Diagnostic Analyses Report of Energy Efficiency Development in Three Countries: Indonesia, the Philippines and Vietnam

Final Report: 31 January 2022

Supported by: The Energy Transition Partnership (ETP)

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ENERGY TRANSITION PARTNERSHIP

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ACRONYMS

ASEAN	Association of Southeast Asian Nations
BAU	Business as Usual
CEA	Certified Energy Auditor
CEM	Certified Energy Manager
CESV	Certified Energy Saving Verifier
CIGA	Certified Investment Grade Auditor
EE	Energy efficiency
EEP	Energy Efficiency Project
EEPFP	EEP Finance Professional
ESCO	Energy Service Company
ESG	Environmental, Social, and Governance
ESI	Energy Savings Insurance
EVO	Efficiency Valuation Organization
GAs	Government Agencies
GDP	Gross Domestic Product
GHG	Greenhouse gas
IGA	Investment Grade Audit
IPMVP	International Performance Measurement and Verification Protocol
IRR	Internal Rate of Return
LFI	Local Financial Institution
M&V	Measurement and Verification

NDC	Nationally Determined Contribution
NGO	Non-governmental Organization
PCG	Partial Credit Guarantee
PPP	Public Private Partnership

UNITS AND CURRENCIES

GWh	GigaWatt hour
kTOE	kilotonnes of oil equivalent
kW	kilowatt
kWh	kilowatt hour
MTCO2e	Million Tons of CO2 Equivalent
MTOE	MegaTonne of Oil Equivalent
USD	United States Dollar

BACKGROUND

A. Southeast Asian Energy Transition Partnership (ETP)

1. The Southeast Asian Energy Transition Partnership (ETP) is a multi-stakeholder platform that aims to accelerate energy transition in Southeast Asia and contribute to the achievement of the UN's Sustainable Development Goals (SDGs) and the Paris Climate goals by bringing together Government Donors, Philanthropies and Partner Governments. ETP aims to empower its partner countries to transition towards an energy system that simultaneously ensures environmental sustainability, economic growth, and energy security. To achieve this goal, ETP will mobilize and coordinate the necessary technical and financial resources to create an enabling environment for renewable energy, EE and sustainable infrastructures in the region.

2. ETP aims to deliver joint action, improved coordination and dialogue to accelerate energy transition in the region by addressing impediments to renewable energy, EE and sustainable infrastructures. ETP Members have come together to fund ETP to (1) support an improved delivery environment to accelerate the energy transition in Southeast Asia, (2) improve coordination between other relevant initiatives in the region, including capital investments and technical assistance, and (3) where possible and appropriate, to promote communication and knowledge sharing among stakeholders in the region on energy transition.

3. With an initial focus on Indonesia, the Philippines and Vietnam, ETP has a mandate to mobilize resources and coordinate the necessary technical assistance to create an enabling environment for energy transition. This includes through high-level technical advisory support, grant-making and capital investment programs, capacity, and skills development programs, and convening of cross-sectoral dialogues with decision makers and broader sets of stakeholders.

B. Energy Efficiency in Southeast Asia

4. To harness and sustain the impressive economic growth the Southeast Asian (SEA) Region has seen, and to meet the growing energy demand in consequence, the SEA countries intend to reduce the regional energy intensity (EI) by 32% by

2025, relative to the 2005 level[1]. Without the prioritization of EE, the set goal to accelerate energy transition and strengthen the energy resilience is harder to achieve and impedes the region's endeavors to move away from conventional energy.

5. With regard to the energy transition in SEA (and globally), all credible studies and plans point to the need for EE to play a prominent role in achieving both cost-effective emissions reductions and improving the utilization of investments into available energy system resources.

6. As a forecast of the Global Climatescope[2] suggests that the countries in the region will need to spend USD14 billion by 2030 to ensure the growing energy demand and an uninterrupted access to energy. It has been shown that only a 1%–4% investment in EE is sufficient to meet 8 - 25% of the projected increase in primary energy consumption by 2030[3]. This dynamic reinforces EE's relevance as a least-cost solution to meeting Southeast Asia's growing energy demand. This will be achieved by harnessing the cost-effective investment where regional energy security will be boosted by lowering the need for imported energy.

7. The practical challenge that designers of programs and initiatives face, however, is that even though the financial returns of energy savings investments are routinely identified as high and bankable in studies concerning the potential of EE, there is substantial under-investment in cost-effective EE initiatives. This "EE investment gap" persists, almost universally, across all countries. The reality is that both the number of implementation-ready EE projects, and the availability of financing for such projects, remain suboptimal because of the various technical, institutional, and financial barriers.[4]

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[1] ASEAN. 2020. JOINT MINISTERIAL STATEMENT OF THE 38 th ASEAN MINISTERS ON ENERGY MEETING. https://asean.org/storage/JMS-of-the-38th-AMEM-Final_Mins.pdf

[2] Climatescope is a unique market assessment, interactive report and index that evaluates the investment conditions for clean energy in emerging economies and evaluates their ability to attract capital for low-carbon energy sources while building a greener economy. The first edition was developed by the Multilateral Investment Fund of the Inter-American Development Bank Group in partnership with Bloomberg NEF

[3] ADBI. 2020. Energy Efficiency in ASEAN: Trends and Financing Schemes. Oct, 2020. Available at: https://www.adb.org/sites/default/files/publication/648701/adbi-wp1196.pdf

[4] (i) Low Awareness of Energy Efficiency, (ii) Lack of Technical Capacity and Project Development Skills, (iii) Small Scale of Energy Efficiency Projects, (iv) Lack of Consistently Enforced Regulations, and (v) No Commercially Attractive Local Financing.

8. If a sufficient range of investments are to be allocated for EE in the region, greater efforts are necessary to marshal policy and stakeholder collaboration in support of such outcomes. In many cases, EE strategies are guided by laws, institutional frameworks, targets, and action plans. Thus, bold, and ambitious national policy targets for EE in Southeast Asia can play a critical role in advancing regional investment for EE interventions and solutions. For example, the national EE targets introduced by SEA countries include:

   - **Indonesia:**[5] Decrease energy intensity by 1% annually and decrease energy–GDP elasticity to below 1% by 2025
   - **Philippines:**[6] 3% of reduction in energy intensity across key economic sectors and at least 10% of energy saving on electricity from all sectors by 2040
   - **Viet Nam:**[7] 5-7% of energy saving in the period of 2019-2025; 8-10% of energy saving in the period of 2019-2030; and reduce power loss to less than 6.5% by 2025

9. Expanding awareness and adoption for effective enabling policies of globally proven EE policy options, including building energy codes, minimum energy performance standards (MEPS), or disclosure of building energy consumption, can further mobilize resources for innovative EE technologies and measures. Development of effective pathways, action plans and investment to reflect the ambitious EE initiatives has been, however, a challenge. The regional and international development partners and actors can play a catalytic role to provide both technical and financial assistance to help SEA countries realize the abundant EE opportunities. Recent experience with development partners programs to promote EE in Southeast Asia is depicted in Annex 1.

10. Work under this initiative will complement the "ETP Energy Efficiency Innovation Window" by providing a diagnostic of the political economy surrounding EE in the SEA region, including provide a compendium and a study of policy mapping and challenges and opportunities and gaps in EE policy frameworks, identify donor-coordinated efforts to advance EE-outcomes, and in energy savings and

[5] Government Regulation No. 79/2014: National Energy Policy, Article 9.
[6] Energy Efficiency and Conservation Roadmap 2017 – 2040 and Philippines Energy Plan (PEP) Energy Demand and Outlook 2017 – 2040.
[7] Vietnam National Energy Efficiency Programme (VNEEP) 2019 – 2030 – Decision 280/QD.

reduced carbon emission (CO2) as a result of enhanced EE programs and investments in Southeast Asia.

1. EXECUTIVE SUMMARY

This report provides a review and an analysis of the current energy efficiency (EE) market status and potential, regulations, policies, targeted energy and GHG reductions, gaps and recommended interventions for each of the three South East Asia countries of Indonesia, the Philippines and Viet Nam. The on-going EE initiatives provided by donors and each respective government were also reviewed to eliminate duplication of new interventions that are recommended in this report to be implemented to overcome the gaps needed to significantly scale-up the implementation of EE.

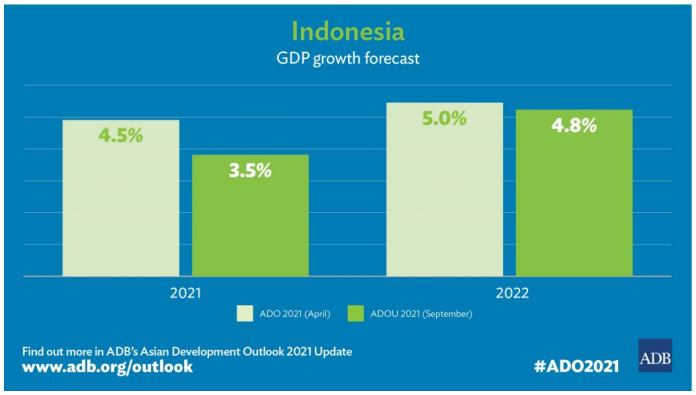
This report provides a market overview and description of common EE barriers, gaps and interventions for all 3 countries with a separate Exhibit attached for each country providing its detailed review and analysis.

In summary, the EE market in all 3 countries is virtually untapped resulting in a huge potential for energy savings, reduced GHG emissions and EE investments. They are still nascent due to many barriers, that include limited EE awareness and demand, lack of capacity to develop 'bankable' EE Projects (EEPs), limited access to financing and insufficient financial capacity of industrial enterprises, ESCOs and government entities. Most owners of energy-consuming facilities (Facility Owners) have not even begun to look at or consider implementing EEPs in their facilities, which is why EE opportunities are so abundant for the most fundamental of EE technologies.

1.1 Indonesia

Indonesia's economy turned negative in the second quarter of 2020 due to COVID, but turned the corner and became positive again in the second quarter of 2021. Its 2021/2020 year-on-year GDP growth is now estimated to be around 3.5% versus a previous estimate of 2.5% to 3.5%. According to ADB's below chart, Indonesia's GDP is estimated to grow in 2022 by around 5%.

Figure 1. Indonesia's GDP 2021-2022 Growth Forecast



Now that the economy is growing again Indonesia's energy needs will start increasing again as well. The Government of Indonesia (GoI) has set ambitious target to reduce its energy consumption by 17.4% in all sectors by 2025. This is based on potential energy savings of 15-35% for the transportation and household subsectors and 10-30%for the industrial and commercial subsectors.[8] These savings are estimated to translate to 96.3 million tons of CO2 emission reductions, contributing around 30% to Indonesia's reduction target from the energy sector.[9]

Unfortunately, the status is that virtually no EE has been or is being implemented in any of Indonesia's sectors. Simply stated, there is very little current market demand for EE leaving the opportunity untapped because it faces the same common barriers faced by many countries in Southeast Asia and other developing countries around the world, plus the additional one of low electric rates. In addition, it currently has no enforceable regulation or policies that contain any incentives, mandates or other features that will drive demand or overcome the significant EE barriers currently facing Indonesia. However, there are some interventions underway by MEMR with respect to the Governmental sector and donors for the private sector, that if completed as planned remove most the key EE barriers. The most significant donor program is from UK Pact which recently completed a competitive call for proposals for its funding of up to GBP 2.7 million of EE interventions in Indonesia over the next 3 years with a schedule start date in March 2022.

[8] National Energy Masterplan (MEMR, 2017)
[9] MEMR, 2019

If all of UK Pact's interventions are implemented, MEMR's PP70 revisions are passed by GoI that include the PPP changes required to remove the ESCO barriers in the government sector, and the recommended interventions in this report, Indonesia could realize EE potential annual savings of **USD 1.5 billion** for an **investment of USD 7.4 billion** for the governmental and industrial sectors.

It also worth mentioning that the commonly-recommended EE fund intervention is not being currently recommended, but could be a possibility in the long term (2-3 years out). The reason for this delay is the need to allow the current interventions being implemented to first overcome the many EE market barriers in Indonesia so there is a sufficient level of 'bankable' EEPs to fund. The primary problem in Indonesia is an inability to build a pipeline of EEPs, which must first be done before creating a fund to finance them.

1.2 Philippines

The Philippine Energy Market as a whole, including the EE market, is largely a private sector led and price-sensitive market. These conditions present a challenge to developing the local EE market with a relatively small domestic capital market dominated by small and medium sized enterprises (SMEs) adversely hit by the pandemic.

The campaigns for EE have been steadily going on for decades in the Philippines. Despite these efforts and fact that the Philippines has the highest electric rates in Southeast Asia, no meaningful EE has been or is being implemented in any of the its energy consuming sectors. Simply stated, there is very little market demand for EE in the Philippines leaving the opportunity untapped because it faces most of the common barriers faced by many countries in Southeast Asia and around the world, plus a few additional ones that are unique to the Philippines.

However, unlike any other country in Southeast Asia, the Philippines enacted a wide-spread energy efficiency law in April 2019, Energy Efficiency and Conservation Republic Act 11285 (EEC Act), that provides a national mandate for EE in its government facilities and is an overarching national regulation that serves as the framework for policies that require the more efficient use of energy and EE technologies throughout the country. It also provides incentives for EEC projects and delineates responsibilities among Government Agencies (GAs) and private entities.

The EEC Act is the primary driver for the potential expansion of the EE market in the Philippines. The residential, commercial, and industrial sectors are the major electricity users. Setting Minimum Energy Performance Standards (MEPS) and Minimum Energy Performance for Projects (MEPP) and energy labeling has been the primary strategy to manage households' energy consumption. MEPP has been established for room air conditioners, refrigerators, lamps and ballasts. For the commercial and industrial sectors, the EEC Act defined the Designated Establishments (DEs), end-users consuming at least 500,000 kWh annually, that are mandated to set annual energy savings targets and implement them.

The EEC Act also prescribes for the certification of EE practitioners to raise the professional standards of those engaged in energy management and energy auditing as well a registration and certification mechanism for ESCOs, all of which are not yet fully implemented. It aims to address barriers to EEPs and the ESCO industry, but faces many challenges that include Policy Implementation, Inherent Government Sector Barriers and lack of Awareness and Capability. The need to increase awareness on EE is evident across various stakeholders. Project hosts, specifically Facility Owners, lack EE knowledge and do not prioritize EE in their operations/expenditures. Facility Owners will often prioritize investments related only to their core business. There is also a general lack of awareness and understanding of the mandated responsibilities of GAs and DEs as set forth in the EEC Act.

The ESCO sector is at its infant stage, mostly composed of SMEs that have limited or no experience in developing 'bankable' EEPs. Specifically, there is limited or no local capability in conducting an Investment Grade Audit (IGA) or performing Measurement and Verification (M&V) on EEPs, and this is compounded by inadequate existing EE professional certifications. The EEC Act requires ESCO to be certified based on the having proven experience in implementing paid-from savings projects, which very few have.

Local banks and Financial Institutions (LFIs) also lack an understanding of EEPs and the type of project-based financing that the market needs. Some LFIs have dedicated EE financing products but they are not attractive to Facility Owners and are not appropriate for ESCOs whose revenues are defined by energy savings. This gap stems from LFIs mostly having limited understanding of how EE technologies generate

energy savings, the ability to measure and verify these savings, and identify and manage associated risks.

A robust and aggressive capacity building and education campaign is necessary to reach all relevant EE stakeholders. DOE is continuously conducting regular awareness campaigns, but more targeted capacity building on developing 'bankable' EEPs and awareness should be done to engage the different stakeholders.

1.3 Vietnam

Vietnam continues to experience high economic growth compared to other regional and global economies. Average gross domestic product (GDP) growth rate reached approximately 7 % during 2001-2010, dropped to around 5.8 % during 2011-2015 and gradually recovered to 6.8 % from 2016 to present. This economic growth, in combination with urbanization and rapid population growth, has boosted demand for energy in general and electricity in particular.

In 2015, total primary energy (PE) supply in Vietnam was 70,588 kilo ton of Oil Equivalent (KTOE). Since 2010, the Total Final Energy Consumption (TFEC) grew by 4.3% per year to reach 61,853 KTOE in 2019. However, the growth rates were relatively higher in 2018 (11.86%) and in 2019 (6.7%) and resulted in a total final PE supply by GDP in 2018 of 0.35 TOE/1000 USD while the average of other countries in the region are at 0.21 TOE/1000 USD.

Vietnam has a high level of energy intensity compared to other international contexts. In 2019, the Total Energy Supply (TES) by GDP was 15.2 GJ/1000USD (IEA[10] , 2021), while the world average amounted to 8 GJ/1000USD of GDP, equating to 0.363 TOE for Vietnam versus the world average of 0.191 TOE (almost double). The fact that energy intensity has not decreased much indicates that Vietnam's EE is very low.

According to the final draft National Power Development Plan for the period 2021-2030 in Vision 2045, Vietnam's power demand is forecasted to increase on average by 9.1% and 7.9% annually for the period 2021-2025 and 2026-2030, respectively. Accordingly, domestic supply capacity of electricity would need to increase almost twofold, from 69,258 MW in 2020 to 137,662 MW in 2030. This growth rate is considered high compared to the region and the rest of the world.

[10] https://www.iea.org/countries/viet-nam

The Government of Vietnam (GVN) is well aware that it needs to balance the need for increasing energy supply for socio-economic growth with ensuring energy security and environmental protection. This requires working different strategies that include enhancing EE to allow for savings and improving energy performance to reduce future supply needs and current losses. GVN recognizes that with the overall shortage of power situation, one of the main benefits of implementing EE would be a reduction of the total energy system cost by significantly reducing fuel costs and demand on the electrical power system.

One of the central EE policies issued in March 2019 is the National Program on Energy Efficiency and Conservation for the period 2019-2030 (VNEEP 3), and it targets a reduction of TFEC by 5-7% in 2025 and 8-10% in 2030 compared to the baseline development. VNEEP 3 also has many different detailed targets for reducing electricity losses, achieving EE and energy savings in various industrial subsectors, green building programs, industrial units with energy management systems, fuel economy for vehicles, etc. VNEEP 3 also contains a legal framework, enhancement of legislative enforcement, promulgation of EE standards, establishment of ESCO technical/financial capacity building support, plus creating energy information systems and establishing an EE fund. Unfortunately, VNEEP 3 is only a policy and not a law that can be legally enforced by GVN.

VNEEP 3 is followed by Vietnam's commitment at the 26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow to target net zero emissions by 2050. Vietnam also introduced stronger measures to reduce greenhouse gas (GHG) emissions on its own abilities as well as with international support in terms of finance and technology transfer. It also vowed to continue implementing its stated goals in the Paris Agreement. In 2022, Vietnam will provide updates for the country's NDC commitment that features the initiatives and efforts to green the energy mix and support the further adoption of EE.

A rough estimate of the potential EE market opportunity for the industrial, residential and governmental primary energy consuming sectors is an investment of USD 4.4 billion and an average annual energy savings of USD 361 million over the 12-year period ended 2023.

The status of the Vietnam EE market is that very little EE has been or is being implemented in any of its sectors, which makes the achievement of the above estimates quite challenging. One of the most significant contributors to the low EE

penetration is the limited awareness and market demand for EE in Vietnam caused by the same common barriers faced by many countries in Southeast Asia, plus the additional significant barrier to EE of having low electric rates. However, there are good EE policies, but they are not effectively enforced and none of them contain any incentives or removal of regulatory barriers in the Governmental sector that could significantly drive EE demand or overcome many of the EE barriers currently facing Vietnam.

1.4 3-Country Recommended EE Interventions

The below table lists all recommended EE interventions for each of the 3 countries.

Table 1: 3-Country EE Interventions

#	INDONESIA	PHILIPPINES	VIETNAM
1	Develop/Implement/Fund Demonstration EEPs (Private Sector)	Support DOE's implementation of EEC Act	Develop/Implement/Fund Demonstration EEPs (Private-Sector)
2	Deliver EEP Development Capacity Building	Develop/Implement/Fund Demonstration EE/ESCO Projects (Private & Government)	Develop Cash Incentive Programs to Drive Private-Sector EE Demand
3	Establish a Robust ESCO Association	Develop Automated Annual Energy Consumption Reporting by DEs	Deliver EEP Development Capacity Building
4	Provide First Loss Fund for ESI Product	Deliver EEP Development Capacity Building	Develop EE Finance De-Risking Products
5		Develop EE Finance De-Risking Products	Develop an Industrial EE Benchmarking System

6		Develop Cash Incentive Programs to Drive Private-Sector EE Demand	Create/Deliver 'EE Product' Awareness and Promotion Programs
7			Remove EE Regulatory Barriers for GAs
8			Create a Robust ESCO Association

2. COMMON EE MARKET BARRIERS

A summary of the EE market barriers, common to all developing countries in Asia, have resulted in very little implementation of EE in Indonesia, the Philippines and Vietnam is provided below.

2.1 Low EE Knowledge and Demand

There is an extremely low level of EE knowledge with most stakeholders in these countries, especially with Facility Owners in the industrial, commercial and governmental sectors. While the industrial and commercial sectors may have a better understanding of EE technologies, they do not understand their benefits and risks, leading to EE being a very low priority for them to invest capital or utilize their credit capacity to finance EEPs versus their core business activities. Also, most private Facility Owners prioritize investments on production/income generation versus EE (savings generation), unless they can pass on the cost to their clients/tenants. So, the low priority for Facility Owners emanates from this plus a fundamental perception that EEPs are equipment infrastructure investments which only need to be made if and when they break. In addition, EEPs have to compete with other capital expenditures; so even when an EEP generates a very attractive internal rate of return **(IRR)** of 25-50%, it is typically still unable to compete with the one-year internal hurdle rates of core business investments. This situation is further aggravated by the pandemic environment in which businesses tend to prioritize financial resources for expenditures that will support their core business operations and business recovery.

The low level of EE knowledge has led to the following major market barriers:

- General lack of understanding and confidence with Facility Owners, LFIs and investors in the estimated future EE savings being achieved and verified, which has led to their unwillingness to implement/fund EEPs and thus a fundamental lack of EE market demand;
- Lack of project-based EEP development skills and technical capacity with local engineers, vendors, consultants and staff of ESCOs resulting in energy audits that only identify a rough estimate of EE opportunities which are not ready to implement and not 'bankable' due to their unreliable savings estimates caused by insufficient data, inaccurate energy baseline, and supporting calculations, plus no M&V plans;
- Lack of national regulations that mandate EE implementation and remove existing regulatory barriers for the governmental sector to be able to engage ESCOs to implement and finance EEPs on a paid-from-savings basis;
- No commercially-attractive financing offered by LFIs, and

Another major contributor to reduced EE demand specifically in Indonesia and Vietnam is their low industrial electricity tariffs which are only about USD 0.078/kWh compared to an average electric price in the world of USD 0.124/kWh[11] and USD 0.15/kWh in the Philippines. These low rates create very low motivation to implement EE technologies due to the resulting low savings, long paybacks and low IRR on investment. It is interesting to note the different situations relative to the low tariffs in Vietnam, and Indonesia. Vietnam's is due to its low generation cost and its state-owned utility is in a dire situation of not having enough generation capacity; whereas in Indonesia, the state-owned utility is generating huge losses, equating to a subsidized low electric rate, and has a lot of excess generation capacity.

2.2 Low EE in Government Facilities

Many countries (like Australia, UK U.S., Canada) have learned that the best way to accelerate EE in their country is for the government to lead by example by implementing comprehensive EEPs in their own buildings. This not only demonstrates the government's confidence in EE to its citizens, but also creates

[11] https://www.globalpetrolprices.com/Vietnam/electricity_prices/

awareness, reduces perceived risks and if done properly can create models and structures that can be replicated for implementation and financing of EEPs in private facilities by Facility Owners, ESCOs and LFIs.

Unfortunately, Government Agencies (GAs) in all 3 countries that own and operate a large number of energy consuming buildings and other assets, like public street lighting, have implemented little to no EE. This is mostly due to existing regulations which preclude them from engaging with ESCOs and other private entities to develop, implement and finance EEPs on their normal commercially-reasonable terms. Existing regulations result in the same 3 barriers faced by GAs throughout South East Asia being experienced in Indonesia, the Philippines and Thailand, summarized as follows:

1) **No Multi-Year Contracts**. GAs cannot commit to make payments beyond the current budget year, and consequently are unable to execute an enforceable contract that would require them to make multi-year savings payments.

2) **No Savings Retention.** A GA's energy budget for its government-owned facilities is typically based on the prior year's actual energy costs. So, when an EEP is implemented that reduces energy costs, the subsequent year's budget is lowered to the reduced energy amount, resulting in no funds being available to make any future payments from the EEP's savings.

