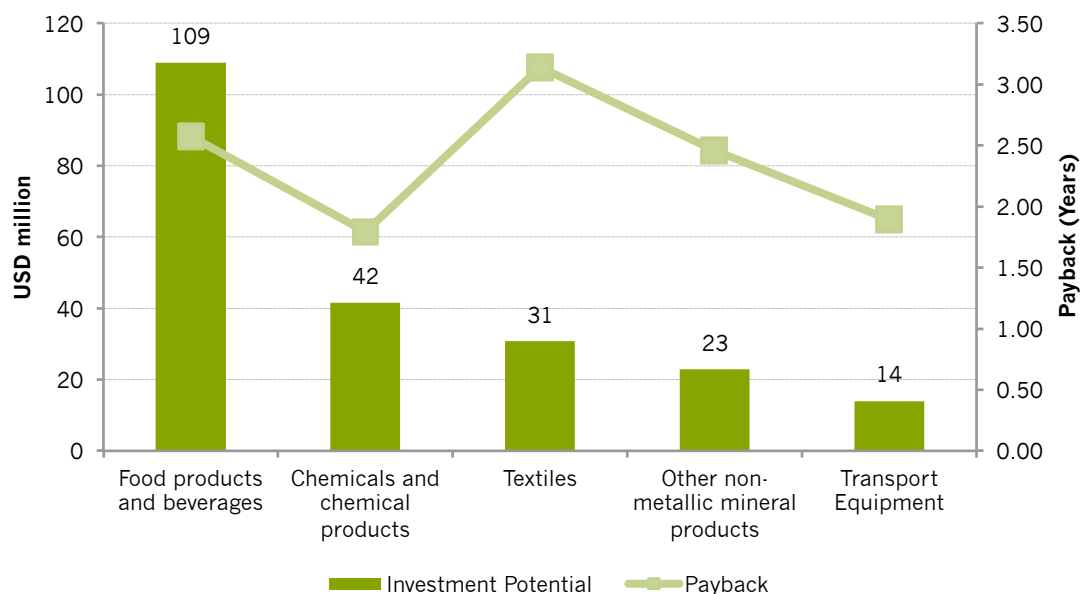
3.5.3.1 Key players

Company	Sub-sector	Sales (US\$mn)
Nestlé Malaysia	Food – Dairy & beverages	1,153
Fraser & Neave	Dairy & soft beverages	1,091
Guinness Anchor	Beverages – Alcoholic	370
Carlsberg Malaysia	Beverages – Alcoholic	323
Leong Hup Holdings	Poultry & food	351
Dutch Lady Milk Industries	Food – Dairy	213
Yeo Hiap Seng	Food & beverages	168
Yee Lee Corporation	Food & beverages	216
Spritzer Berhad	Beverages – Soft drink	31

²³<http://www.epa.gov/ispd/pdf/energy/ch3-4.pdf>

3.6 The Philippines

Philippines: Top 5 industries by Investment Potential



The **Food and Beverage** sector in the Philippines benefits from a robust agriculture and forestry sector, allowing it to dominate the manufacturing industries. While the investment potential of the sector in Philippines is not as large as that in Indonesia or Thailand, it posts the best IRR. This is mainly due to a lack of energy price distortion from subsidies.

The manufacturing industry within Philippines is not as developed as counterparts within the region, thereby leading to the lowest investment potential amongst the 6 countries studied. However, the attractive payback of investment is a strong draw for potential investment.

It is important to note that Philippines impose one of the heaviest corporate taxes in the region, which impairs returns. Energy efficiency is also a low priority amongst policymakers within Philippines, as evident from the lack of a committed national push towards energy efficiency or legal framework that supports energy efficiency development.

3.6.1 Food and beverage

The Food and Beverage industry in the Philippines is dominated by a small number of major firms, most notably the San Miguel Corporation. Physical infrastructure is weak: only a limited

number of large companies have been able to modernise their production processes, with a significant number of manufacturers still relying on manual processes. This presents an opportunity for the implementation of energy efficiency automation systems.

In food processing, heating and cooling systems (steam systems, ovens, furnaces, and refrigeration units) account for 75% of energy use. However, these are necessary to maintain food safety. Motor-driven systems (pumps, fans, conveyors, mixers, grinders, and other process equipment) represent 12% of the sector's energy use, and HVAC functions comprise approximately 8%²⁴.

3.6.1.1 Key players

Company	Sub-sector	Sales (US\$ mn)
San Miguel Corp	Food, Drinks (soft and alcoholic), Packaging & Telecommunications	3,636
Nestle Philippines Inc	Food & Drink - mixed branded consumer	1,792
San Miguel PureFoods	Food - agro & branded consumer	1,538
San Miguel Brewery	Drink - alcoholic, beer	1,056
Universal Robina Corp	Food - confectionery & snacks	984
Unilever Philippines	Food - mixed branded consumer	528
Coca-Cola Bottlers Philippines Inc	Drink -soft drinks	379
Ginebra San Miguel	Drink - alcoholic, spirits	334
Pepsi-Cola Products Philippines	Drink -soft drinks	308
Tanduay Holdings	Drink - alcoholic, spirits	196
Alaska Milk	Drink - dairy drinks	216
Kraft Food Phils	Food - snack food	177
Cosmos Bottling Corp	Drink -soft drinks	171
RFM Corp	Food - mixed branded consumer	163
General Milling Corp	Food - pasta, flour products, snacks	151
Century Pacific Corp	Food - canned food, seafood	151
Pilmico Foods Corp	Food - flour products	130
Zest-O Corporation	Drink -soft drinks	56

²⁴<http://www.epa.gov/ispd/pdf/energy/ch3-4.pdf>

3.6.2 Chemicals and chemical products

The Philippine chemical industry is one of the most heavily invested. Investments in chemical industries registered with the BOI and the Philippine Economic Zone Authority (PEZA) have so far amounted to more than US\$1 billion since 1997, with the petrochemical sector claiming the bulk with investments of at US\$935 million.

Despite its current status as a net importer, the Philippine Board of Investment's (BOI) objective is to develop the sector into a net exporter of specialty chemicals – particularly oleo chemicals²⁵.

The chemical industry uses energy both to supply heat and power for plant operations and as a raw material for the production of chemicals, plastics, and synthetic fibres²⁶.

3.6.2.1 Key players

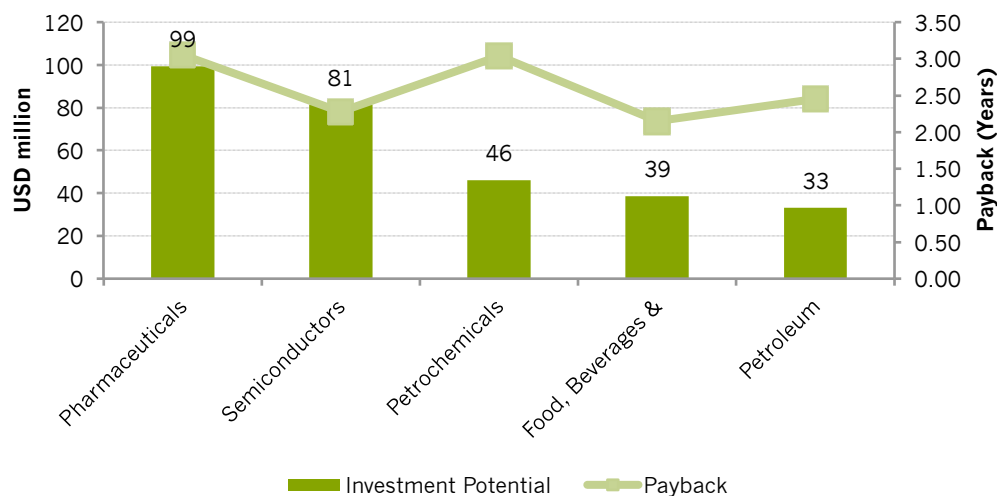
Company	Sub-sector	Sales (US\$ mn)
BASF Philippines	Chemicals – Plastic & Rubbers	15
PNOOC Development Corporation	Petrochemical	434
United Laboratories	Pharmaceuticals	575
Pascual Laboratories	Pharmaceutical	N/A

²⁵Oleochemicals are chemicals derived from plant and animal fats.

²⁶<http://www.epa.gov/ispd/pdf/energy/ch3-3.pdf>

3.7 Singapore

Singapore: Top 5 industries by Investment Potential



The payback of investments in Singapore is the fastest among the 6 countries because of the lack of energy price distortion in the country.

The top 5 industries account for 53% of the total savings estimated for the manufacturing sector in Singapore. These industries collectively present a good starting point for any energy efficiency policy implementation.

3.7.1 Pharmaceuticals

Singapore cemented its position as a major biomedical manufacturing hub with the opening of a US\$500m manufacturing plant in Singapore's Tuas industrial zone. Singapore's pharmaceutical manufacturing portfolio is centred mainly on basic medicines, but there is strong government support for drug research and development.

The energy consumption pattern with the pharmaceutical industry is as follows²⁷:

- Heating, ventilation and air conditioning (HVAC) – 65%
- Plug loads – centrifuges, incubators, dryers, analysis equipment – 25%
- Lighting – 10%

²⁷<http://www.energystar.gov/ia/business/industry/LBNL-57260.pdf>

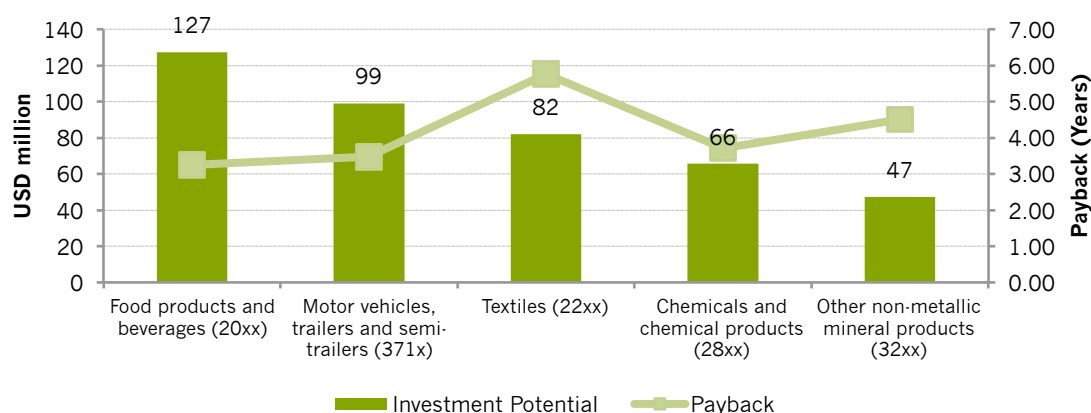
3.7.2 Semiconductors

Singapore's semiconductor industry accounts for 17.8% of total manufacturing output value in Singapore, making it the largest contributor. It is 2nd worldwide in terms of semiconductor output, with a 10.9% global market share. Singapore also plays host to the top 3 foundries in the world.

The wafer fabrication process is a highly energy intensive process²⁸, and the majority of the energy consumed goes toward the chillers and other fabrication process equipment²⁹.

3.8 Thailand

Thailand: Top 5 industries by Investment Potential



In Thailand, the **Food Products and Beverage** sector has the largest investment potential of almost US\$103 million. However, despite the large investment potential present, projects are expected to experience low IRRs and poor payback due to government subsidies for energy tariffs and the highest tax rate. It is estimated that the improvements in energy efficiency for the Food & Beverage industry can result in an annual savings of US\$30 million, thereby delivering a payback of about 3.42 years.

²⁸<http://www.e2singapore.gov.sg/industry/eenp.html>

²⁹http://www.semiconwest.org/cms/groups/public/documents/web_content/p044235.pdf

3.8.1 Food Products and Beverages

Thailand enjoys the reputation of being the largest food exporter in South-East Asia. In recent years, its food-processing industry has seen rapid growth. The industry is highly fragmented: of the 10,000 companies within this industry, only 15% are considered medium to large enterprises.

In food processing, heating and cooling systems (steam systems, ovens, furnaces, and refrigeration units) account for 75% of energy use. However, these are necessary to maintain food safety. Motordriven systems (pumps, fans, conveyors, mixers, grinders, and other process equipment) represent 12% of the sector's energy use, and HVAC functions comprise approximately 8%³⁰.

3.8.1.1 Key players

Company	Sub-sector	Sales (US\$mn)
Charoen Pokphand Foods Plc	Food Meat: Fish, Ready Meals	4,592
Thai Beverages Plc	Beverages: Alcoholic	3,096
Thai Union Frozen Products	Food: Fish	2,029
Unilever Thailand	Food & Beverages: Processed foods	882
Serm Suk	Beverages: Soft drinks	568
Pakfood Public Co Ltd	Food: Fish	255
F&N Dairies Thailand	Food & Beverages: Dairy	245
Thai President Foods Plc	Food: Noodles	244
Oishi Group	Food: Noodles, Bread	176
Tipco Foods Public Co	Beverages: Soft drinks	154
Surapon Foods Public Co Ltd	Food: Frozen foods, Fish	154
Tropical Canning (Thailand) Plc	Food: Fish	119
Malee Sampran	Beverages: Soft drinks	105
Kiang Huat Sea Gull Trading Frozen Food	Food: Fish	102
Siam Food Products Plc	Food: Canned Fruit	87

³⁰<http://www.epa.gov/ispd/pdf/energy/ch3-4.pdf>

3.8.2 Motor vehicles, trailers, semi-trailers

Thailand's automotive industry currently generates 12% of the national GDP and is one of the largest manufacturing sectors in the country. As of 2009, Thailand is the world's largest producer of one-ton pickup trucks and the 7th largest automotive exporter overall.

The main electricity consuming activities within an auto manufacturing facility are³¹:

- Heating, ventilation, air-conditioning (HVAC) – 11%
- Paint systems – 27%
- Lighting – 15%
- Compressed air – 9%
- Welding – 9%

Optimization of motor systems is particularly relevant for this sector: 70% of all electricity is used in equipment motors within the plant³².

3.8.2.1 Key players

Company	Sub-sector	Sales (US\$mn)
Toyota Motor (Thailand) Co. Ltd.	Manufacturing – Motor Vehicles	5,863
Honda Automobile (Thailand) Co. Ltd.	Manufacturing – Motor Vehicles	343
Ford (Thailand) Co. Ltd.	Manufacturing – Motor Vehicles	461

3.8.3 Textiles

The textile industry in Thailand is a major contributor to Thailand's export values. Exports amounted to US\$8 billion in 2008, placing Thailand 15th in the world for textile and garment export³³. Despite a 13% decline in exports in 2009 due to the economic recession, the Thai Textile Manufacturing Association is predicting a 10-15% growth this year³⁴. The following processes account for about 76% of energy use within the industry³⁵:

- Dyeing
- Fiber production
- Spinning
- Weaving

³¹<http://www.energystar.gov/ia/business/industry/LBNL-50939.pdf>

³²<http://www.energystar.gov/ia/business/industry/LBNL-50939.pdf>

³³http://www.boi.go.th:8080/issue_content.php?issueid=47;page=0

³⁴<http://www.ncos.com/Blog/2010/03/Thai-Textile-and-Garment-Exports-to-Rebound-in-2010.html>

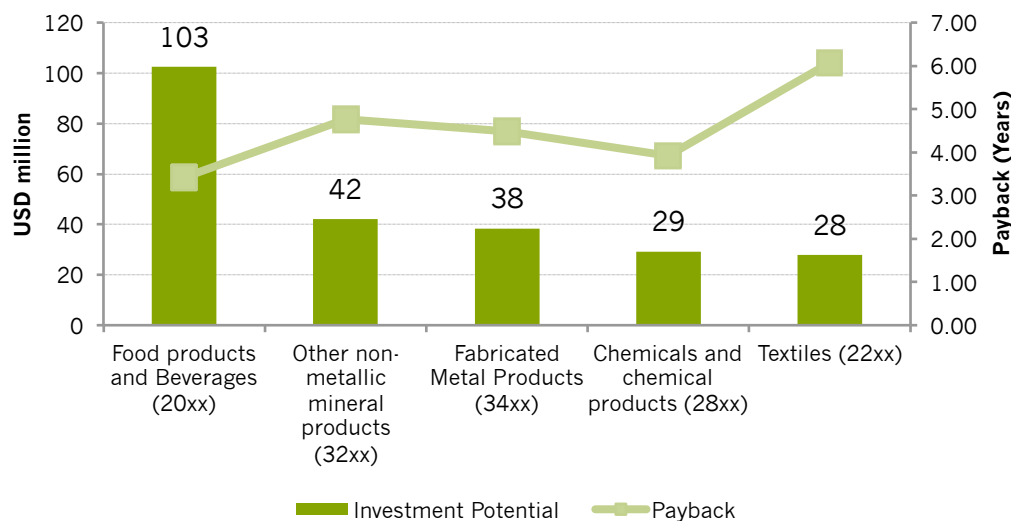
³⁵<http://www.unido.org/fileadmin/import/userfiles/puffk/textile.pdf>

3.8.3.1 Key players

Company	Sub-sector	Sales (US\$mn)
Thai Textile Industry Public Co. Ltd.	Manufacturing – Clothes & Apparels	104
Thai Rayon PCL	Manufacturing – Synthetics	183
Thai Toray Synthetics	Manufacturing – Textile Fibers	154

3.9 Vietnam

Vietnam: Top 5 industries by Investment Potential



In Vietnam, the **Food and Beverages** manufacturing industry clearly dominates the other sectors in terms of investment potential. This is largely due to its strong agricultural sector. It also offers a payback of 3.42 years.

However, Vietnam, along with most countries in the region, experiences energy price distortions due to relatively low tariffs for the industrial sector.

3.9.1 Food and Beverage

The food and beverage sector accounts for about 24% of total industrial output. In recent years, the sector attracting significant foreign interests from MNCS like Unilever, Nestlé and San Miguel. A large and diverse domestic agricultural sector increases the stability of supplies and prices for local producers.

Due to economic expansion and a growing tourism sector, Vietnam is considered to be one the world's highest-potential beer markets. The local beer market is very competitive, with market leaders already established in **Saigon Beer Alcohol and Beverage Corporation** (Sabeco) and **Hanoi Beer Alcohol and Beverage Corporation** (Habeco – 10% owned by Carlsberg). Several powerful multinationals, including **Heineken's JV Asia Pacific Breweries**, as well as Carlsberg, have also already emerged as major players.

The food-processing industry remains largely fragmented except for a few key sectors, such as dairy and confectionery. The drinks industry remains largely fragmented except for a few key sectors, such as alcoholic and soft drinks.

3.9.1.1 Key players

Company	Sub-sector	Sales (US\$m)
Sabeco	Beverages - Alcoholic	543
Vinamilk	Beverages - Dairy	480
Unilever Vietnam	Food and beverages	350 e*
Nestle Vietnam	Food and beverages	210.e*
Habeco	Beverages - Alcoholic	238
Vietnam Brewery Ltd	Beverages - Alcoholic	125 e*
Coca-Cola Vietnam	Beverages - Soft drinks	125 e*
Vissan Import Export Corporation	Food - Meat	121 **
Trung Nguyen Corp	Beverages - Coffee	120 e*
Pepsi-IBC Vietnam	Beverages - Soft drinks	110 e*
Masan Food	Food - Instant noodles, sauces	107
San Miguel Purefoods Vietnam	Food and beverages - Miscellaneous	70 e*
Saigon Beverages Joint Stock Company (Tribeco)	Beverages - Soft drinks	28

e* - as estimated by Business Monitor International

3.9.2 Non-metallic minerals

Vietnam's non-metallic mineral industry is comprised of (1) several large state-owned or state-controlled companies that produce, distribute, and trade non-metallic mineral commodities, such as cement and (2) several foreign companies that worked in joint venture with the state-owned companies or local governments to manufacture cement.

The dominance of cement over other non-metallic mineral products is evident; Vietnam is likely to become the world's 10th biggest cement producer in 2010³⁶. Vietnam currently has 97 cement production lines with annual capacity of 57.4 million tonnes as of 2009.

Substantial amounts of energy are expended in the thermo-chemical processing of limestone, clay and stone in huge kilns at sustained high temperatures.

