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BRANCHENREPORT PHILIPPINEN

ENERGY EFFICIENCY IN SOUTHEAST ASIA WITH SPECIAL FOCUS ON THE PHILIPPINES

AUSSENWIRTSCHAFTSCENTER MANILA
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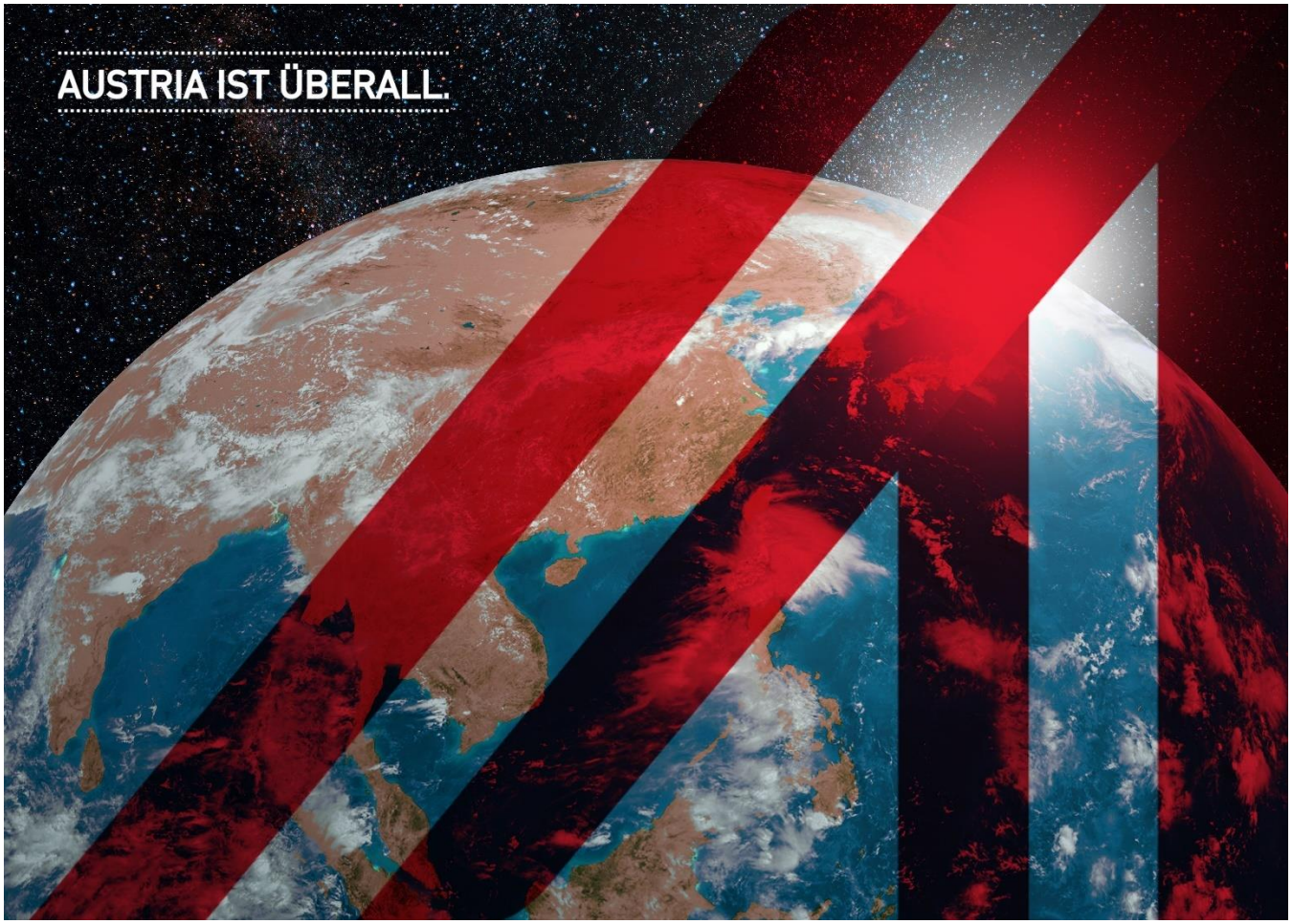

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CONTENT

EXECUTIVE SUMMARY

Over most of the last 20 years, the countries in Southeast Asia could rely on tremendous economic growth and an increase in income levels, which – in turn – also led to an unprecedented rise in energy demand. And these developments will continue in the medium term. By 2040, the IEA expects the region to account for more than 25 % of the global energy consumption. In order to meet this exploding energy demand, over the next decades, governments in Southeast Asia will have to take measures in regards to Energy Efficiency more aggressively than done up until now.
However, countries in the region start off from very different levels with Myanmar and Laos making Energy Efficiency less of an issue while Indonesia, the Philippines and Singapore already have an established accreditation process for energy service companies (ESCOs).

While the first part of the report will compare countries and market potentials with the region, the second part of the report zooms in onto the Philippines and its Energy Efficiency market. In the Philippines, the cost of electricity is the highest in the region while the production of electricity has more than doubled in the last 20 years. The fast-growing energy consumption trends create also significant opportunities for energy efficiency players with the untapped market potential being estimated at EUR 3 bn for the Philippines alone.

In a final chapter, the report, on the one hand, highlights the huge potential resulting from a growth momentum for energy efficiency opportunities, but, on the other hand, also discusses market and regulator challenges which companies are currently facing.

The report was prepared by **Alexander Ablaza** with the support of Mikhael Fiorello C. Llado.
Across Asia and the Middle East, Mr. Ablaza currently provides energy efficiency expertise to governments, multilateral development banks, international development agencies, NPO/NGOs, think tanks, climate funds and other investors with the objective of scaling up energy efficiency capital flows through innovative finance, investment structures, procurement and policy reform.
In June 2018, Alex co-founded and was elected to co-chair the Asia-Pacific ESCO Industry Alliance, which provides a regional platform that links the ESCO organizations of China, India, Indonesia, Japan, Korea, Malaysia, the Philippines, Singapore, Taiwan, and Thailand. He also is one of the co-founders of the Global ESCO Network, with its secretariat in Copenhagen, Denmark. Alex likewise serves as President of the Philippine Energy Efficiency Alliance, a non-profit alliance of energy efficiency market stakeholders. He also serves as CEO of Climargy Inc, a pioneer vehicle for such investment model in the Philippines.
In his regional anchor roles for HQ teams of IFC/World Bank Group and ADB from 2006 to 2013, he enjoyed leading and growing climate finance and energy efficiency investment operations across Asian developing countries, as:
- Regional Climate Finance Specialist for Asia, IFC/World Bank Group's Global Climate Finance Team
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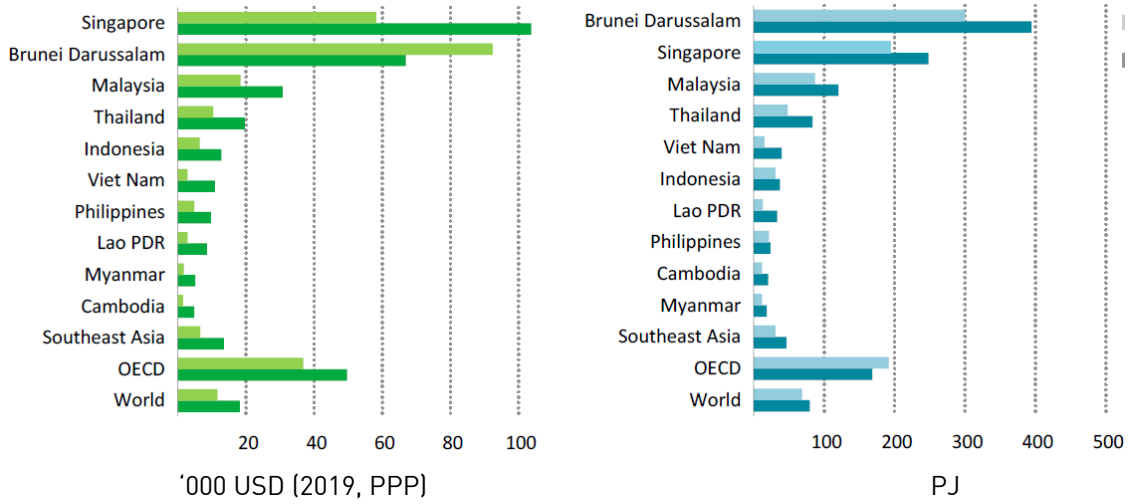
1. SOUTHEAST ASIA'S ENERGY EFFICIENY MARKET

1.1 Energy Outlook

Over the past two decades, Southeast Asia experienced tremendous economic growth, leading also to an aggressive rise in energy demand (Figure 1). Even in the case for Brunei Darussalam where GDP per capita declined, energy demand still demonstrated an opposite trend. Higher electricity consumption in the region, which IEA forecasts to grow at a CAGR of 4% through 2040, is driven by infrastructural developments, technological advances, and increasing electrification. By 2040, Southeast Asia is expected to account for just slightly above one-fourth of global energy consumption, from only 18% today. Uninhibited by economic shifts to the less energy-intensive services sector, energy demand is still seen to grow 60% over the next two decades. As income levels improve, household ownership rates of appliances also rise. The rapidly growing demand for air-conditioning is a key driver of this Southeast Asia energy outlook.

Figure 1: GDP and Energy Demand per Capita in Southeast Asia
(light = 2000, dark = 2019)



Source: IEA 2022

Over the past decade, electrification has been one of the focuses of SEA energy policies. Most of the larger SEA states are already providing electricity access to nearly their entire populations, while countries such as Lao PDR and Cambodia are yet to make major inroads due to struggles in infrastructure and energy sources. In 2018, total electricity generated in SEA amounted to 1,052 TWh, over 80% of which came from four states: Indonesia, Viet Nam, Thailand, and Malaysia. As for energy mix, three-fourths of the region's supply comes from non-renewable sources, such as coal and natural gas. The mix varies widely by state: Singapore and Indonesia are primarily dependent on natural gas and crude oil respectively, while smaller states like Myanmar and Lao PDR rely on hydro-powered facilities. From 2015 to 2018, electricity consumption in SEA grew by 7.1% on average, driven by Indonesia and Viet Nam, among others. Brunei Darussalam was the only state to see a relatively flat consumption rate over this period.

The SEA energy dynamic paints a complex picture for energy efficiency (EE) opportunities: one where there is huge potential resulting from a clear growth momentum but burdened by market and regulatory challenges to be discussed later in this report.