3) **Inapplicable Procurement Procedures.** The procurement method to be followed by GAs requires them to procure (purchase) equipment and services by selecting the company with the lowest upfront cost bid, which is not conducive (or applicable) to selecting EEPs or ESCOs whose primary value is the net present value of future savings. In fact, the lowest upfront cost selection method typically results in much less energy-efficient, lower quality and shorter life energy-consuming products and services having to be purchased. The procurement regulations also require all specifications and costs of the equipment and services being purchased to be identified and fixed upfront in very specific detail to make sure that all bids can be evaluated on the same basis. Unfortunately, this type of detail is not available for an EEP until after an IGA has been completed, which is relatively expensive and time-consuming because it contains all shovel-ready details (final design, etc.) needed for the EEP to be immediately implemented. Neither ESCOs nor any business entity is willing to perform an IGA at no cost if and until they have not

been selected due to the risk of them losing not only their cost to perform the IGA, but their design ideas to competitors. Therefore, different procurement procedures specific to EEPs and the ESCO's performance-based project development approach, all of which have been fully developed, adopted and are being widely used in many markets, need to be applied in order for ESCOs and other private-sector entities to be willing to submit EEP proposals.

2.3 Limited Technical Capacity to Develop 'Bankable' EEPs

One of the most significant barriers to scaling up the implementation and financing of EE is the limited technical/financial experience and capabilities of most EE services providers (i.e., ESCOs and EE consultants) to prepare IGAs and perform other critical development tasks required for a '***Bankable'*** EEP. There is also a clear gap in local energy auditors not knowing about the following requirements of IGAs and Measurement and Verification (M&V) plans:

- An IGA contains the core information needed for an EEP to be successfully implemented. It is a much more detailed energy audit that reflects one or more individual energy savings measures (technologies) at an energy consuming facility, containing all critical assumptions, facility-based measurements and calculations supporting the estimated savings and capital expenditure **(CAPEX),** and a M&V plan for each energy savings measure bundled into an EEP. It must contain all information required for a Facility Owner, developer, LFI and/or investor to be able to understand/evaluate the technical and economic feasibility of the proposed EEP.

- The M&V of energy savings from an EEP is critical to documenting the actual achieved savings and the resulting IRR of the investment. M&V is the meter of an EEP, and it should follow generally accepted and best-practice M&V principles contained in globally published documents like the International Performance Measurement and Verification Protocol **(IPMVP®)**, owned by the Efficiency Valuation Organization **(EVO)** and available for free download at www.evo-world.org.

2.4 No Commercially-Viable EEP Financing

Another global EE barrier (gap) that exists in all 3 countries is a lack of commercially-attractive EE financing, which needs to be 'project-based' in order to be 'attractive'. This financing gap is not caused by a lack of available funds with LFIs, but rather the inability of EEPs to access the existing funding capacity of LFIs on commercially-attractive terms. This caused by a "disconnect" between the traditional lending practices of LFIs and the project-based financing needed by Facility Owners, ESCOs and other developers of EEPs. LFIs typically apply their traditional "asset-based" corporate lending approach for EEPs that limits the amount they lend to a maximum of 70% to 80% of the EEP CAPEX and require full collateral on the entire loan amount. Unfortunately, there is very little collateral value in EE equipment after being retrofitted in a facility; rather, its value is limited to the ongoing cash flow that it can generate over its useful life of 10 to 25 years. The disconnect occurs from LFIs not recognizing the significant future cash flow generated from EEPs because they do not believe or are not satisfactorily assured that such cash flow can be relied upon to repay the related loan. Consequently, LFIs generally assign no value to the future cash flow of EEPs, which requires borrowers (e.g., Facility Owners, ESCOs, etc.) to finance them from their existing credit capacity or collateralized by additional marketable asset collateral or repayment guarantees, all of which is very unattractive to the borrower.

This disconnect results in LFIs not being willing to structure EE loans that consider the future EEP's cash flow as the primary source of loan repayment due in large part by LFIs:

- Not being familiar or comfortable with the EE technologies generating the savings, nor with an ability to measure and verify the savings;
- Not knowing how to properly evaluate the risks and benefits of EEPs; and
- Not knowing how to structure low-risk EEP loans that are attractive to Facility Owners, ESCOs and other project developers.

The current financing situation in all 3 countries is that LFIs do not apply a project-based lending approach for EEPs. Virtually all LFIs are reluctant to finance EEPs on a project basis because of a perceived high risk, small transaction size, small market potential, high transaction costs and a lack of the internal evaluation capacity needed

to assess the risks and cash flow benefits generated from EEPs. Given the questionable loan market size, LFIs are reluctant to acquire new EE technical capacity and are unwilling to invest the time or resources to learn about EE on their own.

Since LFIs assign little or no value to the EEP's future cash flow and do not consider it as increased credit capacity from EEPs in their loan structures, Facility Owners interested in implementing an EEP are required to use their existing core business credit capacity and/or provide additional marketable collateral or guarantees to secure EE loans with LFIs. These requirements coupled with a lack of confidence in the EEP's future savings being achieved, has resulted in a significant barrier for the 3 countries to tap into their huge EE market opportunity.

2.5 Limited Implementation Capacity (Nascent ESCO Industry)

Energy Services Companies (ESCOs)

An ESCO can be defined as a service-based commercial business that ***turn-key*** identifies, develops, implements and finances EEPs in end-use energy consuming facilities on a 'performance' basis. The ESCO's primary performance requirement is that some or all of its payments are directly dependent on the savings from its implemented EEP being realized.

An ESCO's specialty is its ability to provide complete and comprehensive performance-based EE solutions to Facility Owners. ESCOs are sophisticated EEP developers who assume responsibility for an unusually wide spectrum of tasks which includes performing rigorous Measurement and Verification (M&V) on the energy savings over an EEP's financing repayment term in order to manage its risk for the savings to be sufficient to repay the investment.

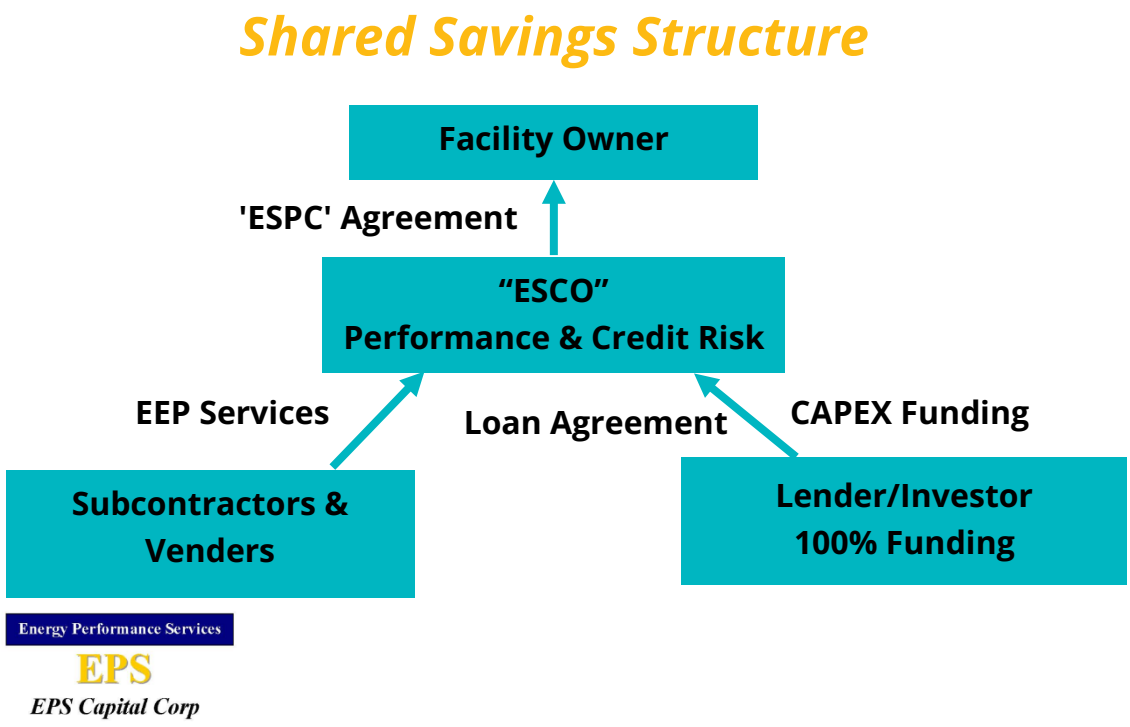
While the ESCO business model is popular in many parts of the world, it is still not developed in any of the 3 countries, even though suppliers, manufacturers, public lighting companies, and local governments recognize its benefits.

Two performance-based financing structures have emerged globally as the most common ones used by ESCOs: ***"Shared Savings"*** and ***"Guaranteed Savings"***. Guaranteed Savings is the predominate structure used in mature markets like the United States, China, Canada, Australia and the EU while Shared Savings is the

predominant one used in most developing markets, like the 3 countries in this report. A brief description of each is provided below.

1) ***Shared Savings*** is an arrangement whereby the ESCO (as opposed to the Facility Owner) finances the total upfront CAPEX of the project and is totally responsible to repay the Lender. The Facility Owner pays a fixed percentage or amount of its realized savings from the project to the ESCO which is large enough for the ESCO to repay its debt service to the Lender, cover M&V costs, and compensation to ESCO for performing its ongoing EEP services. Under this structure (versus Guaranteed Savings), the Facility Owner has no contractual obligation to repay the Lender; but the ESCO does. It should be noted that this structure creates a lot more risk for the ESCO because it not only assumes the project performance risk, but also Facility Owner credit risk. The Shared Savings approach typically requires an equity investment, which in combination with the higher risk assumed by the ESCO, carries a much higher CAPEX (interest rate) than the Guaranteed Savings structure (see the below diagram in Figure 2)[12].

Figure 2. Shared Savings ESCO Structure

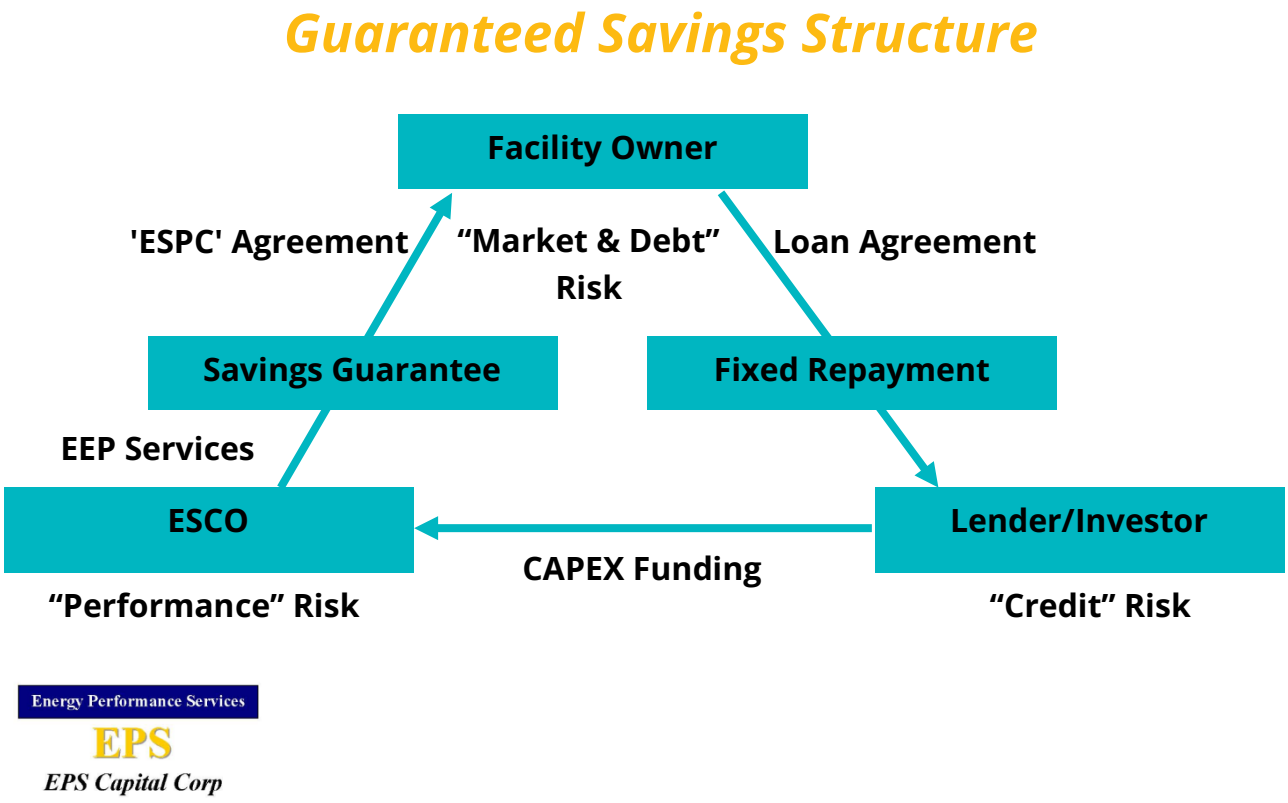


[12] Thomas K. Dreessen Presentations

The Shared Savings Structure is a typical introductory structure for developing markets like in the 3 countries because Facility Owners, with low knowledge and confidence in EEPs and ESCOs, do not want to risk their core capital or credit capacity on EEP investments. ESCOs (mostly SMEs) are forced to try to raise substantial amounts of equity for their EEPs in order to grow, resulting in balance sheets that more resemble banks and leasing companies than what they are, service companies. However, it should be noted that even ESCOs with relatively large balance sheets (e.g., Siemens and Honeywell) are unwilling to assume the Facility Owner credit risk required in this structure. Consequently, the Shared Savings Structure limits long-term market growth for ESCOs and LFIs.

2) ***Guaranteed Savings*** is an arrangement whereby the Facility Owner finances the EEP directly with a LFI or other type of third-party entity ("**Lender**") in exchange for the ESCO providing a guarantee to the Facility Owner it will realize sufficient savings to cover its debt service payments to the Lender. If the realized savings fall short of the debt service payments, the ESCO will reimburse the Facility Owner for the shortfall. If the realized savings exceed debt service, the ESCO typically shares a portion of the excess, usually expressed as a % share with the amount depending on the risk taken and the extent of ongoing services provided by the ESCO. It should be noted that under the Guaranteed Savings approach the ESCO bears no direct contractual obligation to repay the Lender, but that the Facility Owner does. In other words, the ESCO's guarantee is not a guarantee of payment to the Lender; but is a guarantee of energy savings to the Facility Owner (see the below diagram in Figure 3)[3].

Figure 3. Guaranteed Savings ESCO Structure



The Guaranteed Savings structure is typically viable only in countries with a high degree of familiarity and confidence with EE technologies, local implementation expertise and the availability of commercially attractive financing. The Guaranteed Savings concept is difficult to initiate in markets where EE is not well known or the ESCO concept is being introduced because it requires Facility Owners to assume investment repayment risk of the EEPs based on the savings performance of unknown EE technologies. This structure fosters the long-term growth of the ESCO and finance industries because it enables ESCOs, mostly small and medium sized enterprises ("**SMEs**"), with limited credit history and capital resources, to develop and implement savings based EEPs. Guaranteed Savings evolved in the U.S. from the initial Shared Savings structure in response to government Facility Owners, who could access low-cost, tax-exempt financing and desired to significantly reduce interest costs. It was embraced by smaller ESCOs and financial institutions to allow them to grow their respective industries. The primary benefit of this structure is that it reduces financing cost and enables a lot more investment in the EEPs to be made for the same debt service level. The public sector normally prefers this structure in

order to maximize the amount of infrastructure investment made in its facilities that can be repaid from utility costs in its operating budget.

In the past few years, the ESCO industry has made strides in gaining general support from the national governments, but there are still only a few ESCOs in any of the countries who are engaging with a limited number of Facility Owners for their ESPC services. This is due to ESCOs facing the many EE market barriers previously identified plus the fact that most ESCOs are SMEs with limited credit history and insufficient capital resources needed to develop and implement savings-based EEPs on a scalable basis. Other barriers include:

- Lack of knowledge on how to develop, structure and finance performance-based EEPs;
- Lack of an adequate legal framework on business conditions, areas of business and service for ESCO activities, which is specifically needed in Vietnam;
- Shortage of funds and financial institutions involved in ESCO activities, and
- No access to government facilities

2.6 Small Scale, Complexity and Perceived High Risk of EEPs

The global average investment for bundled EEPs, with multiple EE technologies, is very small (less than USD 1 million), and they typically contain multiple energy savings technologies/measures each of which can require a separate M&V protocol to measure the savings return on its investment. These very small transactions and benefits, coupled with the perceived M&V complexities make it challenging for Facility Owners and LFIs to want to focus on EE investments. They also create a perception with LFIs that the potential EE lending market is small, time consuming and will require high transaction costs. This results in an unwillingness by many LFIs to invest the time and resources to learn about EE or to develop the internal capacity needed to assess the risks and cash flow benefits from EEPs and create attractive financing structures.

3. COMMON EE MARKET GAPS

The major gaps that need to be filled in order for EE to be widely implemented in all 3 countries are summarized below.

3.1 Incentives or Mandates to Drive Private-Sector EE Demand

Financial incentives for EE products and services are needed to create interest and new demand for them from private sector Facility Owners. Current EE demand is currently very low due to their very limited knowledge/interest in EE, low return on investment (i.e., low electric rates) and higher price of EE products. Incentives are needed that can be quickly realized into a financial benefit and are significant enough to get the attention of business Facility Owners and their Chief Financial Officers.

3.2 Government EE Regulatory Barriers

The inability of ESCOs and other private sector entities to implement paid-from-savings EEPs in government facilities is one of the major EE market gaps for both GAs and ESCOs that needs to be overcome. The ESCO industry in all 3 countries is nascent with low capacity resulting from limited market awareness, credibility and customer demand, and financing access. Opening up the large Government sector will create national market demand, awareness, credibility, capacity building (i.e., templates, certifications, etc.) and low-risk financing options for the ESCO industry. Fact is that robust ESCO markets mostly only exist in countries where its governmental sector is a primary, if not the primary user of the ESCOs' paid-from-savings ESPC business model.

3.3 No Commercially-Attractive EEP Finance

EE Risk-Mitigation Financing Products are critically needed to overcome the huge collateral and confidence barriers of financing EEPs by LFIs, facility owners, ESCOs and other EEPs developers. These are especially needed for LFIs to revise their traditional lending practices and starting offering project-based lending to EEPs.

3.4 Insufficient EEP Development Capacity Building

There is a lot of project-based development capacity building needed for EEPs in all 3 countries to provide the missing IGA and M&V skills through the training and

certification of professionals of ESCOs and EE Service providers. This is critically-needed to have the market be able to develop 'bankable' IGAs on EEPs with reliable M&V Plans. Other Capacity Building needs include training LFIs on how to evaluate the benefits and risks of EEPs and structure project-based financing that mitigates risks for financiers and yet is attractive to facility owners.

3.5 Limited ESCO Implementation Capability

The nascent ESCO industry lacks the performance-based project development knowledge and experience and is not aware of how to prepare 'bankable' IGAs and reliable M&V plans as well as financing EEPs on a paid-from-savings basis. Providing the above new capacity building programs for IGAs, M&V and ESCO project development and financing is critical to the growth of the ESCO industry.

4. COMMON EE INTERVENTIONS

The successful and cost-effective transition of the energy system requires both higher penetration of renewable energy and a reduction in energy consumption through EE and energy conservation measures. As this report shows, all 3 countries have a large potential for EE to significantly reduce energy consumption, costs and GHG emissions. It can also reduce the total energy system costs through investments in end-use EE devices (e.g., industry and residential sectors) by reducing the energy demand and need for additional power plant capacity investments, which are currently needed in Vietnam. Unfortunately, Vietnam, like the other 3 countries, is not able to exploit its full EE potential due to the institutional and financial barriers identified in this report.

Taking into consideration the EE Gaps identified in each country and eliminating those covered by Donor programs in each respective one, to avoid duplication, the below EE interventions are recommended in all 3 countries. They are prioritized from highest to lowest potential impact in being able to create EE demand and scale-up the implementation of EE throughout the 3 countries.

4.1 Develop/Implement/Fund Demonstration EEPs

Demonstration projects are desperately needed to illustrate to all the EE stakeholders how to successfully apply global best-practices in the development, implementation and financing of EEPs in both private and governmental sector. This

intervention would include identifying/securing EEPs with Facility Owners for an international deeply-experienced EE team to develop, finance and manage the implementation of EEPs that (i) apply 'global best practices' and (ii) bundle multiple 'proven' technologies to maximize the level of EE savings and ensure targeted savings are achieved. This intervention is recommended for both private and government facilities in the Philippines and Vietnam, but not in Indonesia because of the government barriers that first need to be removed under a current donor program. The support would be turnkey in nature and include but not be limited to the following tasks for each Demonstration EEP:

- Prepare a 'bankable' IGA and the included M&V Plant;
- Implement the M&V plan by obtaining, analyzing data and performing initial M&V of savings;
- Prepare proposed EEP financing materials and presenting them to LFIs for consideration of a project-based loan;
- Prepare performance-based procurement procedures and facilitate the selection of a local contractor or ESCO to implement the EEP, and
- Project manage the selected contractor or ESCO's implementation of the EEP.

This intervention would also include the establishment of a relatively small fund (~USD 10-20 million) that would fund the development and implementation of several EEPs in different types of facilities and Gas in order to develop the EE and ESCO market. This intervention is critically needed to create EE demand, especially in a market with low electric rates (i.e., Indonesia and Vietnam) by unlocking the current knowledge, technical and financial gaps on how to successfully develop, implement and finance an EEP in a cost-effective and low-risk manner.

4.2 Remove EE Regulatory Barriers for Government Facilities

This intervention would create a legal framework (with concomitant procedures) private-sector entities like ESCOs to develop, implement and finance paid-from-savings EEPs in governmental facilities. This ability currently does not exist in all 3 countries due to the previously-described 3 common regulatory barriers that must be removed to enable GAs to: i) enter into Multi-Year Contracts, ii) retain Savings in

their budgets and iii) procure/select EEP/ESCOs based on best value versus lowest upfront cost.

There are three potential solutions to removing these regulatory barriers, summarized as follows:

1) **Develop/Enact new ESCO Regulation** that describes/defines the procedures, guidelines regulatory framework that must be followed by GAs for their procurement, funding and implementation of EE projects by ESCOs and other private sector entities in government facilities on a 'paid from savings' basis. This regulation does not regulate how ESCOs operate in private sector business-to business transactions.

   New ESCO type of regulations for government facilities have been successfully enacted in most of the US's 50 states and in Australia, China, the UK and other EU countries. A couple of examples of specific regulatory language that has successfully overcome the savings retention barrier is as follows:

   - **State of Louisiana Statutes, LA Rev Stat 39:254 (2017):** Title 39 – Public Finance; RS 39:254 – Implementation of Recommendations; funding, Paragraph B.(1):

     "*Agencies* able to demonstrate net savings from implementing ECSMs initiated by the agency *may retain all of the utility expenditure savings until the investment costs of implementing the ECSMs are paid in full,* and thereafter may retain one-half of the utility expenditure savings over the remaining useful life of the ECSMs. Such retained utility expenditure savings shall be from funds appropriated or allocated for utility costs to such agency." Source: http://legis.la.gov/legis/Law.aspx?d=96311

   - **Canada Federal Contracting Policy:** Appendix O – Federal Building Initiative – Energy Management (1998), Paragraph 2.1c:

     "*The energy services bill paid by the custodian department will be equivalent to the energy bills before improvements*, adjusted for rate increases and any supplemental fluctuation in energy demand such as a major change

in the use of the building or to health and safety standards." Source: https://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=14494&section=html

This new ESCO regulatory solution is a recommended intervention in both the Philippines and Vietnam by supporting the regulatory revisions through the existing EEC Act in the Philippines and the VNEEP 3 plan in Vietnam.

2) **Revise existing Public Private Partnership (PPP) Regulation** to streamline its development processes, designed for large greenfield 'revenue-based' infrastructure projects like toll roads, to accommodate the much smaller brownfield EEPs. PPP is perfectly aligned for EEPs to be developed, implemented and funded under a savings-based model by contemplating the funding and operation of assets in government facilities by the private sector (i.e., ESCOs) who assume the performance risks and receive multi-year payments called "Availability Payments" under a long-term agreement like the ESCO's Energy Savings Performance Contract (**ESPC**).

   However, the PPP's development process neither matches what is required for the comparatively very small EEPs, nor the turnkey, performance-based development process applied by ESCOs under an ESPC. To be applied for the scalable implementation and funding of EEPs, the typical PPP Planning and Preparation (development) procedures need to be synchronized/streamlined to accommodate the nature of EEPs which are much smaller savings-based projects. This will significantly reduce the GAs' internal resources, external development costs and time, by exempting those PPP procedures that are not applicable to EEPs, like the requirement of the land acquisition.

   This solution is being pursued in Indonesia under other donor programs.

3) **Separately revise each existing government regulation** related to procurement, budgeting and multi-year contracting, as needed to allow ESCOs to turnkey develop, implement and fund EEPs on a paid-from-savings basis in government facilities.

   This third option is very problematic due to the significant challenges and time required to obtain approval by the potentially many GAs that need to change their existing regulations.

4.3 Develop Cash Incentive Programs to Drive Private-Sector EE Demand

Develop two new EE Cash Incentive Programs to create private-sector EE market demand and scaled-up implementation, which are extremely low in all 3 countries. They will be designed to provide private end-use energy consumers with an attractive enough incentive to shift their behavior to purchasing more EE Products and implementing EEPs. All of the below programs are recommended interventions in the Philippines and Vietnam, but not in Indonesia because of them already being developed under a current donor program.