3.9.2.1 Key players

- Vietnam Cement Corporation and its subsidiaries
- Joint ventures, such as:
 - ChinFon Cement Corporation
 - Nghison Cement Company
 - Holcim Cement Joint Venture Company
 - Phuc Son Cement Company
 - Lafarge cement Joint Venture Company

³⁶<http://www.vietpartners.com/default-industry.asp?industry=Cement>

4. Commercial Sector

Evidence from building energy performance benchmarking studies³⁷ suggests that energy consumption patterns are similar across buildings of the same type. This allows energy efficiency projects to be replicated for buildings of the same type.

Commercial buildings may be categorized as³⁸:

- Government
- Health Care
- Hotels
- Offices
- Retail
- Schools

Based on the methodology outlined below, data was collected on offices, hotels and retail malls. Information was not freely available for the remaining building categories due to the data's sensitive nature. This hindered a meaningful comparison across the 6 countries for those categories.

The following sections of the report provide an outline of the methodology adopted and presents findings according to building type.

4.1 Commercial Sector – Methodology

Step 1: Selection of suitable reference indicator

For commercial buildings, estimations of opportunities are based on *gross floor area (GFA)*. This is because previous comprehensive benchmarking studies by Singapore's Energy Sustainability Unit on buildings in the region have found strong correlations between gross floor area and overall building energy consumption³⁹. In all calculations, the currency unit used was US\$ to allow comparison between the countries, while GFA was measured in terms of square metres.

³⁷H. Sun, S.E. Lee, R.M.T. Priyadarsini, X. Wu, Y. Chia and H.-S. Majid (2006): Building energy performance benchmarking and simulation under tropical climatic conditions

³⁸http://www1.eere.energy.gov/buildings/commercial/building_type.html

³⁹Rajagopalan Priyadarsini, Wu Xuchao and Lee Siew Eang (2009): A study on energy performance of hotel buildings in Singapore. *Energy and Buildings*, 41, 1319 - 1324

Step 2: Estimating the investment potential

Floor area data was obtained from DTZ research⁴⁰, Business Monitor⁴¹ and the relevant government statistical agencies. Implementation cost and savings data were obtained from documented case studies in Singapore.

For each commercial building type, the average investment/GFA (in m²) was calculated. Using this, an estimate was made of the total quantum of investment required for EEP implementation within each country for each building type (based on their floor areas).

Step 3: Estimating investment requirement

Using a similar method as described in Step 2, energy savings data from the case study database multiplied by local electricity tariff rates (in US\$) gives an estimate of the cost savings expected in the individual countries.

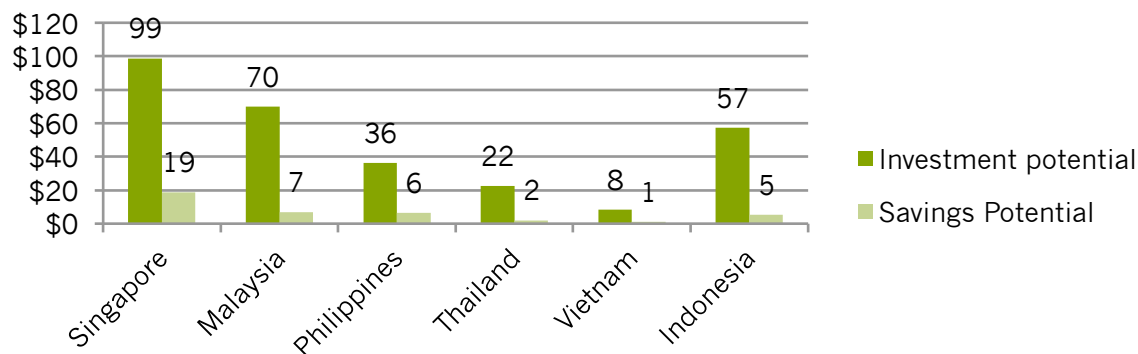
For each commercial building, the average cost savings/floor area is calculated to provide an estimate the total quantum of cost savings from EEP implementation for each building type within each country based on total floor area.

Step 4: Calculating Paybacks

Similar to the industrial market sizing, a projection was made of the savings potential as cash inflows over 5 years. Gross Paybacks are estimated based on the number of years it would take for the investors to recoup the investment

4.1.1 Offices

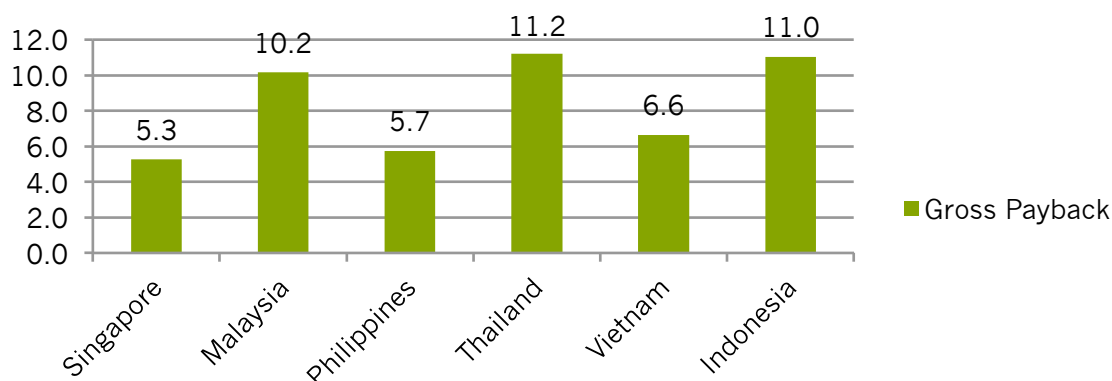
Commercial Offices: Investment and Savings potential (in US\$ mil)



⁴⁰ DTZ Research, <http://www.dtz.com/Global/Research>

⁴¹ Business Monitor International, <http://www.businessmonitor.com/> - database available by subscription only

Commercial Offices: Gross payback period (in years)

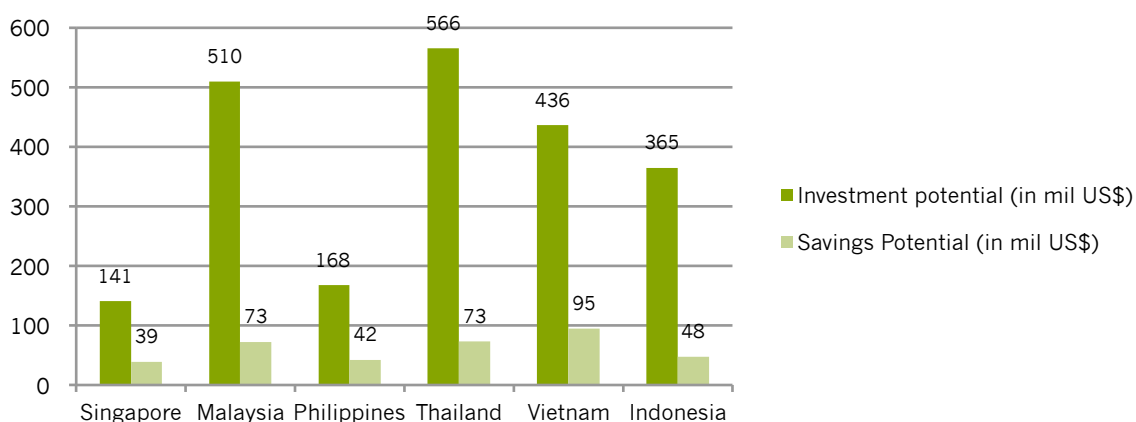


The findings show that Singapore and Philippines commercial office projects are likely to yield the fastest payback.

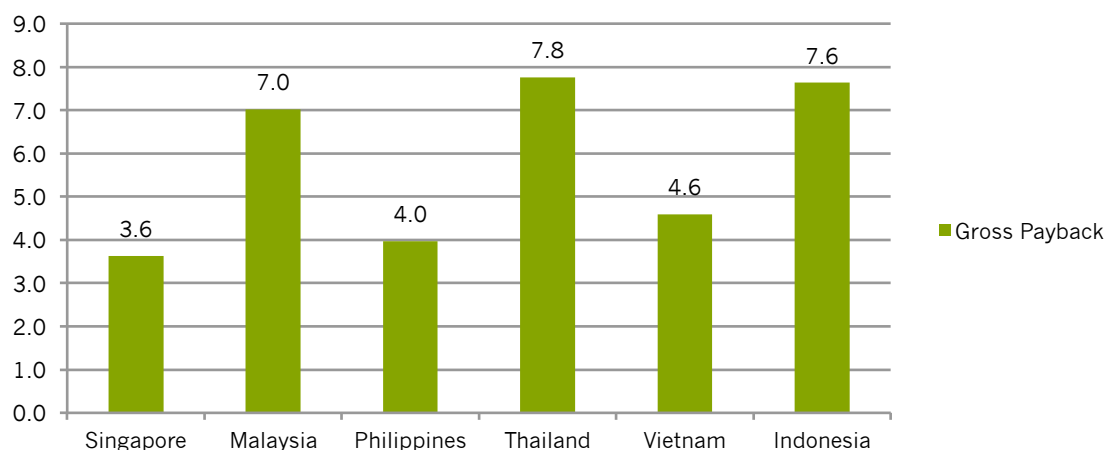
For Singapore, office space within the central business district is restricted by the island's small land area. However, project paybacks are highly attractive due to the pressure of higher electricity and energy prices, thereby leading to higher project returns.

4.1.2 Hotels

Hotels: Investment and Savings Potential (in US\$ mil)



Hotels: Gross payback period (in years)



Amongst the three building categories, **Hotels** post the shortest paybacks. This is due to the unique nature of hotel operations in comparison to offices and retail malls. Energy efficiency opportunities arise from:

- Long operational hours – Hotels are required to operate 24/7 as compared to offices and retail malls, which have fixed opening and closing hours
- Variety of services provided – In addition to lodging, hotels are required to provide other services, such as laundry and heated showers.
- Wasteful energy-use habits of guests⁴²

Approximately 42% of a hotel's energy consumption goes toward heating water⁴³. This is required for showers, pools and laundry operations.

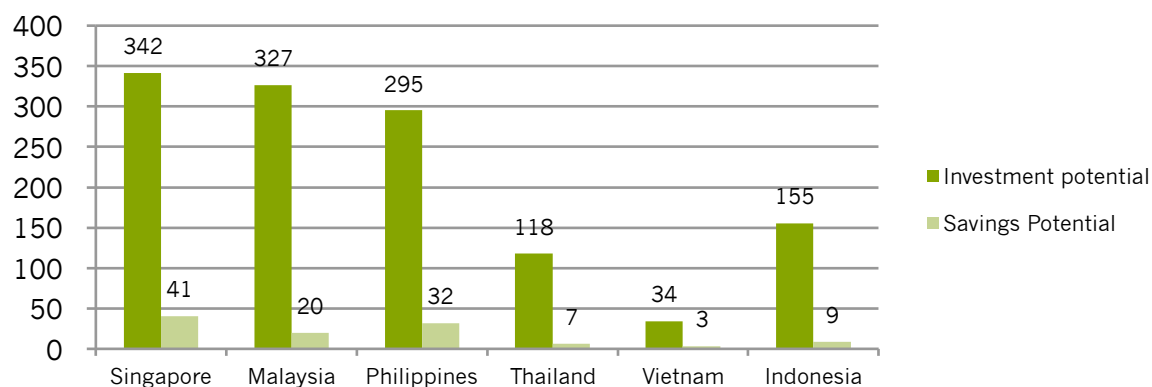
Like in the commercial office sector, Singapore and Philippines yield the fastest paybacks, followed by Vietnam.

⁴²<http://files.harc.edu/Sites/GulfCoastCHP/MarketAssessments/EnergyEfficiencyOpportunitiesLodging.pdf>

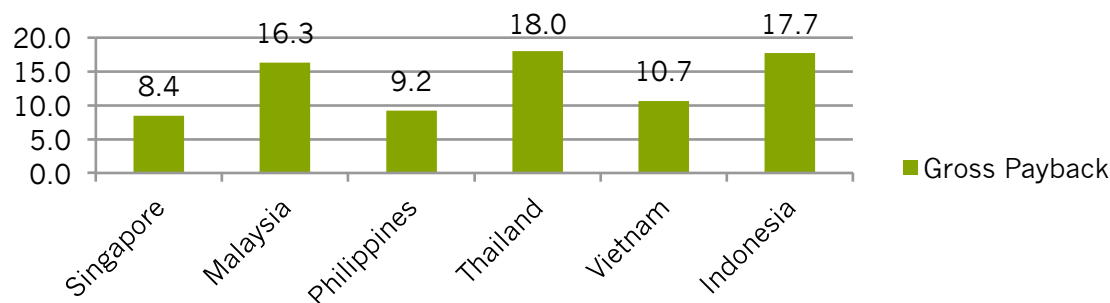
⁴³<http://www1.eere.energy.gov/buildings/commercial/lodging.html>

4.1.3 Retail malls

Retail Malls: Investment and Savings Potential (in US\$ mil)



Retail Malls: Gross Payback (in years)



For the retail mall segment, both the **Singapore** and **Philippines** are attractive investments with quickest Paybacks, and the highest and 3rd highest investment potentials respectively. While expected investment potential for Malaysia and Vietnam is high, the savings potential is low.

4.1.4 Key Commercial Building Developers by Country

Country	Key Developers
Indonesia	<ul style="list-style-type: none"> • PT Duta Graha Indah Tbk • PT Gowa Makassar Tourism Development Tbk • PT Island Concepts Indonesia Tbk • Perdana Gapura Prima Tbk, PT
Malaysia	<ul style="list-style-type: none"> • Sime Darby Property Berhad • Bandar Raya Developments Berhad • Bandar Nusajaya Development Sdn Bhd • Paramount Corporation Berhad
The Philippines	<ul style="list-style-type: none"> • Ayala Corporation • Fort Bonifacio Development Corp. • SM Development Corporation • Cebu Holdings, Inc.
Singapore	<ul style="list-style-type: none"> • Millenia Private Limited • Mapletree Investments Pte Ltd • Capitaland Commercial Limited • Capitamalls Asia Limited
Thailand	<ul style="list-style-type: none"> • Sansiri Public Company Limited • Noble Development PCL • Asian Property Development PCL • L.P.N. Development PCL
Vietnam	<ul style="list-style-type: none"> • Song Da Urb Inv Cons Dev • Tan Tao Investment and Industry Corporation

5. Stakeholder Mapping

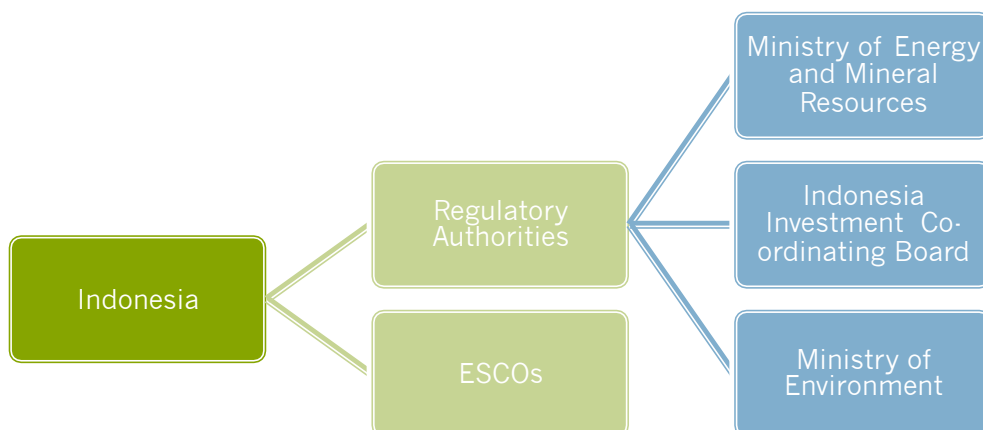
In sizing the market in the earlier sections, the demand side was addressed by identifying the most attractive industry sectors for energy efficiency investment, as well as some of the key players within those sectors.

The successful implementation of any facility to support the investments identified requires the supply side support of both local governments and ESCO partners. This section of the report aims to give an overview of the regulatory partners that would be necessary participants in each country and provide a brief description of their roles.

A comprehensive list of ESCOs operating within each country may be found in Appendix D.

5.1 Indonesia

5.1.1 Stakeholder map

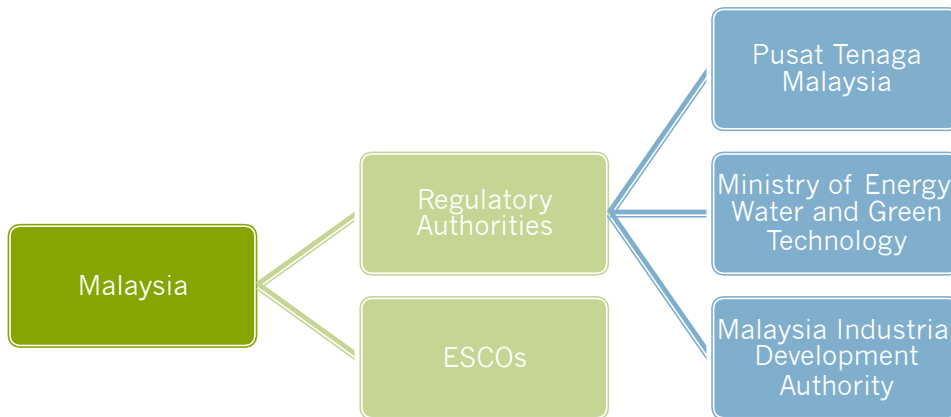


5.1.2 Stakeholder description

Name	Description of role
Ministry of Energy and Mineral Resources	Directorate General of Electricity and Energy is tasked with the formulation and implementation of policies and technical standardization in the field of electricity and energy efficiency.
Indonesia Investment Co-ordinating Board	BKPM is the Investment Coordinating Board of the Republic of Indonesia. As the primary interface between business and government, BKPM is mandated to boost domestic and foreign direct investment through creating attractive investment climate. Restored to Ministerial status in 2009, and reporting directly to the President of the Republic of Indonesia, this investment promotion agency's goal is not only to seek more domestic and foreign investment, but also seek quality investments that improve social inequality and reduce unemployment. The agency works as a proactive advocate for investments as well as a matchmaker for investors.
Ministry of Environment	<p>The Ministry of Environment is a government institution responsible for promoting the protection of the environment in Indonesia. The Deputy Minister for Environmental Conservation is responsible for policy development and coordination of environmental conservation activities, and serves as the National Focal Point to the United Nations Framework Convention on Climate Change (UNFCCC).</p> <p>In implementing the Greenhouse Gas emission Reduction from Industry in Asia and the Pacific (GERIAP) project, the Ministry of Environment works in close cooperation with the Department of Energy and Mineral Resources, which has just launched the Green Energy Policy. The Ministry is responsible for the overall coordination of GERIAP in Indonesia.</p>

5.2 Malaysia

5.2.1 Stakeholder map

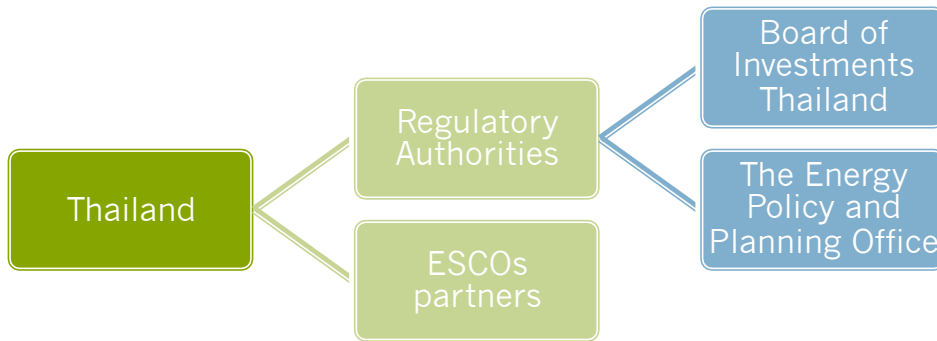


5.2.2 Stakeholder description

Name	Description of role
Malaysian GreenTech Corporation (formerly Pusat Tenaga Malaysia)	The Malaysian GreenTech Corporation is the middleman which co-ordinates various activities, specifically energy planning and research, energy efficiency, and technological research, development and demonstration (R&D) undertaken in the energy sector due to the long lead time for energy projects to come on stream.
Ministry of Energy, Water and Green Technology (KeTTHA)	KeTTHA is responsible for the administration, regulation and management of matters relating to energy, green technology and water in Malaysia.
Malaysia Industrial Development Authority (MIDA)	MIDA is the government's principal agency for the promotion of the manufacturing and services sectors in Malaysia. MIDA assists companies which intend to invest in the manufacturing and its related services sectors, as well as facilitates the implementation of their projects.