Table 1: 2018 Electricity Profile by Country

	% of Population with Electricity Access	Electricity Generation (GWh)	% Non-Renewable	Electricity Consumption 3-year CAGR
Brunei Darussalam	99.9%	4,294	100.0%	-0.9%
Cambodia	89.1%	8,213	40.9%	19.5%
Indonesia	98.1%	276,187	85.4%	7.5%
Lao PDR	93.6%	21,856	2.8%	6.0%
Malaysia	100.0%	168,906	83.1%	4.0%
Myanmar	69.8%	21,811	42.7%	11.9%
Philippines	93.0%	99,871	77.3%	6.4%
Singapore	100.0%	52,905	95.9%	2.0%
Thailand	100.0%	187,843	77.3%	3.3%
Viet Nam	100.0%	210,150	59.1%	14.4%
Southeast Asia	**95.2%**	**1,052,036**	**75.2%**	**7.1%**

Source: IRENA 2019
CAGR = compounded annual growth rate

1.2 Energy Efficiency Market

As countries in Southeast Asia continue to ramp up economic growth, so does the pressure to push for sustainable means to sustain this growth. These states made commitments to energy intensity (measured in units of energy per unit of GDP) and final energy consumption (Table 2). Relative to 2005 levels, the entire Southeast Asia aims for a 30% reduction by 2025. Individual targets set by countries were relative to business-as-usual (BAU) energy forecasts, which are based on the assumption that no incremental energy efficiency policies are implemented. Those states with more developed power sectors set reduction targets that were, unsurprisingly, less aggressive than the Southeast Asia target. Overall, these reduction targets inform the policies that Southeast Asian governments will create to stimulate their energy efficiency industries and the aggressiveness of their implementation.

Table 2: Energy Efficiency Commitments in Southeast Asia

	Type of Reduction Target	Target	Horizon	Baseline
Brunei Darussalam	Total Final Energy Consumption Energy Intensity	63% 45%	2025 2025	2005 2005
Cambodia	Total Final Energy Consumption	20%	2035	BAU
Indonesia	Energy Intensity, per annum	1%	2025	

	Type of Reduction Target	Target	Horizon	Baseline
Lao PDR	Total Final Energy Consumption	10%	2030	BAU
Malaysia	Total Final Energy Consumption	8%	2025	BAU
Myanmar	Total Final Energy Consumption	20%	2030	BAU
Philippines	Total Final Energy Consumption per annum Energy Intensity	1% 40%	2040 2040	BAU 2005
Singapore	Energy Intensity	35%	2030	2005
Thailand	Energy Intensity	30%	2036	2010
Viet Nam	Total Final Energy Consumption Energy Intensity, energy-intensive industries	8% 10%	2020 2020	BAU BAU
Southeast Asia	**Energy Intensity**	**30%**	**2025**	**2005**

Source: Yang and Noor 2020

Across the 10 Southeast Asian markets identified, various energy efficiency technologies have been deployed commercially and have proven to be capable of delivering sufficient or acceptable energy savings across many major energy end-use sectors. These include public buildings, lighting, agriculture, transportation, as well as commercial, industrial, and residential sectors (Table 3).

Table 3: Energy End-Use Sectors and EE Technologies in Southeast Asia

Energy End-Use Sector	Applicable EE Technologies	Southeast Asia Outlook
Public Buildings	• Efficient chilled water plants / high-efficiency chiller systems • Inverter or solar thermal air conditioners • Indoor LED lighting and controls • Building management systems • Energy monitoring and management systems • High-efficiency motors and pumps • Building envelope solutions (insulation, glazed-windows, air sealing, etc.) • Own-use solar rooftop power generation	Evolving policies on energy efficiency include mandates on government agencies across all levels to take the lead in achieving energy consumption reduction targets. Countries with such policies in place include the Philippines and Indonesia.
Public / Street Lighting	• Outdoor LED luminaires (stand-alone) • Outdoor LED luminaires (digitally connected)	Urbanization, rising demand, and rollout of infrastructure projects drive the uptrend in streetlight systems. Municipal street lighting is one of the most common scopes of EE public-private partnerships, and this is expected to continue due to projects' high energy savings rates, low payback periods, and easy scalability.

Energy End-Use Sector	Applicable EE Technologies	Southeast Asia Outlook
Commercial	• Efficient chilled water plants / high-efficiency chiller systems • Inverter or solar thermal air conditioners • Indoor LED lighting and controls • Building management systems • Energy monitoring and management systems • High-efficiency motors and pumps • Solar water heating • District cooling systems • Building envelope solutions (insulation, glazed-windows, air sealing, etc.) • Own-use solar rooftop power generation	Performance improvement of equipment such as water systems and chillers are increasingly becoming a priority. Also, more establishments are expected to utilize smart controls, building management systems, hybrid cooling systems, and thermal storage technologies.
Industrial	• Efficient chilled water plants / high-efficiency chiller systems • High-efficiency motors and pumps • Compressed air systems • High-bay LED lighting • Boilers / Kilns • District heating systems • Process efficiency improvements • Waste heat recovery • Biomass power generation (esp. with feedstock from process waste) • Building management systems • Energy monitoring and management systems • Own-use solar rooftop power generation	Industries are growing in large part due to foreign direct investments. Since these facilities are the most energy-intensive, they are being required by EE policies to undergo energy audits and submit energy management plans. By 2040, industrial electricity demand is expected double.
Agricultural	• Biomass power generation (esp. with feedstock from agricultural waste) • High-efficiency motors with variable speed drives (inverters) • High-efficiency pumps	An increase in biomass generation is expected, with Thailand taking the lead. Indonesia and Malaysia also look to increase domestic biofuel consumption to reduce imports of diesel fuel.
Residential	• Inverter or solar thermal air conditioners (MEP-compliant) • Inverter refrigerators (MEP-compliant) • LED bulbs and tubes • Own-use solar rooftop power generation	Only 15% of households own air conditioners, and the % contribution of space cooling to total electricity consumption has been rising.
Transport	• Hybrid electric vehicles • Electric vehicles • Efficiency improvements to existing vehicles	Transport demand is still primarily oil-based, even with rising shares of biodiesel fuels. Electrification of transport still lags relative to developed Western countries.

Source: Ablaza, Llado, 2022; IEA 2019

In terms of energy efficiency policy development, countries in Southeast Asia are in widely difference stages (Table 4). Unlike most of their neighbors, Myanmar, and Lao PDR place less priority on energy efficiency policy development in favor of infrastructural development and nationwide electrification. Most Southeast Asian countries enforce some form of energy standards and labeling requirements, which are seen as foundational to quickly identifying energy-saving opportunities at the household level.

Minimum energy performance standards is another supporting element, which several Southeast Asian countries have implemented at least for air-conditioning. One major area of improvement, however, is policy and institutional support for energy service companies (ESCOs). Government-led ESCO accreditation processes are in place for only less than a third of Southeast Asian countries. Such accreditation processes would encourage the flow of financial and technical resources to ESCOs, most of which are considered small-/medium-sized enterprises.

Table 4: EE Regulatory Overview

	Key EE Regulatory Framework	Energy standards and labeling	Requirement to periodically submit EE improvement plans	ESCO accreditation	Minimum Energy Performance Standards (MEPS)	Sectors with energy audit requirements	Financial Incentives and Support
Brunei Darussalam	Brunei Energy White Paper 2014	✓	Undergoing policy development		Air Conditioning	Undergoing policy development	Undergoing policy develop-ment: potentially tax exemptions and deductions
Cambodia	Cambodia Basic Energy Plan	✓					Undergoing policy develop-ment
Indonesia	PP no. 70: Energy Conservation and Energy Efficiency (undergoing revision)	✓	✓	✓	Lighting, Refrigeration, Air Conditioning	Public/ private establishments meeting energy consumption thresholds	Tax exemptions /credits, import duty waiver, low lending rates
Lao PDR		✓					
Malaysia	National Energy Efficiency Action	✓			Lighting, Refrigeration, Air Conditioning, Industrial	Commercial, industrial, government	Tax credits, import duty waiver, Green Technology Finance Scheme (GTFS)

	Key EE Regulatory Framework	Energy standards and labeling	Requirement to periodically submit EE improvement plans	ESCO accreditation	Minimum Energy Performance Standards (MEPS)	Sectors with energy audit requirements	Financial Incentives and Support
	Plan (2016-2025)				Electric Motors (voluntary)		
Myanmar	Myanmar Energy Sector Policy						
Philippines	Energy Efficiency and Conservation Act (2019)	✓	✓	✓	Lighting, Air Conditioning, Motors, Vehicles	Commercial, industrial, transport and public entities meeting energy consumption thresholds	Income tax holiday, duty-free importation
Singapore	Energy Conservation Act	✓	✓	✓	Lighting, Refrigeration, Air Conditioning		Energy Efficiency Fund (E2F), accelerated depreciation
Thailand	20-Year Energy Efficiency Development Plan (2011-2030)	✓	✓		Lighting, Refrigeration, Air-Conditioning	Commercial, industrial	Energy efficiency revolving fund
Viet Nam	National Energy Efficiency Program	✓	✓		Lighting, Refrigeration, Air Conditioning, Distribution Transformer, Industrial Electric Motors	Public/ private establishments meeting energy consumption thresholds	Investment tax credits

Source: ASEAN-Germany Energy Programme 2018, UN-FAO 2009, Ministry Science, Technology and Innovation 2019, Energy Policy and Planning Office 2010, International Partnership on Mitigation and MRV 2015

Energy efficiency and conservation activities are typically not considered as business priorities or competencies, given that most organizations would allocate capital to investments or expenses that are more directly related to operations. This is why government regulations and policies help make energy efficiency a corporate policy and stimulate demand for ESCO services.

For at least half of Southeast Asian countries, there is a unfolding path to requiring businesses to conduct energy audits regularly, mostly when a given energy consumption threshold is exceeded. Furthermore, establishments are compelled to provide consumption reduction plants, usually on an annual basis. Altogether, these requirements would fuel a widescale demand for energy efficiency services and be catalytic to ESCO industry development. While an increase in potential energy efficiency projects is welcomed by ESCOs, projects will only push through if they become financially viable.

In Southeast Asia, most governments support the viability of energy efficiency projects through tax-related incentives that generally mirror those found in existing renewable energy policies. Other stimulating mechanisms include grants, concessional financing, and energy efficiency revolving funds (such as in Thailand), all of which boost interest in energy efficiency investment. These mechanisms help rationalize the energy efficiency project risks perceived by commercial financial institutions that generally are yet to understand the financial dynamics of energy efficiency. Below is a summary of the key international organizations that have supported the growth of the energy efficiency market in SEA countries in the last three decades:

Table 5: Key International Organizations Supporting EE Market Development in SEA Countries

Type of Organization/Entity	Organization/Entity
Intergovernmental organization	ASEAN Center for Energy (ACE)
Regional ESCO platform	Asia-Pacific ESCO Industry Alliance (APEIA)
Multilateral development banks and international financing institutions	• Asian Development Bank (ADB) • International Finance Corporation (IFC) • KfW • World Bank
International development agencies	• Agence Française de Développement (AFD) • Danish International Development Agency (DANIDA) • Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ) • European Union programmes (e.g. EU-Switch Asia, EU-ASEP, etc.) • Japan International Cooperation Agency (JICA) • UK Prosperity Fund • US Agency for International Development (USAID) • United Nations Development Programme (UNDP) • United Nations Environment Programme (UNEP) • United Nations Industrial Development Organization (UNIDO) • United Nations Office for Project Services (UNOPS)

Source: Ablaza, 2020

Relative to Western markets, Southeast Asian energy efficiency industries are in their early growth stages. Nonetheless, most of these countries have ESCO associations that underpin private-led efforts to develop policy and serve as a platform for collaboration and sharing of best practices (Table 6). The number of registered ESCOs vary widely, but they do not fully encompass all companies capable of providing energy services (auditing, design, financing) and energy efficiency technologies.