A brief summary of each one is as follows:

a) EE Product Incentives that reflect a cash rebate paid to private purchasers of retail products that minimally offsets the higher cost for household consumers to buy the more expensive EE appliances instead of the less expensive inefficient ones.

b) EEP Incentives that reflect a cash payment to private Facility Owners, ESCOs and other developers who implement EEPs with the amount based on the actual kWh and thermal reductions calculated pursuant to generally accepted M&V principles like the IPMVP and verified by CESVs.

4.4 Deliver EEP Development Capacity Building

To create a pipeline of EEPs, it is necessary to create/implement a national EEP Development capacity building program that trains and certifies the competency of individual professionals working for EE consulting firms, ESCOs, vendors and other EE service providers on how to develop 'bankable' EEPs for implementation in public and private energy-consuming facilities in the 3 countries. It also needs to train bankers how to evaluate and structure commercially-attractive EEP-based loans. It is important to certify the individuals (where the knowledge/skills reside) and not companies, and then require that those certified individuals to personally certify the results of a study/investigation.

The EEP development capacity building programs will combine the leveraging of existing local and training and certification programs with new international ones that will provide the project-based EE knowledge/skills needed for the local

professionals to learn how to prepare detailed IGAs containing reliable savings and CAPEX estimates and M&V plans. All of the below programs are recommended interventions in the Philippines and Vietnam, but not in Indonesia because of them already being developed under a current donor program. A brief summary of each is as follows:

a) **Certified Energy Manager (CEM):** Applies local existing training materials and certification process certifying those individuals who demonstrate their knowledge/ability to analyze energy consumption, identify significant energy users, and establish an energy management system according to ISO 50001.

b) **Certified Energy Auditor (CEA):** Applies local existing training materials and certification process, certifying those individuals who demonstrate their knowledge/ability to audit energy-consuming facilities and identify preliminary EEPs with estimated savings.

c) **Certified Investment Grade Auditor (CIGA):** Applies existing global IGA training materials and TÜV NORD's Exam. TÜV NORD will certify as CIGA those CEAs who demonstrate their competence to prepare IGAs in compliance with generally accepted EE engineering practices. The CIGA program teaches existing CEAs to prepare 'bankable' IGAs on EEPs for 'Decision Makers' and addresses the current market gap for CEAs to be able to develop ready-to-implement EEPs with reliable estimated CAPEX and energy savings based on measurements, supporting calculations including a M&V plan. The 4-day curriculum includes an exam requiring candidates to prepare an actual IGA. The CIGA exam will be conducted online according to international certification standards as outlined in TÜV NORD's procedures.

d) **Certified Energy Saving Verifier (CESV):** Applies existing M&V training materials and Exam from Efficiency Valuation Organization (EVO). EVO will certify as CESVs those CIGAs who demonstrate their competence to certify an EEP's estimated/achieved savings and M&V plans. The CESV program teaches existing CIGAs to prepare M&V plans that comply with generally accepted M&V principles and calculate the interdependency effect on estimated savings from bundling multiple technologies into a single EEP. CESVs will address the 3 countries' current 'low confidence in EE savings' market gap by providing high-grade EE engineers with certified skills to verify estimated savings and M&V plans in IGA reports. The 7-day curriculum includes 3 days of teaching M&V

fundamentals needed due to the market-wide M&V knowledge void and an exam requiring the evaluation of an existing IGA.

e) **EEP Finance Professional (EEPFP)** is a training workshop that teaches staff of financial Institutions and ESCOs how to evaluate the benefits and risks of EEPs and structure project-based financing that mitigates risks for financiers and yet is attractive to facility owners.

f) **ESCO Project Development Professional** is a training workshop that teaches staff of current or prospective ESCOs how to develop, finance, implement and mitigate risks of EEPs under an ESPC.

4.5 Develop EE Finance De-Risking Products

In order to enable LFIs to be willing offer attractive project-based EE financing 2 new EE Finance De-Risking Products are critically needed to overcome the huge collateral and confidence barriers experienced by LFIs, facility owners, ESCOs and other EEPs developers. Both are recommended interventions in the Philippines and Vietnam, but not in Indonesia because of them already being developed under a current donor program. A brief summary of each is as follows:

a) **Energy Savings Insurance (ESI)** product mitigates the performance risk against any shortfalls in an EEP's savings versus its debt service payments to LFIs and/or investment returns to facility owners. It instills confidence with both facility owners and LFIs that the estimated future cash flow savings from an EEP will be realized. It also establishes energy savings as a reliable new future cash flow for LFIs to accept as a source of loan repayment, increased credit capacity and reduced collateral requirements of borrowers. The ESI product will be provided by a locally-respected insurance company (**Insurer**) that would pay the shortfall in an EEP's actual savings versus its related debt service payment to an LFI. Its design follows Chubb's 100% financial coverage successfully implemented in US 20+ years ago versus the partial product-warranty coverage of the Inter-American Development Bank's ESI program. The ESI will be structured as a "zero loss" insurance product with fees charged to the EEPs that cover the long-term losses in order to ensure sustainability. A first-loss fund of about USD 10 million will be included to share initial losses with the Insurer until such time as an experience ratio is determined.

b) **Partial Credit Risk Guarantee (PCG)** product is a common product that mitigates the credit risk assumed by a lender that a borrower will not make its agreed loan payments. A locally-accepted financial institution will be identified to guarantee to LFIs that a significant portion (minimum 50%) of their EEP loans will be repaid by the borrower. This will reduce the amount of collateral required from borrowers by LFIs.

4.6 Establish a Robust ESCO Association

Create a robust ESCO association that plays a key role in creating market credibility by bridging collaboration between key stakeholders including government, private companies, ESCOs, financial institutions, donor agencies, and academics to encourage the improvement of implemented energy efficiency projects' portfolio under the ESCO scheme. The ESCO association will have to hire competent staff so that it becomes a platform for discussion, development of EEPs and ESCO policy. The support needed should also include the establishment of a certification program similar to the 2-step process in the Philippines where ESCOs are first registered and then 'certified' after successfully implementing a few ESPC EEPs.

This intervention is recommended in all 3 countries but not vigorously pursued until sufficient demand is created for EE and ESCO services, which may not occur until other interventions have been implemented.

Diagnostic Review and Analysis of Energy Efficiency Development in Indonesia

Final Report: 31 January 2022

Supported by: The Energy Transition Partnership (ETP)
Prepared by: EPS Capital Corp.

ENERGY TRANSITION PARTNERSHIP

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ACRONYMS

ADB	Asian Development Bank
AFD	Agence Francaise de Developement (French Development Agency)
APBN	Anggaran Pendapatan dan Belanja Negara
APERLINDO	Asosiasi Industri Perlampuan Listrik Indonesia
API	Asosiasi Pertekstilan Indonesia
APKENINDO	Asosiasi Perusahaan Pendukung Konservasi Energi Indonesia
APKI	Asosiasi Pulp dan Kertas Indonesia
APPI	Asosiasi Produsen Pupuk Indonesia
ASEAN	Association of South East Asian Nations
BAPPENAS	Badan Perencanaan Pembangunan Nasional
BAU	Business As Usual
BKF	Badan Kebijakan Fiskal
BOE	Barrels of Oil Equivalent
BPDLH	Badan Pengeloka Dana Lingkungan Hidup
BPHN	Badan Pembina Hukum Nasional
BPS	Badan Pusat Statistik
BSN	Badan Standardisasi Nasional
BUMN	Badan Usaha Milik Negara
BUMD	Badan Usaha Milik Daerah
CEA	Certified Energy Auditor
CEM	Certified Energy Manager
CESV	Certified Energy Savings Verifier

CIGA	Certified Investment Grade Auditor
CPI	Climate Policy Innitiative
DEA	Danish Energy Agency
DEN	Dewan Energi Nasional
DFI	Development Finance Institutions
EBRD	European Bank for Reconstruction and Development
EBT	Energi Baru Terbarukan
ECCJ	Energy Conservation Centre Japan
EE	Energy Efficiency
EEP	Energy Efficiency Project
EEPFP	EE Project Finance Professional
EF	Environmental Funding
ESCO	Energy Service Company
ESI	Energy Saving Insurance
ESM	Energy Saving Measures
ESPC	Energy Saving Performance Contracting
ETC	Energy Transition Council
ETP	Energy Transition Partnership
ETS	Emission Trading Scheme
EU	European Union
EV	Electric Vehicle
EVO	Efficiency Valuation Organization
FX	Foreign Exchange
GA	Government Agency

GABEL	Gabungan Perusahaan Industri Elektronik dan Alat -alat Listrik Rumah Tangga Indonesia
GAMATRINDO	Gabungan Industri Manufaktur Lampu Terpadu Indonesia
GBCI	Green Building Council Indonesia
GCF	Green Climate Fund
GDP	Gross Domestic Product
GGGI	Global Green Growth Institute
GHG	Greenhouse Gas
GIZ	Deutshce Gessellschaft fur Internationale Zusammenarbeit (German Society for International Cooperation)
GoI	Government of Indonesia
HAKE	Himpunan Ahli Konservasi Energi
IEA	International Energy Agency
IESR	Institute for Essential Reform
IFC	International Finance Corporation
IGA	Investment Grade Audit
IIEE	Indonesian Institute for Energy Economics
IIGF	Indonesia Infrastructure Guarantee Fund
IKE	Intensitas Konsumsi Energi
IPMVP	International Performance Measurement and Verification Protocol
IRR	Internal Rate of Return
JICA	Japan International Cooperation Agency
KEN	Kebijakan Energi National
KLHK	Kementerian Lingkungan Hidup dan Kehutanan

KfW	German Development Bank
LFI	Local Financial Institution
LKPP	Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah
M&V	Measurement & Verification
MASKEEI	Masyarakat Konservasi dan Efisiensi Energi Indonesia
MEPS	Minimum Energy Performance Standard
MTRE3	Market Transformation through Design and Implementation of Appropriate Mitigation Action in Energy Sector
NDC	Nationally Determined Contribution
NGO	Non-Governmental Organization
OJK	Otoritas Jasa Keuangan
P3TKEBTKE	Pusat Penelitian dan Pengembangan Teknologi Ketenagalistrikan, Energi Baru Terbarukan dan Konservasi Energi
PCG	Partial Credit Risk Guarantee
PDF	Project Development Facility
PLN	Perusahaan Listrik Negara
PP	Peraturan Pemerintah
PPP	Public Private Partnership
PPSDM	Pusat Pengembangan Sumber Daya Manusia
QA	Quality Assurance
RE	Renewable energy
RIKEN	Rencanq Induk Konservasi Energi Nasional
SINAR	Sustainable Energy For Indonesia's Advancing Resilience
SKKNI	Standard Kompetensi Kerja Nasional Indonesia

SOE	State Owned Enterprise
TA	Technical Assistance
TOE	Ton Oil Equivalent
UK PACT	United Kingdom Partnering for Accelerated Climate Transitions
UN	United Nations
UN ESCAP	UN Economic and Social Commission for Asia and The Pacific
UNIDO	United Nations Industrial Development Organization
UNOPS	United Nations Office for Project Services
USAID	US Agency for International Development
VGF	Viability Gap Fund
WB	World Bank
WHR	Waste Heat Recovery

UNITS AND CURRENCIES

GBP	British Pound Sterling
kWh	kiloWatt hour
$MTCO_2e$	Million Tons of CO_2 Equivalent
MTOE	MegaTonne of Oil Equivalent
IDR	Indonesia Rupiah
USD	United States Dollar

EXECUTIVE SUMMARY

Indonesia's economy turned negative in the second quarter of 2020 due to COVID, but turned the corner and became positive again in the second quarter of 2021. Its 2021/2020 year-on-year GDP growth is now estimated to be around 3.5% versus a previous estimate of 2.5% to 3.5%.

Figure 1. Indonesia's GDP Actual Growth per Quarter

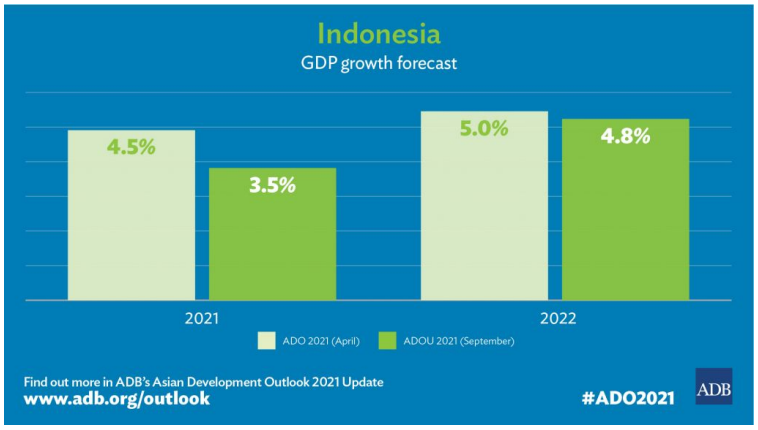
Indonesia's Gross Domestic Product Growth per Quarter (annual % change):

Quarter	2016	2017	2018	2019	2020	2021
Q1	4,94	5,01	5,06	5,06	2,97	-0,17
Q2	5,21	5,01	5,27	5,05	-5,32	7,07
Q3	5,03	5,06	5,17	5,01	-3,49	3,51
Q4	4,94	5,19	5,18	4,96	-2,19	
Full-Year	**5,03**	**5,07**	**5,17**	**5,02**	**-2,07**	**(3,24)**

Source: Badan Pusat Statistik (BPS)

According to ADB's below chart, Indonesia's GDP is estimated grow in 2022 by around 5%.

Figure 2. Indonesia's GDP 2021-2022 Growth Forecast



Now that the economy is growing again Indonesia's energy needs will start increasing again as well. The Government of Indonesia (GoI) has set ambitious target to reduce its energy consumption by 17.4% in all sectors by 2025. This is based on potential energy savings of 15-35% for the transportation and household subsectors and 10-30%for the industrial and commercial subsectors.[1] These savings are estimated to translate to 96.3 million tons of CO2 emission reductions, contributing around 30% to Indonesia's reduction target from the energy sector.[2]

Unfortunately, the status is that ***virtually no Energy Efficiency (EE) has been or is being implemented in any of Indonesia's sectors***. Simply stated, there is very little current market demand for EE leaving the opportunity untapped because it faces the same common barriers faced by many countries in Southeast Asia and other developing countries around the world, plus the additional one of low electric rates. In addition, it currently has no enforceable regulation or policies that contain any incentives, mandates or other features that will drive demand or overcome the significant EE barriers currently facing Indonesia. However, there are some interventions underway by MEMR with respect to the Governmental sector and donors for the private sector, that if completed as planned remove most the key EE barriers. The most significant donor program is from UK Pact which recently completed a competitive call for proposals for its funding of up to GBP 2.7 million of EE interventions in Indonesia over the next 3 years with a schedule start date in March 2022.

Taking into consideration the EE Gaps identified in Section 5 and eliminating those gaps that are expected to be covered by Donor programs in Section 4, to avoid duplication, the following EE interventions are recommended for Indonesia, listed in order of priority:

1. Develop/Implement/Fund Private Sector Demonstrations EEPs
2. Deliver EEP Development Capacity Building
3. Establish a Robust ESCO Association
4. Provide First Loss Fund for a new Energy Saving Insurance (ESI) Product

[1] National Energy Masterplan (MEMR, 2017)
[2] MEMR, 2019

If all of UK Pact's interventions are implemented, MEMR's PP70 revisions are passed by GoI that include the PPP changes required to remove the ESCO barriers in the government sector, and the recommended interventions in this report, Indonesia could realize EE potential annual savings of USD 1.5 billion for an investment of USD 7.4 billion for the governmental and industrial sectors as shown in the below table.

Table 1. Indonesia's Potential EE Market Savings and Investment

Sector	%	USD Million		Simple Payback
		Savings	Investment	
Industry	10%	$ 1,120	$ 4,480	4
Gov't-Owned Facilities	25%	225	1,800	8
Public Street Lighting	50%	190	1,138	6
		$ 1,535	**$ 7,419**	

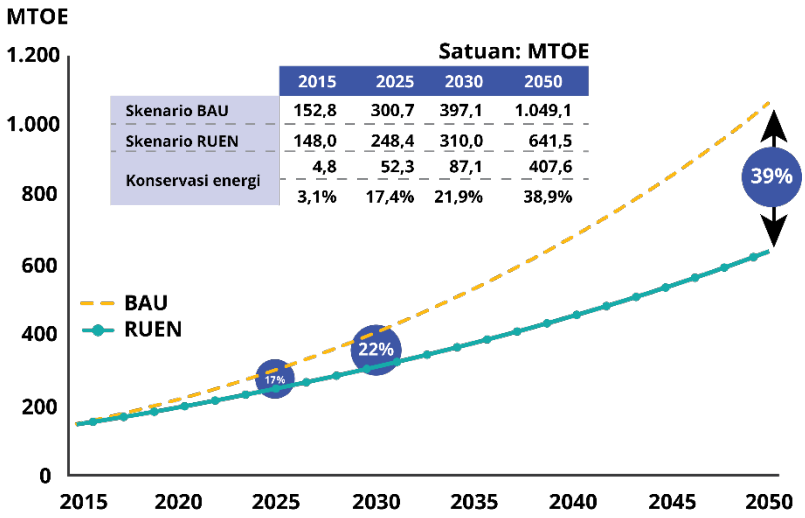
It also worth mentioning that commonly-recommended EE fund intervention is not being currently recommended, but could be a possibility in the long term (2-3 years out). The reason for this delay is the need to allow the current interventions being implemented to first overcome the many EE market barriers in Indonesia so there is a sufficient level of 'bankable' EEPs to fund. The primary problem in Indonesia is an inability to build a pipeline of EEPs, which must first be done before creating a fund to finance them.

1. ENERGY EFFICIENCY ("EE") MARKET

1.1 Status

Energy needs in Indonesia will continue to increase as a result of economic activity and population growth. Based on calculations in the National Energy General Plan (RUEN), with a business as usual (BAU) scenario, Indonesia's energy needs will increase nearly 8 times from 159 MTOE in 2015 to 1050 MTOE in 2050. With energy conservation, energy demand could be 39% lower to 642 MTOE in 2050.

Figure 3. Indonesia's Energy Needs Scenario



Source: 2017 RUEN

Indonesia is the largest producer and consumer of energy in the Southeast Asian region. Using 26% of the total primary energy in the region, Indonesia's energy consumption is equivalent to the combined use of primary energy from Thailand, Myanmar and Singapore. In 2016, Indonesia also was the third largest oil importer and user of oil and the tenth largest electricity generator in the world (IEA, 2016).

With the size of the economy and the largest population in Southeast Asia, Indonesia's energy needs are expected to continue to increase in the future along with increased economic activity and the level of prosperity of its citizens. Moreover, at present Indonesia's average per capita primary energy is still very low at 0.9 toe/capita, compared to Thailand which has reached 2 toe/capita.

As a consequence of increased energy consumption, Indonesia's greenhouse gas emissions from the energy sector have increased. Indonesia is currently the eighth largest emitter in the world, and accounts for 4% of total annual global emissions. GHG emissions increased from 134 million CO2 in 1990 to 496 million CO2 in 2017 (IEA). Indonesia has also committed to reduce GHG emissions by 29% on its own capacity and 41% with international assistance by 2030 as stated in the ratification of the Paris Agreement through Law No. 16/2016.

The growth of Indonesia's energy consumption in the 10-year period (2008-2018) led to an increase of 270 million Barrels of Oil Equivalent (BOE), which was contributed by the transportation, industrial, commercial and household sectors. However, the

rapid growth of energy consumption was not offset by any recognizable EE in any energy user sectors, and thus Indonesia's energy savings target of 17.4% by 2025 is very unlikely to be achieved.

Despite a significant energy savings opportunity, supported by McKinsey's widely-publicized study back in 2015 claiming EE is the most cost effective climate change mitigation measure in Indonesia, the status quo is that ***virtually no EE has been or is being implemented in any of Indonesia's sectors.*** Simply stated, there is very little market demand for EE leaving the opportunity untapped because it faces the same common barriers faced by many countries in Southeast Asia and other developing countries around the world, plus a few additional ones that are unique to Indonesia.

1.2 EE Savings and Investment Market Potential

Since the rapid growth of energy consumption from 2008-2018 was not followed by efforts to improve energy efficiency in various sectors, the energy saving opportunities in both the industrial sector and the building, commercial and governmental sectors in Indonesia remain very large. As can be seen in the below Table 1, the Transportation sector is the biggest energy consumer (43% in 2020), followed by Industrial (34%), Household (17%) Commercial (5%) and Others.

Table 2. 2020 Energy Consumption, Savings Potential and 2025 Targets

SECTOR	2020 Energy Consumption*		Energy Savings Potential**	National 2025 Target***
	MBOE	%		
Transportation	364	43%	15-35%	3%
Industry	288	34%	10-30%	10%
Households	142	17%	15-30%	3%
Commercial	40	5%	10-30%	1%
Other ****	10	1%	10-30%	0.03%
Total *****	**844**	**100%**	**21%**	**17%**

* 2020 Handbook of Energy & Economic Statistics of Indonesia, KESDM
** MEMR Multiple Presentations
*** RIKEN 2011
**** Includes Agriculture, Construction & Mining sectors
***** Excludes Biomass and Non Energy Use

For several years, MEMR has estimated the energy savings potential to be between 15-35% for the Transportation and Household sectors and 10-30% for Industrial and Commercial. Based on these estimates, the calculated % energy reduction that needs to be achieved for each sector by 2025 in order to meet the national 17% target is shown in 'National 2025 Target' column in Table 1 reflecting that the Industrial sector is expected to achieve the largest reduction at 10% of its 2020 Energy Consumption.

The calculated estimate of total ***annual savings and investment*** potential for the sectors of Industry, Government-Owned Facilities and Public Streetlight is shown in the below table to be ***USD 1.5 billion*** and ***USD 7.4 billion***, respectively.

Table 3. Indonesia's EE Market Potential Savings and Investment

Sector	%	USD Million		Simple Payback
		Savings	Investment	
Industry	10%	$ 1,120	$ 4,480	4
Gov't-Owned Facilities	25%	225	1,800	8
Public Street Lighting	50%	190	1,138	6
		$ 1,535	**$ 7,419**	

a. Industry. The ***Industrial sector*** estimates are based on it consuming 30% of PLN's total electricity generated in 2020[3] and assuming a 10% total savings is achieved with a 4-year payback, the estimated ***annual savings*** is calculated to be ***USD 1.1 billion*** for an investment of ***USD 4.5 billion***.[4]

The primary energy efficiency opportunities in the industrial sector are those that generate thermal savings because of the higher global fossil fuel rates resulting in much better paybacks versus electric savings (based on relatively low ~$0.08/kWh rates). This especially applies to motor retrofits where paybacks on new motors often exceed 10 years and on chiller retrofits exceed 7 years.

[3] Statistics PLN 2019
[4] Calculated estimate by Thomas K. Dreessen

There is no known reliable market data which identifies the major EE technologies and their respective volumes being implemented in the industrial sector in Indonesia. However, based on the consultant team's experience in reviewing numerous industrial energy audits and proposals of local industrial ESCO activity in Indonesia, there are three energy savings measures (ESMs) that consistently show up as the most cost-effective technologies based on estimated savings from reducing the consumption of coal (the primary fuel for producing heat and steam in Indonesia). The three most common industrial ESMs are:

1) Retrofit of boiler systems;

2) Installation of new Waste Heat Recovery (WHR) economizers; and

3) Installation of new industrial Process Control Systems.

b. Government. Many countries (like Australia, UK, US and Canada) have learned and successfully experienced the reality that the best way to accelerate EE in their country is for the government to lead by example by implementing comprehensive Energy Efficiency Projects **(EEPs)** in their own buildings. Doing this not only demonstrates the government's confidence in EE work producing new jobs and reduced energy cost savings to its citizens, but also creates awareness that leads to reduced risk perception, new EE market demand, with national models and structures that can be replicated for implementation and financing of EEPs in private facilities by Facility Owners, ESCOs and local banks and financial institutions **(LFIs)**.

The Governmental sector mostly consumes electricity (not coal or fuel oil), and its consumption levels are included in the Commercial sector's 2020 Energy Consumption 40 MBTOE in the above Table 1. Indonesia's state-owned electric utility, Perusahaan Listrik Negara **(PLN)** reported that **government-owned offices, hospitals and schools** consumed ~5.2% of its electricity in 20202[2], which based on a 25% consumption reduction and an 8-year payback could deliver potential annual **savings of USD 225 million** for a total **investment of USD 1.8 billion**.[3]

PLN also reported that government public **street lighting** sector consumed ~1.5% of its total generated electricity in 20202[2], which based on a 50% savings

from LED retrofits with a 6-year payback could result in potential annual **savings of USD 190 million** for a total **investment of USD 1.1 billion**[3]. One of the unique benefits of LED streetlighting retrofits is its single, low-risk technology that is ideal for replication and scalability on a national basis.