5.3 Thailand

5.3.1 Stakeholder map

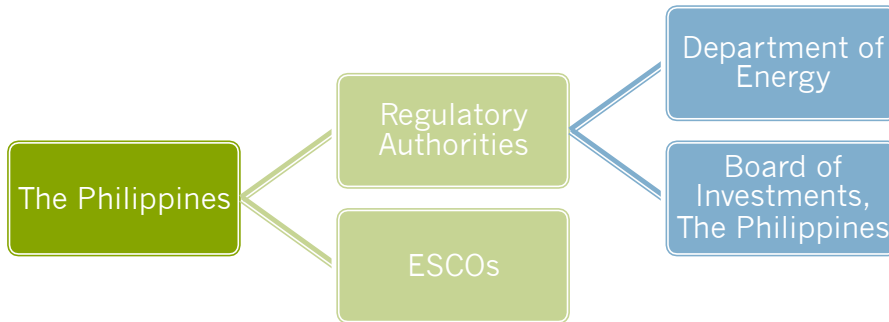


5.3.2 Stakeholder description

Name	Description of role
Boards of Investments Thailand	The Board of Investment in Thailand was created by the Thai government to encourage development in the industrial and commercial sector of Thailand. The Board of Investment also referred to as the Biomass a criteria for any projects applying for generous incentives and privileges under the scheme.
The Energy Policy and Planning Office (EEPO)	EPPO is a pivotal agency in the management and administration of national energy policies and planning, adhering to the principles and giving due consideration to the economic, social and environmental development with transparent operation, emphasizing stakeholders' participation and networking, and is a learning organization that is recognized at both national and international levels.

5.4 The Philippines

5.4.1 Stakeholder map

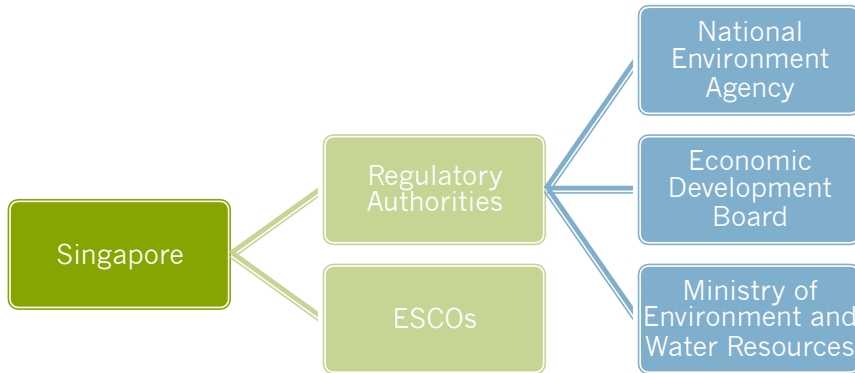


5.4.2 Stakeholder description

Name	Description of role
Department of Energy	To prepare, integrate, coordinate, supervise and control all plans, programs, projects and activities of the Government relative to energy exploration, development, utilization, distribution and conservation.
Board of Investments, the Philippines	<p>The Philippine Board of Investments (BOI), an attached agency of Department of Trade and Industry (DTI), is the lead government agency responsible for the promotion of investments in the Philippines.</p> <p>Taking the lead in the promotion of investments, BOI assists Filipino and foreign investors to venture and prosper in desirable areas of economic activities. Investors are welcome to experience the potentials of the booming Philippine Industry sectors. Profitable business opportunities abound in the food processing, construction, metal products, telecommunications, power and infrastructure projects among others.</p>

5.5 Singapore

5.5.1 Stakeholder map

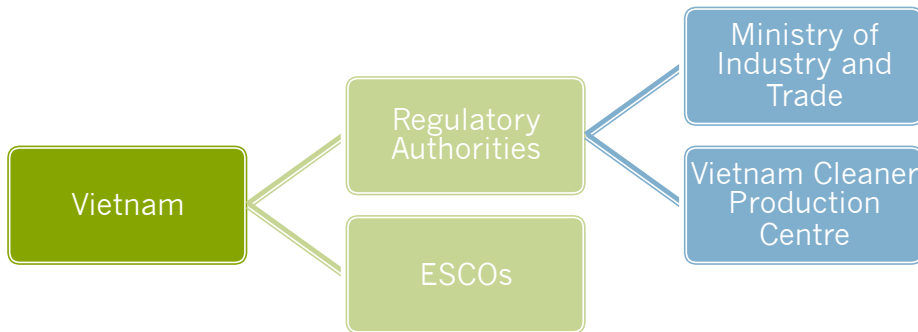


5.5.2 Stakeholder description

Name	Description of role
National Environment Agency	The National Environment Agency (NEA) is the leading public organization responsible for improving and sustaining a clean and green environment in Singapore. The NEA develops and spearheads environmental initiatives and programmes through its partnership with the People, Public and Private sectors.
Economic Development Board	EDB is the lead government agency responsible for planning and executing strategies to enhance Singapore's position as a global business centre and grow the Singapore economy. We dream, design and deliver solutions that create value for investors and companies in Singapore. In so doing, we generate economic opportunities and jobs for the people of Singapore; and help shape Singapore's economic future.
Ministry of Environment and Water Resources	MEWR is committed to providing Singaporeans with a quality living environment. Having achieved our goal of a clean and green living environment, MEWR now aims to move from maintaining good environmental performance in the short term to attaining environmental sustainability in the long run.

5.6 Vietnam

5.6.1 Stakeholder map



5.6.2 Stakeholder description

Name	Description of role
Ministry of Industry and Trade	Regulatory Authority in charge of energy
Vietnam Cleaner Production Centre	Viet Nam Cleaner Production Centre is a member of the United Nations Energy Programme (UNEP) network of national cleaner production centres. Viet Nam Cleaner Production Centre has access to the most up-dated sources of information on cleaner production, and furthermore, is in close contact with international experts on cleaner production. The United Nations Industrial Development Organization (UNIDO) is the Executing agency of the centre.

6. Regulatory Capacity Assessment

Previous implementations of energy efficiency programmes in other countries have unanimously acknowledged that their performance and success is dependent on the regulatory capacity of the implementing country⁴⁴. The objective of the regulatory capacity assessment is to analyse each of the 6 country's regulation frameworks, energy policies, tax/incentives/subsidies structure and the overall governance in supporting a sustainable energy efficiency development in the country.

6.1 Existing Laws Governing Energy Efficiency and Foreign Investment

In order to realise the region's energy efficiency market potential, major policy establishment (and reforms) and adjustments in economic structure are needed. Energy efficiency laws act as overarching guidelines by which regulating authorities can develop appropriate programs. Well-developed laws, providing clear direction and measurable impacts, broken down into short-term milestones, exert greater pressure on relevant authorities to deliver results.

Besides examining the laws governing the energy efficiency, other government initiated programmes or tax incentives/subsidies/grants have an impact on the energy efficiency market as a whole. These factors were also considered in the regulatory assessment of each country.

⁴⁴ World Bank GEF Energy Efficiency Portfolio Review & Practitioner's Handbook;
Financing Energy Efficiency in Developing Countries – Lessons Learned and Remaining Challenges

6.1.1 Key Findings – Regulatory Assessment⁴⁵

	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
National Energy Efficiency Law	Yes	Yes	No	No	Yes	Yes
National Energy Efficiency programs/ master plan	Yes	Yes	Yes	Yes	Yes	Yes
Tax incentives for energy efficiency projects	No	Yes	No	No (Yes for equipment end-user)	Yes	No
Grants and Subsidies for Energy Efficiency Implementation	No	No	No	Yes	Yes	No
Energy Audit assistance	Yes	No	Yes	Yes	Yes	No
Foreign Company Ownership	Yes	Yes	Yes	Yes	Yes	Yes
Overall Regulatory Capacity Assessment	2	3	3	4	4	2

6.1.2 Foreign investment/ownership restrictions

There are no restrictions against foreign investments in Energy Efficiency, or in Equity Funds, except in Indonesia, which restricts foreign ownership in “energy services” companies to 95%, and companies whose primary activities are leasing and other non-leasing financing to 85%.

⁴⁵ Refer to Appendix 4 for details

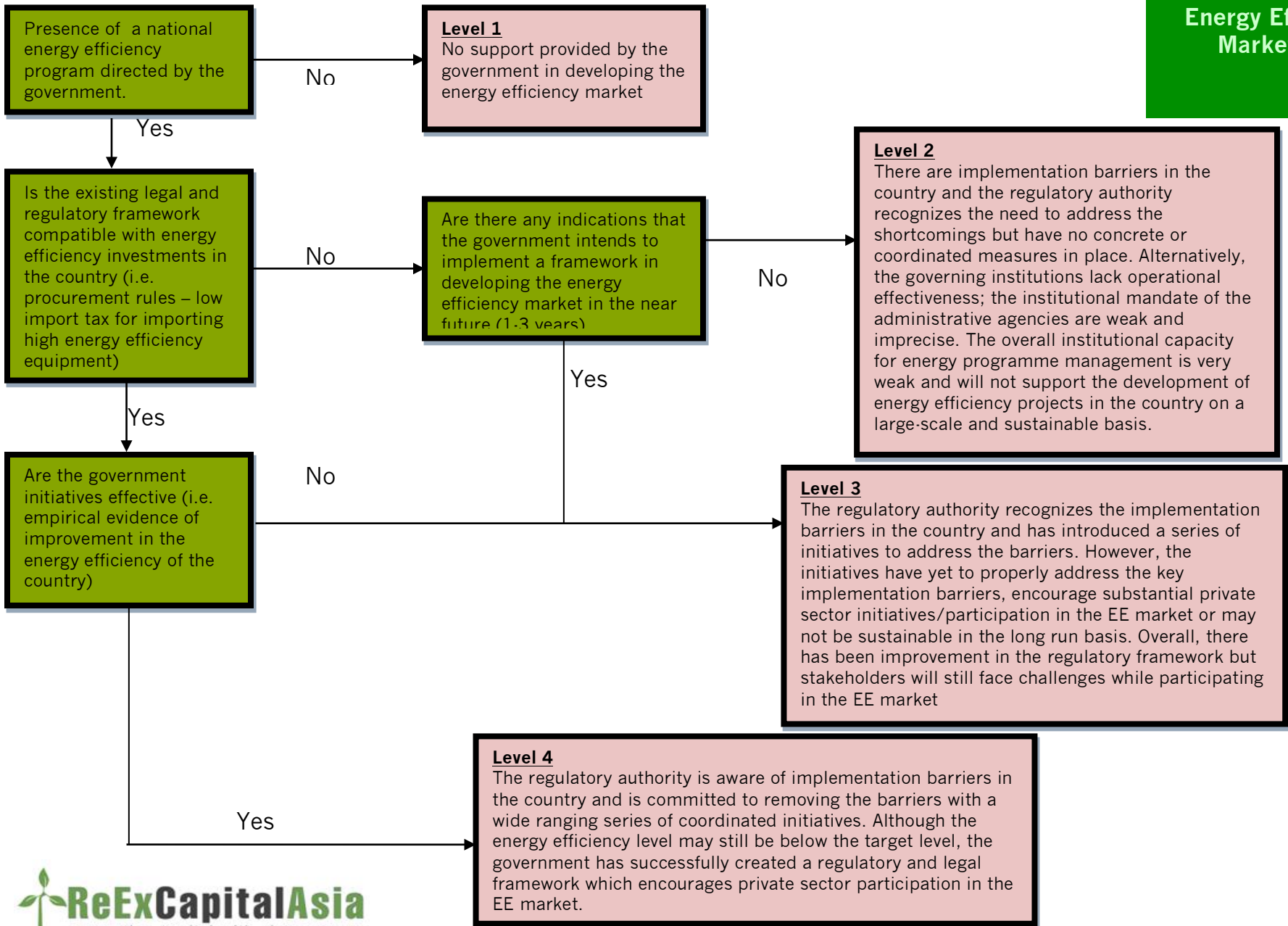
6.2 Assumptions for Regulatory Assessment

Given the relative low level of energy efficiency in the 6 countries, it is understood that energy efficiency implementation barriers exist in different forms for each country. The government of each country can play a vital role in fostering energy efficiency through different means such as aligning legal and regulatory framework to support energy efficiency investments, establishing guidelines and directives for the various stakeholders and even providing incentives in the form of grants, subsidies and tax cuts to stimulate the implementation of energy efficiency projects.

In carrying out the regulatory capacity assessment for each of the 6 countries, a number of assumptions were made to base capacity assessments on the unique environment of each country while allowing an overall comparison across the different countries. The assumptions are:

- The objective of the government regulation is to stimulate and develop a sustainable energy efficiency market in the country
- The implementation barriers may not necessarily be uniform across the 6 countries
- The presence of a particular government initiative in one country does not necessarily imply that the regulatory capacity level is higher in that country than another which did not have the initiative
- While direct government initiatives to address implementation barriers may be crucial in the beginning, the long term solution requires a market based mechanisms with little or low-level of government intervention

Regulatory Capacity Assessment Road Map



6.3 Country Regulatory Capacity Assessment

6.3.1 Indonesia

Capacity Level: 2

6.3.1.1 Review of National Policies

The government of Indonesia has made a pledge to reduce energy intensity by 1 per cent per year on average until 2025 in its energy efficiency plan, The National Energy Conservation Master Plan (RIKEN 2005). RIKEN has also identified sectoral saving goals, something that the other countries with the exception of Thailand have yet to implement. More recently, the World Bank has approved a \$200m loan to the government of Indonesia to support its climate change policies, including increasing the incentives to promote energy efficiency⁴⁶.

However, it is also noted that the Indonesian government over the past few years has repeatedly publicised perhaps unrealistic goals for economic development and for the improvement of the regulatory environment. This has also been extended in its energy conservation goals. When evaluating the effectiveness of the energy efficiency policies, it is clear that the regulatory objectives frequently change and decision makers do not demonstrate enough consistency.

6.3.1.2 Review of Coherence of Energy Policies and Targets

Energy Subsidies

Indonesia's energy prices have been consistently among the lowest across the six countries and are heavily regulated and subsidised by the government. However in the past year, the government has provided strong indications that it intends to scrap electricity and fuel subsidies by 2014-2015 so that energy prices reflect market level, thereby reducing the financial burden on the state. As of 1 July 2010, the electricity tariff rates in Indonesia had increased by an average of 10 percent instead of the original 15 percent indicated last year.

Although the intentions to rationalise energy and electricity prices will move the government's policies in line with the energy saving targets, the issue of energy subsidies remain politically sensitive in the country where efforts to raise fuel prices in the past had sometimes sparked riots. As such, energy subsidies remain a politically divisive issue among the various coalition parties and the validity of the government's goal of scrapping energy subsidies in 4 to 5 years' time remains uncertain.

⁴⁶<http://www.hydrocarbons21.com/content/articles/2010-05-28-indonesia%E2%80%99s-upcoming-energy-efficiency-incentives--an-opportunity-for-hcs.php>

Incentives and Tax Allowance

Currently, apart from a partnership program on energy conservation in energy auditing, there are no specific grants or tax allowances for undertaking energy efficiency projects. The government has stated its intentions to introduce incentives such as tax exemption and fiscal incentives on imports of energy saving equipment and appliances in the near future, although no definitive announcements have been made as of now.

Financing Requirement

There are no specific energy efficiency financing schemes in the country. The lack of contract enforcement and avenues for due recourse, coupled with opaque and often unpredictable government policy changes, increases the operating risk for private financing firms, thereby reducing the attraction to establish financing activities in the country.

Overall Assessment

Overall, despite the ambitious energy efficiency goals in place, it is hard to take confidence that these will lead to any rapid investments. The weak and very often complex administrative process in the country is reflected in the uncertainty in doing business in the country and will impact on any foreign companies considering an entry into the energy efficiency market in the country.

6.3.2 Malaysia

Capacity Level: 3

6.3.2.1 Review of National Energy Policy

The government of Malaysia under the Eight Malaysian Plan and the Ten Year Outline Perspective Plan (OP3) recognized energy efficiency as an important measure to increase the competitiveness of the country's goods and services. Since 2002, the government has introduced a series of initiatives to tackle the energy efficiency implementation barriers in the country. The Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP) was developed as a comprehensive plan to remove barriers to the efficient use of energy by the industrial sector, in total, eight components ranging from bench marking program, energy auditing program to ESCO support program and financial institutions participation programs were included in the MIEEIP.

Despite the best efforts by the government, the pick-up in industrial energy efficiency was not as expected. The MIEEIP assessment report acknowledges that many of the implementation barriers before the MIEEIP still exist. Specifically, many industrial establishments still perceive energy efficiency as high cost and high risk transactions. To address this problem, the government had established a fund this year amounting to RM1.5 billion to provide soft loans to companies that supply and utilise green technology. The government will bear 2 per cent of the total interest rates on the loans borrowed.

Besides industrial energy efficiency, there appears to be a lack of government focus on commercial energy efficiency. Although the commercial sector use about 27 percent of the total electricity generated, not much published data is available on energy performance or actual energy consumption of buildings. The government has initiated a series of energy audits on selected government buildings and while plans are underway to adopt mandatory energy efficiency building design, there has been no existing schemes targeting commercial building owners to implement energy efficiency retrofits.

6.3.2.2 Review of Coherence of Energy Policies and Objectives

Energy Subsidies

Despite the government energy efficiency goals, energy prices are still regulated by the government and are heavily subsidised. The heavily subsidised electricity tariff reduces the incentives for energy end-users to adopt energy efficiency measures. A meeting with the Malaysian energy planning centre, Pusat Tenaga Malaysia (PTM, now known as GreenTech) has revealed that the government is aware of the disconnect between its energy efficiency goals and the existing energy policies; it is the government's objective to remove gas and electricity subsidies over the next 2 to 3 years.

A further discussion with an external consultant⁴⁷, serving an advisory role to the government on energy efficiency policy, has cast doubts on the timeline for the removal of the electricity subsidies. According to him, the country's current reliance on energy subsidies means that it will be at least 5 years before the tariff subsidies can be reduced, and more before it can be completely removed.

⁴⁷ Mr Ong Chin Loon, Managing Director of Cofreth (M) Sdn Bhd and also Vice President of the Malaysia ESCO Association (MAESCO)

Incentives and Tax Allowance

The Malaysian government is highly supportive of energy efficiency and renewable energy investments in the country and has put in place an Investment Tax Allowance (ITA) scheme of 100% on the qualifying capital expenditure incurred within 5 years. A meeting with the Malaysian Industrial Development Authority (MIDA) has confirmed that the ITA applies for energy efficiency investments and this allowance can be offset against 100% of the statutory income for each year of assessment. In view of that, energy efficiency investments stand to benefit significantly and this makes Malaysia particularly attractive as a long term investment prospect.

Financing Requirement

The Malaysian government is also aware that there is a financing gap for energy efficiency projects and this is holding back end-users and ESCOs from committing to these projects. To encourage the take-up for energy efficiency projects, the government through GreenTech has set up the Green Technology Financing Scheme (GTFS) to provide soft loans to companies which intend to incorporate energy efficiency projects.

Overall Assessment

The interviews conducted with the Malaysian government officials at GreenTech and Mida has confirmed the government's high level of commitment towards the promoting energy efficiency in the country. Overall, the government of Malaysia has shown pragmatic signs that it understands the challenges of energy efficiency and is attempting to introduce a coordinated approach in tackling the implementation barriers. However, significant challenges still exist in the country and it may be a few years before the major barriers are addressed but foreign investments in the energy efficiency sector can be certain that the regulatory authority is aware of the challenges and have also taken steps to reduce bias towards domestic companies.

6.3.3 Philippines

Capacity Level: 3

6.3.3.1 Review of National Energy Policy

The Philippine government launch The National Energy Efficiency and Conservation Program (NEECP) in 2004 as an essential strategy in rationalising the country's demand for petroleum

products and eventually lessening the impact of escalating prices on the economy. The NEECP provides the framework for the government's effort to promote efficient and judicious utilisation of energy and it expects to achieve a cumulative energy savings of 9.08million barrels of fuel oil equivalent at the end of the planning period in 2014.

The NEECP is a comprehensive energy efficiency plan that consists of 5 sub-programs which include (i) a nationwide information, education and communication campaign; (ii) voluntary agreement programs; (iii) energy labelling and efficiency standards; (iv) energy management programs; and (v) alternative fuels and technology programs. It is targeted that cumulative savings from the NEECP is to reach 27.62 Mtoe⁴⁸ for the period of 2004-2014.