Table 6: ESCO Market Overview

	ESCO Association	No. of ESCOs and EE service providers	Estimated ESCO Market Size	Estimated ESCO Market Potential	Key Market Barriers
Brunei Darussalam					• Subsidized electricity tariffs • Absence of ESCO development
Cambodia					• Poor awareness of the importance of energy efficiency • Lack of technical know-how
Indonesia	Asosiasi Perusahaan	19			• Subsidized electricity tariffs

	ESCO Association	No. of ESCOs and EE service providers	Estimated ESCO Market Size	Estimated ESCO Market Potential	Key Market Barriers
	Pendukung Konservasi Energi Indonesia				• ESCOs rarely engage in performance contracting
Lao PDR					• Lack of policy on energy efficiency • Lack of technical know-how
Malaysia	Malaysia Association of Energy Service Companies	101	USD 95 million (EUR 92.2 million) (2018)		• Subsidized electricity tariffs • Lack of technical know-how
Myanmar					• Subsidized electricity tariffs • Low electrification rate
Philippines	Philippine Energy Efficiency Alliance	48		USD 160 billion (EUR 155.2 billion) (through 2040)	• Lack of commercial financing for small/medium ESCOs • Risk aversion of financial institutions against energy efficiency projects
Singapore	Sustainable Energy Association of Singapore	19			• Slow increase in demand due to early phase-out of government incentives • Risk aversion of financial institutions against energy efficiency projects
Thailand	Thai ESCO Association	60	USD 200 million (EUR 194 million) (2018)		• Low demand due to poor understanding of the ESCO business by the private sector • Risk aversion of financial institutions against energy efficiency projects
Viet Nam		20			• Subsidized electricity tariffs • Weak ESCO capacity and government support

Source: Ablaza, Liu, Llado, 2020

Growth of the Southeast Asian energy efficiency industries are stifled by structural barriers and market frictions, even despite rising policy support and awareness in opportunities. Electricity prices, which are among the most important drivers of energy efficiency project economics, are heavily subsidized by governments, especially in countries that are more reliant on fossil fuels.

The only exceptions are the Philippines and Singapore, where prices truly reflect the cost of power production. Elsewhere, energy service providers refuse to pursue projects because monetized energy savings fall short of meeting required returns due to sub-optimal electricity tariff rates.

Other market barriers include:

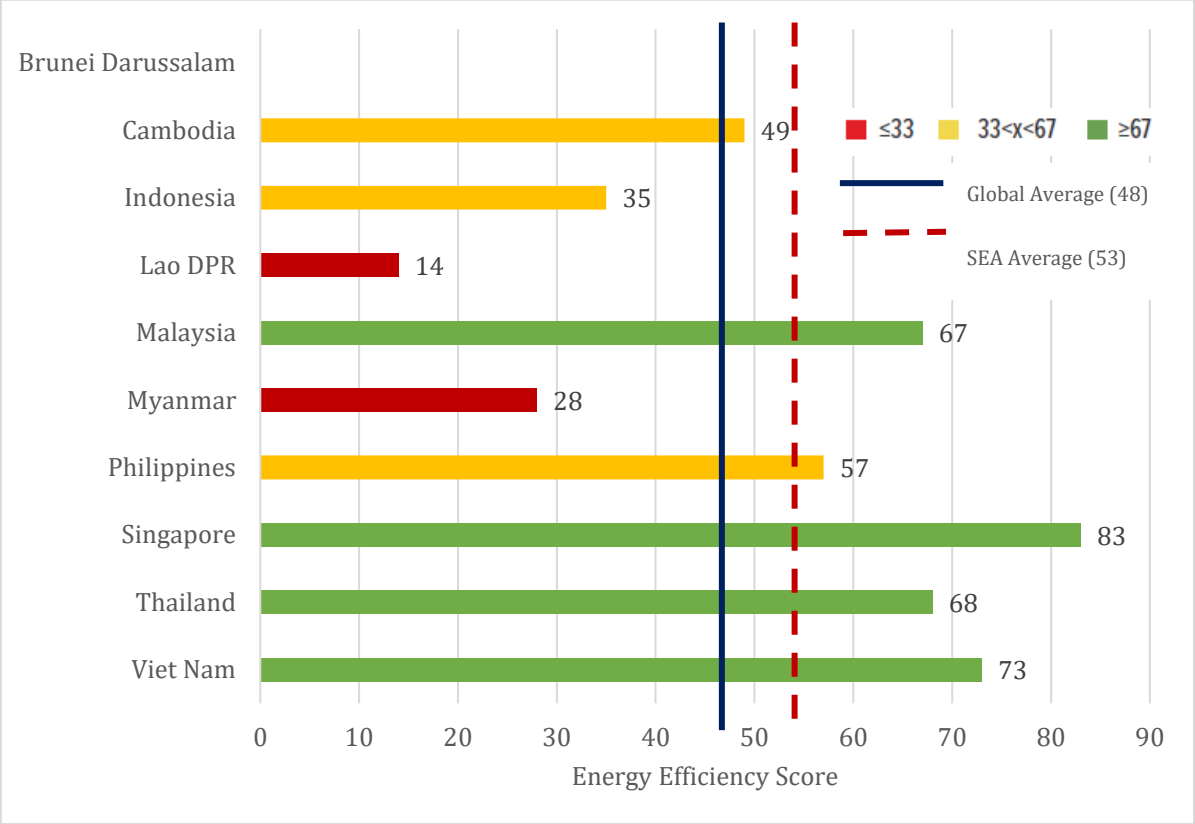
- Energy efficiency projects are perceived as "cost projects" because economic benefits are not outright cash inflows
- Commercial financial institutions consider energy efficiency projects as complex and risky, therefore premiums are added to financing rates
- Clean energy funds prioritize renewable energy over energy efficiency

Even if demand for energy efficiency services increase to desired levels, gaps in technical competence would hinder fully meeting this demand. Most existing projects revolve around lighting and HVAC, but the capacity to implement more process-related interventions is still minimal in Southeast Asia. Other gaps can be found further up the value chain, particularly in the auditing activities that are meant to identify these energy saving opportunities.

In the Philippines, efforts to certify energy managers and auditors are fragmented, and policy-driven guidelines are yet to be rolled out completely. Training using foreign resources and accreditors is an option but considered expensive even for the average-sized ESCO. Lack of technical competence is also an issue in other stakeholders, such as public and private financial institutions that appraise energy efficiency projects for investment purposes.
In the absence of this know-how, appraisers would resort to raising the cost of financing in order to "incorporate the risk". Governments could do better in creating partnerships with other countries with developed ESCO markets to facilitate knowledge transfer and also mobilize capital. At present, such efforts are still decentralized, slow, and typically private-led.

According to the IEA, nearly two-thirds of the global ESCO market is in Asia. While China and its developed energy services market makes up the largest slice of the market, the growth momentum of Southeast Asia establish it as a significant component of the market. With the backdrop of ambitious commitments to reduce energy consumption and intensity, forecasts of rapid growth in SEA energy demand must unavoidably be met with a more aggressive participation of countries' EE industries.
Countries such as Brunei Darussalam, Myanmar, Cambodia, and Lao PDR are expected to have a lower volumes of EE activities given their: (i) smaller power sectors; (ii) infrastructural challenges; and (ii) lack of concrete EE policies. In contrast, states like Indonesia and the Philippines currently strengthen regulatory frameworks to incentivize EE investments and possess deep markets that EE players, both local and foreign, can potentially capture. Materializing this investment potential lies in the degree to which EE policies are enforced, public campaigns raising the merits of EE, and shaping market dynamics to support the financial viability of projects.
On 10 December 2020, the World Bank released the Regulatory Indicators for Sustainable Energy (RISE) report for 2020. The report showed that energy efficiency scores based on 11 performance indicators averaged 53 across nine countries in SEA (excluding Brunei Darussalam).
Five countries, Cambodia, Malaysia, Philippines, Singapore, Thailand, and Vietnam had EE scores exceeding the global average score of 48. While Indonesia, Lao PDR and Myanmar had scores below the global average. Cambodia, Indonesia, and the Philippines scored in the middle-third bracket, shown as yellow bars in Figure 2.

Figure 2: 2020 Energy Efficiency Scorecard for SEA Countries, World Bank RISE 2020



Source: World Bank-ESMAP RISE, 2020

1.3 ASEAN Cooperation for Energy Efficiency, 2021-2025

The ASEAN Plan of Action for Energy Cooperation (APAEC) serves as a guiding framework for sustainable energy sector development in Southeast Asia. The first phase of the APAEC, which ends in 2020, marked several accomplishments for the region, such as a 21% reduction in energy intensity as of 2018 against the 20% target for 2020. Significant headway in minimum energy performance standards, particularly the adoption by seven Southeast Asian countries of ISO 5151 as the testing standard method for air conditioning performance.
Capacity-building activities were also carried out to strengthen regional cooperation, particularly forums on best practices and policy development. As of 2019, the ASEAN Centre for Energy (ACE) has also certified at least 1,000 energy managers. These milestones indicate a clear and definitive movement of Southeast Asian countries towards decarbonization and a more sustainable energy sector.