While the EE Governmental sector is virtually untapped, major regulatory barriers currently exist for Government Agencies **(GAs)** to implement much energy efficiency due to their inability to engage private sector companies like Energy Services Companies (ESCOs) and third-party financiers to develop, implement and/or finance EEPs from savings. Existing regulations preclude GAs from being able to: 1) legally make multi-year savings payments, 2) retain savings in budgets, and 3) procure EEPs, equipment and service on **'life cycle benefit'** versus **'lowest cost'** basis, all of which is needed to accessing the private sector resources in order to have EE implemented in government facilities on a scalable basis.

The above EE opportunities in the governmental and industrial sectors total an incredible **annual savings potential of USD 1.6 billion** and **investment potential of USD 7.8 billion**, which is virtually untapped.

1.3 Current EE Financing in Indonesia

EE funding in the governmental sector mostly comes from the government budget (APBN) or use of international aid funds (grants). EE funding in the private-sector industrial and commercial sector generally comes from Facility Owners, financial institutions, both banking or non-banking such as multilateral institutions, as well established by the government. The current situation in Indonesia is that LFIs are reluctant to finance EEPs on a project basis, because of their perceived high risk, small transaction size, small market potential, high transaction costs and a lack of the internal evaluation capacity needed to assess the risks and cash flow benefits generated from EEPs.

From an Indonesian banking point of view, the legal basis for considering energy conservation in credit quality assessment is based on Bank Indonesia Regulation (PBI) No. 14/15/2012 concerning Asset Quality Rating for Commercial Banks. One of the credit quality assessments is the efforts made by the debtor in order to preserve the environment (for debtors who are required to carry out environmental

management efforts in accordance with applicable laws and regulations). This shows that there is a close relationship between investment in energy efficiency that can reduce external environmental impacts (with environmental management). In almost all cases, successful EEPs directly reduce GHG emissions, proportionately.

Related to financing EEPs, the private sector still uses conventional loan schemes through banks, which are regulated by Decree (SK) of the Board of Directors of Bank Indonesia Number 27/162/KEP/DIR concerning Obligations for the Compilation and Implementation of Bank Credit Policy for Commercial Banks (PPKPB), Bank Indonesia Regulation (PBI) Number 14/15/PBI/2012, Regulation of the Financial Services Authority (POJK) Number 42/POJK.03/2017 concerning the obligation to prepare Credit Policy or Bank Financing for Commercial Banks and POJK Number 16/POJK 03/2014 and Bank Indonesia Circular Letter Number 13/6/DPNP/2011 Regarding Calculation of Risk Weighted Assets for Credit Risk Using the Standard Approach. These regulations serve as a guide for bankers to feel confident about the quality of their loan portfolio assets, demand deposit liabilities and equity coverage.

All projects that utilize bank support under the conventional loan model are constrained by the requirement for additional collateral in the form of assets in addition to the project assets. This provision becomes an insurmountable obstacle to the scalable implementation of EEPs by ESCOs in Indonesia. Likewise, most business entities, especially small and medium sized enterprises (SMEs) and others with limited capital who want to undertake EEPs, are constrained from accessing bank financing that imposes relatively high interest rates and the application of conventional valuation methods.

There are only the following five (5) schemes focused on financing EEPs in Indonesia:

1) Funding Through government-owned PT Sarana Multi Infrastruktur **(SMI)**. All of its below potential EEP loan products contain the barriers described in Section 3.6.

    - Subordinated Loan Facility, together with the appointed Bank, in which SMI can provide loans to another bank as part of a larger loan;

    - Equity Investment Scheme with a project owner or ESCO collaborating with SMI to obtain working capital, while subsequent capital deficiency is obtained from other banks, and

- SMI Sharia Funding provides several funding options including Muntahiya Bittamlik (financial lease), Murabahah (instalment sale) and Musyarakah Muntaqisa (diminishing partnership).

2) Commercial Banking. OJK has a green financing program through OJK Regulation Number 51 Year 2017 concerning Sustainable Finance, which requires financial institutions to allocate a portion of their credit portfolios to finance green projects, one of which is EEPs. Green financing is expected to be a low interest loan solution for EBT electricity generation and energy efficiency project developers. In comparison, in South Korea, the EBT project will get lower interest rates than other projects, around 1.5 to 3.37 percent. However, the average interest rate of banks abroad for projects that have a positive impact on the environment, for example improving environmental quality, reducing pollution or reducing greenhouse gas emissions by 5%. To-date this has not provided any known opportunities for commercially-attractive financing of EEPs in Indonesia.

3) ESCO Financing. While ESCOs can help facility owners to finance EEPs, they will only do this under its common business model to be paid over time from energy savings. ESCOs can facilitate access to commercial finance by taking advantage of reduced energy bills but in Indonesia and most other Southeast Asia countries, ESCOs are too small to be able to secure financing on their own. The ESCO have the potential to play a role as a market aggregator by allowing fund providers to support a portfolio of EEPs. In developed countries, such as the United States, Germany, France, Japan, Canada, Finland and Denmark, ESCOs have carried out Energy Savings Performance Contacting (ESPC) projects to improve EE, guarantee cost savings, and use the annual savings generated from the EEPs to pay off initial investment without an upfront cost from the end user.

4) Public Private Partnership (PPP) for government entities. PPP is a collaboration between the government and private sector entities for providing infrastructure investments and services in the public interest. PPP applies the specifications that have been set previously by the Minister/Head of Institution/Regional Head/BUMN/BUMD, which partially or wholly use the resources of a private sector business entity by taking into account the risk sharing between the parties. While the PPP scheme can be applied in theory

to EEPs and provide a private sector financing option for the government sector in its retrofitting of Government/Local Government office buildings and street lighting, in reality it is designed for large revenue-based infrastructure investments versus small savings-based EEPs. Thus, it contains regulated procedures for developing, funding and operating infrastructure projects in government facilities by private sector companies designed for large ***greenfield***, ***revenue-based*** projects (i.e. toll roads) that require significant time and costs to be incurred by an implementing Government Agency (GA). To be used for financing the much smaller ***brownfield savings-based*** EEPs, the current PPP development (Planning & Preparation) regulated procedures need to be streamlined to accommodate EEPs. This is needed to interest GAs in using PPP to finance EEPs by significantly reducing their internal resources and costs through the exemption of PPP procedures that are not applicable to EEPs (e.g. the acquisition of land, etc.).

1.4 Energy and Carbon Emission Reductions Achieved under BAU Scenario

Despite the many EE limitations and obstacles facing the GoI, it reported that energy savings through December 2020 were 5.7% (preliminary data) of total energy consumption in the Business as Usual (BaU) scenario. This equated to approximately 56.6 million BOE of energy savings from all sectors (i.e. transportation, industry, households and commercial). For 2021, the total energy savings target is 63.3 million BOE for all sectors under the BaU scenario's savings target of 6.1% (MEMR, 2021)[5] and energy consumption of 1,037 million BOE.

The GoI's KEN and RUEN targets are to save a cumulative 11,300 PJ (petajoules) of source energy by 2025 in the BaU scenario. If these targets are achieved, GoI believes it can reduce the need for developing 20 new coal-fired power plants worth around USD 10 billion and reduce greenhouse gas (GHG) emissions by 341 million tons of CO2 equivalent (MtCO2e). This will strengthen GoI's commitment to fulfill its National Determined Contribution (NDC) under Paris Agreement, in which Government commits an emission reduction of 29% by 2030 (IEA, 2019). It also clearly

[5] MEMR's Press release No 018.Pers/04/SJI/2021

demonstrates the direct potential of EE implementation to significantly reduce Indonesia's GHG emissions in the long term.

1.5 EE Stakeholders

A brief description of the primary EE stakeholders beyond the obvious EEP providers and beneficiaries (i.e., Facility Owners, ESCOs, EE Product and Service companies/consultants, LFIs, etc.) is provided below.

NATIONAL GOVERNMENT AGENCIES:

a. Ministry of Energy and Mineral Resources (MEMR) is the primary GoI agency to coordinate all energy-related interventions through the following related agencies:

- ***Directorate of Energy Conservation*** is the focal point for all EE stakeholders, as it has the task of carrying out the formulation and implementation of policies, preparation of norms, standard, procedures, and criteria, providing technical guidance and supervision, evaluation, reporting, conducting promotions, and monitoring the achievements of programs as well as overall control and supervision in the field of energy efficiency.

- ***Centre for Research and Technology Development on Electricity***, New Renewable Energy and Energy Conservation (P3TKEBTKE) is responsible for undertaking research and development in the field of oil and gas, electricity, mineral and coal, new, renewable energy and energy conservation, and as such can facilitate the promotion of EE technologies.

- ***Centre for Education and Training for Electricity, New Renewable Energy and Energy Conservation (PPSDM)*** has the main task to improve the capacity of human resources.

b. Coordinating Ministry of Maritime and Investment is the national coordinator of several ministries, including MEMR, and thus plays a critical role in formulating any national EE policy/ regulations and programs.

c. Ministry of National Development Planning/National Development Planning Agency (BAPPENAS) oversees the national development planning to assist the

President in organizing the national government with the following agencies that can impact EE:

- ***Directorate of Electricity, Telecommunications and Informatics*** is the primary Directorate to support and encourage the ESCO market development in Indonesia, as well as support ESCOs to involve in PPP – EEP.

- ***Directorate of Innovative Funding Engagem***ent is responsible for carrying out the formulation and implementation of policies, preparation of norms, standard, procedures, and criteria, providing technical guidance and supervision, evaluation and reporting as well as control and supervision of PPP scheme, so any EE infrastructure project using PPP scheme will be through this directorate.

d. Ministry of Finance (MOF) is responsible for the nation's finance and state assets, which includes controlling all government spending, budgeting and approving any EE incentives and it includes the following key agencies:

   - ***Fiscal Policy Agency (BKF***) provides support in preparing technical policy, analysis plans and programs in terms of fiscal policy on EE, and further implementing analyses and providing recommendations on fiscal EE policy.

   - ***PPP Units (Direktorat PDPPI)*** coordinates the provision of financial support to facilities and government agencies, such as Project Development Facility (PDF), Viability Gap Fund (VGF), and infrastructure guarantee (through IIGF) for any EEP under the PPP regulatory scheme.

e. Ministry of Manpower plays an important role in approving the National Personnel Competence Standard (SKKNI) for energy auditors, energy managers, and other future EE professionals such as the Certified Investment Grade Auditor (CIGA) and Certified Energy Saving Verifier (CESV) that will be certified with a combined national/international certification scheme.

f. Ministry of Law and Human Right, especially BPHN (National Legal Development Agency), plays important role in the process of forming national laws and regulation as part of establishment of national legal system. So, all EE related laws and regulation will be reviewed and evaluated through PBHN.

g. Financial Services Authority (OJK) regulates and supervises the financial services sector and can play an important role to support national policy formulation on EE financing through its sustainable and green finance initiatives.

h. Ministry of Home Affair (MOHA), especially for Directorate of Regional Revenue, plays a critical important role in the formulation and implementation of policies, preparation of norms, standard, procedures, and criteria, providing technical guidance and supervision, evaluation and reporting as well as controlling and approving all local government Availability Payments for EEP under the PPP regulation.

i. Ministry of Industry (MoI) coordinates/synchronizes the formulation, determination, and execution of policies in industry as well the execution of technical guidance and supervision of policy implementation in industry. It plays an important role for targeting and promoting any EE programs in the industrial sectors.

j. Ministry of Transportation is responsible for the governance and regulation of transportation in Indonesia and can play an important EE role in the transportation sector by setting Fuel Economy standards, developing EE programs targeting reduced energy use.

k. Ministry of Trade directs the formulation of policies to the development of trade in Indonesia and can help to support EE programs on Minimum Energy Performance Standards (MEPS) and Labeling, to ensure that all imported electrical appliances regulated in MEPS meet the minimum levels.

l. Ministry of Environment and Forestry (KLHK) is responsible for managing and conserving that national's forests and can play an important role in working together with MEMR for EE programs that target emission reductions. Also, KLHK has national “PROPER” programs to ensure industries comply with environmental regulations and meet sustainability requirements, where energy efficiency is one of important criteria of compliance.

m. National Energy Council (DEN) was established by the GoI in 2007 is responsible to design and formulate national energy policy for approval by the Parliament, and can play a role in the rolling out of any new EE policies.

n. The Environmental Fund Management Agency (BPDHL) was officially formed in October 2019 to bring multiple sources of funding together to be deployed through a variety of instruments across a number of different sectors (including forestry, energy and mineral resources, carbon trading, environmental services, industry, transport, agriculture, marine and fisheries). BPDLH is an environmental funding (EF) mechanism for channeling and distributing environmental and climate funds to support Indonesia's vision to preserve the functions of the environment and prevent environmental pollution and degradation. This includes efforts to achieve Indonesia's commitment to reduce Indonesia's GHG emissions and to meet the Sustainable Development Goals (SDGs). BPDHL could play important role for supporting EE programs, for example on cash incentives

o. National Research and Innovation Agency/BRIN (Badan Riset dan Inovasi Nasional) was formed by the Indonesian government in 2019 originally as a new agency of the Ministry of Research and Technology and was controversially separated and established as a new cabinet-level government agency on 24 August 2021 and is now the sole national research agency of Indonesia. It can play an important role in the development of new MEPS as well as evaluations and research of EE technologies, to include their maximum utilization and outputs, testing of EE equipment and providing technical EE experts on EE assessments, EE education and technical training, etc.

p. National Standard Agency (BSN) is a government institution, but not an agency or a ministry, having the responsibility for standardization, conformity assessment, accreditation and metrology activities in Indonesia. The Agency took over the function and duty of the Standardization Council of Indonesia and now plays an important role in development of National Standard for supporting EE policy and programs, such as in SNI for testing energy efficient appliances, adoption of the international standard for national standard such as SNI ISO/IEC.

q. National Public Procurement Agency (LKPP) is responsible for all government procurement activity in Indonesia, including the formulation ofP all government procurement policy and regulations and provision of public procurement-related technical guidance and advocacy. It plays a critical role in the

contemplated new PP70 policy and regulation for specific EEP Procurements under the PPP regulatory scheme.

OTHER KEY EE STAKEHOLDERS:

r. Local Governments around Indonesia are partners in implementing EEP, especially for targeting the energy consumption reduction in government facilities.

s. MASKEEI is a national non-profit Indonesian Energy Conservation and Efficiency Society is comprised of individual and organizational members, and has as its mission to achieve national energy security and resilience for sustainable growth in Indonesia through implementation and practice of energy conservation measures.

t. Other Non-Governmental Agencies (NGOs) and Non-Profit Organizations/Associations that include: APKENINDO (Indonesia's ESCO Association), Chamber of Commerce of Indonesia, GBCI (Green Building Council Indonesia), IIEE (Indonesian Institute for Energy Economics), IESR (Institute for Essential Services Reform), CPI (Climate Policy Initiative), HAKE, GABEL, GAMATRINDO (Lamps Association), APERLINDO, Association of Textile (API), Association of Fertilizer Producers (APPI), Association of Pulp and Paper Indonesia (APKI), etc.

u. Energy Management System Certification Bodies such as TUV Nord, Sucofindo, DQS Certification, NQA Indonesia, PT BSI group, PT Bureau Veritas, TUV Rheinland Indonesia, TUV Sud, PT SGS, PT Lyod's Register, PT URS Services

v. Universities also plays important roles in EE, as they are educating future EE professionals, EE policy makers, and other professional supporting EE programs.

w. Test Laboratories include both Government ones like P3Tek KEBTKE, B4T, SOE such as Sucofindo, private ones such as from Qualis, Polytron, Panasonic, etc. Test laboratories play important roles in supporting MEPS and labeling program to conduct independent testing ensuring that energy consuming appliance meet MEPS's level.

x. Product Certification Bodies for Energy Conservation such as TUV Nord, Sucofindo, PT Qualis, PT BSI Group, BISBY.

y. Donors/International Agencies listed in Section 4 such as ADB, DANIDA, USAID, IFC, UNDP, UNIDO, etc. that play an important role for giving EE technical assistance.

2. EE REGULATIONS AND POLICIES

2.1 Summary of Indonesia Regulations

The main Energy Conservation and Energy Efficiency regulations issued by the Government of Indonesia **(GOI)** are depicted in the below chart.

Figure 4. Indonesia's EC and EE Regulations

As the chart shows:

- The initial regulation was Presidential Instruction No. 9, issued in **1982**, concerning Guidelines for the Implementation of Energy Conservation.
- **In 1991**, Presidential Decree No. 43 was enacted, which mandated relevant government ministries and agencies to issue coordinated government rulings and programs within their respective jurisdictions and regulatory roles, to promote and encourage energy conservation.
- **In 2007**, Government Law No. 30 was enacted with the primary aim to significantly reduce the economy's dependence on imported refined oil while boosting the use of other energy sources, including natural gas, biofuels and geothermal resources and a reference to energy conservation.
- **In 2009**, Government Regulation No. 70 was issued which was the first meaningful regulation concerning energy conservation and discussed in more detail in Section 2.2 below.

- **In 2012**, MEMR issued its ministerial Regulation No. 14 concerning Energy Management.
- **In 2014**, the GoI issued policies and targets to reduce energy consumption through Government Regulation No. 79 concerning the National Energy Policy (KEN).
- **In 2017**, Presidential Regulation No.22 was issued regarding the General National Energy Plan (RUEN) which includes a target to reduce energy intensity by 1% per year until 2025 and total energy consumption by 17 % by 2025.

MEMR has also implemented a couple of minor programs and activities over the last 5 years to promote EE that included:

a. Providing Energy Audits and training/certification of Energy Auditors and Energy Managers;

b. Replacing Street Lighting with LED lamps and Solar PV;

c. Developing MEPS and labels and national standard (SNI) for mostly appliances and some other energy consuming equipment, and

d. Promoting the "Potong 10 %" (Cut 10 %) Campaign program.

2.2 PP 70/2009 EE Regulation

PP 70/2009 (PP70) represents Indonesia's only national Energy Conservation Regulation containing mandatory EE requirements of owners of industrial facilities that consume more than 6,000 TOE **(Ton Oil Equivalent)** per year. The requirements include them submitting energy consumption reports, conducting energy management and energy audits, and implementing EEPs identified in the audits or face government penalties that include negative publicity, fines and cutting off of electricity. The problem is that few of the over 6,000 TOE industrial companies complied with PP70's requirements and no enforcement or allowed penalties were imposed.

PP70 also provided the following incentives for industry:

- Tax reductions for EE equipment;

- Import duty reductions for EE equipment;
- Low interest-rate funds for EE investments in accordance with the legislation; and/or
- Energy audit funding by the government.

Unfortunately, none of the above PP70's tax incentives were implemented and the disincentive mechanisms were not enforced allegedly because of a lack of coordination between MEMR and the Ministry of Finance (MoF). Apparently MEMR only has the authority to provide incentives but the authority to give the tax reductions and investment subsidies is under the MoF. Also, the required policy/regulations and guidelines for imposing the penalties or cutting off of energy supply were not issued by MEMR.

In an attempt to meet EE potential and its national targets, MEMR is revising PP 70 to try to establish strategies and actions to conserve energy as needed to enable the country to achieve its 17% in the National Energy Policy. Potential revisions being considered are:

- Increasing mandatory requirements to include all facilities using more than 4,000 TOE, including transport sector (new);
- Mandatory energy consumption reductions in government facilities;
- New private sector incentives and disincentives, and
- New regulatory language to remove barriers for GAs to engage ESCOs by streamlining PPP processes and creating guidelines for the smaller EEP transactions.

Unfortunately, the likelihood of PP70 revisions having any significant impact on accelerating the implementation of EE in Indonesia in the near term is relatively low. This pessimism is based on the fact that the previous mandated energy reductions and penalties in place for the last 11 years have never been enforced. This lack of enforcement by the GoI coupled with the possibility that PP70 may not be revised since MEMR has been saying it is going to do so for the last 3 years leads to the expectation that it may not happen. Also, it is not clear if the final revisions will

contain the required PPP regulatory changes or mandated EE targets to open up the government or contain sufficient substance to make a meaningful difference.

3. EE MARKET BARRIERS in INDONESIA

Indonesia faces most of the same barriers as many other countries in Southeast Asia and in other developing markets, plus a few additional ones that are unique to Indonesia (i.e., low electric rates), are summarized below.

3.1 Lack of EE Knowledge and Demand from Facility Owners

There is an extremely low level of EE knowledge with most stakeholders in Indonesia, especially with owners of energy consuming facilities (Facility Owners) in the industrial, commercial and governmental sectors. In fact, there is virtually no knowledge about EE technologies, benefits and risks emanating from the Indonesians having been told for many years to ignore EE due to its low savings and payback opportunity caused in large part by the country's historically heavily-subsidized and low electricity rates. The very low EE knowledge in Indonesia has led to the following major market barriers, which are described in more detail in this report:

- A general lack of understanding and confidence with Facility Owners, LFIs and investors in the estimated future EE savings being achieved and verified, which has led to their unwillingness to fund or implement EEPs and fundamental lack of EE market demand;
- Lack of EEP development skills and technical capacity with local engineers, vendors, consultants and staff of ESCOs resulting in energy audits that identify EE opportunities which are not ready to implement and are not 'bankable' due to unreliable savings estimates caused by insufficient data, supporting calculations, baseline and Measurement & Verification (M&V) plans;
- Lack of national EE regulations that: i) mandate EE implementation and MEPS, or ii) remove existing regulatory barriers for GAs to engage ESCOs to implement and finance EEPs, and
- No commercially-attractive financing offered by LFIs.

3.2 Indonesia's Low Electric Rates

Indonesia has historically heavily-subsidized its energy costs resulting in very low electric rates that materially reduce EE savings that can be realized by facility owners from more energy-efficient electric technologies. This results in unacceptably long paybacks and a low internal rate of return (IRR) on any such investments.

3.3 Low Government Sector EE Priority and Regulatory Barriers

- Due to the much larger market potential in Indonesia for Renewable Energy (RE) and its replicability/scalability appeal to large energy companies and financial institutions, RE gets most of the public attention for clean or green energy in Indonesia. Consequently, RE is a much larger focus for the government versus implementing much smaller, fragmented and relatively complex EEPs in its own facilities. This has resulted in GAs having very limited knowledge and resources (technical and financial) to implement EEPs

- In addition, GAs are unable to engage private sector ESCOs due to existing regulations not allowing or being compatible with how EEPs are developed, implemented and financed on a paid-from-savings basis by ESCOs and the private sector. Existing regulations result in the below three (3) common barriers in Indonesia, that also exist in the Philippines, Thailand and Vietnam, which preclude GAs from being able to engage the private sector to commercially develop, implement and finance EE Projects in their government facilities on a paid-from-savings basis:

    1) ***GAs cannot legally commit/make multi-year Savings Payments***. While Indonesia's Presidential Regulation No.38/2015 introduced the capability for GAs to make Availability Payments under the PPP regulatory scheme to private sector entities in contracts over multiple years, it does not specify that savings payments are included in such payments.

    2) ***GAs cannot retain multi-year Savings in its Budgets***. Indonesia's budgeting of energy costs for its government-owned facilities is typical of most other governments around the world. The energy budget for a facility is typically allocated from a 'Utilities' (or similarly-named) line item in the 'General Fund' to the specific GA responsible for operating

the applicable facility. The annual budgeted amount is usually based on the prior year actual costs adjusted for consumer price index, or known facility changes. When an EE Project is implemented that reduces energy costs, the GA's subsequent year's energy budget allocation from the General Fund is reduced accordingly. Consequently, there is no budget funding available for the GA to be able to make any payments out of future savings.

3) ***GAs must use 'lowest upfront cost' procurement method***. Procurement procedures in current government regulations are designed to purchase equipment and services on a competitive lowest upfront cost basis. With respect to EE, this results in less energy-efficient, lower quality and shorter life products having to be purchased. It also requires all specifications and costs of the equipment/services being purchased in EE Projects to be identified upfront in very specific detail to make sure that all bids can be evaluated on the same basis. Unfortunately, this type of detail is not available for an EE Project until after a relatively expensive and time-consuming Investment Grade Audit (IGA) has been completed, which contains the final design and all other shovel-ready details needed to implement the EE Project. ESCOs (or any entity) are rightfully unwilling to perform an IGA until they are selected due to the risk of them losing not only their cost to perform the IGA, but their design ideas being made available for public consumption. Therefore, different procurement procedures specific to ESCOs' project concept approach need to be applied in order for them to be willing to submit proposals and be selected on competitive processes that have been developed, adopted and are being widely used in many markets.

3.4 Limited Technical Capacity to Develop 'Bankable' EEPs

One of the most significant barriers to scaling up the implementation and financing of EE in Indonesia is the limited experience and capabilities of most EE services providers (i.e. ESCOs and EE consultants) to prepare IGAs and perform other critical development tasks required for a '**Bankable'** EEP. This is illustrated by the 28 IGAs that were prepared by local consultants for MEMR from 2014-2018 in 19 Industries and 9 Buildings and virtually none of the EE Projects identified in them have been implemented to-date. EPS Capital Corp evaluated 22 of the IGAs and found incorrect

estimates of the energy savings and capital cost **(CAPEX)** to implement the EE Projects in them caused in large part by deficiencies in them not being based on detailed measurements and data related to the actual baseline and operation of the related facilities. There was also a clear gap in the knowledge and experience of local energy auditors in preparing IGAs and Measurement and Verification (M&V) plans according to the following:

- An IGA contains the core information needed for an EEP to be successfully implemented. It is a much more detailed energy audit that reflects one or more individual energy savings measures (technologies) at an energy consuming facility, containing all critical assumptions, facility-based measurements and calculations supporting the estimated savings and CAPEX, and a M&V plan for each energy savings measure bundled into an EEP. It must contain all information required for a Facility Owner, developer, LFI and/or investor to be able to understand/evaluate the technical and economic feasibility of the proposed EEP.