As part of the NEECP plan, all government agencies have to reduce its energy consumption by 10 percent annually. However, further discussions with the implementing agency, the Philippines Department of Energy (DOE) has revealed that there are no penalties for failure to comply with this target. Similarly, there are no penalties or incentives for large energy users which were mandated to report its energy usage to the DOE. With the lack of enforcement, the actual effectiveness of the target set by the government remains to be validated.

The DOE has also been actively promoting energy efficiency in the private sector and directly to end-users. Under the Philippines Energy Efficiency Project (PEEP) which is supported by the Asian Development Bank, initiatives including governmental retrofitting, public lighting retrofitting, expansion of energy efficiency labelling and lamp waste facility have already been undertaken.

6.3.3.2 Review of Coherence of Energy Policies and Objectives

Energy Subsidies

As the electricity tariff rates are not regulated by the government and instead are decided by market forces, the Philippines has one of the highest electricity tariff rates in the region at an average of US\$ 0.119 per kWh⁴⁹.The lack of price distortion for energy pricing makes the country an attractive proposition for energy efficiency as the end-users are incentivised to improve their energy efficiency.

⁴⁸FROM IDEAS TO ACTION: CLEAN ENERGY SOLUTIONS, Philippines Country Report USAID, 2007

⁴⁹<http://www.meralco.com.ph/Corporate/rates/gentrans.htm>

Incentives and Tax Allowance

There are currently no financial subsidies or other budgetary measures to any private or government entities for energy efficiency improvements or projects. Although the government has initiated energy savings target, the lack of financial subsidies and other budgetary measures means that the private sector will have to drive the energy efficiency improvement in the country. Without the supportive policies and appropriate incentives, the actual achievability of the targets remains unlikely.

However, a meeting with the Philippines Board of Investment (PBOI) has revealed that the government has a strong conviction about energy efficiency and would support any private and foreign ventures into the energy efficiency market. The PBOI has confirmed that ventures providing financing for energy efficiency projects in the country will qualify for Pioneer Industry Status; therefore it is possible for 100 percent foreign ownership and also a 6 year tax holiday for operating in the country. The venture will be granted this tax-holiday by the BOI as long as it is endorsed by the Philippines DOE as an energy efficiency related venture.

Financing Requirement

There are currently no locally managed and funded financing schemes for energy efficiency projects in the country. In order to attain a corporate loan for energy efficiency projects, the company must have at least 70 percent local ownership. The lack of dedicated financing for energy efficiency projects, or any initiatives by the government to address the financing gap, undermines the government's drive to promote energy efficiency in the country. Meetings with various ESCOs⁵⁰ in the country have confirmed that the lack of financing is one of the main barriers to energy efficiency projects.

Overall Assessment

The meeting with the Philippines BOI and DOE has revealed a strong government conviction towards energy efficiency. However, the current regulatory structure and policies in the country remain disorganised and do not directly address the energy efficiency barriers. Without strong government support, it is unlikely that the ambitious energy efficiency targets set by the government can be attained by the deadline. On a side note, the lack of restrictions on foreign ownership for energy efficiency investments coupled with the high electricity tariff rates makes the Philippines an attractive investment proposition for foreign investors seeking to make investments in the country's energy efficiency market.

⁵⁰ AV Garcia and Davis Energy

6.3.4 Singapore

Capacity Level: 4

6.3.4.1 Review of National Energy Policies

Under the Sustainable Singapore Blueprint (2009), the government will introduce a series of wide-ranging initiatives targeting the power generation sector, industry sector, transport, buildings and households. Besides allocating state budget to the above mentioned initiatives, the government had also set aside a Research Fund for the Built Environment to encourage and support energy efficiency research and development. In summary, Singapore has set a target of achieving 35 percent energy intensity improvement by 2030.

Energy efficiency matters in Singapore are headed by the Energy Efficiency Programme Office (E²PO), a multi-agency committee led by the National Environment Agency (NEA) and the Energy Market Authority (EMA). As the multi-agency committee involves the key agencies managing the targeted sectors under the Sustainable Singapore Blueprint, it allows greater coordination and communication during the policy planning phase.

Unlike its peers in the other five countries, the government has been very proactive in directly addressing the energy efficiency implementation barriers. Besides introducing a host of direct government funded support schemes to promote energy efficiency in the different targeted sectors, the government of Singapore has demonstrated its commitment to achieving the targets set and is currently undertaking a consultation project on addressing the energy efficiency financing gap. By reviewing its previous energy efficiency initiatives, the government is aware that the lack of a sustainable and commercially viable financing option for energy efficiency financing is holding back adaptation of energy efficiency investment.

As opposed to relying on market forces to address the gap, the government understands the need for support and guidance for the commercial sector and has directly taken up the role of a catalyst.

6.3.4.2 Review of Coherence of Energy Policy and Targets

Energy Subsidies

The electricity tariff rates are not regulated by the government and are the highest among the 6 countries in this study. The average electricity tariff rate is US\$ 0.137⁵¹ and is completely market driven. As a result of the high cost electricity and the need to remain efficient in order to be competitive, the deregulated power generation industry has made significant investment in efficient power generation and fuel switching. The overall power generation efficiency

⁵¹ SP Services: 1 Jul, High Tension Small (HTS) Supplies

improved from 37 percent to 44 percent from 2000 to 2006⁵². As shown here, the high electricity tariff rates, competitive nature and energy producer/end user's need for cost control provides a strong pull factor for energy users to become more energy efficient.

Incentives and Tax Allowance

In order to support the greater energy efficiency in the country, the government of Singapore has introduced a wide-ranging energy efficiency grant schemes. Among the energy efficiency grants available are:

- Audit grants – EASe Scheme
- Investment grants – GREET scheme
- New facilities investment grants – Design for Efficiency scheme

Besides the grants for audits and energy efficiency investments, the government also provides accelerated depreciation allowance for energy efficiency equipment and technology. Even with the wide-ranging incentives and tax allowance, interviews with the various ESCOs based in Singapore has revealed that while the grant schemes provide an incentive for end users invest in energy efficiency, the schemes often have a long and complicated application process. As such, the actual effectiveness of these schemes was diminished and served more as a “sweetener” to the end user as opposed to being the overriding push.

Despite the limitations of the incentives and tax allowance, they remain in line and relevant with the objectives of the Sustainable Singapore Blueprint and the direct funding from the government has clearly demonstrated the commitment to the energy efficiency cause.

Financing Requirement

There is no commercial energy efficiency financing scheme available in the country at the moment. Energy efficiency investments are funded either directly by the end user in a fee-for-service contract or by the ESCO in a performance contracting. As mentioned in the policy review, the government of Singapore is aware of the importance of financing for energy efficiency projects and is currently evaluating different financing options. It is expected that a government guided and commercially managed financing option will be available in near future.

Overall Assessment

The government of Singapore has acknowledged the need for energy efficiency to improve the country's economic competitiveness, energy security and environmental sustainability and has

⁵²<http://www.e2singapore.gov.sg/power-generation.html>

indicated a very strong commitment in tackling the implementation barriers. Among the 6 countries in the report, the government of Singapore allocates the largest funding for energy efficiency grants and subsidies and has demonstrated the highest commitment in directly addressing the implementation barriers. The lack of government intervention in electricity tariff prices and deregulation of the power generation is line with objective of promoting higher energy efficiency and conservation. While there are still areas for improvement, the regulatory capacity in Singapore is highly developed and increasingly supportive of energy efficiency measures.

6.3.5 Thailand

Capacity Level: 4

6.3.5.1 Review of National Energy Policies

The Energy Conservation Act (the ENCON Act) is the primary legislation guiding the country's energy efficiency and conservation policy. Enacted in 1992 and made effective in 1995, the ENCON Act promotes energy conservation by encouraging conservation investments in factories and buildings. It does this by including mandatory regulations as well as incentives to implement the required energy efficiency measures. It also includes the ENCON Fund discussed above in Part C.

The main contents of the ENCON Act include:

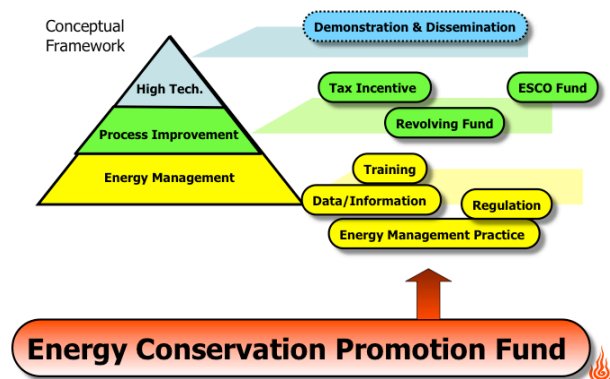
- (i) A Compulsory Program that requires designated factories and buildings to conduct energy audits and submit energy conservation targets, plans, and reports every three years. The Compulsory Program is primarily implemented by the DEDE. (Building Energy Efficiency, USAID 2007 Thailand Country Report).

Designated Buildings are buildings with a potential electricity peak consumption of more than 1,000 kW (or those authorized to install one or more transformers with a total capacity of 1,175 kilovolt-ampere (kVA), or buildings with electricity and/or commercial energy consumption and/or consumption of steam thermal in the past year in a total volume of 20 million mega joules or more of electrical energy equivalent) (Vitooraporn). There are 1,964

designated buildings and 3,313 designated factories in Thailand that fall under this classification. (Nilkuha).

- (ii) A Voluntary Program that promotes and supports energy efficiency and renewable energy programs for smaller facilities, primarily small and medium-sized enterprises (SMEs). This includes demonstration and pilot projects, research and development, renewable energy, information campaigns, and other special projects. It also promotes energy conservation technology, enhances marketing of energy efficient equipment, demonstrates and disseminates PV grid connections for households and government buildings, PV-pumping for village water supply, and biogas from animal slaughter houses. The Voluntary Program is implemented primarily by the Energy Policy and Planning Office (EPPO). (Building Energy Efficiency, USAID 2007 Thailand Country Report).
- (iii) A Complementary Program that raises public awareness of energy conservation, facilitates human resource development, and sees to the administration of the ENCON Act, as well as to the monitoring of the implementation of the funds allocated for program activities⁵³.

In addition to the ENCON Act, there are a number of other policy incentives the Thai government has incorporated into its overall energy efficiency plan. The Figure below illustrates this inclusive conceptual framework.



Source: Nilkuha (Sept. 2009)

⁵³ Building Energy Efficiency, USAID 2007 Thailand Country Report

The present government under Prime Minister Abhisit Vejjajiva's administration has developed policies to encourage energy conservation and efficiency in the household, industrial, service and transportation sectors through campaigns fostering energy-saving disciplines and promoting effective energy use. The programs provide incentives to encourage private sector investment in energy-saving appliances and incentives for the household sector to reduce electricity consumption during peak periods. Programs support research and development and set standards for electrical appliances and energy-saving buildings, and support the development of public mass transportation and railway systems to improve energy efficiency, which will help defer the economy's investment in energy procurement.

Thailand has adopted the ambitious goal of reducing the energy intensity of GDP 25% by 2030 (with base year 2005), in line with the ASEAN goal agreed to by ASEAN Energy Ministers to improve energy intensity by at least 8% by 2015 compared to 2005. Thailand has set goals for reducing its energy consumption in the industrial sector by 3190 ktoe or 4.4%, the transportation sector by 3413 ktoe or 4.7%, and the residential sector by 1217 ktoe or 1.7% by 2011⁵⁴.

6.3.5.2 Review of Coherence of Energy Policies and Targets

Energy Subsidies

Although a free and fair market is promoted by the government, the electricity tariff rates in the country are still lower than the market rates in Singapore and Philippines. This can be attributed to the variety of fuel source utilised for power generation and, as a result of the spread of fuel type used, the electricity prices in Thailand are less affected by changes in fuel costs.

Incentives and Tax Allowances

The Thai Government has provided various tax incentive programs over the years pertaining to energy efficiency. Presently, tax incentives appear to be limited to cost-based deductions for corporate income tax. The Ministry of Energy has in previous years offered discretionary performance-based financial incentives calculated by reference to the applicant's income tax rate; however the financial incentive does not appear to be available this year in 2010. The

⁵⁴ APEC Compendium of Energy Efficiency Policies of APEC Economies

cost-based incentive program introduced by the Revenue Department in 2005 limited deductions to acquisitions up to THB 50 million; however the cost based incentive program introduced in 2009 does not impose an expressed limit. The 2009 cost-based incentive program does permit a 125% deduction in total; however this is made up of two components: (i) a 25% deduction to be made prior to end 2010 and (ii) 100% depreciation over a period of at least five years. The deductions are available only for investments made between 19 May 2009 and 31 December 2010 in certain types of energy efficiency products.

The tax incentive programs have been very successful and have resulted in significant energy savings. The cost-based program supported 94 projects between 2002 and 2008, achieving an energy savings of US\$ 10 million per year and resulting in US\$ 3.2 million in tax reductions. The performance-based program (allowing entities to reduce taxable income with actual energy savings) supported over 200 energy efficiency projects between 2002 and 2008, saving US\$ 30 million per year in energy savings and resulting in US\$ 3 million in tax reductions⁵⁵.

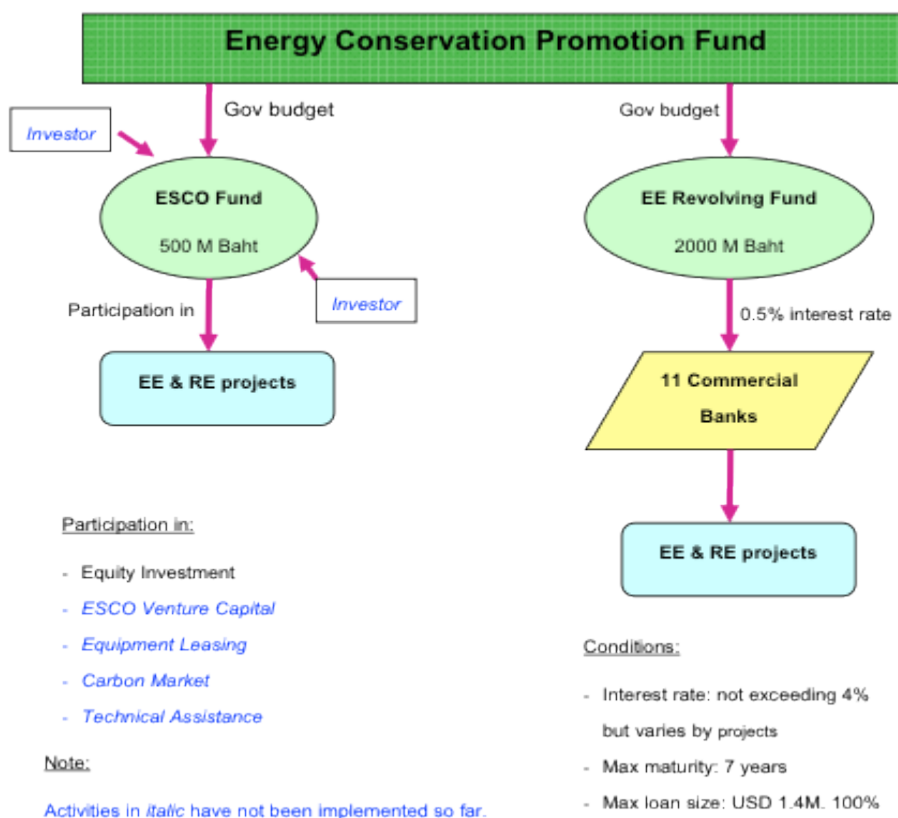
Last, there is also an incentive program through the Board of Investment (BOI), where import duties and corporate taxes are exempt for 8 years if it is a new investment in energy efficiency (or renewable energy) equipment. As of October 2009, 37 projects have been approved by this program, resulting in a total investment of US\$ 235 million with potential energy savings of up to US\$ 72.3 million⁵⁶.

Financing Requirements

The Ministry of Energy has established various financing mechanisms to promote energy efficiency. Under the Energy Conservation (ENCON) Act three funds were created, (i) the ENCON Fund; (ii) the Energy Efficiency Revolving Fund (EERF); and (iii) the Energy Service Company (ESCO) Fund. The EERF and the ESCO funds received initial capital from the ENCON Fund, as diagramed b

⁵⁵Prasert Sinsukprasert, Energy Efficiency and Renewable Energy Financing Measures: Thailand, 1st Expert Group Meeting Global Energy Efficiency 21 (Geneva, Switzerland, April 20, 2010).

⁵⁶APEC Peer Review on Energy Efficiency, available at http://www.ieej.or.jp/aperc/PREE/PREE_Thailand.pdf.



Source: APEC Peer Review

*The size of the EERF is inconsistent with the number below which reflects the updated budget size.

a. The Energy Conservation (ENCON) Fund

The Energy Conservation (ENCON) Act was established to promote energy conservation by encouraging energy efficiency investments in factories and buildings. As part of the Act, the ENCON Fund was formed in 1992 in order to provide financial support to government agencies, state enterprises, non-government organizations, individuals and businesses that wish to increase efficiency in energy utilization.

The Fund started out with THB 1.5 billion (US\$ 45 million), which was transferred from the Petroleum Fund. (EPPO Website). The Fund receives revenues from a tax of THB 0.04 (US\$ 0.001) per liter on all petroleum products sold in Thailand. In June 2005, the ENCON Fund had a balance of more than THB 14 billion (US\$ 350 million). (Hong, et al., Building Energy Efficiency).

The Fund provides funding for research, development, demonstration, incentives (grants/soft loans), capacity building, and policy study. (Sinsukprasert). Resources from the ENCON Fund are directed to the compulsory, voluntary and complementary programs, which include: government buildings, existing designated factories and buildings, factories and buildings under designing or construction, public awareness campaigns, promotion of renewable energy

utilization, promotion of small power producers using renewable energy, industrial liaison, existing non-designated factories and buildings, research and development, human resources development, public awareness campaigns under NEPO's responsibility, management and monitoring. EPPO Website).

The ENCON Fund Committee manages the Fund. The duties and authority of the Committee are detailed in Sec. 28 of the ENCON Act (EPPO Website).

b. The Energy Efficiency Revolving Fund (EERF)

The EERF was established in January 2003 to stimulate and leverage commercial bank investment in energy efficiency (and renewable energy) projects. The EERF has a current budget of THB 672 million (US\$ 21 million) to lend to individual projects for a term of up to seven years with a maximum loan of THB 50 million (US\$ 1.3 million) and with a maximum interest rate of 4% from the banks. Eleven commercial Thai banks are participating in the Program, which is supervised by the Department of Alternative Energy Development and Efficiency (DEDE). (Sinsukprasert, April 2010). There have been four phases of the program so far with additional money provided from the ENCON Fund when the government has deemed it appropriate.

Currently the EERF has supported over 280 energy efficiency projects (239 factories and 41 buildings). The overall total investment has been approximately THB 5.1 billion (US\$ 157.47 million), with an energy savings of THB 1.46 billion (US\$ 44.8 million) per year. (Sinsukprasert, April 2010). The details of the EERF are outlined below in Figure 26.