The second phase of the APAEC (ASEAN 2020) aims to build on the achievements of the first phase and lays out the following objectives through 2025:

- Expanding and promoting EE standards and labeling
    - Developing MEPS policy roadmaps
    - Introducing monitoring, verification, and enforcement (MVE) initiatives
- Enhancing participation of ESCOs and other stakeholders
    - Fostering partnerships between ESCOs, financial institutions, and other private sector parties
    - Initiating the integrated ASEAN Energy Management Certification Scheme

- Strengthening sustainability of building EE
    - Developing the ASEAN Building and Cooling Roadmap
    - Conducting information-sharing activities on best practices
- Pursuing EE in the transport sector
    - Conducting capacity-building activities on vehicle fuel economy
    - Conducting information-sharing activities on best practices
- Advancing EE in the industrial sector
    - Promoting energy management to reduce energy consumption and increase business competitiveness
    - Conducting information-sharing activities on best practices

1.4 Energy Efficiency Investments through 2040

The IEA laid out estimates for EE investment in Southeast Asia from 2019 to 2040 based on various policy scenarios in the region. The stated policies scenario (STEPS) takes into account current announced policy frameworks and targets but does not forecast any changes in these policies over the forecast horizon. However, evolving changes in energy efficiency technologies are incorporated. In contrast, the sustainable development scenario (SDS) assume that policies evolve to accommodate the target outcomes under the United Nations Sustainable Development Goals, particularly achieving carbon emission reduction targets and universal access to energy by 2030. Compared to the USD 4.0 billion (EUR 3.9 billion) estimated EE investments for 2018, the average annual investment (through 2040) for Southeast Asia is USD 17.7 billion (EUR 17.2 billion) under STEPS and USD 41.0 billion (EUR 39.8 billion) under SDS. (IEA 2019)

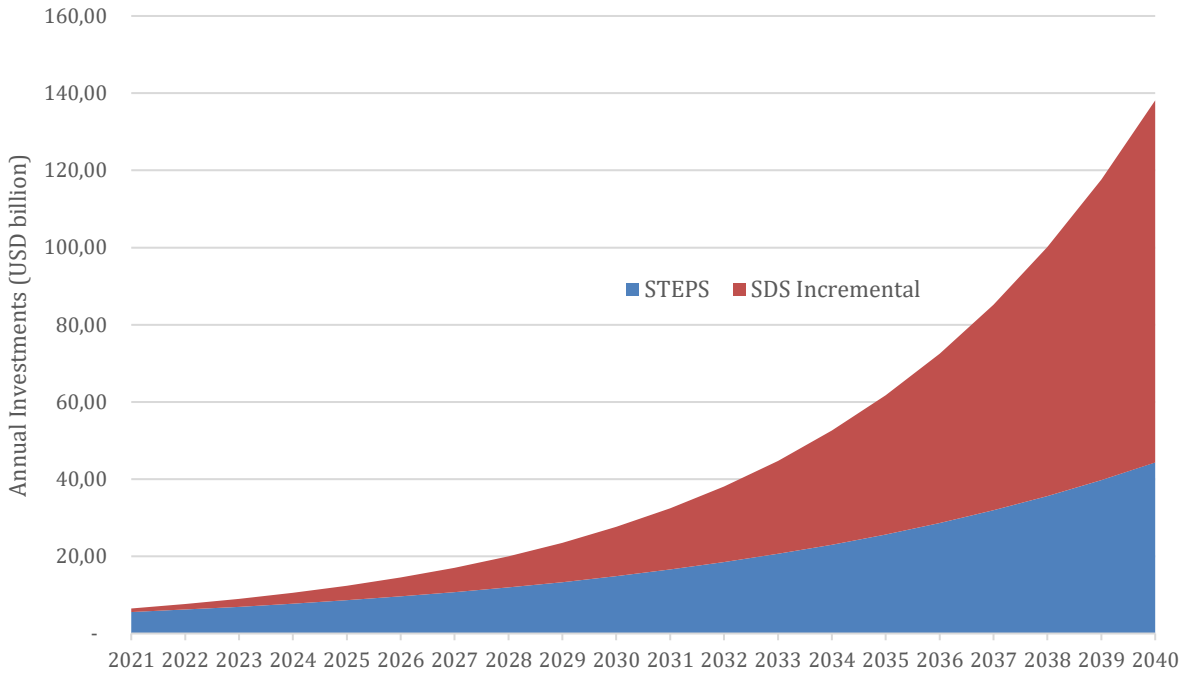
Building on IEA's estimates of average annual EE investments for SEA, this study conservatively forecasts the level of EE investments in the region through 2030 and 2040 (Table 7 and Figure 3).

Table 7: Estimates of EE Investments in SEA through 2040 by IEA Scenario

	IEA Scenario: STEPS	IEA Scenario: SDS
2021-2030	USD 95.38 billion (EUR 92.52 billion)	USD 148.57 billion (EUR 144.11 billion)
2021-2040	USD 380.04 billion (EUR 368.4 billion)	USD 891.78 billion (EUR 865.03 billion)

Source: Ablaza, Llado, 2020, based on IEA projections

Figure 3: Forecasted Growth of EE Investments in SEA through 2040 by IEA Scenario



Source: Ablaza, Llado, 2022, based on IEA projections

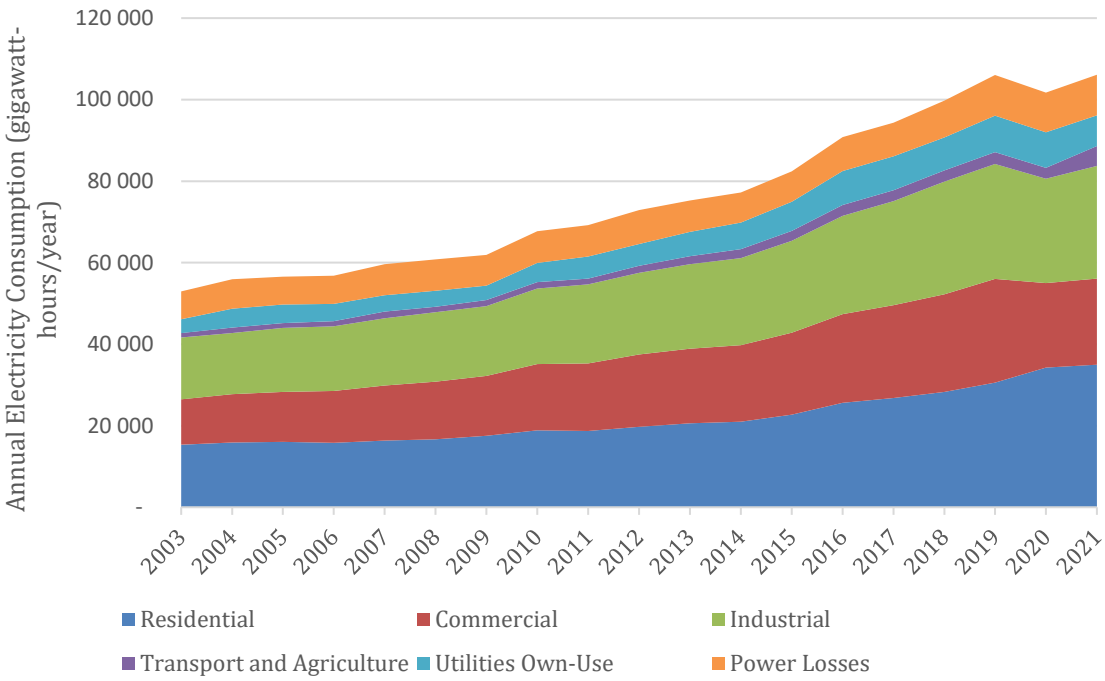
2. THE PHILIPPINES ENERGY EFFICIENCY MARKET

2.1 Market Baseline

By the end of 2021, the average household electricity rate was USD 0.163 (EUR 0.158) per kWh, the highest in Southeast Asia. Electricity production has more than doubled since 2000, and demand is expected to increase by 5.5% annually through 2040, with the share of coal generation continuing to increase rapidly. In 2020, total annual energy consumption in the Philippines amounted to 32.4 million tons of oil equivalent (Mtoe/yr). This figure grew at 3.3% annually since 2009. Of this 32.4 Mtoe of annual energy consumption, 7.2 Mtoe or 22.1% was consumed in the form of electricity.

The three largest end-use sectors of electricity were the residential, transport, and industrial sectors, each consuming a roughly equivalent share, or 31.0%, 30.3%, and 19.0% respectively. The services sector consumed 14.2%, agriculture sector consumed less than 2%, while utilities own-use and systems losses take close to 4% each. Although 2021 figures are yet to be finalized, the industrial sector is expected to once again take a larger share of consumption as the economy continues to recover from the COVID-19 pandemic. Since 2003, electricity consumption has been growing steadily at an average annual growth rate (AAGR) of 3.94% (Figure 4).

Figure 4: Philippines Annual Electricity Consumption (2003-2021, GWh /yr)



Source: DOE, 2021

The Department of Energy's (DOE) Energy Efficiency and Conservation (EE&C) Roadmap for 2017-2040 forecasts energy demand to grow by 80% between 2017 and 2040, at an assumed CAGR of 3.5%. It was also assumed that the transport, commercial buildings and industry will be the most significant contributors of energy savings. DOE targets a ramp-up of energy efficiency impacts to reach 10,000 ktoe/yr in annual energy savings by 2040.
Based on the 2040 energy savings target, it is estimated that a total of 182,378 kilotons of oil equivalent (ktoe) in accrued energy savings will need to be achieved to meet DOE's EE targets by 2040. This will deliver about USD 725.6 billion (EUR 703.8 billion) in energy savings, a significant portion of which could be used to finance EE capital gaps through innovative structures and contracting models.

To enable sufficient capital flows toward an economy-wide portfolio of EE projects, several market, policy and financing barriers will need to be addressed by the full and effective enforcement of the recently enacted EE policy framework in the next 2-5 years:

(i) Commercial, industrial, transport and government end-users will need to quickly perform energy audits and prepare EE projects;
(ii) ESCOs and EE technology providers will need improved access to project finance and contracting tools;
(iii) Demand-side management (or DSM) will need to be re-designed and implemented by distribution utilities amid the power industry restructuring law of 2001;
(iv) Expanded Government procurement regulations should enable ESCO performance contracts, public-private partnership (PPP) transactions and joint venture (JV) agreements for EE projects; and,
(v) More innovative, off-balance sheet financing modalities would allow ESCOs to pursue more aggressive pipelines of shared savings performance contracts.