- The M&V of energy savings from an EEP is critical to documenting the actual achieved savings and the resulting IRR of the investment. M&V is the meter of an EEP, and it should follow generally accepted and best-practice M&V principles contained in globally published documents like the International Performance Measurement and Verification Protocol (**IPMVP**®), owned by the Efficiency Valuation Organization (**EVO**) and available for free download at www.evo-world.org.

3.5 Small Scale, Complexity and Perceived High Risk of EEPs

The global average investment for bundled EEPs, with multiple EE technologies, is very small (less than USD 1 million), and they typically contain multiple energy savings measures each of which can require a separate M&V protocol to measure the savings return on its investment. These very small transactions and benefits, coupled with the perceived M&V complexities make it challenging for Facility Owners to want to focus on EE investments. They also create a perception with LFIs that the potential EE lending market is small, time consuming and will require high transaction costs, making them unwillingness to invest the time and resources to develop the internal capacity needed to understand or assess the risks and benefits of lending to EEPs.

3.6 No Commercially-Viable EE Financing

The primary EEP financing options for a Facility Owner are through an ESCO or self-financing. The major consideration in choosing the financing type is based on the assumed risks and desired benefits of the Facility Owner. Generally, ESCOs are desired because the CAPEX investment costs for implementing EEPs are high and the technologies used are unknown to Facility Owners. Large companies with EE knowledge and financing capacity tend to finance their own EEP investments. On the other hand, small and medium-sized (**SME**) companies who tend to have limited financing and difficulties in getting loans, will tend to choose financing through an ESCO. The feasibility of choosing the ESCO financing model is not only based on facility owner needs but also on access to EEP financing.

Irrespective of who finances an EEP, one of the most significant global barriers (gaps) that exists in Indonesia is a lack of commercially-attractive EE financing, which needs to be 'project-based' in order to be 'attractive'. This financing gap is not caused by a lack of available funds, but rather the inability of EEPs to access the existing funding capacity of LFIs on commercially-attractive terms. There is a "disconnect" between the traditional lending practices of LFIs and the project-based financing needed by Facility Owners, ESCOs and other developers of EEPs. LFIs typically apply their traditional "asset-based" corporate lending approach for EEPs that limits the amount they lend to a maximum of 70% to 80% of the EEP CAPEX and require full collateral on the entire loan amount. Unfortunately, there is very little collateral value in EE equipment after being retrofitted in a facility; rather, its value is limited to the ongoing cash flow that it can generate over its useful life of 10 to 25 years. The disconnect occurs from LFIs not recognizing the significant future cash flow generated from EEPs because they do not believe or are not satisfactorily assured that such cash flow can be relied upon to repay the related loan. Consequently, LFIs generally assign no value to the future cash flow of EEPs, which requires borrowers (e.g. Facility Owners, ESCOs, etc.) to finance them from their existing credit capacity or collateralized by additional marketable asset collateral or repayment guarantees, all of which is very unattractive to the borrower.

This disconnect results in LFIs not being willing to structure EE loans that consider the future EEP's cash flow as the primary source of loan repayment due in large part by LFIs:

- Not being familiar or comfortable with the EE technologies generating the savings, nor with an ability to measure and verify the savings;
- Not knowing how to properly evaluate the risks and benefits of EEPs; and
- Not knowing how to structure low-risk EEP loans that are attractive to Facility Owners, ESCOs and other project developers.

The current financing options in Indonesia are summarized in Section 1.3. All of them reflect the fact that LFIs are reluctant to finance EEPs because of a perceived high risk, small transaction size, small market potential, high transaction costs and a lack of the internal evaluation capacity needed to assess the risks and cash flow benefits generated from EEPs. Given the questionable loan market size, LFIs are reluctant to acquire new EE technical capacity and are unwilling to invest the time or resources to learn about EE on their own.

Since LFIs assign little or no value to the EEP's future cash flow and do not consider it as increased credit capacity from EEPs in their loan structures, Facility Owners interested to implement EEPs are required to use their existing core business credit capacity and/or provide additional marketable collateral or guarantees to secure EE loans with LFIs. This requirement coupled with a lack of confidence in savings being achieved, has resulted in a significant barrier for Indonesia to tap into the huge EE opportunity of its industrial and commercial sectors. Most private companies have not even begun to look at or consider implementing EEPs in their facilities, which is why EE opportunities are so abundant for the most fundamental of EE technologies.

3.7 Limited Enforcement of Regulatory EE Mandates

There have been several problems in implementing the legal mandates in the PP70 Energy Conservation Government Regulation that include, but are not limited to the following:

- The obligation to carry out conservation for users of energy sources and energy users greater or equal to 6,000 (six thousand) equivalent tons of oil per year cannot be implemented.

- Providing incentives (fiscal and financial) to those who want to carry out energy efficiency investment activities and have not shown any success in unregulated energy conservation.
- The authority of the Government and regional government is not based on the location, user approach; benefits and impacts, and efficiency according to Law No. 23 of 2014 concerning Regional Government.
- There is no regulation regarding administrative sanctions.
- Energy Conservation management content material, which includes activities: energy supply, energy exploitation, energy utilization, and conservation of energy resources, is still unclear so that the content needs to be enriched.
- Some provisions on incentives cannot be implemented because there is no delegation of regulations to the level of Minister of Finance Regulation.
- The regulation of the authority to implement energy conservation in the Government is not cross-sectoral, even though energy conservation is in the cross-sector, such as the Ministry of Public Works and Public Housing, the Ministry of Industry, the Ministry of Finance, the Ministry of Transportation so that in addition to general norms, it is also necessary to implement regulations at the Ministry/Institution level.
- Management of energy conservation through utilization only focuses on energy management.
- Energy conservation arrangements do not yet accommodate various legal needs in the community, institutional energy conservation trust agencies, ESCOs, and green building arrangements, green banks, green investments, green industries.

3.8 Limited Implementation Capacity (Nascent ESCO Industry)

The ESCO industry in Indonesia began in 2011with formation of a trade association called APPKENINDO that was not organized on a sustainable basis and thus quickly became dormant. While becoming a national priority, has remained very nascent and is currently not successful. ESCOs are mostly SMEs with limited credit history and capital resources needed to develop and implement savings-based EEPs on a

scalable basis. The primary reason for not being successful is the lack of overall EE market demand caused by the many barriers described in Section 3. Consequently, there are only about five (5) known ESCOs by ESDM operating in Indonesia, most of whom have limited experience, competencies, resources and ability to access project financing.

An ESCO can be defined as a service-based commercial business that ***turn-key*** identifies, develops, implements and finances EE Projects in energy consuming facilities on a 'performance' basis. The ESCO's primary performance requirement is that some or all of its payments are directly dependent on the savings from its EEP being realized.

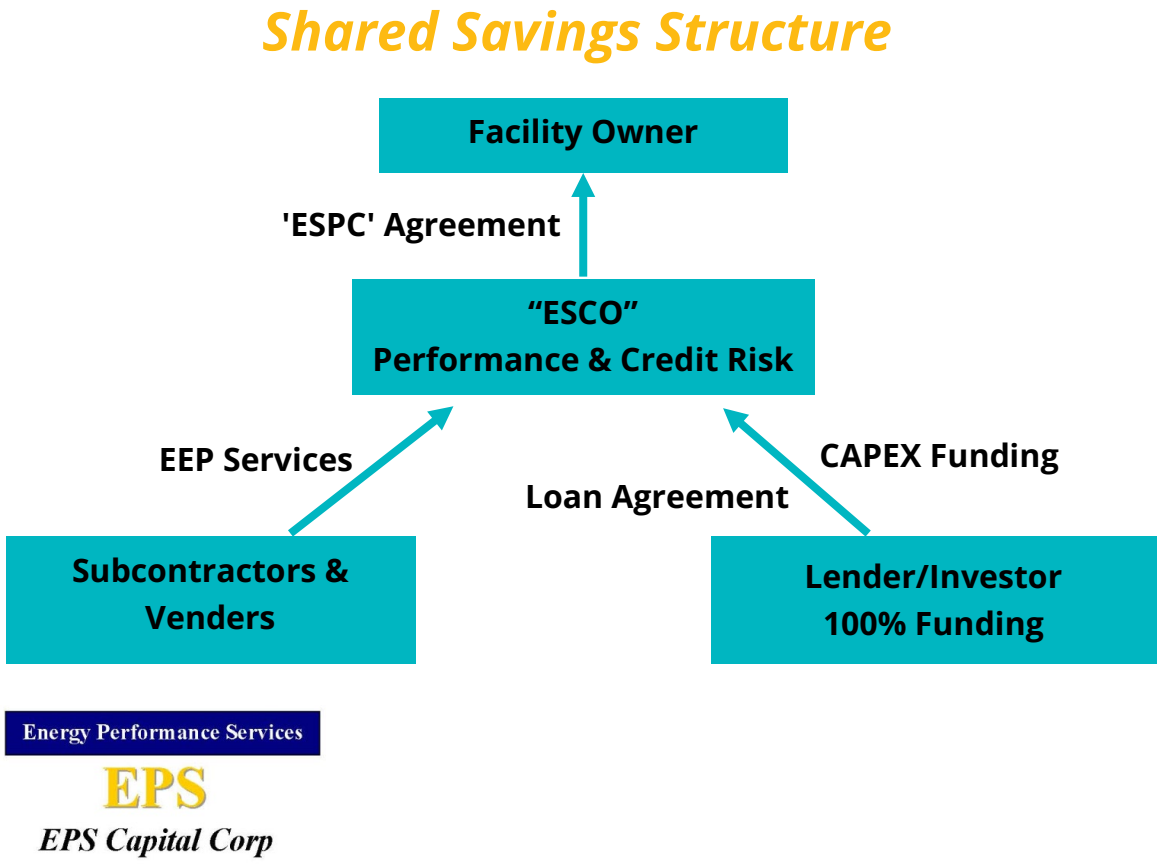
An ESCO's specialty is its ability to provide complete and comprehensive performance-based EE solutions to facility owners. ESCOs are sophisticated EEP developers who assume responsibility for an unusually wide spectrum of tasks which includes performing rigorous M&V on the energy savings over the project's financing repayment term in order to manage its risk for the savings to be sufficient to repay the investment.

Two performance-based financing structures have emerged globally as the most common ones used by ESCOs: "***Shared Savings***" and "***Guaranteed Savings***". Guaranteed Savings is the predominate structure used in mature markets like the United States, China and the EU while Shared Savings is the predominant one used in most developing markets (like Indonesia). A brief description of each is provided below and a brief list of the key elements that should be included in an ESPC are in Exhibit B.

a. ***Shared Savings*** is an arrangement whereby the ESCO (as opposed to the Facility Owner) finances the total upfront CAPEX of the project and is totally responsible to repay the Lender. The Facility Owner pays a fixed percentage or amount of its realized savings from the project to the ESCO which is large enough for the ESCO to repay its debt service to the Lender, cover M&V costs, and compensation to ESCO for performing its ongoing EEP services. Under this structure (versus Guaranteed Savings), the Facility Owner has no contractual obligation to repay the Lender; but the ESCO does. It should be noted that this structure creates a lot more risk for the ESCO because it not only assumes the project performance risk, but also Facility Owner credit risk. The Shared Savings approach typically

requires an equity investment, which in combination with the higher risk assumed by the ESCO, carries a much higher CAPEX (interest rate) than the Guaranteed Savings structure (see below diagram)[6].

Figure 5. Shared Savings ESCO Structure



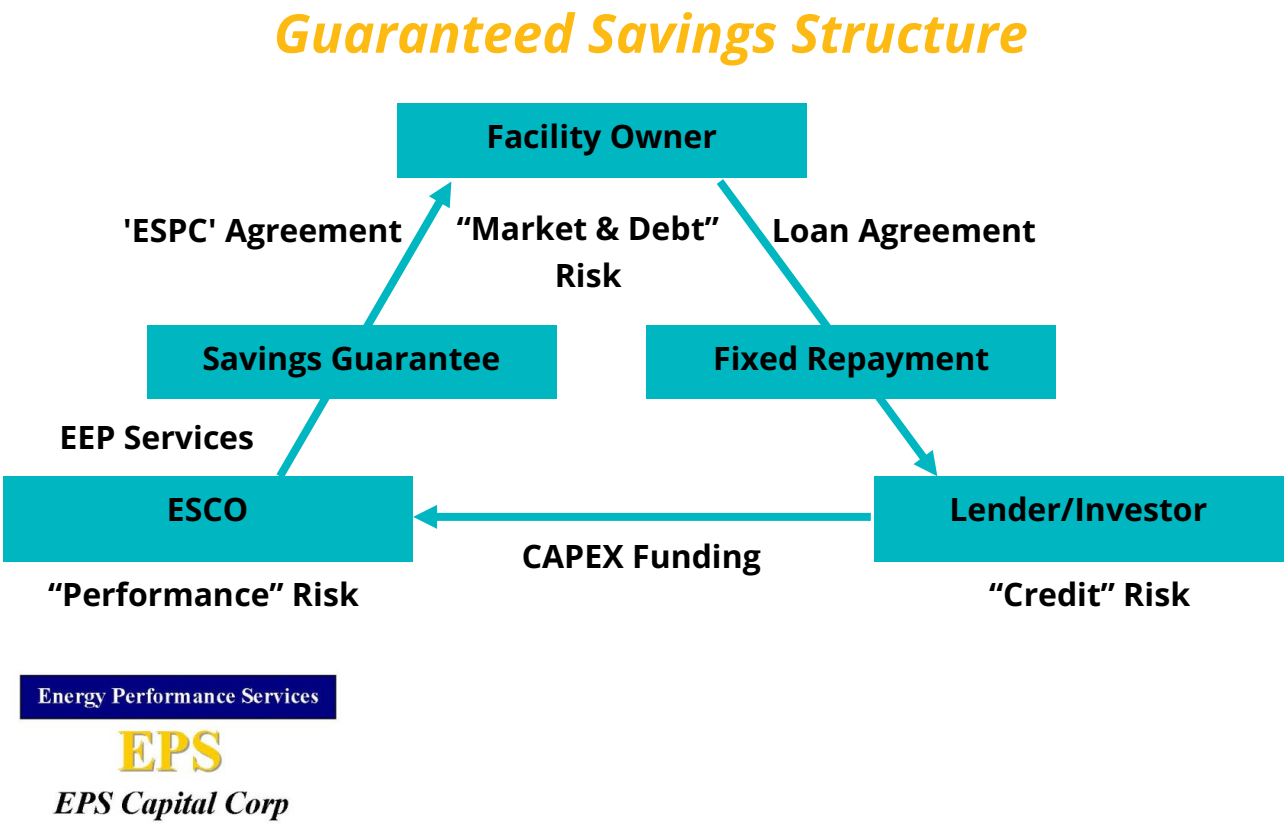
The Shared Savings Structure is a typical introductory structure for developing markets like Indonesia because Facility Owners, with low knowledge and confidence in EEPs and ESCOs, do not want to risk their core capital or credit capacity on EEP investments. ESCOs (mostly SMEs) are forced to try to raise substantial amounts of equity for their EEPs in order to grow, resulting in balance sheets that more resemble banks and leasing companies than what they are, service companies. However, it should be noted that even ESCOs with relatively large balance sheets (e.g. Siemens and Honeywell) are unwilling to assume the Facility Owner credit risk required in this

[6] Thomas K. Dreessen Presentations

structure. Consequently, the Shared Savings Structure limits long-term market growth for ESCOs and LFIs.

b. **Guaranteed Savings** is an arrangement whereby the Facility Owner finances the EEP directly with a third-party entity **("Lender")** in exchange for the ESCO providing a guarantee to the Facility Owner it will realize sufficient savings to cover its debt service payments to the Lender. If the realized savings fall short of the debt service payments, the ESCO will reimburse the Facility Owner for the shortfall. If the realized savings exceed debt service, the ESCO typically shares a portion of the excess, usually expressed as a % share with the amount depending on the risk taken and the extent of ongoing services provided by the ESCO. It should be noted that under the Guaranteed Savings approach the ESCO bears no direct contractual obligation to repay the Lender, but that the Facility Owner does. In other words, the ESCO's guarantee is not a guarantee of payment to the Lender; but is a guarantee of energy savings to the Facility Owner (see below diagram)[3].

Figure 6. Guaranteed Saving ESCO Structure



The Guaranteed Savings structure is typically viable only in countries with a high degree of familiarity and confidence with EE technologies, local implementation expertise and the availability of commercially attractive financing. The Guaranteed Savings concept is difficult to initiate in markets where EE is not well known or the ESCO concept is being introduced because it requires Facility Owners to assume investment repayment risk of the EEPs based on the savings performance of unknown EE technologies. This structure fosters the long-term growth of the ESCO and finance industries because it enables ESCOs, mostly SMEs, with limited credit history and capital resources, to develop and implement savings based EEPs. Guaranteed Savings evolved in the U.S. from the initial Shared Savings structure in response to government Facility Owners, who could access low-cost, tax-exempt financing and desired to significantly reduce interest costs. It was embraced by smaller ESCOs and financial institutions to allow them to grow their respective industries. The primary benefit of this structure is that it reduces financing cost and enables a lot more investment in the EEPs to be made for the same debt service level. The public sector normally prefers this structure in order to maximize the amount of infrastructure investment made in its facilities that can be repaid from utility costs in its operating budget.

A few ESCOs in Indonesia have implemented some small EEPs under the ***Shared Savings Structure***, which is appealing to Facility Owners because they have virtually no risk related to the development, implementation or funding of the EEP. Only the Shared Savings model has worked because the ESCO provides all the upfront CAPEX for the EEPs and the Facility Owner only pays a majority of the savings to the ESCO over a period of up to 10 years. Unfortunately, the Shared Savings model is very limiting for the ESCO industry's growth versus the Guaranteed Savings structure, whereby the Facility Owner finances the upfront cost for the EEPs and the ESCO guarantees to the Facility Owner that the savings will be sufficient cover its financing repayment.

4. CURRENT, POTENTIAL AND PAST DONOR EE INITIATIVES

4.1 Current Donor EE Initiatives

The following donor EE initiatives are currently active in Indonesia:

1. **ASEAN Low Carbon Energy Programme (LCEP)** is a 3-year GBP 18 million TA program provided by the UK Prosperity fund to implement Green Finance and EE interventions in 6 southeast Asia countries (Philippines, Indonesia, Thailand, Vietnam, Malaysia and Myanmar) that ends in March 2022. The ongoing TA program in Indonesia is the development EEP Loan Product for SMI, for the Loan Product Manual is the only part expected to be completed by 31 March 2022.

2. **SINAR is a 5-year USAID Program**. Below is a summary of EPS Capital's confidential scope of work being provided to MEMR in first quarter of 2022, which reflects the only agreed EE work in the SINAR program.

    i. Capacity Building for the implementation of Government Initiative PPPs and Business Entity Initiatives (Solicited PPP and Unsolicited PPP):

        - Preparation of an 'Academic' Technical Study explaining the justification for MEMR's preparation of a new Regulation on PPP Procedures for Implementing Government Cooperation with Business Entities in the Provision of Energy Efficiency Infrastructure EEPs.

        - Development of a new PPP project proposal documents (solicited and unsolicited) that reflect new EEP processes and procedures which synchronize those in the existing PPP regulation for Streetlighting and other EEPs

    ii. Stakeholder consultation forum on PPP business model and potential development of Demonstration Projects for Energy Efficiency in Government Facilities

    iii. Development of 'Academic' technical study to support the justification for a new MEMR's Regulation on ESCO

iv. Development of an 'Academic' technical study to support the justification for revision of MEMR's Regulation No/ 14/2012 on Energy Management.

v. Development of revised SKKNI (National Personnel Competence Standard) for energy managers, energy auditors for Energy Efficiency, which linked to the Development of syllabus and curriculum for Energy Management

vi. Development of Indonesia Nasional Standard (SNI) for several equipment so that it can be referred to in the MEPS especially for SNI Performance which is not yet adopted (e.g. Boilers, etc.)

vii. MEPS Development for Boilers

viii. Sharing lessons learned in Carbon Trading and Economy including training/certification for SNI 14064

3. **AFD** has and is providing the following support:

   a. Funded an IGA for industry via ADB

   b. Supported the development of masterplan for Smart City Lighting for Bogor and Mataram Municipal. This was accomplished together with SMI who provided a feasibility study on financing, legal, contract and environment, whereas ADF provided technical analysis.

   c. Working with Bappenas, AFD is conducting a mapping of EE in industrial sector by synchronizing the database of Ministry of Energy, Ministry of Industry and Central Bureau of Statistics (BPS) on the consumption of energy in industry sector.

   d. Smart streetlighting with potential CAPEX savings of 30-40% and energy savings of 30-50% in Bogor and Mataram to be done in 2022.

   e. Preparing for EE in buildings. Indonesia is encouraged to support EE for housing (financing to BTN for both landed and vertical housing). From the policy side, it has been endorsed my Min of Energy and Min of Public Works. Early stage - mobilize the BEEP program to facilitate MEMR 2023 based on GCF proposal from AFD. Preliminary stage trying to assess the

base case, potential gains, BTN's appetite for this since it was initiated by AFD, who was introduced by BEEP

f. Providing EURO ~20-30 million TA funds to SMI for RE/EEP development – original 100 million.

4. **Danish Energy Agency (DEA)** through Danish Embassy provided technical assistance in EE.

   a. Providing Capacity Building for DKI's Jakarta Building Inspectors (completed in August 2019).

   b. Providing EE measures at Banten 2 Labuan OMU and Banten 3 Lontar OMU Coal Fire power plants (completed in 2021)

   c. Mapping/ benchmark for Energy Intensive Industry to Documents EE Saving potentials

   d. Capacity Building and Study Trip to Denmark

   e. Assistance for Development of Net Zero Building with Potential project is Terminal 4 of Jakarta's Soekarno Hatta International Airport

   f. Energy Management Training and Certification for Public and Commercial Buildings

   g. Energy Saving Scenario and Update EE target in National EE framework.

   h. Roadmap for EE in Building

5. **UNDP through MTRE3** has provided some EE programs which are listed below; however, those in blue were identified in their original conceptual plan and with no known activity to-date are questionable as to whether they will be completed within its program timeline.

   a. Renewable Energy Survey of PV Rooftop

   b. Energy Consumption Benchmark Index: 273 Commercial Building in Riau, Jambi, NTT, West Sulawesi, Jakarta, Medan, Surabaya, and Bandung

c. IGAs: Menara Ravindo, Transmart Pekan Baru, EBTKE Building, Mall Ratu Indah, RS Karyadi Semarang, and Pullman Bali

d. Implementation and Certification of ISO 50001 for EBTKE's Building

e. Energy Management System (EnMS) for Angkasa Pura 1 (Ngurah Rai Airport) and 2 (Soekarno Hatta Airport) and Pertamina RU 4.

f. Mitigation action to be registered in National Registration System for EBTKE and Ravindo Building, along with the development of MRV report emission reduction for Energy Efficiency in Building

g. Seek for Investment for Mall Ratu Indah and Pullman Bali Hotel

h. Facilitate ESCO/ ESPC for Graha Niaga Tata Utama, with M&V documents completed and now in the process of discussion for implementation between Facility Owner and vendor using Device as Service/ Leasing scheme.

i. Green Airport Banyuwangi (Certification target with "Gold" achievement) which is expected to complete by December 2021

j. Support Solar PV of Angkasa Pura project

k. Develop methodology to calculate GHG reduction in Building under EE Activities

l. Develop methodology to calculate GHG reduction in Powerplant, which have been completed for PLTS with kWh export/ import and PLT POME biogas (on-grid)

m. Gender responsive action: Training for Woman's Energy Managers and Auditors which was completed in October 2021.

n. Support online reporting system for mitigation action on Powerplant (APPLE-GATRIK).