The plan for the EERF was to stimulate commercial bank investment, and thus eventually come to an end. The DEDE plans to shift away from providing financial support to providing other types of assistance, such as awareness building and technical support. To fill the void once the EERF is phased out, the DEDE has set up a new fund for Energy Service Companies

(ESCOs) to serve the needs of small and medium-sized enterprises in the energy sector. The ESCO Fund is discussed in greater detail in the section below.

c. The Energy Services Company (ESCO) Fund

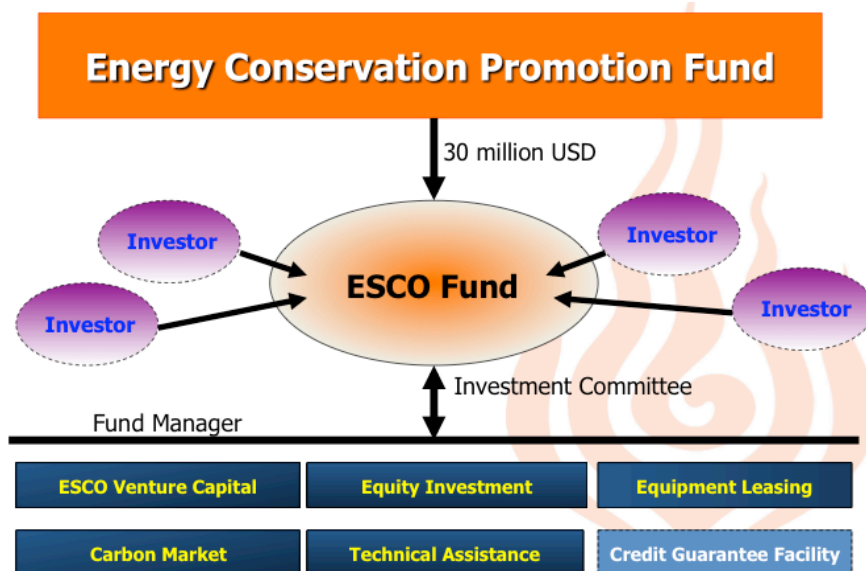
The ESCO Fund was launched by the DEDE in October 2008 with an initial fund size of THB 500 million (US\$ 15 million). The Fund was established as a pilot venture capital initiative to address the issue of the lack of equity capital for small project developers. The ESCO Fund provides a source of venture capital for ESCOs to jointly invest with private operators in energy

efficiency and renewable energy projects through various channels such as venture capital, equity investment, equipment leasing, carbon markets, technical assistance and credit guarantee facilities. The structure is illustrated in the Figure below.

The Fund provides equity capital for up to 50% of the total equity (with a cap at US\$ 1.25 million per ESCO) with repayment in five (5) years. In the case of very small projects, the Fund provides its support through equipment leasing.

The identification and appraisal of projects has been outsourced to two fund managers, the Energy Conservation of Thailand Foundation and the Energy for Environment Foundation (who received THB 250 million each). As of April 2010, the Fund has approved THB 4.6 billion (US\$ 145 million) for supporting investment in 26 energy efficiency and renewable energy projects.

Figure 1. ESCO Fund Structure (April 2010)



Source: Sinsukprasert (DEDE, Ministry of Energy)

Overall Assessment

Overall, the Thai government has clearly demonstrated a strong commitment from the aspects of energy efficiency and conservation and institutional development. The legislative framework is in line with the energy efficiency goals while the government initiated programs appear well-developed with a clear long-term goal in mind.

6.3.6 Vietnam

Capacity Level: 2

6.3.6.1 Review of National Energy Policy

The government of Vietnam initiated the country's first-ever comprehensive plan on improving energy efficiency and conservation in all sectors of the economy in 2006. Under the Vietnam National Efficiency Program (VNEEP) Phase 1 from (2006 to 2015), energy savings of 3 percent to 5 percent were targeted between the period of 2006-2010 and 5 percent to 8 percent of the total national energy consumption period in period 2011-2015. The plan shares similarity with the Malaysian MIEEIP by breaking down the specific objectives into different specialised components.

The Vietnamese Ministry of Industry and Trade (MOIT) plays the role of a focal coordinator on energy efficiency and conservation and is authorised to administer the implementation of the VNEEP. In order to develop organisations and systems related to improving energy efficiency and conservation on government levels from the central government to local governments, an inter-ministerial committee was established 2006 and is chaired by the MOIT.

Although the VNEEP is highly comprehensive in its coverage of all sectors of the economy, an in-depth analysis of the government initiatives reveals numerous shortcomings with the country's regulatory capability. While the national energy efficiency goals have been memorialised in the country Decree, there appears to be a lack of regular promotion effort by the government or any of its officials or agencies. Without regular promotion or championing of the goals, the national energy efficiency plan runs of risk of failing to garner the necessary impact to guarantee an implementation success.

It also appears that the 6 components of the VNEEP are not fully integrated and the programs in each component appear to overlap and not be part of the overall roadmap to achieve the national energy efficiency goals. A possible explanation for the overlapping of programs could be attributed to the lack of government financing for the energy efficiency programs carried

out in the country and the government's reliance on foreign donors to support the program implementations. With foreign donor support, the programs and planned activities are often dictated by the donor entity and as such, the programs and activities carried out in the country appears to lack a cohesive and integrated approach.

Another area of weakness identified is the lack of an official organisation or agency that is officially appointed for energy data collection. Without proper sharing and integration of energy data collected by the different parties, it is difficult to conduct a proper monitor and evaluation of the country's energy efficiency and conservation progress. Overall, while there is a comprehensive energy efficiency plan in the country and the government has clearly designated responsibilities to the different government bodies or agencies, there appears to be a lack of drive and cohesiveness in the regulatory authorities handling of the energy efficiency goals.

6.3.6.2 Review of the Coherence of Energy Policies and Targets

Energy Subsidies

The pricing mechanism for certain energy fuels and electricity tariff in Vietnam is regulated by the government. In particular, the coal price in the country for power generation is lower than the international prices. This result in one of the lowest electricity tariff rate compared to the other 5 countries in this report. The current electricity price is about US\$ 0.053 per kWh and there are no immediate plans to rationalise the electricity prices.

Incentives and Tax Allowance

Currently, there are no tax allowances for energy efficiency investments and for import of energy efficiency equipment into the country. The meeting with MOIT officials has confirmed that there are no immediate plans by the government to introduce any tax allowances for the above. There are also no direct government subsidies or grants scheme being extended to end-users or ESCOs in making energy efficiency investments. However, there are several foreign-funded initiatives which provide financial support to enterprises in undertaking energy efficiency projects.

One such example is the Pilot Commercial Energy Efficiency Program (CEEP) which took place from 2004-2009. With a grant from the Global Environment Facility (GEF), the government of Vietnam provided:

- Training for energy efficiency service providers
- Provision of audit and investment grants
- Development of market transformation programs

Although there are at any point several foreign-funded energy efficiency initiatives in the country, a key concern as mentioned in the policy review above is that there is often overlapping of program goals and the differing terms and conditions of each program may over-complicate the application process for the intended end users which may in turn prevent the end users from applying for the appropriate support scheme.

Financing Requirement

Besides the government grant for energy efficiency audit and investments mentioned above, there are no long-term energy efficiency financing schemes in operation at the moment. The VietCom Bank provides financing for mainly renewable energy projects and offers corporate debt with recourse for energy efficiency investment loans. Currently, there are no indications of any government initiatives to set up a dedicated non-recourse energy efficiency financing scheme in the country.

Overall Assessment

The government of Vietnam has made significant progress in promoting energy efficiency in recent years through the introduction of a coordinated national energy efficiency plan. However, there appears to be a lack of coherence between the energy policies and targets. The government has initiated several energy conservation targets but there is little or no implementing policies from the government to support these initiatives. The meeting with MOIT, the key agency in charge of energy efficiency has confirmed that there are very little current and upcoming government activities to address the implementation barriers in the country. Overall, while the government has taken a positive step towards promoting energy efficiency and conservation in the country, the policies and regulatory framework in the country is neither supportive nor comprehensive for foreign energy efficiency investments in the country.

7. ESCO Capacity Assessment

The definitions for Energy Service Companies (ESCOs) vary from country to country but the common theme involves the use of performance-based contracting, which means that the ESCO's payment is directly linked to the amount of energy saved (in physical and monetary terms). In order for the energy efficiency market potential to be fulfilled, the ESCO market in the country must have the proper skills (corporate management, financial management and credit assessments, risk mitigation and management, sales) to implement the energy efficiency projects.

As such, the purpose of the ESCO capacity assessment is to determine the overall level of competencies of the ESCO industry in each of the 6 countries and the industry's ability to support energy efficiency initiatives and goals in the future.

7.1 Summary of ESCO Capacity Assessment

7.1.1 No. Of ESCO Players⁵⁷

	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
Total players	9	12	18	34	37	20

The number of ESCOs in listed each country is based on a desk research of the companies that listed itself as an energy-service company. A basic level of due diligence was conducted to ensure that the companies do provide energy services and/ or other energy efficiency improvement measures in the user's facility or premises. Due to the lack of publicly available information on the ESCO revenues, it is not possible to gauge the size of each ESCO or its scale of operations.

7.1.2 ESCO Association⁵⁸

	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
ESCO Association	No	Yes	Yes	Yes	Yes	No

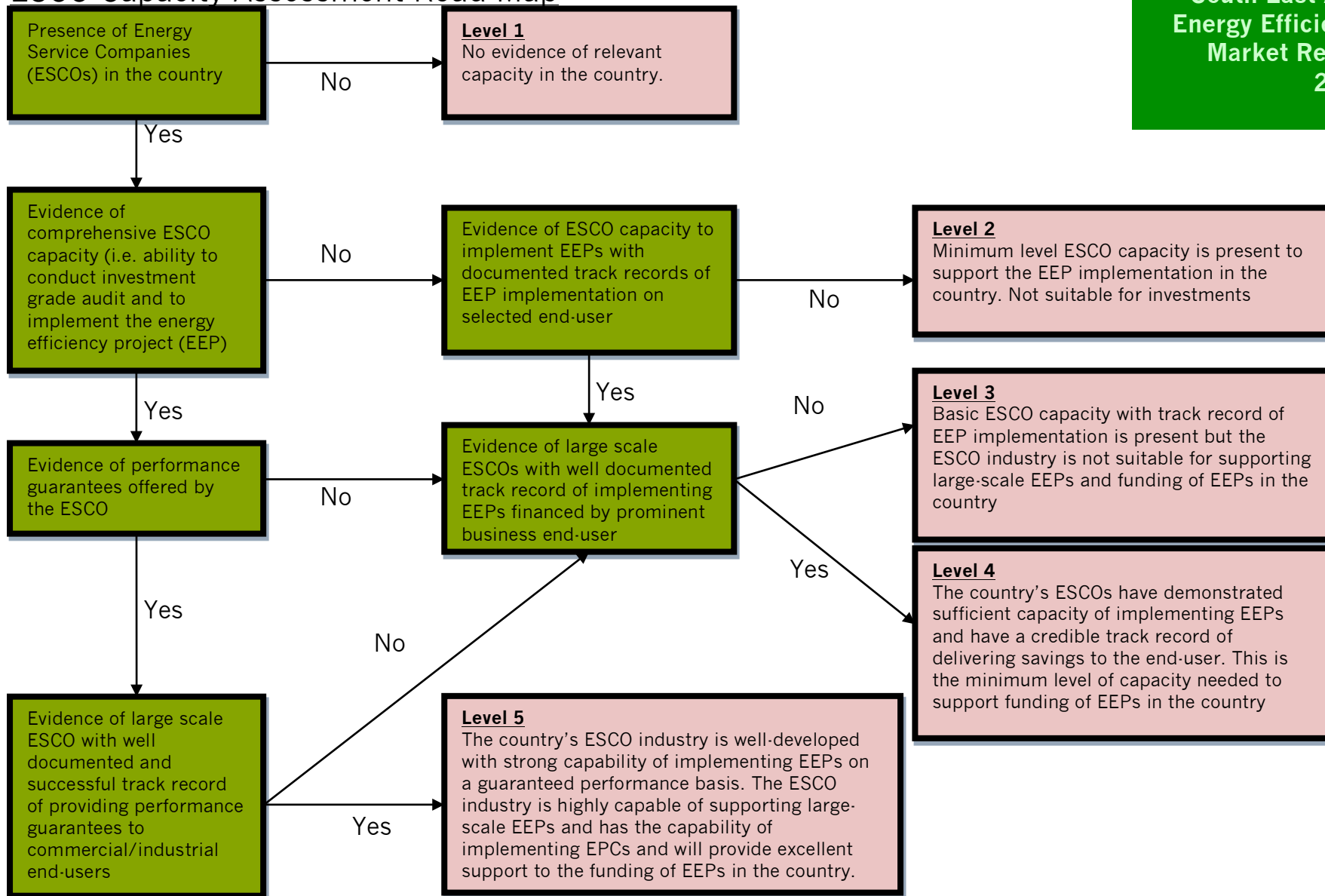
7.1.3 Overall ESCO Capacity Assessment

	Indonesia	Malaysia	Philippines	Singapore	Thailand	Vietnam
(Existing Capacity Level)	2	3	3	4	5	2

⁵⁷ Refer to Appendix xxx for reference to the list of ESCOs in each country

⁵⁸ Refer to Appendix xxx for reference to the ESCO association

ESCO Capacity Assessment Road Map



7.2 Country ESCO Capacity Assessment

7.2.1 Indonesia

Capacity Level: 2

7.2.1.1 Country ESCO Capacity Assessment

The ESCO market in Indonesia remains very underdeveloped when compared to its neighbouring countries. Presently, it is estimated that there are around 9⁵⁹ ESCOs offering varying level of energy efficiency related services in the country. Among the 13 ESCOs that have been noted, the major players include the state-owned ESCO like PT EMI as well as foreign-owned ESCOs such as Schneider Electric and Johnson Controls.

It has to be noted that the term energy service company (ESCO) in Indonesia and also for the other 5 countries refer to a broad spectrum of potential service providers and does not specifically refer to the common international definition of ESCOs which work under performance and shared-savings contract mechanisms. In Indonesia, while free energy audits are provided to more than 250 building and industrial facilities, the number of energy efficiency projects implemented has not been proportionate to the number of energy audits conducted. Overall, the majority of the ESCOs are not at the level of technical and financial competency to support energy performance contracting.

7.2.1.2 ESCO Assessment

PT Energy Management Indonesia (EMI)

PT. Energy Management Indonesia was established in 1987 as a State Owned Enterprise which focuses in energy conservation and management. EMI offers the following services to local institutions and companies in Indonesia:

1. *Energy Consultancy Services* .EMI provides supervision, assistance and recommendations to clients through economic and technical studies in the implementation of energy management system. In order to ensure sustainable cost savings are achieved, EMI also helps to clients in achieving the proper operations, monitoring and sustainable operations of the system.
2. *Technical Inspection and Implementation of Energy Efficiency*. In order to identify energy savings potentials, data gathering and operational feasibility studies in energy consumption devices, EMI can assist clients in conducting Energy Audit, Energy Survey, Technical Inspections and Operational Feasibility Studies Services.

⁵⁹ Refer to Appendix 5.1

3. *Human Resources Training on Energy Efficiency.* The company also provides a certified training lesson to provide clients' staff with adequate knowledge and professional standard in helping their companies to achieve energy efficiency and conservation targets.
4. *Construction, Modification and Diversification of Energy Conservation Measures.* A network of partnerships with local energy efficiency companies will help clients in meeting their goals for a high level of energy conservation standard.
5. *Technology Equipment Supplies.* The strategic trading business unit supplies energy efficiency equipment such as solar powered equipment, electricity control systems for buildings and lights, wind turbine, vehicle LPG conversion systems, environmentally-friendly air conditioners.
6. *ESCO Services.* The primary services that the firm offers within the ESCO space include retrofitting, replacement of main systems and cogeneration systems.

Other ESCOs include:

PT ElectroFlow Indonesia

EuroAsiatic

7.2.2 Malaysia

Capacity Level: 3

7.2.2.1 Country ESCO Capacity Assessment

Before the implementation of the Malaysian Industrial Energy Efficiency Improvement Project (MIEEIP) in 2002, some consultancy or equipment suppliers provided some energy efficiency advisory services but not in a way corresponding to the ESCO and energy performance contracting concept.

Presently, while most ESCOs registered in the country are capable of conducting energy audits and providing specific energy efficiency overhaul such as heating, ventilation and air-conditioning (HVAC), only a few of them are ready to move away from energy audits and fee-for-service to energy performance contracting. From the findings of interviews conducted with

several of the local ESCOs, the main barrier preventing ESCOs from offering performance contracting is the lack of financing for such projects.

7.2.2.2 ESCO Capacity

Cofreth (M) Sdn Bhd

Formerly a subsidiary of GDF SUEZ, Cofreth has since attained an independent status and provides facility management as its main business. With IJM Bhd Sdn as its current main shareholder, the 220-workforce company has a proven track record of providing a range of service from energy audits to performance contracting. The energy performance contract (EPC) done by the company were financed internally and typically range from US\$ 100,000 to US\$ 200,000 per project with a 3-5 year contract duration. The company's Managing Director is also the Vice-President of the Malaysian ESCO Association (MAESCO) and also serves an advisory role to the government on energy efficient policies.

Matrix Energy Sdn Bhd

The company provides EPC and finances such contracts through commercial loans from retail banks with personal guarantees from the company. Due to the financing nature used, there is a limitation to the number of projects which the company can take on at any one time. According to the company, it has undertaken a total of 17 projects and has completed 10 already. The contracts typically last between 5-8 years with a split sharing of the savings between the ESCO and the end-user (90:10). While the average EPC contract ranges between RM700,000 to RM800,000, the largest project which it has undertaken to date cost RM2 million.

KJ Engineering

With Europe's leading energy services company Dalkia as its majority shareholder, and annual revenue of €17m, KJ Engineering is one of the leading ESCOs in Malaysia. To date, it has financed several large-scale EPC projects such as district cooling EPC in 2003. The recent financial crisis and decreased the company's ability to finance EPC projects internally but this is not expected to persist as the economy recovers. Besides performance contracting, the company also offers operations and management (O&M) services which complements its ESCO services and also ensures that guaranteed savings are assured through proper operation and maintenance of retrofitted equipment.

7.2.3 Philippines

Capacity Level: 3

7.2.3.1 Country ESCO Capacity Assessment

While the Philippines government has been active in formulating energy efficiency policies and developing the country's regulatory framework, the ESCO industry in the country is still underdeveloped. Presently, it is estimated that Philippines has around 18⁶⁰ active ESCOs providing energy efficiency services in the country. Fee-for-service remains as the predominant ESCO business model in the country⁶¹; while the source of the report is almost 5 years old, little progress has been made since then. The majority of the ESCOs are small and medium scale companies, the larger and more structured ones have 10-12 permanent staff and typically undertake 7-8 projects per year⁶². The overall level of ESCO capacity in the country is very low with performance contracting almost non-existent except for a handful of projects funded internally by large multi-national ESCOs.

7.2.3.2 ESCO Capacity

Davis Energy

The company has in business for over 6 years and was mainly involved in Heating, Ventilation and Air Conditioning (HVAC) projects of around US\$100,000. The company offers fee-for-service and has not undertaken any EPC in the Philippines; the lack of financing is cited as the reason why performance contracting is not offered although the company is keen to do so if financing is available. Besides operating in the Philippines, Davis Energy also has extensive partnerships with Transac Asia and has undertaken projects in Singapore.

Smart Cool

Smart Cool is a systems vendor specialising in energy efficiency technology for commercial, industrial and retail chilling systems. The company indicated that it is not a dedicated ESCO even though it offers energy efficient systems. Under special arrangements, the company may structure an offer package which includes an energy audit and also vendor financing for the agreed systems. However, the sizes of such deals are relatively small and are also less common.

Other ESCOs include:

Tropical Focus

OSP-Honeywel

PowerSource

⁶⁰ Refer to Appendix 5.3

⁶¹ Refer to ESCO Survey in Philippines, Asian Development Bank, 2005

⁶² Philippines Sustainable Financing Program, GEF Project Brief, 2006

7.2.4 Singapore

Capacity Level: 4

7.2.4.1 Country ESCO Capacity Assessment

Despite its relative small geographical land area, Singapore has a significant number of multi-national ESCOs with operations in the country. There are currently 14 ESCOs accredited under the Energy Services Companies (ESCOs) Accreditation Scheme in Singapore. Besides the accredited ESCOs, there are numerous other firms of varying sizes offering various levels and types of energy efficiency retrofits. As a result of the strict regulatory framework and low level of operating risk, there are significantly more ESCOs offering EPC services. Several of the ESCOs interviewed have undertaken performance contracting and are very familiar with the EPC requirements.

From the interview with the ESCOs, the general consensus is that while the ESCOs in Singapore have the capacity to offer and undertake performance contracting, the ESCOs are still limited by the lack of financing for such projects and as a result, the number of EPCs being undertaken is still lower than the number fee-for-service projects. Another notable finding is that the majority of ESCOs in Singapore only offer commercial energy efficiency retrofits. The lack of specific technical and process knowledge has been cited as the main reason for the lack of focus on industrial energy efficiency retrofits.

Overall, the ESCOs operating in Singapore have demonstrated capacity to provide the necessary energy efficiency retrofits

7.2.4.1 ESCO Assessment

Equation Energy

Equation Energy is a subsidiary of listed Equation Corp Limited. It provides energy management and professional engineering consultancy services to the building industry. Equation energy provides energy audit, project design and implementation services. It has three on-going Energy Performance Contracts. Contract size is typically between S\$1.5 – 2.5 million. Some project references include the Singapore Ministry of Manpower Building, Monetary Authority of Singapore Building and Grand Hyatt Singapore.