Table 8 lists the key local agencies and organizations which lead efforts toward the long-term transformation of the the energy efficiency and conservation market in the Philippines:

Table 8: Key Local Agencies and Organizations Leading EE&C Market Stakeholders in the Philippines

Type of Organization/Agency	Organization/Agency
Lead government agency	Energy Utilization Management Bureau (EUMB), Department of Energy (DOE)
Civil society organization of ESCOs, EE technology/service providers, investors, industry associations, and end-users	Philippine Energy Efficiency Alliance (PE2)
Civil society organization of EE practitioners	Energy Efficiency Practitioners Association of the Philippines (ENPAP 4.0)

Source: Ablaza, 2022

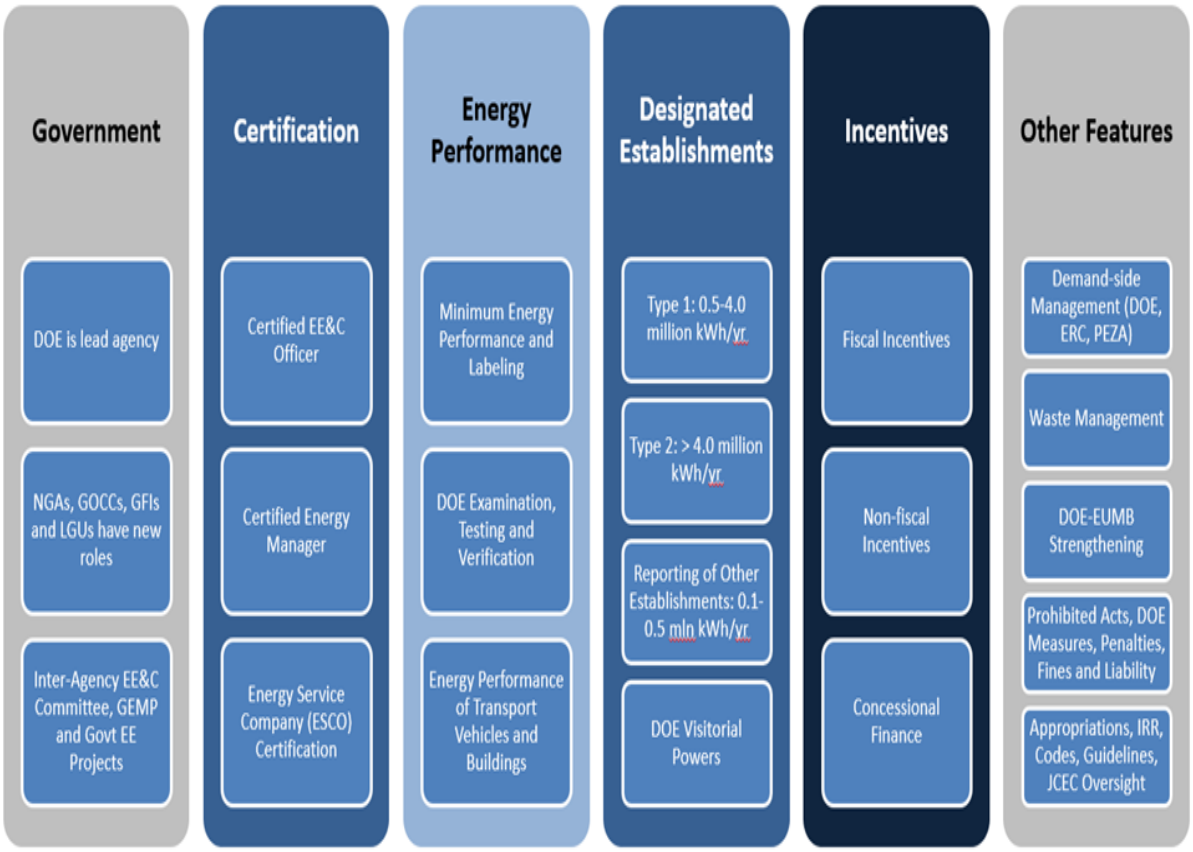
At least 55 EE market stakeholders, including ESCOs, EE technology/service providers, consulting firms, law offices, portfolio investors, industry associations, and large EE end-users (listed in Appendix B of this report) form the Philippine Energy Efficiency Alliance (PE2), a non-profit industry group that partners with the government to advance policy-based EE market reforms.

2.2 Policy Baseline

Republic Act No. 11285, otherwise known as the Energy Efficiency & Conservation (EE&C) Act, and its implementing rule and regulations (IRR) are quickly shifting the voluntary market regime of the years 1990-2019 into a mandatory market regime that should affect most energy end-users, directly or indirectly.

This law was designed to push both public and private sectors into enabling responses and/or implementation of actual EE&C projects, as the country aspires to achieve DOE's 2040 targets in the approved National EE&C Roadmap. (Figure 5 and Table 9).

Figure 5: Key Components of the EE&C Act



Source: Ablaza, 2022

Table 9: Salient Provisions of EE&C Act Relevant to Private Sector Stakeholders

Responsibilities of the private sector	• Manufacturers, importers, and distributors, and retails of energy-consuming products must comply with minimum energy performance standards • Energy-consuming products must be labeled accordingly • Vehicle manufacturers, importers, and deals must comply with fuel economy performance labeling requirements • New building constructions and retrofits must comply with the minimum requirements specified on energy-conserving design of buildings
Obligations of designated establishments: ***Type I – annual energy consumption = 0.5 to 4GWh*** ***Type II – annual energy consumption = more than 4GWh***	• An energy management system based on ISO 50001 must be integrated into business operations • Average specific energy consumption bust be improved based on determined annual reduction targets • A certified energy conservation officer and certified energy manager must be employed for Type I and Type II establishments respectively.

Fiscal Incentives	• Income-tax holiday • Exemption on custom duties of qualified equipment or parts • Additional deductions from taxable income
Non-Fiscal Incentives	• Awards and recognition for innovations in energy efficiency and conservation best practices and successful projects • Technical assistances from government agencies for the development and promotion of energy-efficient technologies

Source: Ablaza, Llado, 2022

Since the recent passage of the law, implementing agencies have been publishing guidelines and circulars with respect to the EE&C Act's Implementing Rules and Regulations. Among these are guidelines on the registration and certification of ESCOs and certification processes for Certified Energy Auditors, Certified Energy Conservation Officers, and Certified Energy Managers.

Table 10: EE Policies in the Philippines (as of 25 August 2022)

Republic Acts	
Republic Act No. 11285	An Act Institutionalizing Energy Efficiency and Conservation, Enhancing The Efficient Use of Energy, and Granting Incentives to Energy Efficiency and Conservation Projects; Signed: 12 April 2019
Department Circulars by the Department of Energy	
DC2019-11-0014	Implementing Rules and Regulations of Republic Act No. 11285 (Energy Efficiency and Conservation Act); Signed: 22 November 2019, Effective: 21 December 2019
DC2020-06-0015	Prescribing the Guidelines of the Philippine Energy Labeling Program (PELP) for Compliance of Importers, Manufacturers, Distributors and Dealers of Electrical Appliances and other Energy-Consuming Products (ECP); Signed: 15 June 2020
DC2020-06-0016	Prescribing the Minimum Energy Performance for Products (MEPP) covered by the Philippine Energy Labeling Program (PELP) for Compliance of Importers, Manufacturers, Distributors, Dealers and Retailers of Energy-Consuming Products; Signed: 15 June 2020
DC2020-09-0018	Guidelines in the Administration, Classification and Certification of Energy Service Company (ESCO); Signed: 9 September 2020, Effective: 9 October 2020

DC2020-10-0023	Prescribing Policy Framework for the Development of the Fuel Economy Rating, Fuel Economy Performance, and Related Energy Efficiency and Conservation Policies for the Transport Sector and other Support Infrastructures; Signed 22 October 2020
DC2020-12-0026	Adoption of the Guidelines on Energy Conserving Design of Building; Signed: 22 December 2020, Effective: 6 March 2021
DC2021-01-0001	Guidelines for the Qualifications, Assessments, Registration, and Certification of Energy Conservation Officers CECO), Energy Managers (CEM), and Energy Auditors (EA); Signed: 11 January 2021, Effective: 6 March 2021
DC2021-05-0011	Guidelines for the Endorsement of Energy Efficiency Projects to the Board of Investments for Fiscal Incentives; Signed: 11 May 2021, Effective: 2 July 2021
DC2022-03-0004	Guidelines for the Endorsement of Energy Efficiency Strategic Investments to the Board of Investments for Fiscal Incentives; Signed: 3 March 2022, Effective: 6 April 2022
DC2022-03-0005	Guidelines for the Recognition of Testing Laboratories for the Examination, Testing and Verification of the Energy Efficiency of Energy-Consuming Products (ECPs) and the Fuel Efficiency of Transport Vehicles, Including the Issuance of Certificate of Endorsement to the Board of Investments (BOI) for Fiscal Incentives; Signed: 10 March 2022, Effective: 6 April 2022
DC2022-03-0006	Adoption of Training Regulations [and Prescribing] Certification Process for Energy Auditors (EAs); Signed: 17 March 2022, Effective: 6 April 2022
DC2022-03-0007	Adoption of Training Regulations for the Certification of Energy Conservation Officers (ECOs); Signed: 17 March 2022, Effective: 28 April 2022
DC2022-03-0008	Adoption of Training Regulations and Prescribing Certification Process for Training Institutions and Energy Managers (EMs); Signed: 17 March 2022, Effective: 28 April 2022
DC2022-04-0013	Adoption of Certification Guidelines for Energy Audit Conducted by Firm, Partnership, Corporation and Sole Proprietorship (FPCS); Signed: 5 April 2022, Effective: 19 May 2022
Department Orders by the Department of Energy	

DO2019-07-0013	Constituting the Committee on the Accreditation of Energy Service Companies (ESCOs); Signed: 10 July 2019
DO2020-01-0001	Organizing the Inter-Agency Energy Efficiency and Conservation Committee (IAEECC); Signed: 9 January 2020
DO2020-01-0002	Operationalization of the Strengthening of the Energy Utilization Management Bureau (EUMB), Support Services and Field Offices on Accordance to Republic Act No. 11285 or the Energy Efficiency and Conservation Act (EEC Act); Signed: 28 January 2020
DO2020-06-0008	Guidelines on Reassignment of DOE Personnel not from EUMB who have signified Interest to be Part of the Strengthened or Reorganized EUMB; Signed: 20 June 2020
DO2021-09-0014	Guidelines on Energy Efficiency Excellence Awards; Signed: 15 September 2021
DO2022-02-0003	Creation of a Philippine Steering Committee (PSC) and Technical Working Groups (TWG) for Renewable Energy (RE) and Energy Efficiency and Conservation (EE&C) Under the Clean Energy Finance and Investment Mobilization (CEFIM) of OECD; Signed 21 February 2022
DO2022-03-0005	Guidelines on the Issuance of the Certificate of Energy Efficiency Cost Reductions (EECR); Signed: 22 March 2022
DO2022-04-0006	Guidelines on the Endorsement of Government Energy Efficiency Projects to the Inter-Agency Energy Efficiency and Conservation Committee Pursuant to the Government Energy Management Program Guidelines; Signed: 7 April 2022
Memorandum Circulars by the Department of Energy	
MC2020-05-0001	Directing All Designated Establishments under Commercial, Industrial and Transport Sectors to Submit Energy Consumption Reports; Signed: 13 May 2020, Published: 27 May 2020
Resolutions by the Inter-Agency Energy Efficiency and Conservation Committee	
Resolution No. 1 s. 2020	Directing All Government Agencies, including the Local Government Units (LGUs) and Foreign Service Posts, to Comply with the Government Energy Man-

	agement Program (GEMP), Ordering the Department of Energy to Conduct Energy Audits and Spot Checks, and Submit Proposed Improvements to the GEMP, Sep 2020
Resolution No. 2 s. 2021	Directing All Government Entities, including the Local Government Units (LGUs) and Foreign Service Posts, to Use Energy Efficient Light Emitting Diode (LED) Lamps in Government Buildings and Facilities as a Requirement for Compliance to the Government Energy Management Program (GEMP), May 2021
Resolution No. 3 s. 2021	Directing All Government Entities, including the Local Government Units (LGUs) and Foreign Service Posts, to Use Inverter Type Air-Conditioning Units or Similar Equivalent Technologies in Government Buildings and Facilities as a Requirement for Compliance to the Government Energy Management Program (GEMP), Oct 2021
Resolution No. 4 s. 2021	Enjoining the Council of Good Local Governance to Consider, Include and Adopt the Energy Efficiency and Conservation (EEC) as one of the Areas in the Criteria per Section 7 of Republic Act No. 11292 – "The Seal of Good Local Governance Act of 2019," Dec 2021
Resolution No. 5 s. 2022	Directing All Government Entities (GEs), Including the Local Government Units (LGUs) and Foreign Service Posts to Observe the Approved Government Energy Management Program (GEMP) Guidelines, Jan 2022
Policy Issuances by other Government Agencies	
DILG Memorandum Circular No. 2020-082	Guidelines in Implementing RA No. 11285 or the "Energy Efficiency and Conservation Act" and its IRR, For All Provincial Governors, City Mayors, Municipal Mayors, DILG Regional Directors, BARMM Minister for Local Government, and others concerned; Signed: 9 May 2020
NEA Memorandum No. 2020-042	Compliance to Republic Act No. 11285 or the "Energy Efficiency and Conservation Act" and its Implementing Rules and Regulations, for all Electric Cooperatives; Signed: 14 August 2020
NEA Regulatory Advisory No. 2022-005	Implementation of Energy Efficiency Programs; Signed: 19 February 2022