6. **UNDP through ADLIGHT programme** has also provided some ongoing EE programs listed below; however, those in blue were identified in their original

conceptual plan and with no known activity to-date are questionable as to whether they will be completed within its program timeline.

a. Improving Local LED's quality, energy efficiency and affordability through MEPS

b. Energy labelling for LED indoor and outdoor lamps

c. Establishing knowledge center and system to help manufacturers and training programs for laboratories

d. Strengthened regulatory and policy framework and MVE to improve fair market competition for EE lamps by policy and guidelines for LED Public procurement (including street lighting)

e. Developing pilot EEPs in 3 different entities covering a Commercial Building, Government-owned facility and SOE facility.

f. Providing a small incentive or support for lamps, for example by providing LED lamps as samples

g. Developing EE finance Guideline for banks

h. Conducting EE Training for banks on EE and LED Finance

7. **IEA** supported MEMR on the following EE activities:

a. Developing indicator and benchmark on EE Policy

b. Conducting survey and analysis of cooling and road map of building sector

c. Developing new POME (reporting of Energy Use by Energy Users- 6000 TOE) as required by PP 70/2009 along with website business information system (website sinergi)

d. Developing a modeling and roadmap for Energy Conservation for land transport

e. Developing a road map for low carbon building and construction in line with Global Alliance for Building and Construction methodology and a pilot project for smart building.

f. Developing indicator and benchmark on EE policy

g. Identification of companies consuming energy higher or equal to 4000 TOE per year in Industrial and Transport Sectors

h. Developing a policy package for textile industry

i. Delivering an online EE indicators course for all sectors plus benchmarking analysis workshops for pulp & paper and textiles

j. Providing support for the development of a land-based transport roadmap using policy package framework

k. Providing support Indonesia's EV Strategy

- Technical analysis of battery swapping for electric two wheelers.
- Technical analysis of the development, implementation and use of electric two wheelers in Indonesia.
- Deliver transport indicators training

8. **CLASP** gave technical support to MEMR on the following EE activities:

a. Conducting survey and study on End -Use Market survey.

b. Conducting a market study for 4 Appliances (Rice cooker, Lighting, Refrigerator and Fan)

c. Study of Monitoring and compliance to Lighting and AC for MEPS Regulation

d. Providing support for regulation formulation and data development

e. Supporting the socialization of implemented 4 MEPS and Labelling for AC, Refrigerator, Rice Cooker, and Fan

f. Conducting a Market Study on Refrigerated Display Cases (RDC)

g. Capacity Building on Testing facilities for refrigerator and rice cooker

h. Market Study for chiller

i. Market study for transformer distribution

j. Market and outreach to Producers and consumers (Super-Efficient AC Marketing Campaign)

k. Development of tools for assessment of high-risk products

9. **World Bank** in conjunction with the IFC is currently piloting a sustainable housing development program with Ministry of Public Works who wants its support to develop technical guidance on the implementation of green building principle in the national housing program.

   - Embedding green building principle (energy efficiency included) in the national housing program regulation
   - Currently in the loan preparation phase.

10. **OECD** is giving support in the following areas:

    - Development of Clean Energy Finance and Investment Policy
    - Pilot Project in Industry (Identifying Industry)
    - Technical support on the Emission Trading Scheme (ETS)
    - Clean Energy Finance Training and Program in Indonesia
    - Technical Support to OJK on Development of Sustainable Green Taxonomy
    - Facilitate knowledge sharing on EE Activities / stakeholder dialogues
    - Support industrial decarbonization strategies and assess the financing needs of Industry decarbonization developing economies

11. **UN ESCAP** also gives support on EE specifically on Cooling Demand Assessment for modelling process and intervention scenarios in the following sectors such as building space cooling, food cold chain, mobile-air conditioning, healthcare cold chain, and process cooling.

4.2 Potential UK PACT Indonesia Interventions (2022-2024)

The UK Pact recently issued a call for proposals for its funding of up to GBP 2.7 million of EE interventions over the next 3 years. Competitive proposals were submitted on 30 November 2021 and announcement of a winner for each of 3 separate TORs is scheduled to be on 19 January 2022. A summary of each TOR and EPS Capital's proposal for 2 of them (provided herein on a confidential basis) is provided below, which if selected could overcome the identified EE Capacity, Incentives and Financing gaps.

1) **TOR:** ***"Capacity building & institutional strengthening*** - Support the Ministry of Energy and Mineral Resources and other relevant actors to have increased capacity to prepare, implement and monitor energy efficiency projects both in the public and private sectors"

   - EPS Capital proposed over 50 EE technical trainings and certifications over the next 3 years via the below list of existing local and international best-practice programs that provide new EE knowledge/skills needed to prepare detailed IGAs containing reliable savings and CAPEX estimates and M&V plans.

     i. Local Certified Energy Manager (CEM)

     ii. Local Certified Energy Auditor (CEA)

     iii. International Certified Assessors for Energy Manager

     iv. International Certified Investment Grade Auditor **(CIGA)**

     v. International Certified Energy Saving Verifier **(CESV)**

2) **TOR:** ***"Energy efficiency fiscal & financial policies*** - Support the Ministry of Energy and Mineral Resources to have additional, credible policy options to

increase fiscal and financial incentives for energy efficiency projects and the ability to implement them."

- EPS Capital proposed to create the following **EE Cash Incentive Programs** and **EE Finance De-Risking Products**:

  1) **EE Cash Incentives:** two types of EE cash payments that provide private end-use energy consumers with an attractive enough incentive to shift their behavior to purchasing more EE Products and implementing EEPs:

     a. EE Product Incentives that reflect a cash rebate paid to private purchasers of retail products that offsets the higher cost for household consumers to buy the more expensive EE appliances instead of the less expensive inefficient ones.

     b. EEP Incentives that reflect a cash payment to private facility owners, ESCOs and other developers who implement EEPs based on the actual kWh and thermal reductions calculated pursuant to generally accepted M&V principles like the IPMVP and verified by CESVs.

  2) **EE Finance De-Risking Products:** Energy Savings Insurance **(ESI)** and Partial Credit Risk Guarantee **(PCG)** product that will overcome the huge collateral and confidence barriers of financing EEPs by LFIs, facility owners, ESCOs and other EEPs developers.

3) ***"TOR: Energy efficiency in buildings*** - Support the Ministry of Energy and Mineral Resources and other relevant actors to have increased capacity in implementing energy efficiency measures in existing buildings including government offices and existing transport infrastructure buildings such as ports and airports, and where relevant, to set ambitions towards net-zero buildings." No proposal submitted by EPS Capital.

4.3 Past Donor EE Initiatives

A summary of the EE initiatives previously provided and completed by Donors to Indonesia is as follows:

a) **ADB** has provided a lot of EE Technical Assistance (TA) to Indonesia over the last 10 years that includes the following programs in which EPS Capital was the primary consultant:

1) Completed TA (4/30/2021) on Scaling Up Energy Efficiency that:

- Developed MEPS for 4 Residential Appliances included in the recently-passed MEPS regulation
- Created a microsite of MEPS program and a system which will support and enable MEMR to monitor the MEPS and Labelling program through producers/importers, test laboratory, and local certifying LSP.
- Drafted language in MEMR's planned revisions to its PP70/2009 regulation that removes barriers for private-sector implementation of EE in Government facilities through the streamlining of existing PPP processes
- Initiated development of Denpasar Streetlighting Demonstration Project that applies existing PPP processes
- Developed baseline of Denpasar's Street Lighting's PPP Project intended to be a demo project linked to the revision of MEMR's PP 70/2009 that removes barriers for private-sector implementation of EE in Government facilities through streamlining the existing PPP process, which EPS Capital had provided the Draft Language of PP 70/2009 revision.

2) Completed TA (September 2016) on Indonesia EE Accelerator Programs that supported MEMR and other Local EE Stakeholder with the following activities:

- Creating template for accelerating the implementation and financing of LED street lighting retrofits at municipalities by ESCOs, based on international best practice procurement specifications, commissioning and M&V methodologies.

- Developing a Government ESCO Regulator Roadmap. Created a Roadmap of modifications to existing PPP regulations to overcome government procurement, budget and contracting barriers.

- Evaluating 9 IGAs performed by 2 local consultants for MEMR, including site visits and providing feedback to MEMR and local consultants on how to improve the IGAs:

- Upgrading one Industrial IGA for MEMR to make publicly available as a reference Case Study on its website.

- Conducting a Pre-IGA workshop to teach newly formed ESCOs how to develop savings based EEPs under the typical ESCO process and bundling of multiple measures into an integrated EEP.

3) Completed TA (May, 2016) on Municipal Street Lighting and PLN's substation lighting retrofits, that implemented municipal LED Street Lighting pilot projects at Semarang and Batang Municipalities, which gave valuable lesson learns. More importantly, this TA had addressed the void of LED's Street Lighting standard by providing an LED's technical specifications suitable to be implemented in National, Provincial and Local Road in Batang and Semarang. As a result, the technical specification, and the requirement for an independent test for LED Street Lighting were the adopted in The Minister of Transportation's Regulation No 27/2018 on Street Lighting. The lesson learned and experience from the pilot projects have become a valuable reference, especially on the baseline development, for EEP in LED Street Lighting Retrofits, including one project with another ADB's TA on Scaling Up Energy Efficiency supporting Denpasar Street Lighting Demonstration Project under PPP scheme with status in planning stage, but the TA was just ended in April 2021.

4) Completed TA (2016) that aimed to Facilitate the implementation of EEPs in Indonesia's ***industrial export/import companies*** by developing new loan products, a pipeline of EEPs and delivering capacity building to enable IEB to fund EEP loans with its $30 million EE loan from ADB, along with the following activities:

- Conducting Assessment of the EE potential in Indonesia's industrial sector and developed new EE financing products in line with the EE market demand and IEB's business development strategy.
- Designing savings-based EE Loan and guarantee products for IEB to offer to existing customers.
- Developing a US$ 30 million pipeline of EEPs and secured EEP Loans by IEB on US$ 8 million funding from a ADB loan to IEB.
- Preparing 20 Project Concepts and 5 IGAs on industrial EEPs and structured project-based financing for IEB with its new EE Loan product
- Creating materials and conducting 15 EE Finance trainings to all IEB loan-related staff on how to evaluate and finance EEPs, and multiple Awareness Seminars to all EE stakeholders and a workshop on IEB's new EEP Loan and Insurance products

b) **UNIDO** funded by GEF had a program on "Promoting Industrial EE through system optimization and energy management standard in Indonesia" with four component covering Introduction of energy a management system and capacity building, capacity building on system optimization, financial capacity development to support EEP in Industry and implementation of energy management and system optimization project, completed in 2017. This project had helped established the national professionals with competence standard for energy managers (ISO 50001) and energy auditors (50002) to give confidence to market of the experts' skills. In addition, the ISO 50001 and ISO 50002 had been adopted to SKKNI (national personnel competence standard). Capacity development to support EEP in Industry was done together with OJK and MEMR, by giving training to bankers on EE and development of Guideline Book on "EE financing in Industry for Financial Institution".

c) **Cooperation with Association of South East Asian Nations (ASEAN)** Countries had several programs as follows

1) ASEAN Standards Harmonization Initiative for EE (ASEAN Shine) specifically for household appliances in ASEAN

2) Participation in ASEAN Energy Awards

3) Training and Certification of AEMAS (ASEAN Energy Management Scheme)

4) Participate in ASEAN -Japan Energy Efficiency Partnership (AJEEP)

d) **Energy Conservation Centre Japan (ECCJ)** had supported on the development of Energy Consumption Intensity (IKE) and Energy Management System Guideline (EnMS Guideline)

e) **Ministry of Economy, Trade and Industry (METI)** Japan had provided training on Zero Energy Building

f) **Energy Conservation Centre Japan (ECCJ)** supported the development of IKE (Energy Consumption Intensity) and EnMS (Energy Management System) guidelines.

5. EE MARKET GAPS

The current regulatory, administrative and policy support from the government has been in large part not effective, and thus has not assisted in overcoming the EE Barriers in Section 3. However, there are some interventions underway by MEMR with respect to the Governmental sector and donors for the private sector, that if completed as planned could have a significant positive impact on removing some of the key EE barriers. A summary of these interventions to be completed and the remaining gaps that need to be filled in order for EE to be widely implemented throughout Indonesia is provided below.

5.1 No Incentives or Mandates to Drive Private-Sector EE Demand

Financial incentives for EE products and services are needed to create interest and new demand for them from private sector Facility Owners. Current EE demand is currently very low due to their very limited knowledge/interest in EE, low return on investment (i.e. low electric rates) and higher price of EE products. Incentives are need that are quickly realized and significant enough to get the attention of business owners and their Chief Financial Officers. The good news is that UK Pact's outstanding call for EE proposals (see Section 4.2) is scheduled to announce a winner on 19 January 2022 that could help fill this gap by providing two types of **EE Cash Incentives** that could be provided to private end-use energy consumers with an

attractive enough incentive to shift their behavior to purchasing more EE Products and implementing EEPs:

1) EE Product Incentives will reflect a cash rebate paid to private purchasers of retail products (commonly used globally by many utilities) that minimally offsets the higher cost for household consumers to buy the more expensive EE appliances instead of the less expensive inefficient ones.

2) EEP Incentives will reflect a cash payment to private facility owners, ESCOs and other developers who implement EEPs based on the actual kWh and thermal reductions calculated Other Capacity Building needs.

5.2 Government EE Barriers and Lack of Demand

The inability of ESCOs and other private sector entities to implement paid-from-savings EEPs in government facilities still remains as one of the major EE market barriers. However, this barrier will be substantially removed when the following interventions currently underway are completed:

a) MEMR revises and gets the GoI to enact PP70 to include the following:

   i. Stating that Availability Payments include Savings payments

   ii. Referring to creation of new ESCOs and EEP procedural guidelines

   iii. Mandates all GAs to reduce their energy consumption by 10% by 2025.

b) After PP70 is enacted, MEMR creates and enacts the new ESCO and EEP guidelines

c) USAID's SINAR program develops new PPP solicited and unsolicited EEP proposal documents that reflect new ESCO processes and procedures

5.3 No Commercially-Attractive EE Finance

EE risk-mitigation financing products are critically needed to overcome the huge collateral and confidence barriers of financing EE Projects by LFIs, facility owners, ESCOs and other EEPs developers. LCEP's ongoing TA program in Indonesia for the development of an EEP Loan Product at SMI, to be completed on 31 March 2022, is

not likely to provide a scalable solution to this major EE financing gap. However, the UK Pact's announcement of a winner on 19 January 2022 could fill this gap through the development of the Partial Credit Guarantee (PCG) and Energy Savings Insurance (ESI) EE Risk-Mitigation Financing Products.

5.4 Insufficient EE Capacity Building

a) Technical capacity to develop 'bankable' EEPs for professionals of ESCOs and EE Service providers to prepare 'bankable' IGAs with reliable M&V Plans. Good news is that UK Pact's outstanding call for proposal is scheduled to announce a winner on 19 January 2022, which could fill this gap by providing a significant number of the following EE trainings and certifications over the next 3 years:

   1) Local Certified Energy Manager (CEM)

   2) Local Certified Energy Auditor (CEA)

   3) International Certified Assessors for Energy Manager

   4) International Certified Investment Grade Auditor (CIGA)

   5) International Certified Energy Saving Verifier (CESV)

b) Other EE Trainings. Other EE awareness and trainings are needed for LFIs, ESCOs and other stakeholders to become aware and knowledgeable of EE technologies, financing and development procedures.

5.5 Limited ESCO Implementation Capability

The nascent ESCOs lack knowledge and experience on preparing IGAs) and M&V plans as well as on implementing paid-from-savings EEPs. Since the ESCO business model, applying the 'shared savings' and 'guaranteed savings' approaches for government EEPs, is still not possible, ESCOs need support to have the regulatory revisions made to be able to offer their services to GAs.

New capacity building programs for IGAs, M&V and ESCO project development and financing need to be developed and offered in the Indonesian market.

6. RECOMMENDED INTERVENTIONS

Taking into consideration the EE Gaps identified in Section 5 and eliminating those that are likely to be filled by Donor programs in Section 4 to avoid duplication, the below EE interventions are recommended for Indonesia. They are prioritized from highest to lowest potential impact in being able to create EE demand and scale-up the implementation of EE in Indonesia.

6.1 Develop/Implement/Fund Private Sector Demonstration EEPs

Demonstration projects are desperately needed to illustrate to all EE stakeholders in Indonesia how to successfully apply global best-practices in the development, implementation and financing of EEPs in both the private and governmental sector. Since implementation of EEPs in government facilities is not possible until MEMR's PP70 revisions and ESCO/EEP Guidelines are enacted so that the PPP financing scheme can be applied to remove the 3 existing regulatory barriers, it is recommended to pursue EEP demonstration projects in private energy-consuming facilities.

This intervention would include identifying/securing EEPs with private-sector facility owners for an international deeply-experienced EE team to develop, finance and manage the implementation of EEPs that (i) apply 'global best practices' and (ii) bundle multiple 'proven' technologies to maximize the level of EE savings and ensure targeted savings are achieved. The support would be turnkey in nature and include but not be limited to the following tasks for each Demonstration EEP:

- Prepare a 'bankable' IGA and the included M&V Plant;
- Implement the M&V plan by obtaining, analyzing data and performing initial M&V of savings;
- Prepare proposed EEP financing materials and presenting them to LFIs for consideration of a project-based loan;
- Prepare performance-based procurement procedures and facilitate the selection of a local contractor or ESCO to implement the EEP, and
- Project manage the selected contractor or ESCO's implementation of the EEP.

This intervention would also include the establishment of a relatively small fund (~USD 10 million) that would fund the development and implementation of several EEPs in different industries to facilitate development of the private sector EE and ESCO market. This intervention is critically needed to create EE demand, especially in a market with low electric rates, by unlocking the current knowledge, technical and financial gaps on how to successfully develop, implement and finance an EEP in a cost-effective and low-risk manner.

6.2 Deliver EEP Development Capacity Building

Capacity building is still needed that includes the following programs currently being offered by "**MASKEEI**", Indonesia's non-profit national Energy Conservation and Efficiency Society through its existing Energy Efficiency Training & Certification (EETC) program

a) EE Market Awareness is a Seminar that presents the benefits and risks of implementing EE Projects to all stakeholders along an overview of the Indonesia EE market opportunity, barriers and possible solutions.

b) ESCO Project Development Professional is a training workshop that teaches staff of ESCOs (or prospective ESCOs) how to develop, finance, implement and mitigate risks of EE Projects under an Energy Savings Performance Contract (ESPC).

c) EE Project Finance Professional (EEPFP) is a training workshop that teaches staff of LFIs, and ESCOs how to evaluate the benefits and risks of EE Projects and structure project-based financing that mitigates risks for financiers and yet is attractive to facility owners.

This intervention can have the long-term effect of increasing demand for EE products by providing the needed increased knowledge for ESCOs on how to develop performance-based EEPs and project-based EEP financing for LFIs. It should be able to be implemented with relative ease since it does not require any government intervention or support.

6.3 Develop a Robust ESCO Association

The ESCO association can play a key role in creating market credibility by bridging collaboration between key stakeholders including government, private companies, ESCOs, financial institutions, donor agencies, and academics to encourage the improvement of implemented energy efficiency projects' portfolio under the ESCO scheme. The current ESCO association, APKENINDO, has been dormant for nearly 10 years and needs to be reorganized with competent staff so that it becomes a platform for discussion, development of EEPs and ESCO policy in Indonesia. The support needed should also include the establishment of a certification program similar to the 2-step process in Philippines where ESCOs are first registered and then 'certified' after successfully implementing a few ESPC EEPs.

This intervention should be able to be implemented with relative ease since it does not require any government intervention or support.

6.4 Provide First Loss Fund for New ESI Product

The UK Pact TA support is scheduled to develop an ESI product with an insurance company **(Insurer)** that will mitigate the performance risk for LFIs against any shortfalls in savings versus the debt service payment levels to be made to them. However, it does not provide for the first-loss fund of about USD 5-10 million that will very likely need to be provided to share initial losses with the Insurer until such time as an experience ratio is determined.

This intervention logically should not be vigorously pursued until sufficient demand is created for EE and ESCO services, which may not occur until many of the interventions being performed by other donors and herein have been implemented. It should be able to be implemented with relative ease since it does not require any government intervention or support.

EXHIBIT A: DEFINITIONS

Below are key EE definitions published and or officially used in Indonesia.

1) **Energy** is the capacity to do work, and may occur in the form of heat, light, mechanical, chemical, and electromagnetic[7]

2) **Energy Conservation** means systematic, planned and integrated actions in order to conserve domestic energy resources and improve the efficiency of energy utilization through Energy Efficiency.[8]

3) **Energy Conservation Services** are activities related to the planning, implementation, operation, and maintenance as well as measurement and verification in the field of Energy Conservation.[9]

4) **Energy Efficiency (EE)** means the effort to use energy efficiently and appropriately without compromising comfort, safety, and productivity.[9]

5) **Energy Efficiency Project (EEP)** is the implementation of one or a number of energy savings measures in the system, facilities, and processes of users of energy and energy resources.[3]

6) **ESCO** is an Energy Conservation Services Company is a company incorporated under Republic of Indonesia's law that implements Energy Conservation/Energy Efficiency Services based on Energy Saving Performance Contract.[9]

7) **Energy Savings** means the reduction of energy consumption to produce the same output, and /or to increase the productivity with the same energy consumption.[6]

8) **Energy Savings Measure (ESM)** means a single Cost Saving technology of method in an EEP that provides Energy saving.[10]

[7] PP 70/2009
[8] Proposed Revision of PP 70/2009
[9] Cancelled ESCO regulation No 14/2016 proposed by MASKEEI to be put back into PP 70/2009 revisions
[10] Draft MOHA Guideline on PPP-ESCO

9) **Energy Saving Performance Contract (ESPC)** is an agreement between the Service User and the Company (ESCO) where the payment in the agreement is made periodically based on Energy Saving performance.[8]

10) **Energy Audit** is the evaluation of an Energy User's process of energy utilization and identification of opportunities to save energy as well as recommendation of improving efficiency for energy users in the context of Energy Conservation.[7]

11) **Energy Users** are individuals, enterprises, permanent establishment, government agencies and non-governmental organization, which utilize energy and/or energy resources to produce products and/or services.[7]

12) **Energy Utilization** is an activity to utilize energy either directly or indirectly from energy sources.[7]

13) **Investment Grade Audit (IGA)** is a more detailed Energy Audit activity with the purpose to understand and evaluate specific energy saving measures for the implementation at Energy User facilities, with estimated implementation cost and energy saving supported by measurement, detailed calculations, assumption, and a measurement and verification plan to provide a better understanding to the owners of the energy user.[8]

14) **Measurement and Verification (M&V)** of Energy Saving Performance is the process of measuring and verification of the energy savings by means of comparing the amount of energy use before and after the commissioning of an Energy Efficiency Project and during the duration of an Energy Saving Performance Contract.[8]

15) **Government Facilities** are facilities controlled by the government financed by government budget (APBN) or regional budget (APBD), under the management of government institution in broad scope, which is not including goods or assets owned by State Owned Company/ Local Government Owned Company, which its implementation aims specifically for activities of the state and government administration.[8]

16) **Badan Layanan Umum (BLU)** is government agency that is developed to provide services to public in the form of goods and/ or services without

prioritizing of profit seeking and based on efficiency and productivity on its activity's implementation.[8]

17) **Availability Payment (AP)** means a periodic payment made by a GCA in accordance with the quality and/or other criteria specified in the PPP agreement (i.e., ESPC) and shall also have the same meaning as "ESPC Payment" herein.[9]

18) **Minister** is the minister who carries out government affairs in the field of energy.[7]

Diagnostic Review and Analysis of Energy Efficiency Development in the Philippines

Final Report: 31 January 2022

Supported by: The Energy Transition Partnership (ETP)

Prepared by: EPS Capital Corp.