G-Energy Global

G-Energy provides energy auditing and project design services for its clients. The company's clientele consists mostly of shopping malls and offices. While G-Energy has not implemented any projects on an EPC basis, it has plans to do so in the future. Company has undertaken projects undertaken ranging from S\$500k to S\$8 million. Project references include City Square Mall in Singapore, the Singapore Central Library and Nanyang Technological University.

Other ESCOs include:

Kaer

United Premas

LJ Energy

Invensys

Actsyst

7.2.5 Thailand

Capacity Level: 5

7.2.5.1 Country ESCO Capacity Assessment

The Thai ESCO industry has the longest and largest exposure to energy efficiency performance contracting as it is the only country among the 6 with a commercially-managed energy efficiency financing mechanism⁶³. The fund was established to stimulate a financial sector involvement in energy efficiency projects and while it developed the project evaluation capacity of the financiers, the increased investment in energy efficiency projects also stimulated a growth in the Thai ESCO market. The total investment for energy efficiency projects with a performance contract increased from US\$6.5 million in 2000 to US\$86.9 million in 2006⁶⁴.

There are a number of different types of contractors classified under the broader grouping of ESCOs in Thailand. The collection of 39 registered ESCOs in Thailand (listed in Appendix 2) have developed from various businesses specialties in equipment and technology. Based on data collected in 2009 on 24 ESCOs, the IIE has classified them into the following groups (illustrated in Figure 17 below):

- i. Large Scale Company that can provide both the Equipment and Technology (ET)– These companies possess technically competent employees, technologies and equipment. They can provide services for the whole process from investigation to maintenance. There are 5 registered ESCOs in this category.
- ii. Company that serves as an Equipment Agent (EA) – These companies do not possess the equipment and technology but act more like agents or distributors of certain technologies and equipment. There are 13 registered ESCOs in this category.
- iii. Company that developed from an Energy Consultation Organization (EC)– These companies originated as energy consultants, who possess knowledge and competency in all aspects including performing an energy consumption investigation, project design,

⁶³Thai Energy Efficiency Revolving Fund

⁶⁴<http://www.asiaesco.org/pdf/presentation/3-1.pdf>

administrative management, and maintenance of equipment. There are 9 registered ESCOs in this category.

Company that developed from the Energy Generator Business (EG)– These companies originated from businesses focusing on energy conservation. They are large scale organizations that provide a range of services including investigation of energy consumption, installation of equipment, and maintenance. There are 3 registered ESCOs in this category.

7.2.5.2 ESCO Assessment

Energy Conservation System (Thailand) Co. Ltd.

The company is one of the leading ESCOs in Thailand and has extensive experience in implementing projects in various industries such as garment, food, electronic, plastic and commercial buildings.

Excellent Energy International Co., Ltd.

The company (EEI) has been in business since 1999 and was formed by Global Energy Partner LLC, Electric Power Research Institute (EPRI) and Univentures PCL. EEI has a comprehensive expertise in cogeneration power plants and also provision of both industrial and commercial energy conservation projects. EEI offers both EPC and fee-for-service contracts.

7.2.6 Vietnam

Capacity Level: 2

7.2.6.1 Country ESCO Capacity Assessment

Until 2004, most of financing sources for energy efficiency projects came from international funding facilities (provided by international financial institutions like the World Bank), or by the developed government. During the field trip to Vietnam, it was concluded that while there was genuine intent by some of the local companies to promote energy efficiency and performance contracting in the country, there is little ESCO capacity to provide large-scale commercial and industrial energy efficiency retrofits. The overwhelming majority of the energy service companies are either engineering firms or vendors with little experience or technical knowledge in providing energy efficiency audits and implementation.

7.2.6.2 ESCO Assessment

RCEE Energy and Environment Joint Stock Company

Among the ESCOs interviewed in Vietnam, RCEE Energy and Environment Joint Stock Company demonstrated the most promising capabilities in providing energy efficiency performance contracting. The company has extensive experience in managing Carbon Development Mechanisms (CDM) projects and has indicated its intentions to commit to the provision of energy efficiency performance contracting. However, the company indicated that it provides mainly energy audits and neither has prior experience or the technical skills in offering and implementing performance contracting.

GreenField Consulting (Systech)

GreenField is a research-based company providing advisory and technical support for the development of renewable energy projects in Vietnam. The company indicated that it has no experience in doing energy efficiency projects.

8. EE Financing Facility Recommended Structure

On the basis that the work under this study has demonstrated that there is significant potential for the establishment of a dedicated financing vehicle to promote investment into energy efficiency projects in the region, this section looks at a tentative structure for such a fund facility.

8.1 Assumptions Made for the Recommendation

The recommendations that follow have been made on the basis that Singapore is the “**country of residence**” where the management of the fund would be located. The following countries: Indonesia, Malaysia, Philippines, Thailand and Vietnam are the “**country of source**” whereby the profit from the respective country will be remitted back to Singapore.

The recommended structure is based on:

- Legally accepted business model in the respective country
- Lowest tax rate applicable for the fund in both the country of source and the country of residence
- Setting up an SPV in the country of source to hold assets/projects financed by the fund

- The assets/projects financed by the fund are leased out by the end-users (hirers) who will make a pre-determined number of lease payment/rental to the SPV.
- The profit made from the country of source will be subjected to the tax regime in the country before being remitted back to the country of residence (Singapore).

8.1.1 Indonesia

Recommended Operations Structure	<p>The investment law in Indonesia requires that a foreign owned enterprise operating wholly or mostly in Indonesia must be a separate business unit be organised under Indonesian law and domiciled in Indonesia. Hence, branches are not normally permitted in Indonesia except for banking and oil and gas sectors.</p> <p>Outright foreign ownership of a limited liability company is allowed and there are no explicit regulations against financial leasing in the country.</p> <p>It is recommended that a wholly foreign-owned limited liability company (PMA – Penanaman Modal Asing) be set up as a local subsidiary of the fund to hold assets/projects for lease.</p>
Set-up Requirement	<ul style="list-style-type: none"> • A letter of approval must first be obtained from the Investment Coordinating Board (BKPM). • It is also standard practice to employ the services of a notary public to draft articles of association, who will then undertake the steps to obtain the necessary legal documents.
Tax Rate Applicable for the Fund	<p>Indonesia:</p> <ul style="list-style-type: none"> • Single flat rate of 25 percent if the business profits are deemed to be through business activities by the tax authority. • Dividend Withholding tax applies at 15 percent when it is remitted out of the country <p>Singapore:</p> <ul style="list-style-type: none"> • With the existence of a DTA with Indonesia, the profit remitted back to Singapore should not be subjected to further taxation by the Singapore authority.
Additional points of clarification	<p>N.A</p>
Useful Links	<ul style="list-style-type: none"> • http://www.deloitte.com/view/en_PG/pg/insights-ideas/itbg/9619b247c4efd110VgnVCM100000ba42f00aRCRD.htm • http://www.expatriation.or.id/business/companyestablishment.html • http://www.dfat.gov.au/publications/indonesia/Ind_chp6.pdf

8.1.2 Malaysia

<p>Recommended Operations Structure</p>	<p>Malaysia has an attractive option of allowing companies to set up operations at the Labuan International Business and Financial Centre (IBFC). The Labuan IBFC allows the setting up of an Offshore Leasing business and the returns are subjected to a low-tax jurisdiction. (Offshore leasing means business of sub-letting property for hire for the purpose of the use of the property by the hirer, regardless of whether the letting is with or without an option to purchase the property. Property includes any plant, machinery, equipment or other chattel attached or to be attached to the earth).</p> <p>Labuan companies are allowed to deal with a Malaysian resident, subject to conditions that must be met including approvals from the relevant Malaysian regulatory authorities.</p>
<p>Set-up Requirement</p>	<p>Applicants for the conduct of offshore leasing in Labuan IBFC must either be:</p> <ul style="list-style-type: none"> • An Offshore company incorporated or registered under the Offshore Companies Act. • A Special Purpose Vehicle (SPV) set up to facilitate leasing transactions including inter-company transactions. <p>The offshore company set up in Labuan is required to engage the services of a Labuan Trust Company, which will serve as the company's registered office.</p>
<p>Tax Rate Applicable for the Fund</p>	<p>Malaysia: taxation at 3 percent of net audited profit or a flat tax of RM20,000</p> <p>Singapore: As the income received from the foreign jurisdiction (Malaysia) is less than 15 percent, the income is subjected to the corporate tax of 17 percent, however a tax credit will be available to take into account the underlying tax paid in the foreign country (Malaysia). Overall the tax paid in Singapore should be 17 percent less the tax credit given.</p>
<p>Additional points of clarification</p>	<ul style="list-style-type: none"> • To clarify the term "investments" in the "holding of investments" part of the definition. More information is needed about whether owning assets in the country that will be leased out by the fund qualify as an investment • DTA: Under the DTA, the earnings remitted back to Singapore should be subjected to full corporate tax since no offset is applicable in this scenario
<p>Useful Links</p>	<ul style="list-style-type: none"> • http://www.labuanibfc.my • http://www.lawandtax-news.com/html/labuan/jlblatoltr.html • http://www.lowtax.net/lowtax/html/jlbcos.html • http://www.deloitte.com/view/en_PG/pg/insights-ideas/itbg/1fca74168800e110VgnVCM100000ba42f00aRCRD.htm

8.1.3 Philippines

<p>Recommended Operations Structure</p>	<p>In general, branches and subsidiary corporations are subjected to uniform registration fees, uniform requirements for business licenses and investment and the same taxation. Additionally, a 15 percent branch profits tax is levied on the after-tax profits remitted by a branch to its head office. A branch is considered an extension of the parent company and for the purpose of investment law is considered fully foreign-owned and does not limit potential legal liability for the parent company.</p> <p>Despite the above, the Philippine Corporate Law requires that majority of the board of directors to be residents in the Philippines. This requirement serves as a limitation to the degree of flexibility for the Fund.</p> <p>As such, the recommended structure of operation in the Philippines is to set up a branch to carry the fund's operations in the country.</p> <p>All inward transfers of foreign exchange for investment purposes must be registered with the central bank to facilitate future profit remittances and capital repatriation.</p>
<p>Set-up Requirement</p>	<p>Registration with the Securities and Exchange Commission (SEC) is mandatory.</p> <p>A Branch Office (a foreign corporation organized and existing under foreign laws that carries out business activities of the head office and derives income from the host country) is required to put up a minimum paid in capital of \$200,000 which can be reduced to \$100,000 if activity involves advanced technology, or company employs 50 direct Employees.</p>
<p>Tax Rate Applicable for the Fund</p>	<p>Philippines:</p> <ul style="list-style-type: none"> • 30 percent corporate tax • 15 percent branch profit tax (on after tax profits remitted) <p>Singapore:</p> <p>Foreign remittances are exempt from tax as the income received from the foreign jurisdiction (Philippines) has a headline tax of greater than 15 percent.</p>
<p>Additional points of clarification</p>	<p>N.A</p>
<p>Useful Links</p>	<ul style="list-style-type: none"> • http://www.gov.ph • http://www.boi.gov.ph • http://www.deloitte.com/view/en_PG/pg/insights-ideas/itbg/3263a0be83ffd110VgnVCM100000ba42f00aRCRD.htmhttp://philippinesbusinessregistration.com

8.1.4 Thailand

<p>Recommended Operations Structure</p>	<p>Due to the lack of specific rulings of setting up of subsidiaries in Thailand, it is advisable to register a private limited company with the Ministry of Commerce (MOC). The shareholders of a private limited company enjoy limited liability and can be wholly owned by foreigners⁶⁵.</p> <p>Since there are no explicit restrictions on the ownership of energy efficiency assets/projects and on leasing business activities, it is assumed that a wholly foreign-owned private limited company can be set up in Thailand to serve as a subsidiary of the fund. The subsidiary can conduct the business activity of holding and leasing both fixed and non-fixed assets.</p>
<p>Set-up Requirement</p>	<ul style="list-style-type: none"> • Apply and obtain a Foreign Business License • A minimum of 3 shareholders (promoters) is required at all times.
<p>Tax Rate Applicable for the Fund</p>	<p>Thailand:</p> <ul style="list-style-type: none"> • 30 percent corporate tax (Juristic income tax) on the net profit arising from or in consequence of the business carried out in Thailand • Alternatively, should the subsidiary receive purely assessable passive income (i.e. rental/lease payment) paid from Thailand, the income is only subjected to a withholding tax of 15 percent <p>Singapore: Foreign remittances are exempt from tax as the income received from the foreign jurisdiction (Thailand) has a headline tax of greater than 15 percent (30 percent Juristic income tax or 15 percent Withholding tax).</p>
<p>Additional points of clarification</p>	<ul style="list-style-type: none"> • Under the assumption that the wholly foreign owned private liability company holds assets/projects and receives monthly rental/lease payment, only withholding tax and not juristic income tax applies?
<p>Useful Links</p>	<ul style="list-style-type: none"> • http://www.boj.go.th • http://www.deloitte.com/view/en_PG/pg/insights-ideas/itbg/301dbc5c6500e110VgnVCM100000ba42f00aRCRD.htm

⁶⁵In order to be wholly foreign-owned, the company must

- 1) Have business activities that are not listed in the Restricted Business Activities under the Foreign Business Act
- 2) Apply and receive approval for a Foreign Business License (FBL) if the activity is in the list of restricted activities

8.1.5 Vietnam

<p>Recommended Operations Structure</p>	<p>Vietnam's WTO entry has opened up a number of previously restricted or closed sectors to greater foreign investments. Foreign business can operate in Vietnam via:</p> <ul style="list-style-type: none"> • establishing a wholly foreign-owned enterprise (WFOE) • establishing joint ventures(JV) between local and foreign investors • investing pursuant to a contract: Business Cooperation Contract (BCC) <p>Compared to a WFOE and a JV which are considered Vietnamese corporate legal entities, no legal entity is needed to be formed for a BCC and the parties to such agreement may agree to share profits and losses or conduct their business in a manner similar to a contractual JV. Market entry via BCC is common for infrastructure projects as there is greater flexibility to design specific Build-Operate-Transfer contracts or Build Transfer contracts. It has to be noted that the potential counter-party risk is higher under a BCC since the enforcement terms depends on the ability of the counter-party (partner) to carry out its obligations under the contract.</p> <p>There has been no description of regulations on leasing activities in the country. Setting up a WFOE in the form of a limited liability company to hold assets for lease is another viable operation structure in Vietnam. This is especially so since the country imposes a uniform corporate income tax on both local and foreign owned enterprises.</p>
<p>Set-up Requirement</p>	<ul style="list-style-type: none"> • There are no per se net worth or capital structure requirement • In order to carry out business or an investment project in the WFOE or JV form, an investor must set up a Vietnamese legal entity. The incorporation of the Vietnamese company takes place simultaneously with the licensing of the first project (i.e. a foreign investor cannot incorporate a company without a project). • Regardless of the form of direct investment, an IC must be obtained from the relevant license issuing body for business enterprises to legally do business in Vietnam.

<p>Tax Rate Applicable for the Fund</p>	<p><u>Vietnam:</u></p> <ul style="list-style-type: none"> • 25 percent uniform corporate income tax • However, for enterprises operating in environmental related sectors, the corporate income tax is 10 percent • Alternatively, should the subsidiary receive purely assessable passive income (i.e. rental/lease payment) paid from Thailand, the income is only subjected to a withholding tax of 15 percent <p><u>Singapore:</u></p> <ul style="list-style-type: none"> • With the existence of a DTA with Vietnam, the profit remitted back to Singapore should not be subjected to further taxation by the Singapore authority unless the fund qualifies for a CIT of 10 percent. In that case, the business profit remitted from Vietnam should be subjected to the remaining 7 percent tax imposed by the Singapore Government. • Should the profit generated be considered a passive income (royalty/rental/lease payment) and only withholding tax is levied, there should not be further taxation imposed by the Singapore Government.
<p>Additional points of clarification</p>	<ul style="list-style-type: none"> • Do energy efficiency business operations qualify for the 10 percent environmental related sector corporate income tax? • Are there any regulations regarding investment holding companies holding assets/projects for lease
<p>Useful Links</p>	<ul style="list-style-type: none"> • http://www.vietnamesewto.com • http://www.deloitte.com/view/en_PG/pg/insights-ideas/itbg/94cbef42bcefd110VgnVCM100000ba42f00aRCRD.htm

Appendix 1 - Electricity Tariff Rates

Assumptions

For simplicity purposes, the highest electricity consumption bracket rate was used in our calculation. The rationale behind this is due to the energy intensive nature of majority of the manufacturing industries. Based on that, it is assumed that the high energy consumption will result in the energy end-user being billed at the highest energy usage bracket rates. However, the electricity demand rate was not included in the cost due the varying format at which it is charged by the different electricity providers in each country.

Tariff Rates (Industrial)

	Cost of Industrial Electricity (per kWh) ⁶⁶			
	Local Currency (Off-peak)	Local Currency (Peak)	Local Currency (Average)	US Dollars (Average)
Indonesia	550	550	550	0.062
Malaysia	0.16	0.266	0.213	0.069
Philippines	5.36485	5.36485	5.36485	0.124
Singapore	0.1368	0.2177	0.17725	0.135
Thailand	1.1914	2.695	1.9432	0.065
Vietnam	496	1758	1127	0.058

Tariff Rates (Commercial)

	Cost of Commercial Electricity (per kWh)			
	Local Currency (Off-peak)	Local Currency (Peak)	Local Currency (Average)	US Dollars (Average)
Indonesia	550	550	550	0.062
Malaysia	0.16	0.266	0.213	0.069
Philippines	5.36485	5.36485	5.36485	0.124
Singapore	0.1368	0.2177	0.17725	0.135
Thailand	1.1914	2.695	1.9432	0.065
Vietnam	902	2943	1922.5	0.099

⁶⁶Local currency- US\$ Exchange rate as of 22/6/2010 from XE Universal Currency Converter

Electricity Tariff Source

Country	Source
Indonesia	Average selling electricity price of PLN
Malaysia	Tariff E3 - High voltage Peak/ Off-Peak Industrial Tariff
Philippines	Average Generation Cost [Source:
Singapore	Extra High Tension - Peak/ Off-Peak
Thailand	Large General Services - Peak/ Off-Peak
Vietnam	*Due to the bundled nature and complex nature of the country's tariff structure, it is not possible to quantify the actual per unit cost of electricity. Instead, the average tariff rate provided by the Electricity Regulatory Authority of Vietnam was used

Appendix 2 – Country Market Potential

Appendix 2.1 Indonesia Market

Industrial Sector

Industry	Total Annual Output	Total Annual Output	Total Dollar Savings Potential	Total Dollar Investment Potential	Total Dollar Investment Potential	Total Dollar Savings Potential
	(IDR bn)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)
Petroleum Refinery	132,145	14,678	\$0.00101	\$0.00066	15	10
Liquefied Natural Gas (LNG)	81,561.5	9,059	\$0.00101	\$0.00066	9	6
Food, Beverages and Tobacco Industries	420,629	46,721	\$0.00581	\$0.00233	271	109
Textile, Leather Products and Footwear Industries	116,483	12,938	\$0.00485	\$0.00167	63	22
Wood and Other Products Industries	80,134.5	8,901	\$0.00201	\$0.00102	18	9
Paper and Printing Products Industries	61,110	6,788	\$0.00368	\$0.00159	25	11
Fertilizers, Chemical and Rubber Products Industries	162,658	18,067	\$0.00625	\$0.00352	113	64
Cement, and Non-Metallic Quarr Products Industries	43,482	4,830	\$0.01031	\$0.00434	50	21

Iron and Steel Basic Metal Industries	26,733	2,969	\$0.00625	\$0.00401	19	12
Transport Equip., Machinery & Apparatus Industries	346,157	38,449	\$0.00587	\$0.00293	226	113

Commercial Sector

Building Type	Total Floor Area (mil m ²)	Estimated Investment Requirement (US\$ mil)	Estimated Savings Potential (US\$ mil)
Commercial office	4	57	5
Hotel	8	365	48
Retail mall	2	155.5	9

Appendix 2.2 Malaysia Market Potential

Industrial Sector

Industry	Total Annual Output	Total Annual Output	Total Dollar Savings Potential	Total Dollar Investment Potential	Total Dollar Investment Potential	Total Dollar Savings Potential
	(MYR mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)
Food, Beverages and Tobacco	26,791	8,358.5	\$0.00581	\$0.00229	48.5	19
Textile mill products	7,873	2,456	\$0.00806	\$0.00159	20	4
Apparel and other textile products	2,658	829	\$0.00277	\$0.00076	2	0.6
Leather and leather products	167	52	\$0.00372	\$0.00064	0.2	0.