Source: PE2, 25 August 2022

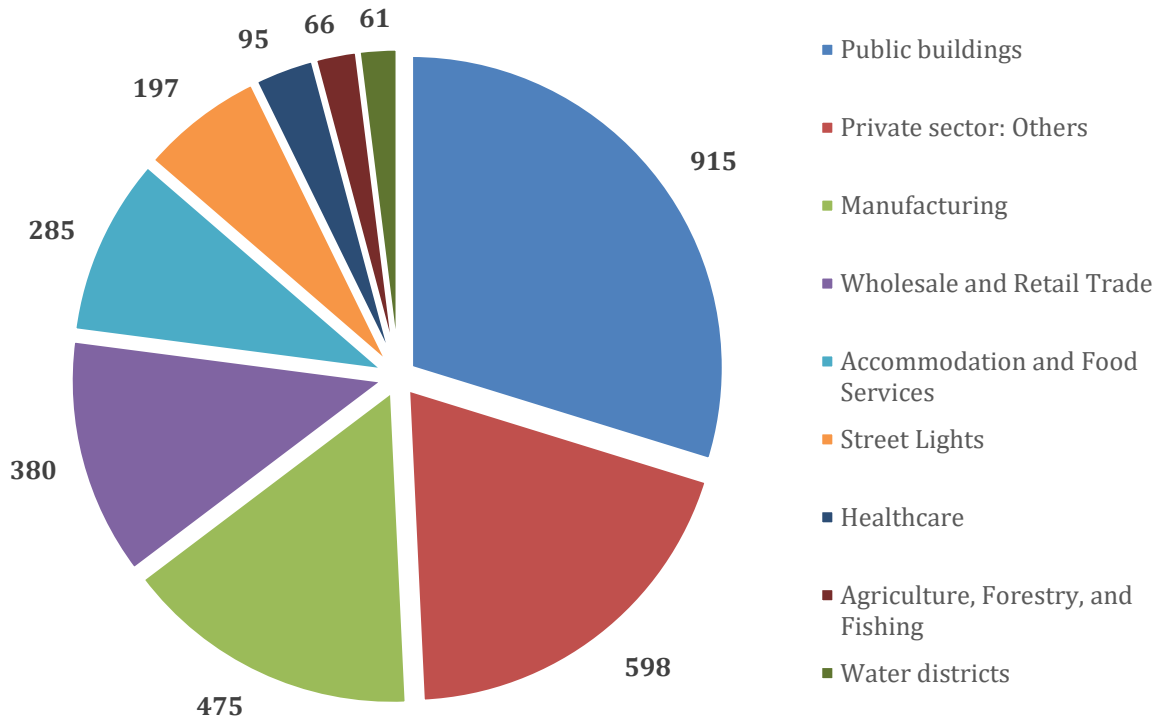
2.3 Market Potential

The recent passage of the EE&C Act coupled with the country's fast-growing energy consumption trends create significant opportunities for EE players. The untapped EE market in the Philippines is estimated at USD 3.1 billion (EUR 3.0 billion) (Figure 6). Over 60% of this potential is expected to come from the country's

private sector, followed by the 30% share of public buildings (mostly those of national government agencies and local government units).

Most of the estimated Philippine market will involve more common EE interventions such as lighting, HVAC, and chiller retrofits, resulting from the latter country's lack in providers of more sophisticated EE technologies. Also, the business cases of these "simpler" EE projects are significantly helped by the absence of electricity subsidies by the government, thus increasing energy savings and lowering payback periods. Through 2030, an additional USD 1.9 billion (EUR 1.8 billion) of EE potential will be available in the market due to encouraging consumption trends and economic growth.

Figure 6: Philippines' USD 3.1 Billion EE Market Potential by Segment (2020, USD millions)



Source: Ablaza, Llado, 202

Collectively, the private sector segments can potentially pull USD 1.9 billion (EUR 1.8 billion) in equipment sales and services for EE improvement retrofit projects in commercial buildings such as shopping malls, hotels, office buildings, business process outsourcing facilities, data centers, residential apartments and condominiums and hospitals. Under this same private sector potential, industrial EE improvement projects will also be implemented within facilities of manufacturers, assemblers, and other players engaged in packaging, refining, agri-business and agri-support services.

What drives the USD 915 million (EUR 887.6 million) market potential is the sector's 4.6 TWh of annual electricity consumption, 2.4 TWh of which are buildings used by national government agencies and therefore are covered under the Government Energy Management Program. There are 1,595 cities and municipalities in the country, but majority of electricity consumption (and thus future energy savings) is concentrated in the

National Capital Region, where most national government agencies and the largest local government units are located.

There are around 450,000 public streetlights in the Philippines, 90% of which are still operating on high-pressure sodium (HPS) lamps. These HPS lamps consume 279 GWh of electricity every year, and replacement with LED is expected to lead to at least a 50% energy saving rate. The USD 197 million (EUR 191.1 million) EE potential in this market segment can be achieved in one of two ways. Municipalities or cities can be approached by ESCOs through public-private partnerships – a streetlight retrofitting model that has been widely implemented in the rest of Southeast Asia.
Alternatively, electric cooperatives and distribution utilities that help manage these street lighting systems can serve as the contract counterparties, with project scopes potentially covering the utilities' multiple service areas across the country.

The water district sector was also identified as a key market given that most of the 79 water districts and their 1.3 million service connections across the country are operating on dated and well-depreciated equipment. The USD 61 million (EUR 59.2 million) market estimate is largely based on pumping retrofits that would reduce electricity consumption for the same amount of water production. These projects are expected to have an average payback period of 2.2 years due to the large amount of efficiency gains seen in multiple case studies.

Outside the USD 3.1 billion (EUR 3.0 billion) EE market estimate for the Philippines are other possible EE segments which cannot be tapped as easily due to one of the following constraints: lack of financing modality, low creditworthiness of customers, or bundling of EE costs with non-EE capital expenditure. Table 11 details these incremental EE markets.

Table 11: Incremental EE Markets in the Philippines

Market Segment	EE Potential Estimate	Drivers
New streetlight installations	USD 416 million (EUR 403.5 million), inclusive of pole installation	143,000 new streetlights needed to cover unlit roads
Household appliances	USD 700 million (EUR 679.0 million)	Credit card-cased financing of air-conditioner and refrigerator upgrades
Transport re-fleeting	USD 9.9 billion (EUR 9.6 billion)	Replacement of public buses and jeepneys with electric / hybrid diesel vehicles
Green buildings	USD 230 million (EUR 223.1 million) through 2030, EE component only	2.7 million square meters of additional green building floor area through 2030

Source: Ablaza, Llado, 2022

3. AUSTRIAN EE COMPANIES AND SEA EE BUSINESS OPPORTUNITIES

3.1 Overview of Austrian EE Companies

For the purposes of this report, Austrian EE companies are commercial entities that are engaged in one or more energy efficiency-related products/services and are either incorporated or headquartered in Austria. Table 12 provides a representative sample of 17 Austrian EE companies that may or may not have a market presence in Asia, including those that have intentions of entering that region in the future.
This table is by no means an exhaustive list of Austrian EE companies, but rather meant to facilitate a discussion on doing EE business in Southeast Asia through the lens of Austrian EE companies.

Table 12: Austrian EE Companies

Company	Key EE Business Lines	Market Presence in Asia*
adte power GmbH	• Heat exchangers • Food-waste-to-energy • Biogas equipment	Biogas transactions in: • Taiwan • Japan ** Based public information*
BDI BioEnergy International	• Biodiesel • Greentech process solution • Biomass-to-liquid	Presence in: • Hong Kong • Malaysia ** Based public information and interview with company representative*
Bertsch Energy GmbH & Co KG	• Power plant engineering • Waste heat recovery • Process recovery	None
BINDER Energietechnik GmbH	• Renewable heating solutions • Biofuels • Boiler systems • CHP plants	Service centers in: • China • Japan • Mongolia • South Korea • Sri Lanka ** Based public information*

Company	Key EE Business Lines	Market Presence in Asia*
Brucha Gesellschaft m.b.H.	• Building insulation • Cold room assembly	Cold storage project in: • The Philippines ** Based public information*
Compost Systems GmbH	• Exhaust air systems	Presence in: • India ** Based public information*
cree GmbH	• Timber-hybrid system for buildings • Green construction	Presence in: • Japan • Singapore ** Based on public information and interview with company representative*
denkstatt & enertec GmbH	• Energy audit • EE solution design	None
Ecotherm Austria GmbH	• Power-to-heat solutions • Heat exchangers • Steam generators • Insulation • Heat recovery	Projects in: • China • Hong Kong ** Based on interview with company representative*
Enerox GmbH	• Energy storage	Sales support in: • Taiwan • Thailand ** Based on interview with company representative*

Company	Key EE Business Lines	Market Presence in Asia*
Glassolutions eckelt glas GmbH	• Insulated glass solutions	Projects in: • South Korea • China • Tokyo • Bahrain ** Based public information*
Ibiden Ceram GmbH	• Regenerative thermal processes using ceramics • Energy-efficient reduction in nitrogen oxide	Presence in: • China • South Korea ** Based public information*
INNIO Jenbacher GmbH & Co OG	• Biogas CHP • Cogeneration	None
Leobersdorfer Maschinenfabrik GmbH	• Compressor solutions	Presence in: • China • Indonesia • Japan • South Korea • Taiwan ** Based public information*
NAHTEC Nahwärmetechnologie & Anlagentechnik GmbH	• Biogas cogeneration	None
SolarFocus GmbH	• Biomass boiler systems • Air-source heat pumps	None

Company	Key EE Business Lines	Market Presence in Asia*
SOLID Solar Energy Systems GmbH	• Solar heating and cooling • Solar process heat	Presence in: • Singapore ** Based public information*

Source: Ablaza, Llado, 2022

3.2 Drivers for Scaling Up EE Business Activity in SEA

In addition to public information on the 17 companies listed above, interviews and presentations were conducted with representatives of 6 of these companies to enrich the gathered data. Information from these discussions and selected public materials pointed to the following salient reasons for Austrian EE companies to develop their business activity in the Southeast Asian market (if they haven't already):

- **Trends favoring innovation** – As economies continue to grow rapidly, markets in Southeast Asia increasingly embrace innovation, including such products and services brought in by Western players. Interview respondents pointed out that such need for innovation constitutes a "market pull" that is critical especially for niche technologies looking to expand beyond Europe and the Americas. This means that local players, such as developers seeking highly insulating, reliable, but affordable building materials, will be willing to partner with Austrian providers that possess such technologies.