ENERGY TRANSITION PARTNERSHIP

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ACRONYMS

ADB	Asian Development Bank
ADB	Asian Development Bank
AFET	Alternative Fuels and Energy Technologies
AFETD	Alternative Fuels and Energy Technology Division
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
ASEP	Access to Sustainable Energy Program
AEUR	Annual Energy Utilization Report
BAU	Business as Usual
BPS	Bureau of Product Standards
CAPEX	Capital Expenditure
CEA	Certified Energy Auditor
CECO	Certified Energy Conservation Officer
CEM	Certified Energy Manager
CES	Clean Energy Scenario
CFC	Chlorofluorocarbon
CHED	Commission on Higher Education
COA	Commission on Audit
COPE	Code of Practice for Energy Labeling of Products
DBM	Department of Budget Management
DE	Designated Establishment
DEA	Detailed Energy Audit

DENR	Department of Environmental and Natural Resources
DILG	Department of Interior Local Government
DOE	Department of Energy
DOF	Department of Finance
DOST	Department of Science and Technology
DOTR	Department of Transportation
DTI	Department and Trade and Industry
EAT	Energy Audit Team
ECP	Energy Consuming Product
EDGE	Enhancing Development and Growth through Energy
EE	Energy Efficiency
EEC	Energy Efficiency and Conservation
EECO	Energy Efficiency Conservation Office
EEP	Energy Efficiency Project
EnMS	Energy Management Standard
ENPAP	Energy Efficiency Practitioners Association of the Philippines
EPIRA	Electric Power Industry Reforms Act
EPMPD	EEC Program Management and Technology Promotion Division
EPRED	EEC Performance Regulation and Enforcement Division
EPSMD	EEC Public Sector Management Division
ER	Energy Regulation
ERC	Energy Regulatory Commission
ERTLS	Energy Research Testing and Laboratory Services
ESCO	Energy Service Company

ESG	Environmental, Social, and Governance
ESI	Energy Savings Insurance
ESP	Energy Secure Philippines
EU	European Union
EUMB	Energy Utilization Management Bureau
EV	Electric Vehicle
EVCS	Electric Vehicle Charging Station
GAs	Government Agencies
GEF	Global Environment Facility
GEMP	Government Energy Management Program
GHG	Greenhouse gas
GIS	Geographic Information System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GOCC	Government Owned and Controlled Corporations
HEV	Hybrid Electric Vehicles
IAEECC	Inter-Agency Energy Efficiency and Conservation Committee
IEC	Information, Education and Communication
IFC	International Finance Corporation
IGA	Investment Grade Audit
IIEE	Institute of Integrated Electrical Engineers
IRR	Implementing Rules and Regulations
ISO	International Organization for Standardization
IT	Information Technology
ITH	Income Tax Holiday

ITDI	Industrial Technology Development Institute
JICA	Japan International Cooperation Agency
LATD	Lighting and Appliances Testing Division
LCEP	Low Carbon Energy Programme
LGU	Local Government Unit
M&V	Monitoring and verification
MECR	Monthly Energy Consumption Report
MEPP	Minimum Energy Performance for Product
MEPS	Minimum Energy Performance Standard
MFCR	Monthly Fuel Consumption Report
NDC	Nationally Determined Contribution
NEDA	National Economic Development Authority
NGO	Non-governmental Organization
OPEX	Operating Expenses
PCG	Partial Credit Guarantee
PCIEERD	Philippine Council for Industry, Energy & Emerging Technology Research and Development
PE2	Philippine Energy Efficiency Alliance
PEEP	Philippine Energy Efficiency Project
PEESLP	Philippine Energy Efficiency Standards and Labeling Program
PELP	Philippine Energy Labeling Program
PIEEP	Philippine Industrial Energy Efficiency Project
PIEMPI	Philippine Institute of Energy Management Professionals
PSEF	Philippines Sustainable Energy Finance Program

PSME	Philippine Society of Mechanical Engineers
PUVMP	Public Utility Vehicle Modernization Plan
RA	Republic Act
RCOA	Retail Competition and Open Access
RE	Renewable Energy
REF	Reference Scenario
RES	Retail Electricity Suppliers
SDG	Sustainable Development Goals
SEC	Securities and Exchange Commission
TA	Technical Assistance
TESDA	Technical Education and Skills Development Authority
TPPD	Third Party Project Developer
UK	United Kingdom
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development

UNITS AND CURRENCIES

GBP	British Pound Sterling
GWh	GigaWatt hour
kTOE	kilotonnes of oil equivalent
kW	kilowatt
kWh	kilowatt hour
MTCO$_2$e	Million Tons of CO_2 Equivalent
MTOE	MegaTonne of Oil Equivalent
PhP	Philippine Peso
USD	United States Dollar

EXECUTIVE SUMMARY

The Philippine Energy Market as a whole, including the energy efficiency (EE) market, is largely a private sector led and price-sensitive market. These conditions present a challenge to developing the local EE market with a relatively small domestic capital market dominated by small and medium sized enterprises (SMEs) adversely hit by the pandemic.

The campaigns for energy efficiency and conservation (EEC) have been steadily going on for decades in the Philippines. Despite these efforts and fact that the Philippines has the highest electric rates in Southeast Asia, *no meaningful EE has been or is being implemented in any of the its energy consuming sectors*. Simply stated, there is very little market demand for EE in the Philippines leaving the opportunity untapped because it faces most of the common barriers faced by many countries in Southeast Asia and around the world, plus a few additional ones that are unique to the Philippines.

However, unlike any other country in Southeast Asia, the Philippines enacted a wide-spread energy efficiency law in April 2019, Energy Efficiency and Conservation Republic Act 11285 (EEC Act), that provides a national mandate for EE in its government facilities and is an overarching national regulation that serves as the framework for policies that require the more efficient use of energy and EE technologies throughout the country. It also provides incentives for EEC projects and delineates responsibilities among Government Agencies (GAs) and private entities.

The EEC Act is the primary driver for the potential expansion of the EE market in the Philippines. The residential, commercial, and industrial sectors are the major electricity users. Setting Minimum Energy Performance Standards (MEPS) and Minimum Energy Performance for Projects (MEPP) and energy labeling has been the primary strategy to manage households' energy consumption. MEPP has been established for room air conditioners, refrigerators, lamps and ballasts. For the commercial and industrial sectors, the EEC Act defined the Designated Establishments (DEs), end-users consuming at least 500,000kWh annually, that are mandated to set annual energy savings targets and implement them.

The EEC Act also prescribes for the certification of EE practitioners to raise the professional standards of those engaged in energy management and energy auditing as well a registration and certification mechanism for ESCOs, all of which are not yet

fully implemented. It aims to address barriers to EEPs and the ESCO industry, but faces many challenges that include the following:

1. **Policy Implementation**. Some of the provisions of the EEC Act have not been fully developed or implemented yet. The Department of Energy (DOE) is still establishing the necessary structures and systems that will allow it to fully support the young EEC sector and to enforce the mandatory provisions. The focus is still at building awareness among Designated Establishments (DEs) on their energy saving responsibilities and not yet on the strict monitoring of regulatory compliance. Furthermore, DOE has limited resources and capability to fully enforce the energy savings monitoring systems and other provisions.

   DOE needs to be provided with various types of support to facilitate the development of department circulars, processes, and procedures to fast tract the implementation of the provisions under the EEC Act. DOE can benefit from technical advice and capacity building to enhance internal capabilities. Its Energy Utilization Management Bureau (EUMB) also needs support to establish infrastructures such as appliance/equipment testing laboratories and IT facility/online platform for the mandatory annual energy utilization reports mandated to be submitted by DEs.

2. **Inherent Government Sector Barriers:** The Government Energy Management Program (GEMP) was the first mandatory EE initiative intended for buildings and facilities owned by GAs. While the program resulted in energy savings, it also uncovered challenges in implementing public sector EEPs with private sector entities like ESCOs. GAs are unable to engage ESCOs or any other private-sector entities to implement EEPs in their facilities on a paid-from-savings basis because GAs cannot legally commit to a multi-year savings payment scheme, cannot retain multi-year savings in its budgets (zero-budgeting policy), and are required to use “lowest cost” instead of “best value” procurement method. The EEC Act contains general language to overcome these barriers but unfortunately, they still exist, because the required new procurement and paid-from-savings procedures are not included in the current GEMP Guidelines expected to be approved by the IAEECC within 2021 or in early 2022. Consequently, despite the EEC Act mandating GAs and LGUs to implement EE, they are severely hampered in being able to comply due to their inability to

access private-sector "paid-from-savings' funding and EE services that many of them do not have.

3. **Awareness and Capability.** The need to increase awareness on EE is evident across various stakeholders. Project hosts, specifically the owners and managers of energy-consuming facilities (Facility Owners), lack EE knowledge and do not prioritize EE in their operations/expenditures. Facility Owners will often prioritize investments related only to their core business. There is also a general lack of awareness and understanding of the mandated responsibilities of GAs and DEs as set forth in the EEC Act.

   The ESCO sector is at its infant stage, mostly composed of SMEs that have limited or no experience in developing 'bankable' EEPs. Specifically, there is limited or no local capability in conducting an Investment Grade Audit (IGA) or performing Measurement and Verification (M&V) on EEPs, and this is compounded by inadequate existing EE professional certifications. The EEC Act requires ESCO to be certified based on the having proven experience in implementing paid-from savings projects, which very few have.

   Local banks and Financial Institutions (LFIs) also lack an understanding of EEPs and the type of project-based financing that the market needs. Some LFIs have dedicated EE financing products but they are not attractive to Facility Owners and are not appropriate for ESCOs whose revenues are defined by energy savings. This gap stems from LFIs mostly having limited understanding of how EE technologies generate energy savings, the ability to measure and verify these savings, and identify and manage associated risks.

   A robust and aggressive capacity building and education campaign is necessary to reach all relevant EE stakeholders. DOE is continuously conducting regular awareness campaigns, but more targeted capacity building on developing 'bankable' EEPs and awareness should be done to engage the different stakeholders.

4. **Financing EEPs**. LFIs do not provide project-based EE financing in the Philippines. This financing gap is not caused by lack of available funds, but rather the inability of EEPs to access the existing funding programs of LFIs on commercially-attractive terms. Most LFIs are not equipped to understand and recognize the significant future cash flow generated from EEPs, and are not

confident that such cash flow can be relied upon to repay the loan. Consequently, LFIs generally assign no value to the future cash flow of EEPs and thus require Facility Owners and any other borrowers to finance them from their existing credit capacity, or provide additional collateral that most are unwilling or unable to provide.

A possible intervention is to set up de-risking financing mechanisms/products such as an Energy Savings Insurance (ESI) for EEPs. ESI overcomes the lack of confidence barrier many Facility Owners and LFIs have, as well as collateral barriers by mitigating the performance risks against any energy savings shortfall. It also establishes energy savings as a reliable future cash flow for LFIs to accept as a source of loan repayment, increased credit capacity and reduced collateral requirements of borrowers. A Partial Credit Guarantee (PCG) is also needed for EEPs even though the government-funded PhilGuarantee GA is set up to provide it for loans taken out from private commercial banks. The challenge is that PhilGuarantee has no prior experience with EEPs and is prohibited from providing guarantees to on financed by government-owned financial institutions. These de-risking mechanisms can facilitate EEPs' access to local financing.

Development of the EE market is still at the early stages but the level playing field for its development has been established by the regulatory framework with DOE providing the stable foundation for EEPs to begin flourishing in the short term.

Taking into consideration the EE Gaps identified in Section 5 and eliminating those covered by Donor programs in Section 4, to avoid duplication, the following EE interventions are recommended for the Philippines. They are prioritized from highest to lowest potential impact in being able to create EE demand and scale-up the implementation of EE in the Philippines. It should be noted that DOE, as the designated GA responsible for all EE in the Philippines, will be the lead counter-party agency with which all interventions are to be coordinated.

1. Support DOE's implementation of the EEC Act

2. Develop/Implement/Fund Private & Government Demonstration ESCO Projects

3. Develop Automated Annual Energy Consumption Reporting by DEs

4. Deliver EEP Development Capacity Building

5. Develop EE Finance De-Risking Products

6. Develop Cash Incentive Programs to Drive Private-Sector EE Demand

If they are implemented in conjunction with all major EE mandates in the EEC Act, the Philippines could realize the EE potential estimated in this report for the governmental and industrial sectors totaling an incredible annual savings of USD 1.5 billion and investment of USD 7.6 billion.

1. ENERGY EFFICIENCY (EE) MARKET

Urbanization and the rising dependence on electronic gadgets and appliances for social connections and for daily comfort underscore the importance of energy consciousness. Approximately 51% of the Philippines' 105 million people live in urban areas, with 21 million living in Metro Manila alone. In Region IV-A, the south suburban area of Metro Manila has a population of 16.1 million and 11.2 million live in Region 3, the north area of Metro Manila. The rest of the urban areas are spread on the islands of the Visayas Region and Mindanao. The country's growing economy also drives energy consumption, especially the services sector that has exhibited the most significant growth over the last ten years.

In 2019, prior to the COVID-19 global pandemic, the Philippines' total final energy consumption stood at 36 million TOE per year. The transport sector was the most energy-intensive sector, accounting for 35% of the total final energy consumption. The pandemic in 2020 dampened the economic activities reducing energy demand to 32 million TOE per year. The consumption profile shifted since most work and all school classes became home-based, resulting in the household sector becoming the largest share of the total final energy consumption at 31%[1]. While the pandemic resulted in a dip in demand, energy consumption is expected to rise as the country loosens quarantine/lockdown measures and economic recovery activities are implemented.

To manage energy demand and contribute to climate action, DOE's (DOE) Philippine Energy Plan defined a Clean Energy Scenario (CES) as an alternative to the Reference Scenario (REF) or the Business as Usual (BAU) case. The CES utilizes more renewable energy and promotes energy efficiency as a "way of life." The CES has a higher share

[1] DOE. 2020. Philippine Energy Plan 2018-2040.

of renewable energy in the energy mix and a slower growth of the total final energy consumption, compared to the BAU, at 4.4% annually. The CES' projected total energy requirement will be at about 87 million TOE per year in 2040, which is 9.3% lower than the 96 million TOE per year BAU.

1.1 Status and Potential

a) Status

Despite having the highest electric rates in Southeast Asia and a significant energy savings opportunity, the status quo is that ***no meaningful EE has been or is being implemented in any of the Philippines' energy consuming sectors***. Simply stated, there is very little market demand for EE in the Philippines leaving the opportunity untapped because it faces most of the common barriers faced by many countries in Southeast Asia and around the world, plus a few additional ones that are unique to the Philippines.

For 2020, Designated Establishments (DEs) reported PhP 15 billion (USD 300 million) of EE investments covering retrofits, equipment maintenance, and equipment acquisition that yielded energy savings of 120,464,478 kWh or PhP 1 billion (USD 20 million) per year. Also, investments reported for 2020 by newly registered ESCOs totaled PhP 689 million (USD 13.8 million) and yielded energy savings of PhP 209.8 million (USD 4.2 million). See the distribution of EE technologies deployed in the below Table 1.

Table 1. Reported EEPs, as of April 2021[2]

Project Name	Project Cost (Million PhP)	Energy Savings (kWh/year)
Office Building Air-Cooled Conversion	77	2,565,696
Chilled Water Plant Retrofit	47	1,939,798
Water-cooled Packaged A/C System Retrofit	101	2,674,736

[2] DOE. Philippine Energy Plan (2018-2040), Page 144

Replacement of Centrifugal Water-cooled Chiller	19	635,000
Chilled Water Plant and BMS Retrofit	258	5,212,000
Conversion of Air-cooled Chiller Plant to Water-cooled Chiller Plant	34	4,380,000
Industrial Refrigeration Retrofit	56	2,564,640
Replacement of Standard efficiency motors (SEM) with high efficiency motors (HEM)	82	3,010,200
Lighting System Retrofit	13	330,341
TOTAL (PhP)	689	23,312,411
Total (USD)*	**USD 13,780,000**	

Note: The above-mentioned sample EEPs were undertaken by ESCOs with the corresponding investment cost and equivalent energy savings.

* USD estimates not included in source material.

In 2021, DOE-EAT and others completed 90 energy audits of building showing a small total electricity savings of about 12 million kWhs or USD 2 million) per year. DOE also implemented a small demonstration EEP at one of its buildings containing the below two (2) energy savings measures that were estimated to save a total of 459,000 kWhs or USD 111,700 per year.

1. Replacement of existing fluorescent lamps with LEDs, estimated to reduce energy consumption by 65,000 kWhs and save DOE PhP 834,000 (USD 16,700) per year and with a project payback period of 2.82 years.

2. Replacement of existing non-inverter air conditioning units with inverter-type ones, estimated to reduce energy consumption by 394,000 kWhs equating to savings of PhP 4.7 million (USD 94,000) per year and with a project payback period of 4.75 years.

The good news is that the Philippines enacted an aggressive national energy efficiency law in April 2019, Energy Efficiency and Conservation Republic Act 11285 (EEC Act), that provides a national mandate for EE and is the overarching national regulation that serves as the framework for policies that require the more efficient use of energy and EE technologies. It also provides incentives for EEC projects and delineates responsibilities among government agencies (GAs) and private entities.

Prior to the EEC Act, EE activities were voluntary and driven by government's public awareness initiatives and labeling programs, as well as by technical assistance programs of development partners. The Government Energy Management Program (GEMP) mandated GAs and their offices to meet at least a 10% reduction in electricity consumption from the baseline average monthly consumption during the 1st trimester of 2004. Each GA had to reduce its fuel consumption by at least 10% benchmarked on the average monthly consumption during the 1st semester of 2005[3]. DOE created Energy Audit Teams (EAT) that oversee the public sector's compliance to this target. A certificate of savings is issued to GAs that have undergone the energy audit process and complied with the submission of Monthly Energy Consumption Reports (MECRs) and Monthly Fuel Consumption Report (MFCRs). The GEMP in the EEC Act is a mandatory EE program meant to achieve energy savings by shifting to more efficient technologies and being more judicious in energy use.

The initial Philippine Energy Efficiency Standards and Labeling Program (PEESLP) was the first EE labeling program undertaken jointly by DOE and the Department and Trade and Industry (DTI). It required appliances and lighting products to meet a prescribed minimum energy efficiency level and to carry an energy label at the point of sale. Labeling standards were implemented for room air-conditioners, household refrigerators and freezers, and lights and ballasts. The PEESLP is the precursor of the Philippine Energy Labeling Program (PELP) under the EEC Act, which increases the prescribed EE levels in the existing labeling standards and adds other equipment and vehicles to its scope.

The EEC Act is expected to significantly enhance the demand for and attract investments in EEC projects in the country. It is also expected to create a new EEC sector market, introduce new entrants, and new business models. This brings with it a potentially vast market in the product supply side: importation, distribution and

[3] DOE. 2008. Implementing Rules and Regulations Directing the Institutionalization of a Government Energy Management Program (GEMP).

production of more EE appliances, and equipment. It also is expected to create new professional skill sets or green jobs in the area of education, engineering, sciences and auditing, as well as a need for Energy Service Companies (ESCOs).

However, the true impact it will have on EE implementation in the Philippines depends solely on the efficacy of its implementation from both an operational and enforcement perspective.

b) Energy Saving Potential

There are no official energy savings projections released by DOE due in large part to the lack of reliable baseline energy consumption data from which to calculate the estimated savings. Under the EEC Act, all DEs will be required to start reporting their ongoing energy consumption and establish annual savings targets, but the overall national EE target has not yet been defined. The national target and any sectoral EE targets should be established in the National Energy Efficiency Conservation Program (NEECP), which is yet to be launched. There have been a few studies that estimated energy savings potential as follows:

- A DOE 2010-2030 energy saving forecast projection estimated an annual energy savings potential of 3,455 kTOE in the household, industrial, commercial, transport and agriculture sectors equating to a very small PhP122 million or USD 2.4 million per year[4]. This estimate was used to justify the passing of the EEC Act. It is notable that in the early versions of the EEC Bill, when it had not been legislated yet, there was a 1% annual energy savings requirement for DEs.

- Back in 2013, the EU's Switch Asia Program endeavored to define EE targets for the Philippines based on their assessment of achievable potential by 2030, which is shown in table below. Extrapolating from the above kTOE estimate, the 10,655 kTOE would also equate to a very small USD 7.5 million per year.

[4] T. Guingona III, Exploratory Note for Senate Bill 3325, Fifteenth Congress of the Republic of the Philippines, Third Regular Session (2012).

Sector	Implied annual % savings (total savings by 2030)	Annual energy saved by 2030 (kTOE)
Transport	1.9% (25%)	4,861
Industry	1.3% (15%)	3,088
Residential Buildings	1.2% (20%)	1,432
Commercial Buildings	1.9% (25%)	1,206
Agriculture	0.8% (10%)	78
Total	**1.6% (24%)**	**10,655**

Source: Switch Asia Program. 2013. An Energy Efficiency Roadmap for the Philippines 2014-30. Final Report.

Given the significantly understated potential energy savings reflected above, a rough estimate of the energy savings is calculated[5] below, based on 100,000 GWHs of electricity consumption shown in Figure 1, plus experience-based % savings and paybacks for the governmental and industrial sectors.

1. **Government Facilities:**

- ***Government-owned Facilities and SUCs*** (State-owned Universities and Colleges) - assumed ~5% of total electricity consumption in 2020[6], savings of 25% with an 8-year payback equates to potential annual savings of PhP 16 billion (USD 318 million) and investment of PhP 127 billion (USD 2.5 billion)

- ***Public Street Lighting*** assumed ~1.5% of total electricity consumption in 2020 , savings of 50% from LEDs with a 6-year payback equates to potential annual savings of PhP 10 billion of (USD 191 million) and investment of PhP 57 billion (USD 1.1 billion) investment.

[5] Calculated by Thomas K. Dreessen
[6] DOE 2020. Philippine Energy Plan 2018-2040: 100,000 GWhs

2. **Industrial Facilities:**

   Assumed ~19% of total energy consumption (per below Table 1), savings of 10% on electricity and thermal with a 4-year payback equates to PhP 49 billion of potential annual savings (USD 976 million) and investment of PhP 195 billion (USD 3.9 billion) investment.

The above EE opportunities in the governmental and industrial sectors total an incredible **annual savings potential** of **USD 1.5 billion** and **investment potential of USD 7.6 billion**, which is virtually untapped.

1.2 Primary Energy Consuming Sectors

The below table shows the changes in total final energy consumption of the different sectors by fuel type for 2020 versus 2019.

Table 2. Total Final Energy Consumption, by Sector and Fuel Type (in kTOE)

	2019	2020	Growth Rate
Industry	**7,306**	**6, 205**	**-15.1%**
Coal	2,217	1,494	-32.6%
Natural gas	62	37	-39.5%
Oil	1,381	1,557	12.7%
Biomass*	1,207	905	-25.0%
Biodiesel	15	13	-9.8%
Electricity	2,424	2,198	-9.3%
Transport	**12,697**	**9,843**	**-22.5%**
Oil	12,181	9,416	-22.7%
Biodiesel	127	97	-23.5%
Bioethanol	380	324	-14.8%

Electricity	9	7	-28.3%
Households	**9,711**	**10,028**	**3.3%**
Oil	1,312	1,238	-5.7%
Biomass**	5,772	5,842	1.2%
Electricity	2,627	2,949	12.2%
Services	**4,936**	**4,611**	**-6.6%**
Oil	2,360	2,467	4.5%
Biomass*	353	325	-7.8%
Biodiesel	33	37	12.6%
Electricity	2,191	1,782	-18.6%
Agriculture	**473**	**437**	**-7.7%**
Oil	229	211	-8.0%
Biodiesel	4	4	-6.5%
Electricity	240	222	-7.5%
Non-Energy Use	**1,137**	**1,263**	**11.2%**
Oil	996	1,126	13.1%
Coal	141	137	-2.7%
Total	**36,260**	**32,388**	**-10.7%**

* includes rice hull, fuelwood, bagasse, agri-waste and animal waste

**includes charcoal, fuelwood, and agri-waste

***includes rice hull, charcoal, and fuelwood

Source: DOE. 2020. Philippine Energy Plan 2018-2040.

As can be seen the contraction of economic activities due to COVID-19 resulted in a 10.7% reduction in total final energy consumption in 2020 versus 2019. The Transport sector was the most energy-intensive prior to the pandemic but bore the brunt of the travel restrictions and registered a sharp decline of 22.5%. The energy consumption in the Industry and Services sector dropped by 15.1% and 6.6% respectively, due to the strict quarantine restrictions that crippled businesses.

The 2021-2022 recovery programs are expected to increase energy demand by 4.7% in 2022. Recent improvements in transport infrastructures are expected to induce mobility and energy consumption to pick up by 6.4% in 2022. Recovery plans for the agriculture sector are geared toward modernization that expects to increase its energy utilization by 2.3% in 2022. The industrial sector is expected to recover with a 5.7% increase in its energy consumption in 2022, while the service sector is expecting a 5.5% growth. The energy consumption of households is still expected to increase by 1.9% in 2022 because many jobs are expected to remain remote/home-based.

Table 3. Covid-19 Recovery Plans Impact to Energy Demand

Sector	Levels (MTOE)					Growth Rates (%)		
	2018	2019	2020	2021	2022	19-20	20-21	21-22
Agriculture	0.44	0.47	0.47	0.48	0.49	0.3	2.0	2.3
Industry	7.52	7.39	6.98	7.38	7.80	-5.5	5.8	5.7
Services	4.67	4.91	4.42	4.66	4.91	-10.1	5.5	5.5
Residential	9.43	9.71	10.00	10.28	10.47	3.0	2.8	1.9
Transport	12.24	12.69	10.54	11.25	11.97	-16.9	6.7	6.4
Non-Energy	1.42	1.14	1.08	1.15	1.20	-5.1	6.9	4.5
Total	**35.72**	**36.31**	**33.49**	**35.21**	**36.85**	**-7.8**	**5.1**	**4.7**

Fuel	Levels (MTOE)					Growth Rates (%)		
	2018	2019	2020	2021	2022	19-20	20-21	21-22
Coal	2.57	2.36	2.25	2.49	2.71	-4.8	11.1	8.7
Natural Gas	0.06	0.06	0.03	0.00	0.00	-54.8	-100.0	-
Oil Products	18.17	18.51	16.10	17.11	18.09	-13.1	6.3	5.7
Biofuels	0.52	0.56	0.49	0.52	0.55	-12.7	6.4	5.4
Electricity	7.10	7.49	7.31	7.67	8.12	-2.4	4.9	5.9
Biomass	7.29	7.33	7.32	7.41	7.39	-0.1	1.2	-0.3
Total	**35.72**	**36.31**	**33.49**	**35.21**	**36.85**	**-7.8**	**5.1**	**4.7**

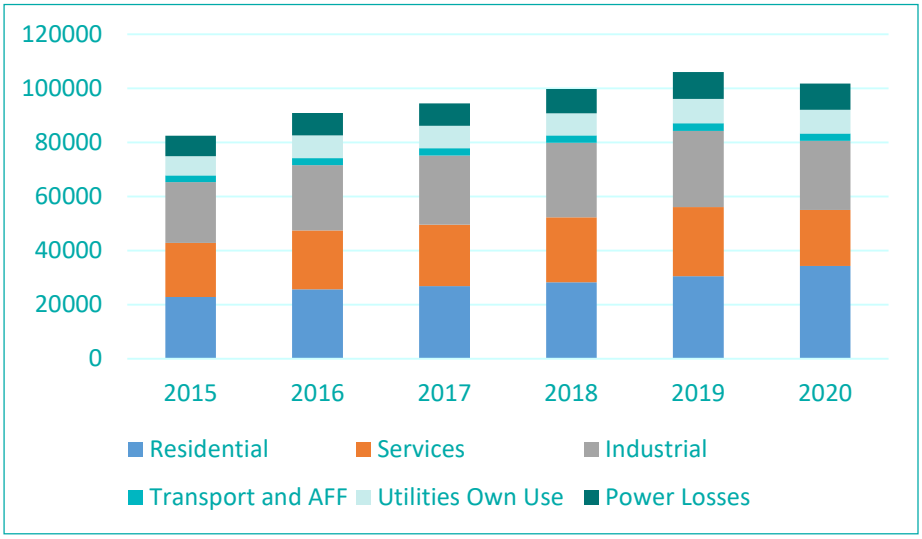
**red font: short term outlook*

Source: DOE. 2020. *Philippine Energy Plan 2018-2040.*

Prior the COVID-19 pandemic, the Philippines' electricity consumption was increasing at an average annual rate of 6.53% from 2015 – 2019[7]. The global pandemic negatively affected economic activities that resulted in a 2.4% decrease in electricity consumption between 2019 and 2020. The residential or household sector remains the largest consumer of electricity, with an average increase of 7.7% annually (2015-2019). The industrial and services sectors averaged annual increases in electricity consumption of 5.8% and 6.1%, respectively.