Millwork, Plywork & Structural	8,777	2,738	\$0.00492	\$0.00145	13.5	4
Paper and Allied products	5,942	1,854	\$0.00675	\$0.00215	12.5	4
Printing & Publishing	5,322	1,661	\$0.00368	\$0.00095	6	1.6
Misc. Petroleum Products	84,658	26,413	\$0.00103	\$0.00024	27	6
Industrial Inorganic Chemicals	23,816	7,430	\$0.00825	\$0.00203	61	15
Agricultural Chemicals	2,430.2	758.2	\$0.00268	\$0.00064	2	0.5
Plastics Materials and Synthetics	9,073.8	2,831.0	\$0.00813	\$0.00235	23	7
Drugs	1,184.1	369.4	\$0.00510	\$0.00098	2	0.4
Miscellaneous Chemical Products	7,314.0	2,281.9	\$0.00756	\$0.00146	17	3
Rubber and miscellaneous plastics	33,389.3	10,417.2	\$0.00580	\$0.00217	60.5	23
Stone, Clay, and Glass Products	12,825.8	4,001.6	\$0.01031	\$0.00259	41	10
Primary Metal Industries	16,408.1	5,119.2	\$0.00937	\$0.00163	48	8
Nonferrous rolling and drawing	2,052.1	640.3	\$0.00475	\$0.00119	3	0.8
Fabricated Metal Products	7,737	2,414	\$0.00950	\$0.00254	23	6
Refrigeration & Service Machinery	3,423.5	1,068	\$0.00467	\$0.00093	5.0	1

Industrial Machinery	1,587	495	\$0.00507	\$0.00180	2.5	1
Electric Lighting and Wiring Equipment	8,926.5	2,785	\$0.00430	\$0.00093	12	3
Communications Equipment	34,776	10,850	\$0.00031	\$0.00013	\$3.4	1.4
Semiconductor and Related Devices	45,213	14,106	\$0.00213	\$0.00048	\$30.1	6.8
Misc. Electrical Equipment & Supplies	2,826	882	\$0.00403	\$0.00105	\$3.5	1
Electronic Components and Accessories	8,692	2,712	\$0.00214	\$0.00080	\$5.8	2
Instruments and Related Products	6,621	2,066	\$0.00413	\$0.00148	\$8.5	3
Motor Vehicles & Equipment	22,146.5	6,910	\$0.00677	\$0.00221	\$46.7	15
Ship and Boat Building and Repairing	1,995	622.5	\$0.00098	\$0.00026	\$0.6	0.2

Commercial Sector

Building Type	Total Floor Area (mil m²)	Estimated Investment Requirement (USD mil)	Estimated Savings Potential (USD mil)
Commercial office	5	70	7
Hotel	12	510	75
Retail mall	4	327	21

Appendix 2.3 Philippines Market Potential

Industrial Sector

Industry	Total Annual Output	Total Annual Output	Total Dollar Savings Potential	Total Dollar Investment Potential	Total Dollar Investment Potential	Total Dollar Savings Potential
	(PhP mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)
Food products and beverages	856,337	18,759	\$0.00581	\$0.00226	109	42
Textiles	173,936	3,810	\$0.00806	\$0.00257	31	10
Apparel, leather, footwear	61,890	1,356	\$0.00325	\$0.00113	4	\$1.5
Wood and Other Products Industries	102,613	2,248	\$0.00201	\$0.00099	4.5	2
Paper and paper products	88,579	1,940	\$0.00675	\$0.00347	13	7
Printing & Publishing	33,591	736	\$0.00368	\$0.00154	3	1
Chemicals and chemical products	282,991	6,199	\$0.00670	\$0.00331	42	\$20.5
Petroleum and coal products	176,007	3,856	\$0.00350	\$0.00128	13.5	5
Rubber and plastic products	75,004	1,643	\$0.00580	\$0.00350	9.5	6

Other non-metallic mineral products	101,003	2,212.5	\$0.01031	\$0.00419	23	10
Basic metals	79,836	1,749	\$0.00625	\$0.00388	11	7
Fabricated Metal Products	57,749	1,265	\$0.00950	\$0.00410	12	5
Machinery	31,060	680	\$0.00224	\$0.00157	1.5	1
Electrical machinery and apparatus	71,553	1,567	\$0.00276	\$0.00194	4	3
Transport Equipment	93,870	2,056	\$0.00677	\$0.00357	14	7

Commercial Sector

Building Type	Total Floor Area (mil m ²)	Estimated Investment Requirement (USD mil)	Estimated Savings Potential (USD mil)
Commercial office	3	36	7
Hotel	4	168	45
Retail mall	3	295	34

Appendix 2.4 Singapore Market Potential

Industrial Sector

Industry	Total Output	Total Output	Total Dollar Savings Potential	Total Dollar Investment Potential	Total Dollar Investment Potential	Total Dollar Savings Potential
	(SGD mil)	(US\$ mil)	(US\$ Mil)	(US\$ mil)	(US\$ Mil)	(US\$ mil)
Semiconductors	38,131	27,637	\$0.00213475	\$0.00093568	81	36
Computer Peripherals	9,629	6,979	\$0.00322447	\$0.00145724	31	14
Data Storage	7,935	5,751	\$0.00322447	\$0.00145724	26	12
Info-communication & Consumer Electronics	9,863	7,149	\$0.00150358	\$0.00075167	15	7
Other Electronic Modules & Components	1,669	1,209	\$0.00185304	\$0.00093541	3	2
Petroleum	31,860	23,092	\$0.00133087	\$0.00053676	34	13.5
Petrochemicals	19,335	14,014	\$0.00238041	\$0.00078263	46	15
Specialty Chemicals	5,513	3,996	\$0.00435681	\$0.00176998	24	10
Others	1,810	1,312	\$0.00756265	\$0.00281805	14	5

Pharmaceuticals	18,094	13,114.5	\$0.00282212	\$0.00139581	99	32.5
Medical Technology	3,173.5	2,300	\$0.00254478	\$0.00126070	8	4
Machinery & Systems	9,065	6,570	\$0.00263718	\$0.00130337	24	11
Precision Modules & Components	10,339	7,494	\$0.00263718	\$0.00130337	27	13.5
Marine & Offshore Engineering	20,111	14,576	\$0.00086301	\$0.00043654	17	9
Aerospace	7,010.5	5,081	\$0.00341795	\$0.00164021	24	11.50
Printing	2,590	1,877	\$0.00368304	\$0.00184107	10	5
Food, Beverages & Tobacco	6,637	4,811	\$0.00580841	\$0.00270022	38	18

Commercial Sector

Building Type	Total Floor Area (mil m²)	Estimated Investment Requirement (USD mil)	Estimated Savings Potential (USD mil)
Commercial office	7	99	20
Hotel	3	141	41
Retail mall	4	342	43

Appendix 2.5 Thailand Market Potential

Industrial Sector

Industry	Total Annual Output	Total Annual Output	Total Dollar Savings Potential	Total Dollar Investment Potential	Total Dollar Investment Potential	Total Dollar Savings Potential
	(THB mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)
Food products and beverages	19,450	\$0.00655	\$0.00202	127	39	19,450
Tobacco products	1,277	\$0.00496	\$0.00080	6	1	1,277
Textiles	10,180	\$0.00806	\$0.00140	82	14	10,180
Apparel and other textile products	2,310	\$0.00277	\$0.00067	6	1.6	2,310
Leather and leather products	1,576	\$0.00372	\$0.00056	6	1	1,576
Wood and Other Products Industries	1,107	\$0.00201	\$0.00054	2	0.6	1,107
Paper and paper products	3,051	\$0.00675	\$0.00189	21	6	3,051
Printing & Publishing	1,246	\$0.00368	\$0.00084	5	1	1,246
Coke, refined petroleum products and nuclear fuel	8,542	\$0.00350	\$0.00070	30	6	8,542

Chemicals and chemical products	9,802	\$0.00670	\$0.00180	66	18	9,802
Rubber and plastic products	6,571	\$0.00580	\$0.00191	38	12.5	6,571
Other non-metallic mineral products	4,575	\$0.01031	\$0.00229	47	10.5	4,575
Basic metals	4,300	\$0.00625	\$0.00211	27	9	4,300
Fabricated Metal Products	3,564	\$0.00950	\$0.00223	34	8	3,564
Machinery & Systems	4,311	\$0.00224	\$0.00086	10	4	4,311
Office, accounting and computing machinery	5,243	\$0.00683	\$0.00193	36	10	5,243
Electrical machinery and apparatus	4,370	\$0.00276	\$0.00106	12	5	4,370
Communications Equipment	7,948	\$0.00031	\$0.00011	2.5	1	7,948
Instruments and Related Products	959	\$0.00413	\$0.00130	4	1.3	959
Motor vehicles, trailers and semi-trailers	14,642	\$0.00677	\$0.00195	99	28.5	14,642
Furniture manufacturing	0.004	\$0.00075	\$10.5	2	0.004	\$0.0008

Commercial Sector

Building Type	Total Floor Area (mil m ²)	Estimated Investment Requirement (USD mil)	Estimated Savings Potential (USD mil)
Commercial office	1.6	22	2
Hotel	13	566	79
Retail mall	1.3	118	7

Appendix 2.6 Vietnam Market Potential

Industrial Sector

Industry	Total Annual Output	Total Annual Output	Total Dollar Savings Potential	Total Dollar Investment Potential	Total Dollar Investment Potential	Total Dollar Savings Potential
	(VND bn)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)	(US\$ mil)
Food products and beverages	296,738	15,667	\$0.00655	\$0.00191	103	30
Tobacco products	18,017	951	\$0.00496	\$0.00076	5	0.7
Textiles	65,719	3,470	\$0.00806	\$0.00133	28	5
Apparel and other textile products	61,343	3,239	\$0.00277	\$0.00064	9	2
Leather and leather products	54,074	2,855	\$0.00372	\$0.00053	11	1.5

Wood and Other Products Industries	26,502	1,399	\$0.00201	\$0.00051	3	0.7
Paper and paper products	28,229	1,490	\$0.00675	\$0.00179	10	3
Printing & Publishing	15,303	808	\$0.00368	\$0.00079	3	0.6
Coke, refined petroleum products and nuclear fuel	2,413.5	127	\$0.00350	\$0.00066	0.4	0.1
Chemicals and chemical products	82,724	4,368	\$0.00670	\$0.00171	29	7.5
Rubber and plastic products	60,405	3,189	\$0.00580	\$0.00181	18.5	6
Other non-metallic mineral products	77,203	4,076	\$0.01031	\$0.00216	42	9
Basic metals	63,595	3,358	\$0.00625	\$0.00200	21	7
Fabricated Metal Products	76,524	4,040	\$0.00950	\$0.00212	38	9
Machinery & Systems	21,919	1,157	\$0.00224	\$0.00081	3	1
Office, accounting and computing machinery	25,205.5	1,331	\$0.00683	\$0.00182	9	2

Electrical machinery and apparatus	58,817	3,105	\$0.00276	\$0.00100	9	3
Communications Equipment	32,204.5	1,700	\$0.00031	\$0.00011	0.5	0.2
Instruments and Related Products	5,085	268.5	\$0.00413	\$0.00124	1	0.3
Motor vehicles, trailers and semi-trailers	40,001	2,112	\$0.00677	\$0.00184	14	4
Furniture manufacturing	68,328	3,608	\$0.00353	\$0.00071	13	3

Commercial Sector

Building Type	Total Floor Area (mil m ²)	Estimated Investment Requirement (USD mil)	Estimated Savings Potential (USD mil)
Commercial office	0.6	8.4	1.3
Hotel	10	436.5	92
Retail mall	0.4	34.3	3

Appendix 3: SIC Codes & Recommendations

- A. The **Standard Industrial Classification (SIC)** is a United States government system for classifying industries by a four-digit code.
- B. Energy efficiency retrofit data is based on recommendations made according to “times recommended” for a specific industry vertical according to SIC code. The list of industries discussed and their corresponding SIC codes are as follows:

Thailand

- a. Food products and beverage (20xx)
- b. Chemicals and chemical products (28xx)
- c. Motor vehicles, trailers, semi-trailers (371x)
- d. Textiles (22xx)

Indonesia

- a. Food, Beverage and Tobacco (20xx, 21xx)
- b. Transport Equipment, Machinery and Apparatus (34xx, 35xx)
- c. Fertilizers, Chemicals and Rubber Products (28xx, 30xx)

The Philippines

- a. Food products and beverage (20xx)
- b. Chemical and chemical products (28xx)
- c. Petroleum and coal products (29xx)
- d. Wood and other products (24xx)

Singapore

- a. Semiconductors (3674)
- b. Petroleum (2911)
- c. Pharmaceuticals (2834)
- d. Marine and Offshore Engineering (373x)
- a. Petrochemicals (2865)

Malaysia

- a. Misc Petroleum (299x)
- b. Industrial Inorganic Chemicals (281x)
- c. Rubber Products (30xx)
- d. Semiconductor Devices (3674)

Vietnam

- a. Food products and beverage (20xx)
- b. Non-metallic mineral products (32xx)
- c. Chemicals (28xx)

Data is courtesy of U.S Department of Energy – Industrial Technologies Program (<http://iac.rutgers.edu>).

Appendix 4 – Regulatory Capacity

Appendix 4.1 National Energy Efficiency Plan

Country	National Energy Efficiency Plan
Indonesia	<p>1) <u>The National Energy Conservation Master Plan (2005) – (RIKEN)</u> The plan states that Indonesia’s goal is to decrease energy intensity by around 1% per year on average until 2025. RIKEN identified sectoral energy savings as:</p> <ul style="list-style-type: none"> • Industry sector (for select industries) – 15% to 30% • Commercial building sector – electrical savings of 25% • Residential sector – 10% to 30% <p>2) <u>The National Energy Management Blueprint (2006)</u> The plan explains the goal of RIKEN is to realise Indonesia’s energy saving potential</p> <p>3) <u>The National Energy Policy (2006)</u> The plan states that Indonesia’s goal is to achieve energy elasticity of less than 1 in 2025</p> <p>Institutional Organisation</p> <ul style="list-style-type: none"> • Ministry of Energy and Mineral Resources • Directorate General of Electricity and Energy Utilization • Directorate of New Renewable Energy and Energy Conservation
Malaysia	<p><u>The Ninth Malaysian Plan (2006-2010)</u> The primary objective of the energy efficiency programs set out in the Ninth Malaysia Plan is to ensure the security of energy supply, enhance economic growth through efficient energy management and mitigate the negative impact of energy activities on the environment.</p> <p>Institutional Organisation</p> <ul style="list-style-type: none"> • Energy Unit of Economic Planning Unit (EPU) of the Prime Minister’s Office • Ministry of Energy, Green Technology and Water (MEFTW) • Energy Commission (EC) • Pusat Tenaga Malaysia (PTM) – Malaysia Energy Centre

<p>Philippines</p>	<p><u>The National Energy Efficiency and Conservation Program (NEECP)</u> The NEECP is a comprehensive plan to institute measures for improving energy efficiency and conservation in all sectors of the economy by 2014, particularly for petroleum products and electricity in the Philippines. The overall goals of the program are to:</p> <ul style="list-style-type: none"> • Curb the impact of oil price volatility on the economy and reduce carbon dioxide emissions to protect the environment • Improve utilisation by all users through energy efficiency and conservation programs which is expected to achieve an estimated potential cumulative energy savings of 9.08 million of barrels of fuel oil equivalent (boe) at the end of the planning period in 2014 <p><u>Institutional Organisation</u></p> <ul style="list-style-type: none"> • Energy Efficiency & Conservation Division (EECD) • Department of Energy (DOE)
<p>Singapore</p>	<p><u>Sustainable Singapore Blueprint (2009)</u> In the blueprint, Singapore has set a target of achieving a 35% energy intensity improvement by 2030.</p> <p><u>Institutional Organisation</u></p> <ul style="list-style-type: none"> • Energy Efficiency Programme Office (E²PO) – E²PO is a multi-agency committee led by: • National Environment Agency, and consisting of: • Energy Market Authority (EMA) • Economic Development Board (EDB) • Building and Construction Association (BCA) • A*Star
<p>Thailand</p>	<p><u>The Energy Conservation Act (ENCON Act)</u> The Energy Conservation Act (the ENCON Act) is the primary legislation guiding the country's energy efficiency and conservation policy. Enacted in 1992 and made effective in 1995, the ENCON Act promotes energy conservation by encouraging conservation investments in factories and buildings. It does this by including mandatory regulations as well as incentives to implement the required energy efficiency measures.</p> <p><u>Institutional Organization</u></p> <ul style="list-style-type: none"> • Board of Investments • The Energy Planning and Policy Office (EPPO) • Department of Alternative Energy Development and Efficiency (DEDE)

Vietnam	<p><u>Vietnam National Energy Efficiency Program (VNEEP)</u> The VNEEP is the first long-term comprehensive plan to institute measures for improving energy efficiency and conservation in all sectors of the economy in Vietnam. Phase 1 (2006-2010) of the plan aims to actively start up all components of the program and Phase 2 (2011-2015) aims to expand each component based on lessons learned in Phase 1.</p> <p><u>Institutional Organisation</u></p> <ul style="list-style-type: none"> • Ministry of Industry and Trade (MOIT) • The National Steering Committee (involves inter-ministerial coordination) • Energy Efficiency and Conservation Office (EECO)
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Appendix 4.2 Energy Efficiency Laws, Decrees, Acts

Country	Energy Efficiency Laws, Decrees, Acts
Indonesia	<p><u>Republic of Indonesia, Law No. 30/2007 regarding Energy (The Energy Law)</u> Purpose: The Energy Law is the legally binding legislation on energy, including energy conservation.</p>
Malaysia	<p><u>Electricity Supply Act (1990) & (Amended 2001)</u> Purpose: The main purpose of the act is to regulate the electricity supply industry. The act also has provisions on the efficient use of electricity.</p> <p><u>Efficient Management of Electrical Energy Regulations 2008</u> Purpose: To promote efficient use of electrical energy through a better energy planning and management – applicable for the commercial and industrial sector</p>

Philippines	<ul style="list-style-type: none"> • DOE Memorandum Circular No. 93-03-05 Series of 1993 (Energy Consumption Monitoring) • Executive Order No. 123, Series of 1993 (Power Conservation and Demand Management) • Executive Order No. 472, Series of 1998 (Fuel Conservation in Road Transport) • Administrative Order No. 103, Series of 2004 (Adoption of Austerity measures – Fuel and Electricity) • Administrative Order No. 110, Series of 2004 (Institutionalization of Government Energy Management Program) • Administrative Order No. 126, Series of 2005 (Directing the Enhanced Implementation of the Government Energy Conservation Program) • Administrative Order No. 183, Series of 2007 (Directing the Use of Energy Efficient Lighting/Lighting Systems in Government Facilities) • Guidelines on Energy Conserving Designs of Buildings (2007) (note: this guideline is a reference document of the National Building Code.).
Singapore	<p>Energy efficiency is governed through a number of regulatory measures:</p> <ul style="list-style-type: none"> • <u>Environmental Protection and Management Act (EMPA)</u> Purpose: Mandatory energy labelling of household air conditioners, refrigerator, household clothes dryer and fuel economy labelling for passenger and light goods vehicle. • <u>Building Control Act (BCA)</u> Purpose: Building control regulations for environmental sustainability
Thailand	<p><u>The Energy Conservation Promotion Act (2007)</u> Purpose: To enforce energy conservation</p>
Vietnam	<p><u>Decree on Energy Conservation and Energy Efficiency (103/2003/ND-CP)</u> Purpose: The decree aims to promote the energy conservation and energy efficiency for meeting the increasing energy demand as well as environmental protection, reasonable energy resource exploitation, and sustainable socio-economic development. The decree regulates all designated energy consumers that use at least 1000 tonnes of oil equivalent of energy a year (or 3million kWh/year for electricity consumption). It also confirmed that the government carries out the state management on energy efficiency and conservation and the Ministry of Industry, as its duty to government, is responsible for implementing the state management on energy efficiency and conservation. Apart from that, other related ministries such as Ministry of Science and Technology, Ministry of Construction, Ministry of Transport and the General Statistics Office, etc. are responsible for coordinating with the Ministry of Industry (now called MOIT) in implementing the state management duty on energy efficiency and conservation in provinces and sectors.</p>