- **Rising demand for cooling and insulation** – A significant number of Austrian EE companies cater directly to cooling and insulation needs, and the demand for such tend to be more stable rather the other energy efficiency needs (especially process-oriented ones). Demand for air-conditioning is seen as a key driver to the aggressive growth in electricity consumption foreseen for Southeast Asia. In fact, pilot projects of some interview respondents were with hotels, hospitals, and other commercial users of cooling and insulation technologies. The near-future demand for this energy efficiency service is helped further by the ongoing recovery from the economic slump caused by the COVID-19 pandemic.

- **Phase-out of energy subsidies** – When it comes to EE project economics, some interview respondents noted that there is difficulty in achieving a simple payback of 3-5 years on premium offerings, such as high-quality heating solutions, boiler systems, and process heating. In Southeast Asia, electricity prices are expected to rise as governments gradually remove subsidies. Taking the lead in this regional effort are Singapore and the Philippines, where subsidies have been completed phased out and therefore electricity prices reflect the true cost of power. Higher prices lead to large monetized energy savings, which ultimately drive returns of energy efficiency projects.

- **Climate change and sustainability initiatives** – Policies and markets in SEA are starting to respond to global calls for climate change mitigation, targeted reductions in greenhouse gas emissions and the corporate mainstreaming of sustainability programs in large businesses are jointly pulling more energy-efficient products and solutions from the global supply chain. The Paris climate agreement obligations of all ratifying nations in SEA, the requirement for sustainability reporting among top corporations and the roll-out of green finance serve to expand procurement and utilization of climate-smart technologies and services, including those offered by Austrian EE companies.

- **Aggressive EE policy frameworks** – Some interview respondents noted how Asian governments took stricter policy stances towards furthering energy efficiency and conservation goals, in contrast to what they observed as a tendency by Western governments to push back on such goals. True enough, governments in Southeast Asia have taken focus in enacting or implementing mandatory energy efficiency policy frameworks, as well as generating critical demand for ESCO services. Take the EE&C Act of 2019 in the Philippines for example, under which medium- and large-sized energy end-users are now obligated to comply with energy management obligations such as regular conduct of energy audits, appointment of certified energy managers, and implementation of energy consumption reduction plans.

  Moreover, national- and local-level public sector EE programs are strengthened, ESCO accreditation and certification processes are accelerated, fiscal and non-fiscal incentives for investors of energy efficiency projects are institutionalized, and penal provisions for violations (ex. failing to comply with energy management reporting requirements) are specified. Indonesia is in the process of improving its existing energy conservation law of 2009, while Malaysia intends to soon pass its own EE&C law.

3.3 Market Barriers to be Removed to Scale Up EE Business

The aforementioned drivers form the "market pull" needed by several Austrian EE companies to justify expanding their businesses across Southeast Asia, especially in the Philippines. However, there were also findings on key market barriers that must be overcome to raise the chances of success in the region:

- **Availability of key resources** – Certain interview respondents remarked that supply of inputs will determine financial viability, not only of the decision to enter the region but also the project from the end user's perspective. Reliance on the import of raw materials such as timber could be detrimental for providers of innovative building solutions, or unstable supply of feedstock would negatively affect the economics of a biomass project.

- **Energy pricing and policy** – Despite the ongoing shift away from subsidies, electricity pricing remains a concern for several Austrian EE companies. An interview respondent highlighted the need for price competitiveness relative to the status quo source of power, while another stated that governments must provide clarity on guaranteed rates and feed-in tariffs that are applicable to certain projects. Electricity prices proportionally drive project revenues, but such movements are levered by fixed project costs, leading to volatility in expected returns.

- **Customs and regulations** – As with any overseas expansion, shipping costs and duties add a layer of complexity to project economics. Austrian EE companies that are asset-heavy are clearly more sensitive to this issue, especially when specialized equipment cannot be manufactured in a regional hub. Local approvals and permits could also add to the prolonging of project lead times. Some governments in Southeast Asia could still do better in streamlining permits required for a wide range of energy efficiency projects, perhaps in proper response to a forecasted increase in such projects resulting from their enacted energy efficiency policies.

- **Regional manufacturers make Austrian offerings less price-competitive** – End-users of EE products open their global procurement systems to regionally manufactured goods meeting certain minimum technical specifications. If such equipment and systems are procured solely on an initial capital cost basis (and not on life cycle cost basis), then several Austrian and other European, US and Japanese product manufacturers find it increasingly difficult to win purchase awards in competitive procurements against counterparts manufactured in China or SEA.

- **Low awareness of EE benefits especially where energy subsidies still exist** – As ESCO industries are relatively young for most Southeast Asian countries, recognition of the benefits of EE solutions is

still lackluster. Potential customers within key market segments would fail to assess the economic value of total cost of ownership or life cycle cost of pursuing EE projects, especially with subsidized electricity tariffs reinforcing their perception that energy savings would not quickly recoup the investment.

- **EE policy framework needs to be strengthened in some markets** – Policymakers in some Southeast Asian countries, pressured by national targets to meet sustainability goals, are starting to understand that previously enacted EE legislation have fallen short of stimulating demand for EE products and services. For instance, the minimum energy consumption thresholds to be hurdled before an energy end-user needs to comply with regulatory obligations remains very high in countries such as Indonesia and Singapore. Energy conservation regulations do not serve to develop the local ESCO sector with accreditation systems and capacity building programs. Also, many of these laws are unable to mobilize private capital because of the lack of provisions on fiscal incentives, concessional finance and innovative procurement.

- **Lack of access to commercial and developmental finance** – In spite of their typical 3 to 5-year simple payback periods, several EE projects rely on available, accessible and affordable external financing instead of drawing from internal capital budgets of both commercial and industrial energy end-users. Internal funds are commonly prioritized for activities that are closer to the core business operations of the host enterprise. Local and regional EE organizations have estimated that around two-thirds of the EE capital gap in any economy will have to be mobilized through off-balance sheet financing modalities.
  This means that around USD 594 billion (EUR 576.2 billion) may have to be flow through third-party investors such as ESCOs, Super ESCOs, equity providers, public-private partnership (PPP) proponents and implementing agencies of large-scale Government-led EE retrofit programs in the next 20 years across the 10 SEA economies. Commercial banks and development financial institutions will need to design and de-risk dedicated EE lending facilities with more concessional terms for ESCOs and other third-party investors. Equity vehicles will need access to long-term equity and debt and guarantee services, also at sub-commercial pricing and tenors.

4. RECOMMENDATIONS

4.1 Recommendations for Austrian EE Companies

The market opportunities and gaps determined by information gathered from Austrian EE companies inform several recommendations for commercial and industrial players looking to growing their energy efficiency businesses in Southeast Asia and the Philippines.
This report suggests that Austrian EE offerings will be more competitive on a life-cycle cost basis in Southeast Asia by removing the first-cost barrier, particularly through the creation of new ESCOs, collaboration with existing ESCOs in the region, innovative financing modalities and mechanisms, bolstered research and development, and fostering synergies among Austrian stakeholders.

- **Creation of ESCOs** – A subset of Austrian EE companies are capable of both providing comprehensive solution packages (designing, financing, implementation) and issuing energy performance guarantees to energy end-users. The ability to provide such guarantees reflects these companies' ability to manage risk and maximize the value of findings from energy audits conducted.

  A well-functioning ESCO possesses all these capabilities, with the addition of leveraging energy performance contracting (essentially a performance guarantee approach that is financially more beneficial to end-users) and the availability of sufficient capital to finance projects. Such Austrian EE companies can bridge the "short gap" towards becoming an ESCO through capitalizing an entity, such as a subsidiary in Southeast Asia, with foreign or local equity, which would then support the initial pipeline of energy efficiency projects. Templates for energy performance contracts are also made available in several ESCO associations and can be leveraged. Success in this initial pipeline would then win the confidence of potential investors, such as Austrian sources, for future projects.

- **Widen sales channels to ESCOs** – Existing ESCOs in Southeast Asia may serve as effective go-to-market channels, and so Austrian EE companies may partner with them to extend their reach. Until energy performance contracting becomes their standard practice, Austrian EE companies transact primarily through direct sale of their equipment and services. These offerings can be flowed through ESCOs in Southeast Asia, leveraging on the latter's relationships with customers that would otherwise be difficult to reach for Austrian players.

  This approach will be most effective for markets with established ESCO industries, such as Malaysia, Singapore, Thailand, and the Philippines. Indonesia, Viet Nam and perhaps Cambodia are poised to also have an ESCO industry in the medium-term. One way to start working relationships with these ESCOs is for Austrian EE companies to become active members of local ESCO associations, which typically welcome overseas members.

- **Broaden business delivery with innovative financing** – Structures such as public-private partnerships have been used to distribute risk and financing burden across parties willing to take them. The aversion towards EE project economics stems from having to pay a significant upfront capital expenditure, only to be offset by cost reductions rather than outright cash inflows. Public procurement processes and commercial entities are reluctant towards this financial dynamic and prefer not to have the EE assets on their balance sheets.

  Therefore, Austrian EE companies may consider off-balance-sheet financial mechanisms, such as energy performance contracting. Among the key benefits of these off-balance-sheet mechanisms are: (i) upfront costs are spread out over a longer period of time; and, (ii) different project risks are allocated efficiently to the parties most capable of absorbing them. Utilizing these mechanisms will reduce perceived risks and encourage public and private customers alike to enter into EE transactions. In the event that off-balance-sheet mechanisms are not viable due to regulatory constraints or lack of local precedent, project financing could still be a useful option. Other concessions, such as absorbing more of customers' credit risk, could be considered by Austrian EE companies to complement off-balance-sheet mechanisms in order to address market dynamics in the region. This increased exposure can be managed and diversified away through aggregation of multiple projects.

- **Invest more and sustain Austria-based R&D capacities** – As the number of local players increase in response to evolving EE policies and market dynamics, Austrian EE companies should consider investing considerably in R&D to establish product differentiation. One of the companies interviewed indicated that their Austria-based R&D team has been crucial to the success of their product line in Southeast Asia, even in the presence of competing, locally sourced energy management solutions. Moreover, since such expertise would normally be based in Austria, this investment would be beneficial to the Austrian economy.