Appendix 4.3 Country Tax Incentives

Country	Tax Incentives
Indonesia	<ul style="list-style-type: none"> • Nil
Malaysia ⁶⁷	<ul style="list-style-type: none"> • Pioneer Status – A company granted Pioneer Status will enjoy partial exemption from payment of income tax. The company will only have to pay tax on 30% of its statutory income. The period of tax exemption is five years, commencing from the Production Day as determined by the Ministry of International Trade and Industry (MITI). • Investment Tax Allowance (ITA) - As an alternative to Pioneer Status, a company may apply for Investment Tax Allowance. A company granted Investment Tax Allowance will be given an allowance of 60% in respect of qualifying capital expenditure (such as factory, plant, machinery or other equipment used for the approved project) incurred within five years from the date on which the first qualifying capital expenditure is incurred. The allowance can be utilised to offset up to 70% of the statutory income in the year of assessment. Any unutilised allowance can be carried forward to subsequent years until the whole amount has been used up. The balance i.e. 30% of the statutory income will be taxed at the prevailing company tax rate. ITA is a better alternative for capital-intensive projects with long gestation period.
Philippines	<ul style="list-style-type: none"> • Nil
Singapore ⁶⁸	<ul style="list-style-type: none"> • Direct Tax Rebates – Nil • One Year Accelerated Depreciation Allowance – The tax incentive for energy efficient equipment and technology and the objective of the scheme is to encourage companies to replace old, energy-consuming equipment with more energy efficient ones and to invest in energy-saving equipment. Under this scheme, the capital expenditure on the qualifying energy efficient or energy-saving equipment can be written off in 1 year instead of three. Capital expenditure pertains to costs incurred by the investment in or purchase of long-term business assets.
Thailand ⁶⁹	<ul style="list-style-type: none"> • Tax Incentives (Board of Investment – BOI) – The Thailand Board of Investment offers 8 years corporate income tax exemption for manufacturing of energy-saving machinery and renewable energy equipment and machinery. Energy service consulting companies providing consulting services regarding the use and/or installation of energy-saving machinery also qualifies.
Vietnam	<ul style="list-style-type: none"> • Nil

⁶⁷<http://eib.org.my/index.php?page=article&item=98,117>

⁶⁸<http://www.nccc.gov.sg/incentive/home.shtm>

⁶⁹http://www.dede.go.th/dede/fileadmin/upload/nov50/may53/6_5_53Business.pdf

Appendix 4.4 Government Grants and Subsidies

Country	Grants & Subsidies
Indonesia ⁷⁰	<p>Partnership program on energy conservation</p> <ul style="list-style-type: none"> Free energy audits provided to more than 250 buildings and industrial facilities between 2003-2007 Between 2003-2007 implemented measures result in annual savings of about 80 GWh annually
Malaysia ⁷¹	None
Philippines ⁷²	<p>Energy management advisory services</p> <ul style="list-style-type: none"> Free energy advisory services offered by the DOE to energy-intensive facilities to evaluate the energy efficiency of operations and recommend improvement measures
Singapore ⁷³	<p>Energy Efficiency Improvement Assistance Scheme (EASe)</p> <ul style="list-style-type: none"> Grant covering efficiency monitoring and 50% of an investment grade energy audit Capped at S\$200,000 over 5 years ESCO, local or foreign, should be accredited by the ESU <p>Grant for Energy Efficient Technologies (GREET)</p> <ul style="list-style-type: none"> Grant covering 50% of labour and equipment costs Capped at S\$2mil (US\$1.43mil) per project Only eligible for projects of payback between 3-7 years <p>Green Mark Incentive</p> <ul style="list-style-type: none"> Owners/Developers: S\$3000-6000 per 1000m², capped at S\$300k - 3mil, depending on Green Mark Rating Architects: S\$500-S\$1000 per 100m², capped at S\$50k-100k, depending on Green Mark Rating <p>CDM Documentation Grant</p> <ul style="list-style-type: none"> Grant offering up to 50% of the cost of engaging a carbon consultant to develop a Project Design Document that uses a new or existing methodology, capped at S\$100k. CDM project developer and proposed project should be located in Singapore. <p>SCEM Training Grant</p> <ul style="list-style-type: none"> Subsidy of the energy manager-training course. Pay \$950 for the professional level.

⁷⁰<http://www.ieej.or.jp/aperc/CEEP/Indonesia.pdf>

⁷¹<http://www.ieej.or.jp/aperc/CEEP/Malaysia.pdf>

⁷²<http://www.ieej.or.jp/aperc/CEEP/Philippines.pdf>

⁷³<http://www.e2singapore.gov.sg/incentives.html>

<p>Thailand⁷⁴</p>	<p>Free energy audit</p> <ul style="list-style-type: none"> To about 800 SMEs annually <p>30% subsidy program</p> <ul style="list-style-type: none"> 30% subsidy for investing in 11 standard energy saving measures (to max. US\$50,000 per facility) Leveraged over US\$10mil for 400 approved projects (average US\$30,000 project size, 1.5 year payback)
<p>Vietnam⁷⁵</p>	<p>Commercial Energy Efficiency Pilot Programme</p> <ul style="list-style-type: none"> 25%-40% co-financing for first 210 participating projects, expected to focus on simple, replicable projects like lighting retrofits <p>Government budget under National Strategic Program on Energy Saving and Effective Use about 2 mil/year⁷⁶</p>

⁷⁴<http://www.iecej.or.jp/aperc/CEEP/Thailand.pdf>

⁷⁵<http://www.iecej.or.jp/aperc/CEEP/Viet%20Nam.pdf>

⁷⁶http://www.asiaeec-col.eccj.or.jp/st-takes/co_vie.html

Appendix 5 – Country ESCO List

Appendix 5.1 Indonesia ESCO List

ESCO	Services	Website
PT Ultimate Standard International	Audit, Consulting	http://www.ultimatestandard.com/
PT Tatasolusi Pratama	Audit, Facilities management	http://www.tsp-id.com
PT Energy Management Indonesia	Stated-owned ESCO (Was previously known as PT. Konservasi Energu Abadi (Koneba))	http://www.energyservices.co.id
PT. ElectroFlow Indonesia	Power conditioning system engineering firm	http://www.electroflow.com
PT Pura Mayungan	Completing the Energy Management value chain are our Energy Management Networks, Demand Management, Power Factor Management, as well as Energy & Power Quality Audits.	http://www.puramayungan.com/
Spirax Sarco Private Ltd	Provider of knowledge, service and products for the control and efficient use of steam and other industrial fluids.	http://www.spiraxsarco.com/
PT Solar Power Indonesia	Auditing, Consultation, Energy Efficient Refrigeration and cooling	http://www.solarpowerindonesia.com/contact_us.htm
PT Solusi Mitra Integrasi Teknologi (SMIT)	Consulting and cogeneration engineering	http://www.smit.co.id/
EuroAsiatic		

Appendix 5.2 Malaysia ESCO List

ESCO	Service	Website
ECO Energy Sdn Bhd	Energy audits and EPC. Has prior project experience in Wood and Pulp, Chemical, Semiconductor, Transport, Telecommunications industries	http://www.eco-energy.com.my
Cofreth (M) Sdn Bhd	Guaranteed savings and EPC. Mainly auditing and project implementation. Not an equipment supplier.	http://www.cofreth.com.my
Matrix Energy Sdn Bhd	Energy auditor for Malaysian government buildings. Has own manufacturing facility. Mainly building EE.	http://www.matrixenergysaver.com/
Gading Kencana Solar Sdn Bhd	Audit, Consulting	http://www.gadingkencana.com.my
Hexgen Energy Corporation Sdn Bhd	EPC possible. Provides energy audits and some vending of equipment. No references. (Need calling for project references)	http://www.hexgenenergy.com.my
Power Quality Engineering Sdn Bhd	PQE is actively involved in the area of providing project management and implementation to mainly to MNCs in semiconductor, telecommunication, transportation and building services sectors. Some vending of equipment: loggers, meters, equipment protectors, stabilizers.	http://www.pqe.com.my
Total Metering Solution Sdn Bhd	Implementation, Vendor?	http://www.tms.com.my
Schneider Electric (Malaysia)	Turnkey, Vendor	http://www.schneider-electric.com.my
Johnson Controls (M) Sdn Bhd	Turnkey, Vendor	http://www.johnsoncontrols.com/publish/us/en/locations.html

Energy Optimization Asia Sdn Bhd	Vendor (Chillers)	http://www.energyopt.com
Mayekawa (M) Sdn Bhd	Vendors (Chillers, compressors)	http://mycomkl.com.my
KJ Engineering Sdn Bhd	Provides guaranteed performance contracting district cooling and cogeneration plants	http://www.kjeng.com.my
Energy & Utility Management Sdn Bhd	Australian based firm. Client base of mainly industrial petroleum and chemical companies. Provides auditing services, no vending of equipment.	http://www.consult-eum.com

Appendix 5.3 Philippines ESCO List

ESCO	Service	Website
CPI Energy Philippines, Inc.	EPC	http://www.cpi-energy.com/aboutus.htm
Trigen Energy Philippines, Inc.	EPC	http://www.trigen-energy.com/
Schneider Electric (Philippines)	Turnkey, Vendor	http://www.schneider-electric.com.ph
Cagayan Electric power & Light Co., Inc. (CEPALCO-ESG)	Utility or IPP	http://www.cepalco.com.ph/
Meralco Energy, Inc.	Utility	http://www.meralco.com.ph
Celcotec Industrial Corporation	Construction	http://www.celcotecphil.com

Geosphere Technologies, Inc.	Energy planning and management	http://www.geospheretechnology.com
Enertech System Industries, Inc.	Boiler technology, no mention of energy services or EPC	http://www.enertech-phil.com
Instrumentation and Control Specialist, Inc.	Instrumentation systems	http://www.incs.com.ph
RN Ferrer Association, Inc.	Auditing, Consulting, Design and Building	
Mantron Industries, Inc.	No info	
Davies Energy Systems, Inc.	Design and Build	http://www.daviesenergysys.com/
PHPC Co Ltd, Inc	(Subsidiary of Hitachi Plant Technologies) Design, Build and Maintenance	http://www.phpcco.com
D.B. International Sales & Services Inc.	Turnkey, Vendor	http://www.dbiphils.com/
Dyna Industrial	Turnkey, Vendor (Air conditioning)	http://www.dynaindustrial.net/
Trane Philippines	Turnkey, Vendor (Air conditioning)	www.trane.com
Johnson Control	Turnkey, Vendor	www.johnsoncontrols.com
Power Source, Inc.	EPC	http://www.powersourcellc.com/eso.php
Nexus Phil, Inc.	Audit, Consulting, Design and Building	http://www.nexusphil.com/index.php?option=com_content&view=category&layout=blog&id=34&Itemid=54
Tropical Focus	Design, Building, Operation (HVAC, cooling)	
OSP-Honeywell Instrumentation and Control	Design, Building, Operation (HVAC, cooling)	

Appendix 5.4 Singapore ESCO List

ESCO	Service	Website
Cofely South East Asia Ltd	EPC	http://www.elyosea.com.sg
G-Energy Global Pte Ltd	EPC	http://www.genenergy.com.sg
LJ Energy Pte Ltd	EPC	http://www.ljenergy.com
United PREMAS Ltd	EPC, Vendor	http://www.unitedpremas.com
CPG Consultants Pte Ltd	Audit, facilities management company	http://www.cpgcorp.com.sg
Equation Energy Pte Ltd	Audit	http://www.equcorp.com
Eetarp Engineering Group	Audit	http://www.eetarp.com.sg/services.html
TÜV SÜD	Audit	http://www.tuv-sud-psb.sg/services.aspx
UMC ServiceMaster	Audit	http://www.servicemaster.com.sg
ecoBAO	Audit, Implementation	http://www.ecobao.com/Services.html
Invensys Process System (S) Pte Ltd	Audit, Vendor	http://www.invensys.com
Enerfficient Pte Ltd	Audit, Implementation	http://www.enerfficient.com
Johnson Controls (S) Pte Ltd	Turnkey, Vendor	http://www.johnsoncontrols.com
Siegle + Epple Asia Pte Ltd	Turnkey, Vendor	http://www.siegleundepple.de
Hitachi Plant Technologies Ltd	Turnkey, Vendor	http://www.hitachi-pt.com
IESYS Pte Ltd	Turnkey, Monitoring	http://www.iesys.org
Kaer Pte Ltd	Turnkey, Monitoring	http://www.kaer.com/
ACTSYS Process Management Consultants	Turnkey, Monitoring, Maintenance	http://www.actsys.com
Trane Singapore	Turnkey, Vendor, Financing	http://www.trane.com/Commercial/
Honeywell Pte Ltd	Turnkey, Vendor	http://www.honeywell.com
Consider Group Asia	Audit, Consulting, Design, Building	http://www.consider.be/www/energy/
Energy Partnership	EPC	http://www.energy-partnership.com

Economic Energy	EPC	http://www.eenergy.com.sg/epcontract.htm
Quantum Automation	Turnkey	http://www.qa.com.sg
Schneider Electric (Singapore)	Turnkey, Vendor, Financing	http://www.schneider-electric.com.sg
Westec Concepts Pte Ltd	Turnkey, Vendor	http://www.freewebs.com/danielwongkk/index.htm
D.A.T.A. Engineering	Monitoring	http://www.dataengineering.com.sg/Services.htm
Cimelia Resource Recovery	E-waste recovery. Listed under HP's unaccredited directory.	http://www.cimeliaglobal.com/services.php
Green Mark Consultants	Building audit, Project developer	http://www.green-buildingconsultants.com/services.html
Far East Refrigeration	HVAC System design, consulting and vendor	http://www.fareastref.com.sg

Appendix 5.5 Thailand ESCO List

ESCO	Service	Website
Energy Conservation System (Thailand) Co. Ltd.	EPC	http://www.ecsthailand.co.th
Excellent Energy International (Thailand) Co. Ltd	EPC	http://www.eei.co.th/
Energy Performance Service (Thailand) Co. Ltd	EPC	-
McKinnon & Clarke (Thailand) Co., Ltd.	EPC	http://www.mckinnon-clarke.co.th/
CHCL Energy and Environment Management (Thailand) Co. Ltd	EPC, Distributor for Siemens	http://www.chclgroup.net/index.php?option=com_content&task=view&id=32&Itemid=37

Elyo-H Facilities Management Ltd.	EPC	http://elyo-hfm.com/content/index.asp
Team Energy Management (Thailand) Co. Ltd	Audit, Design	http://www.temcl.com/index.htm
Guarantee Engineering Co., Ltd.	Audit, Turnkey, Vendor	http://www.guarantee-engineering.com/
PowerEEE Group	Audit, Consulting, Design and Building	http://www.powereee.com
Energy Design Concept Co. Ltd	Turnkey, Vendor	http://www.edco.co.th
Honeywell Systems (Thailand) Co. Ltd	Turnkey, Vendor	http://www.honeywell.com
Modular International Co. Ltd	Turnkey, Vendor (Lighting)	http://www.modular.co.th
ENAXIS (Thailand) Co. Ltd	Turnkey, Vendor	http://www.enaxis.net/
Siemens (Thailand) Co. Ltd	Turnkey, Vendor	http://www.siemens.co.th
Elco Power Systems Ltd	Turnkey, Vendor (power systems)	
Johnson Control Systems International (Thailand) Limited	Turnkey, Vendor	http://www.johnsoncontrols.com
Energy Optimization (Thailand) Co. Ltd	Turnkey, Vendor (Chillers optimizer)	http://www.energyopt.com
Schneider (Thailand) Ltd.	Turnkey, Vendor	http://www.schneider-electric.co.th
Energy Technology Consultants Co. Ltd	Consulting, Design, Engineering, Construction	
Thai Technic Electric Co. Ltd	Consulting, Design, Engineering, Construction	http://www.tte.co.th/index.htm
BTM Engineering (Sumi-Thai International Co. Ltd)	Vendor	http://www.sumi-esco.com; website defunct
BNB Inter Group Co. Ltd	Vendor (A/C)	http://www.bnbintergroup.co.th/index.php
ENOP Co. Ltd	Vendor	http://www.enopco.com
Compressed Air Management Co., Ltd.	Vendor, air quality audit	http://www.airmanagement.co.th

EPRI Co. Ltd	Research Institute	http://www.epri.com
Thai-MC Co. Ltd	Telecom	http://www.mitsubushithai-mc.com
EM Group	To provide "Energy Consultancy Services" which cover all aspects of energy sector, especially Energy Conservation, and Renewable Energy. They have also previously been involved in energy efficiency consulting	www.em-group.co.th
ENSOL Co. Ltd	EPC	http://www.ensol.co.th/business.php
Chamnankij Engineering Co. Ltd	Provides engineering services	http://www.chamnankij.co.th
Cos Motor (Thailand) Co. Ltd	Listed as ESCO in DEDE's list of ESCOs	
EESCO Energy and Environment Services Co. Ltd	No info	
VESTA PMS (Thailand) Co. Ltd	No info	
Westa PML (Thailand) Co. Ltd	No info	
Full Advantage Co., Ltd.	Full Advantage Co., Ltd. is a regional sustainable energy and environment solutions provider in the field of Energy and Environment. Full Advantage has 3 main business activities, namely: Business/Project Development; Advisory and Consulting; Climate Change Activities	http://www.full-advantage.com/contact.html
Thai Technic Electric Co. Ltd.	Electric solutions provider, includes energy management system and plant automation and control.	http://www.tte.co.th/

Appendix 5.6 Vietnam ESCO List

ESCO	Service	Website
Schneider Electric Vietnam Limited	Turnkey, Vendor	http://www.schneider-electric.com.vn
Cong ty Co phan Giai phap Cong nghe Vietnam (Vietnam Technology Solution Joint Stock Company)	Energy consulting, communication about energy efficiency, energy management training and development renewable energy renewable energy	http://vets.com.vn
VESCO- Vietnam Energy Service JSC	ESCO	http://vesco.vn/web_en/index.php?option=com_contact&Itemid=3
RCEE Energy and Environment JSC	Energy efficiency auditing services	http://www.rcee.vn
Energy Conservation Research and Development Center (ENERTEAM)	Energy audits; Energy conservation project advisory, consultancy & development	http://www.enerteam.org/enerteam/?module=9
Dualistic Protech Environment & Save Energy Company Limited (DPSE)	EE solutions, materials & equipment provider (lighting technology)	http://www.dpse.vn/en/
Cong ty Co phan Giai phap Tiet kiem Nang luong va Cong nghe Thong Tin (ESIT)	Training & Consultancy Services; Energy audits; Supply & Installation of EE equipment (electrical)	http://www.esit.vn

About us:

ReEx Capital Asia is a leading Clean Energy Investment Banking and Consulting Boutique specializing in the Asia Pacific region with headquarters in Singapore and representation in New Zealand, Indonesia and the Philippines:

A quick glance at ReEx Capital Asia:

- Capital raising for renewable energy infrastructure, energy efficiency projects, cleantech startups, green product & services companies (US\$5-100m)
- Award-winning Advisor: strategy, financial structuring, M&A, due diligence, valuation, business modelling, feasibility study, market analysis, etc
- Decisive mix of financial & technical skills in Energy, Waste and Water sectors with deep Asia Pacific market expertise and extensive industry network
- 100+ clean energy transactions over past 15 years with aggregate value in excess of US\$2 billion
- Track record with major customers: GDF Suez, REC Solar, Credit Suisse, BNP Paribas, E.ON, United Nations, Asian Development Bank, World Bank, etc.

Clean Energy Investment Banking

Private placement, project finance
M&A, divestiture

US\$2 billion aggregated value raised to date: Solar, Wind, Hydro, Biomass, Biogas, Geothermal, Biofuel, Energy Efficiency, etc

Focus on small-mid caps (US\$5-100m)

Equity, Debt, Structured Products

Buy-side / Sell-side

Early-Stage to pre-IPO – located in Asia Pacific

Strong connection with PE&VC Funds, strategic corporate investors, family offices, banks

Low Carbon Consulting

Independent strategic, financial, commercial and technical advice

Niche: renewable energy & energy efficiency in Asia Pacific

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