- **Build synergies and collaborations among Austrian companies** – EE businesses can grow because Austrian companies are pursuing projects through formal and informal collaborations. For instance, pump businesses can grow while piggybacking on the increased demand for air conditioning or chilled water system products and services, whether for new construction or retrofits in existing facilities. Austrian lenders and investors can work with Austrian technology suppliers and ESCOs to jointly develop bankable projects, performance contracts or PPP transactions. Austrian ESCOs can negotiate bulk pricing deals with Austrian EE technology manufacturers and service providers.

- **Partnerships with local players and stakeholders** – Entry into a new market such as Southeast Asia requires a thorough understanding the local market dynamics and policy environment. This process can be accelerated through forming partnerships with local players with experience in doing business in the region, such as contractors, engineering companies, and trading companies. Austrian EE companies may also engage consultants to better understand the pertinent legal frameworks governing energy efficiency transactions in that country. Several interview respondents confirmed starting these partnerships in Southeast Asia, while others moved on to creating local subsidiaries after building on those partnerships.

4.2 Recommendations for Governments and Development Agencies

From the same set of drivers and gaps, and after assessing the persistent EE market barriers in the region, this study forwards the following recommendations for Governments, international development agencies and international financing institutions to consider in support of responding to energy security and climate change mitigation objectives through bolstered EE markets:

- **Review, amend and strengthen EE laws** – For some Southeast Asian countries, EE policy frameworks fall short of creating demand for energy efficiency technologies, services, and financing. Policy-driven demand ought to cover most, if not all, economic sectors in order to be sizeable and make an impact on aggregate energy consumption. With attracting foreign investments still a priority, EE policies in some countries relaxed obligations, such as setting minimum energy consumption thresholds so high that majority of commercial and industrial end-users are left out of mandatory obligations, such as consumption reduction targets and energy management reporting.

  Certain markets are yet to have official ESCO accreditation processes, and measurement and verification (M&V) professional certification systems are still lacking. Project returns fail to attract investors and project developers, especially in the absence of material tax-based fiscal incentives or provisions for viability gap funding. Policy frameworks should be revisited through lens of their actual effectiveness on stimulating energy efficiency industries and shaping the desired energy consumption behaviors.

- **Accelerate public spending for EE projects** – Governments, with the aid of development agencies and funders, should design and implement large-scale EE retrofit programs for public buildings, public streetlighting, water utility pump efficiency, and even EE improvements of small and medium

enterprises (SMEs). This would not only create significant levels of virtual power generation (at levels equivalent to several coal-fired power plants), but also serve to quickly reduce operating expenditures of both public entities and SMEs.

More relevant to the post-COVID-19 economic recovery, accelerated EE spending has been said to be a more effective job generator than traditional infrastructure-based stimulus activities. In a study inspired by IEA, the Philippine Energy Efficiency Alliance (PE2) estimates that EE projects generate 45% more jobs for the same amount of stimulus or capital expenditure than mainstreamed infrastructure projects. (Ablaza 2020).

- **Flow concessional finance to grow and de-risk EE investments** – EE markets severely lack commercial players able to invest debt, equity and guarantee products with pricing, security and tenors that are able to support the project financing needs of commercial banks, development financial institutions, ESCOs, Super ESCOs, EE portfolio investors, EE project developers, vendors, and PPP proponents. There is a clear role for international financial institutions and multilateral development banks to invest its own capital resources in developing country markets, whether or not blended with climate funds. While private capital is already flowing at growing velocities toward portfolios of renewable energy projects in SEA, such has not been the case for the EE market. Development investors will also need to mobilize technical assistance grant funding to prepare these projects with detailed energy audits and capacity building.

- **Accelerate removal of energy subsidies** – With only two out of the ten Southeast Asian countries pricing electricity at its true cost, the accelerated phase-out of electricity subsidies should be a policy priority to encourage EE investments. Some EE players have already strengthened their regional presence in response to rising tariffs (e.g. Malaysia). The removal of fossil fuel subsidies, particularly in oil-producing nations such as Malaysia, Brunei Darussalam, and Indonesia, would also lift any pass-throughs to electricity prices, therefore benefiting EE project economics. This policy development would also positively impact the use of off-balance-sheet mechanisms, with the incremental monetary savings from higher tariffs being shared by end-users and ESCOs.

- **Push innovation in government procurement** – Public procurement processes should be revised to enable procurement based on total cost of ownership or life cycle cost, which would then make EE solutions more attractive to public sector customers. At present, most of public procurement in Southeast Asia put more weight on upfront cost, thus favoring cheap solutions at the expense of more burdensome maintenance costs. Accounting for life cycle costs of a system would result into a truer estimate of a proposed solution's net benefit, allowing seemingly more expensive but higher-quality Austrian offerings to compete with local bidders.

  These procurement revisions would also widen the range of EE options available to public agencies, ultimately benefiting the energy service industry. Government procurement policies should also approve and respect multi-year contracts through various administrations, typically shifting in short elective cycles, as well as allow energy and maintenance monetary savings to be invested in EE and ESCO projects, instead of reverting automatically to the public treasury.

- **Insulate all public and private procurement from corruption** – Strengthening policies against unethical business practices will reduce transaction costs and make product and service offerings by Austrian players more commercially attractive. Bureaucracies and complex legal requirements already hamper entry of foreign players into Southeast Asa, but this situation is further aggravated by the prevalence of unethical behavior of some government stakeholders, as pointed out by one of the interviewed Austrian EE companies. Extensive anti-corruption policies will send a strong signal to foreign players that entering the Southeast Asian market is a feasible business decision, especially in an industry that is well in its early stages and is yet to develop a robust regulatory framework.

- **Relax foreign ownership restrictions, where applicable** – Foreign ownership restrictions, specifically for ESCOs, EE project developers, portfolio investors and providers of energy management solutions, should be revisited on the grounds that they contribute to the achievement of sustainability

goals and energy intensity reduction targets. These restrictions have made it difficult for Austrian businesses to establish wholly or majority-owned subsidiaries and gain local funding or access to fiscal incentives. Loosening these restrictions would not only ease access to financing, but also remove restraints on the import of technology and expertise from countries with developed energy service industries, such as Austria. This would also allow Austrian equity investments to optimize their commercial returns on investments made on EE businesses or projects in SEA markets.

- **Scale-up end-user EE awareness programs** – Governments, with the support of international development agencies and civil society organizations, should widen the reach of energy efficiency public awareness programs which will clearly communicate the multiple benefits and financial attractiveness of EE projects implemented in the commercial, industrial and government sectors. An increased level of end-user awareness will proportionately increase the market demand for life-cycle cost-based procurements of quality EE technologies, solutions and services, as well as the availability and advantages of implementing EE projects through the ESCO performance contracting model.

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APPENDIX A

Member Companies of the Philippine Energy Efficiency Alliance (PE2)

Company	PE2 Category	Business / Specialization
ABB Inc	Regular B	EE technologies, services
Aboitiz Power Corp	Regular B	Power generation, distribution, and retail electricity services
Advanced Energy Technologies Renewables Plus Co Inc	Regular B	EE/RE technologies, services
Alpha Centauri Electrical Services Inc	Regular A	ESCO
Atlas Copco (Phils) Inc	Regular B	EE technologies, services
AVGarcia Power Systems Corp	Regular B	EE technologies, services
Azbil Philippines Corp	Regular A	ESCO
Certification International Phils Inc	Regular B	ISO certification services
Climargy Inc	Regular C	EE portfolio investments
Concepcion Carrier Air Conditioning Co	Regular A	ESCO (HVAC)
Daikin Airconditioning Philippines Inc	Regular B	HVAC technologies, services
Danfoss Inc	Regular B	EE technologies, services
Delta Dore Inc	Regular A	ESCO
EconoServ Solutions International Inc	Regular A	ESCO
Edward Marcs Phils Inc	Regular A	ESCO (solar cooling, PV)
Engie Services Philippines	Regular A	ESCO (HVAC, DCS)
ESCA Inc	Regular B	EE technologies, services
ESE-TECH Industrial Solutions Corp	Regular B	EE technologies, services
European Chamber of Commerce of the Philippines Inc (ECCP)	Associate D	Foreign chamber
Filairco Technical Services Co Inc (Trane Phils)	Regular A	ESCO (HVAC)
First Gen Energy Solutions Inc	Regular A	ESCO
Geosphere Technologies Inc	Regular B	EE technologies, services
Green Light LED Energy Solutions Inc	Regular B	EE technologies, services
Hi-Cool Engineering Corp	Regular A	ESCO (HVAC)
iControltech Inc	Regular B	EE technologies, services
Indra Philippines Inc	Regular B	EE technologies, services
Innovative Polymers Pte Ltd	Regular B	EE technologies, services

Company	PE2 Category	Business / Specialization
Italian Chamber of Commerce in the Philippines Inc (ICCPI)	Associate D	Foreign chamber
Manila Electric Company (Meralco)	Regular B	Power generation, distribution, and retail electricity services
Meralco Energy Inc (MSERV)	Regular A	ESCO (utility-owned)
Mitsubishi Corporation	Regular B	EE technologies, services
MOSVELDTT Law Offices	Regular B	Professional services (legal)
Nayon Kontrol Systems	Regular B	EE motors, services
Newton Electrical Equipment Co Inc	Regular B	EE technologies, services
NextGen Innovations Phils Inc	Regular B	EE technologies, services
OSP ESCO International	Regular A	ESCO (HVAC)
Phoenix Pilipinas Gas and Power, Inc	Associate E	EE end-user (LNG, fuels)
Pi Energy Inc	Regular A	ESCO
Pilipinas Shell Petroleum Corp	Associate E	EE end-user (fuels, retail)
Republic Cement & Building Materials Inc	Associate E	EE end-user (cement manufacturer)
Resources Consolidated International Trading Inc	Regular B	EE technologies, services
Schneider Electric Philippines	Regular A	ESCO
Siemens Inc	Regular B	EE technologies, services
Signify Philippines Inc	Regular B	EE lighting solutions
Solid Cement Corp (CEMEX)	Associate E	EE end-user (cement manufacturer)
Stellar Equipment & Machinery Inc	Regular B	EE technologies, services
Stratcon Power Services Philippines Inc	Regular B	EE technologies, services
Thermal Solutions Inc	Regular A	ESCO (HVAC)
Total Renewable & Energy Efficiency Solutions Corp	Regular A	ESCO
TS-I Energy Solutions Corp (TS-I ESCO)	Regular A	ESCO (HVAC)
Upgrade Energy Phils Inc	Regular A	ESCO
Verne Energy Solutions Corp	Regular B	EE technologies, services
Villaraza & Angangco Law Offices	Regular B	Professional services (legal)
Waterfront Philippines Inc	Associate E	EE end-user (hotel chain)
Westco Electrical & Equipment Corp	Regular A	ESCO

Source: PE2, 14 September 2022.

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