[7] DOE 2019. 2019 *Key Energy Statistics*. Manila, Philippines

Figure 1. Electricity Consumption by Sector 2015-2020 (GWh)



AFF = Agriculture, Forestry, Fishery

Data Source: DOE. 2020. *Philippine Energy Plan 2018-2040.*

As reflected in Figure 1, residential, industrial and services sectors are the top 3 energy-intensive sectors. For residential areas, EEC policies and programs on energy labeling of appliances have been formulated. Baseline market research on lighting and air conditioning appliances, the most commonly used in households, were prioritized. Studies on other equipment are continuing for high efficiency motors, chillers, and boilers. The EEC Act targets mainly the DEs, defined as those establishments in the Philippines consuming more than one million fuel oil equivalent liters of energy annually, in the industrial and services sectors, including government services.

1.3 Energy and Carbon Emission Reductions under BAU Scenario

The total greenhouse gas (GHG) emissions from energy-related activities reached 123.3 million tons of CO2 equivalent ($MTCO_2e$) per year in 2018, which is 4% higher than the previous year's emissions (118.5 $MTCO_2e$). Power generation contributed 51.7% of the emissions while transport's share was 27.9%. The growth in GHG emissions can be attributed in large part to the use of coal for power generation and oil in the transport sector.

The BAU and CES assumptions in the computation of the country's estimated GHG emission reductions are shown in the below Table 4.

Table 4. Business as Usual and Clean Energy Scenario Assumptions[8]

	Scenario Assumptions	
	Reference Scenario ***(Business as Usual)***	**Clean Energy Scenario** ***(Alternative Scenario)***
Energy Demand	• Supports an accelerated economic expansion post-COVID19 (i.e., High GDP scenario). • Maintains current blending schedule for biofuels (2.0 percent biodiesel and 10.0 percent bioethanol) until 2040. • 5.0 percent penetration rate of electric vehicles for road transport. (motorcycles, cars, jeepneys) by 2040. • Current efforts on energy efficiency and conservation (EEC) as a way of life continues until 2040.	• 10.0 percent penetration rate of electric vehicles for road transport (motorcycles, cars, jeepneys) by 2040. • 1.5 percent increase in aggregate natural gas consumption from the Transport and Industry sectors between 2020 and 2040. • 5.0 percent blending for biodiesel starting 2022. • Up to 5.0 percent energy savings on oil products and electricity by 2040.

The below Table 4 shows the calculated GHG emissions in the BAU and the CES, and the total estimated GHG reductions from 2020-2040.

[8] DOE Philippine Energy Plan (2018-2040), page 170.

Table 5. GHG Emissions and Avoidance of Highlight Years, in MTCO2e

	2010	2020	2025	2030	2035	2040	Total
BAU	**53.11**	**109.89**	**151.50**	**192.26**	**246.15**	**339.48**	**4,277.59**
Transformation	33.02	81.39	115.19	145.69	185.55	259.48	**3,241.16**
Industry	12.04	15.99	20.63	27.00	36.26	50.08	**612.53**
Others	8.05	12.51	15.67	19.56	24.34	29.93	**423.90**
CES	**53.11**	**107.19**	**147.74**	**182.03**	**206.99**	**246.75**	**3,751.99**
Transformation	33.02	79.82	113.71	138.89	150.97	172.47	**2,787.52**
Industry	12.04	15.20	19.24	25.01	33.67	46.89	**570.73**
Others	8.05	12.18	14.79	18.13	22.35	27.39	**393.74**
Total GHG Avoidance/Reduction	**-**	**2.71**	**3.76**	**10.22**	**39.16**	**92.73**	**525.59**
Unconditional Targets: GHG Avoidance / Reduction included in BAU and CES	**-**	**1.13**	**2.28**	**3.43**	**4.58**	**5.72**	**71.96**

Source: DOE Philippine Energy Plan 2018-2040

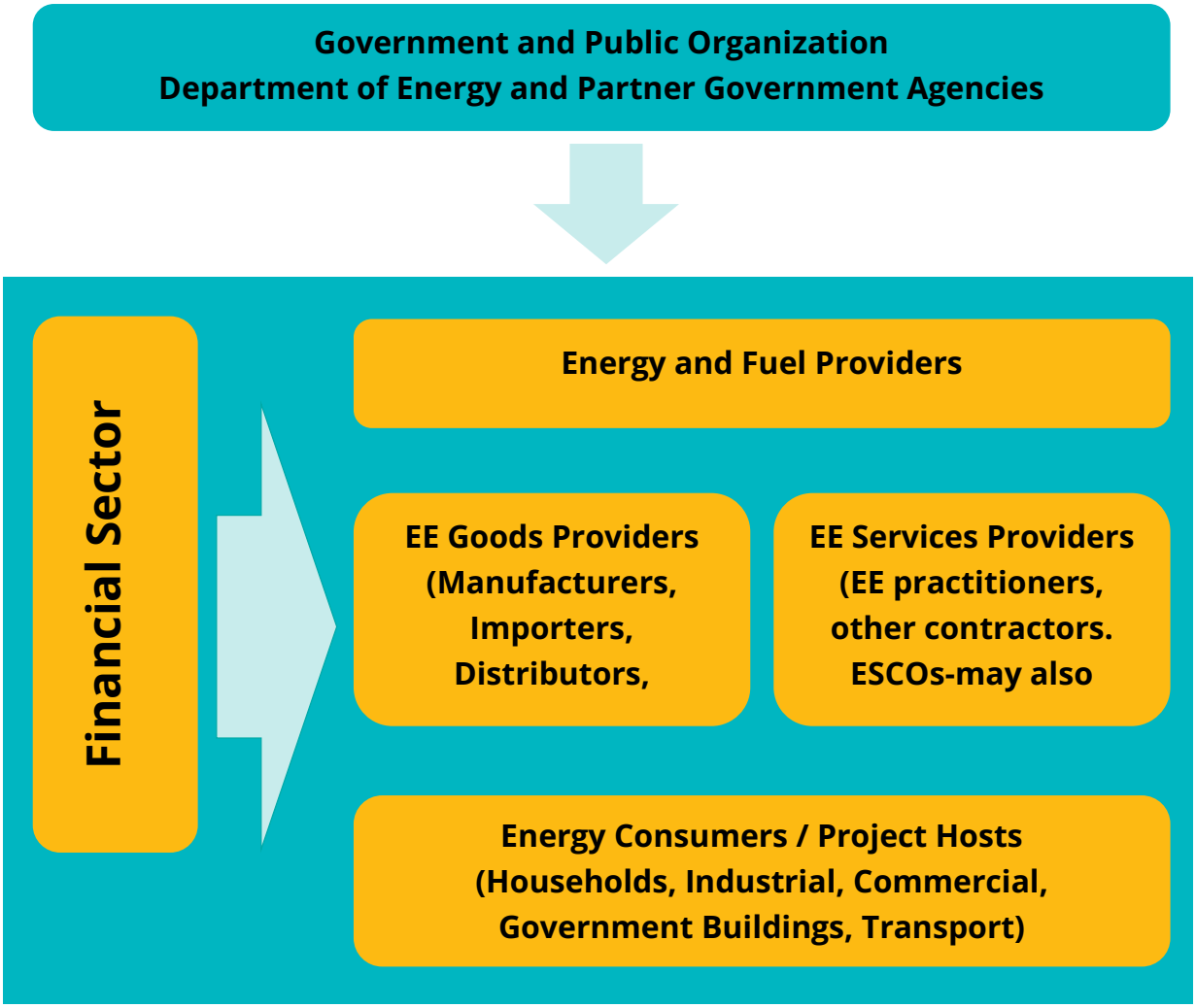
The BAU scenario incorporates existing policies and programs on renewable energy, alternative fuels, and EE. It also integrates the Asia-Pacific Economic Cooperation's (APEC) aspirational target to reduce aggregate energy intensity by 25% in 2030 to 45% by 2035 from the 2005 level. The BAU and CES scenarios cover unconditional NDC targets that the government will implement through all DOE programs including EE with an estimated annual reduction of 72 MTCO2e from 2020-2040, or an average of 3.43 $MTCO_2e$ per year.

The specific contribution of EE in GHG reduction is difficult to estimate since the projected energy savings from EE initiatives are not clearly defined. More robust evidence-based estimates could be derived, once the National Energy Conservation database, stipulated in the EEC law, is established. This database will track reports submitted to DOE by DEs over time. This database will become the source of

information about baseline energy consumption of energy intensive sectors and energy savings potentials therefrom.

1.4 EE Stakeholders

Figure 2. EE Stakeholder Map



Source: JICA, 2012

a) **DOE** is the lead **government agency** to implement the EEC Act. DOE works together with partner GAs through the Inter-Agency Energy Efficiency and Conservation Committee (IAEECC). Local government units (LGUs) must establish their respective Energy Efficiency Conservation Office (EECO) that will

assist DOE in monitoring the compliance of DEs with their obligations under the EEC Act. The EECO shall also develop and implement their respective local EEC plans and incorporate these to their local development plans.

DOE extends its collaborative efforts to partner GAs in support to the formulation and adoption of policies related to EE that include:

- Department of Transportation (DOTR) related to programs on low carbon transport and allied technologies and services
- Department of Science and Technology (DOST) for research and development matters
- Department of Trade and Industry (DTI) Bureau of Product Standards on the labeling of safety aspects of appliances and industrial equipment, roads and EVs, electric vehicle charging stations (EVCS), Safety Management Systems, Intelligent Transport Systems, Luminaries and Lampholders, Rotating Electrical Machines and household and similar electrical appliances, which may be used as reference in setting energy performance requirements for energy consuming products (ECP)
- Commission on Higher Education (CHED), Technical Education and Skills Development Authority (TESDA), and State Universities for training and Information, Education and Communication (IEC) activities

b) **EE Goods Providers** are the suppliers of EE appliances and equipment to energy consumers or end-users.

c) **EE Service Providers** comprise existing or potential Energy Service Companies, Energy Managers, or Energy Auditors who may belong to professional associations such as:

- PE2 (Philippine Energy Efficiency Alliance)
- ENPAP 4.0 (Energy Efficiency Practitioners Association of the Philippines)
- DOE registered and/or certified ESCOs, certified energy managers, certified energy auditors, certified energy conservation officer and other EE practitioners

- Architects, construction companies, property developers

d) **Financial Institutions** are also key stakeholders in the EE market. Some local banks have specific EE financing products that they offer to Facility Owners, ESCOs, project hosts, and the public sector. The banks in the Philippines currently providing EE financing are as follows:

1) Development Bank of the Philippines (DBP) is the primary Government Financing Institution (GFI) with a lending program specifically designed for energy efficiency projects called the Energy Efficiency Savings (E2SAVE) Financing Program which began in 2018. E2SAVE is designed to assist public and private firms enhance their productivity by adopting new and energy efficient technologies that will advance optimal power consumption in their energy-related projects (See Section 3 for details).

2) Landbank of the Philippines (Landbank) is another major GFI in the Philippines promoting EE financing through its 'GO Green' Financing Program designed for SMEs and LGUs.

3) Bank of the Philippine Islands (BPI) is a private bank that engaged the IFC in 2008 to develop its Sustainable Energy Finance (SEF) Program (see the below Section 2.5 f) designed to finance technologies that improve the efficiency of energy generation, energy distribution and energy use. According to BPI, its SEF program helped over 300 private companies, such as property developers, pursue more environment-friendly, cost-efficient projects. As of the end of 2018, it had disbursed PHP 52.6 billion (USD 1 Billion) for EE, RE, and climate resiliency projects, of which 20% were for Green Building projects.

4) Banco de Oro Unibank (BDO) is a private bank that also engaged the IFC from 2010-2016, to develop a SEF Program and to provide BDO with credit risk coverage under its risk-sharing facility (see the below Section 2.5 f). According to BDO, it has developed a "climate smart" portfolio of more than PHP 500 million (USD 10 million). In December 2017, BDO raised USD 150 million from the issuance of its first green bond, with IFC being the sole investor. The green bond funds are to be used exclusively to finance climate smart projects that include renewable energy, green buildings, and EE.

5) Philippine Guarantee Corporation (PHILGUARANTEE) is a government guarantee agency that has been newly reorganized to combine the government guarantees offered by the former Philippine Exim and Philippine Guarantee entities. It primarily provides credit guarantees to banks and financial institutions on their loans to private sector.

2. EE REGULATIONS

With the 2019 passing of the Republic Act (RA) No. 11285, "The Energy Efficiency and Conservation Act" or "EEC Act", promotes energy efficiency and conservation (EEC) to become a "way of life" for everyone in the Philippines. This is the direction that DOE has been echoing through their information, education, and awareness campaigns prior to the EEC Act. After almost three decades of voluntary practice, it has now become mandatory for energy intensive establishments to be more judicious with their energy consumption and consequently help make EEC become a major contributor to climate change mitigation and reduction of Greenhouse Gas (GHG) emissions.

In addition to ensuring the sufficient and stable supply of energy, the implementation of EEC will aid the country to fulfill its UN Sustainable Development Goals on clean energy (SDG 7) and climate action (SDG 13). It will also contribute to attaining the country's Nationally Determined Contribution (NDC) to the Paris Agreement, which is set at a 75% reduction in GHG emissions by 2030 relative to the 2010 business-as-usual scenario.

The EEC Act was approved in April 2019, and its Implementing Rules and Regulations (IRR) were subsequently approved/released in November 2019. In 2020, DOE issued the Memorandum Circular defining the DEs (defined in Section 2.5). In the months thereafter, DOE issued multiple Department Circulars required to implement the EEC Act, which included release of the Philippine Energy Labeling Program (PELP), Minimum Energy Performance for Products, Guidelines on ESCO Registration and Certification and Guidelines on Energy Conserving Building Designs. In less than two years, the supporting legal and administrative guidelines have been articulated and stipulated showing the importance of EEC in managing energy demand particularly in four main sectors, the industrial and commercial buildings sector, transport and residential sectors as shown in the below Figure 3.

Figure 3. EE Regulations and activities by sector

INDUSTRY

- Energy Audit
- Awareness Campaign (IEC)
- Energy consumption Monitoring
- ESCO Promotion Program

BUILDING

- Energy Audit
- Awareness Campaign (IEC)
- Energy consumption Monitoring
- ESCO Promotion Program
- Government Energy Management Program

TRANSPORT

- Standard and Labeling Program (Passenger Cars and Light Duty Vehicles)
- Electric Vehicle Charging Stations
- Awareness Campaign (IEC)
- Energy Consumption Monitoring

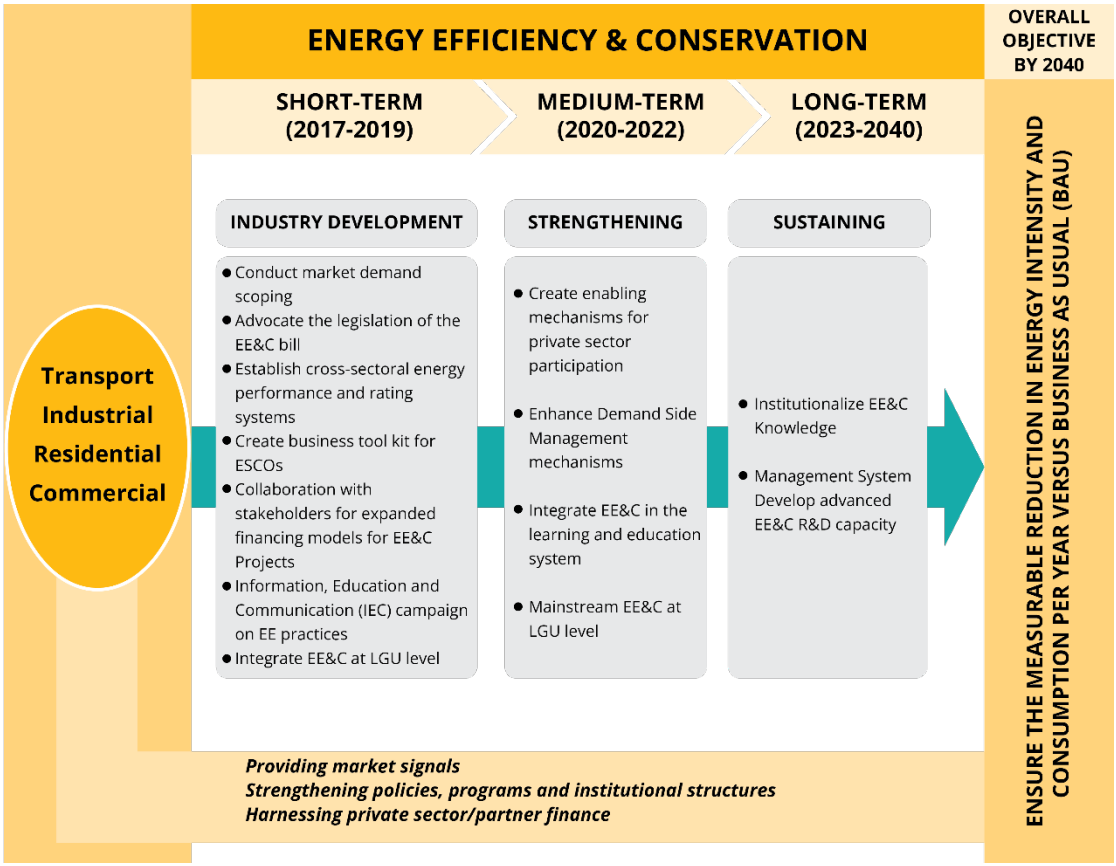
RESIDENTIAL

- Standard and Labeling Program (Household Appliances)
- Awareness Campaigns (IEC)
- Energy Consumption Monitoring

With EEC policies and measures in place, the government expects to see a more manageable growth in energy demand that could result in the deferment of additional power generation capacities and energy infrastructures and facilities for the on-grid market. Other benefits include environmental health due to reduced GHG emissions and creation of green jobs and investments for the economy.

DOE also developed an EEC Roadmap through 2040 which is shown below in Figure 4.

Figure 4. The EEC Roadmap, 2017-2040



Source: DOE, 2020. *Philippine Energy Plan 2018-2040*.

The following measures have been articulated in DOE's EEC Roadmap:

- Continue IEC activities on EEC policies, programs and best practices
- Mainstreaming and integrating EEC at the LGU Level: Continue targeted IEC campaigns for LGUs to enhance their understanding of their obligations under the EEC Act.
- Integrating EEC in the learning and education system and through mass media: Implement more programs that promote general awareness and public education on EEC as a way of life. Government-owned mass media channels including TV, radio, and publications may be tapped to echo principles of EEC.

- Strengthen support for the Commission on Higher Education (CHED) and Technical Education and Skills Development Authority (TESDA) faculty and instructors in the development of degree or non-degree courses or curriculum mainstreaming RE, EE, climate change, sustainability and sustainability reporting in the Colleges of Accounting, Architecture, Engineering, Finance, Mathematics, Sciences, as well as in skill-based (non-degree capacity building

- Enhance Demand Side Management Mechanism through the "Guidelines for the Endorsement of Energy Efficiency Projects to the BOI for Fiscal Incentives (DOE Department Circular 2021-05-0011 by providing to ESCOs and project hosts on proven EE technologies and systems applicable in local industries and establishments.

- Strengthening cross-sectoral energy consumption monitoring through data automation

- Developing energy efficiency program for air and sea transport

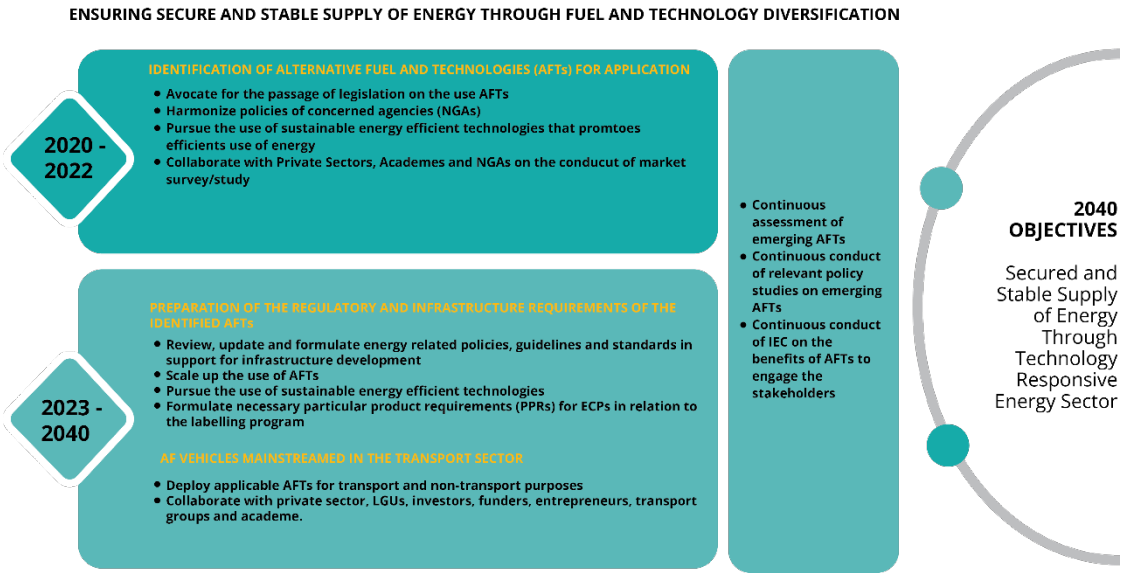
- Institutionalizing EEC Knowledge Management System

- Expand the list of accredited appliances and industrial equipment under the PELP to include electric motors, chillers, boilers, steamers, district cooling, etc.

- Ensuring energy security and weather-proofing of Power Line Distribution Systems and Facilities

Parallel IEC efforts for promoting EE in the transport sector are also being conducted by DOE. As shown in the alternative fuels and energy technologies (AFET) roadmap in Figure 5, policy development, public consultations, legislative advocacy and promotion of low carbon vehicles, fuel efficient technologies, EVs and HEVs are being pursued in collaboration with the DOTR and other partner GAs.

Figure 5. Alternative Fuels and Energy Technologies (AFET) Roadmap



One of the major programs with the DOTR in the Public Utility Vehicle Modernization Plan (PUVMP) which is expected to aid in creating demand for AFETs and ancillary components of the program. A past donor program developed the "Adoption of Test Standards for Electric Motors" report that recommended the minimum and high energy efficiency performance standards for electric motors. The report recommends the adoption of a MEPS and labeling program for induction motors.

DOE strongly supports and provides inputs and position papers for integration in these proposed legislations and policies in favor of ensuring a level playing field conducive fiscal and market environment for AFETs and assuring harmonized policies. DOE supports policies and programs that will contribute to the long-term infrastructure development on AFETs. DOE is also seeking possible areas of cooperation with other countries that have successfully adopted and mainstreamed the use of AFETs, EVs and HEVs and EV charging stations for technology transfer and best practices sharing.

A brief description of each regulation issued to-date under the EEC Act is provided below.

2.1 Energy Efficiency and Conservation Republic Act 11285 (EEC Act)

This Act was passed in April 2019, and it institutionalizes and mandates EEC as a "way of life" for Filipinos. It declares a national policy to:

- Institutionalize EEC towards the efficient and judicious use of energy by formulating, developing, and implementing EEC plans and programs
- Promote and encourage the development and use of efficient renewable energy technologies
- Reinforce related laws and other statutory provisions for a comprehensive approach to EE, conservation, sufficiency, and sustainability
- Ensure a market-driven approach to EE, conservation, sufficiency, and sustainability.

The mainstreaming of EEC programs in each energy consuming sector are guided by the different regulations and provisions as shown in Figure 3.

2.2 Implement Rules and Regulations of the EEC Act

The implementing rules and regulations, established under the issued Department Circular No. 2019-11-0014, define the framework for the implementation of the EEC Act. It delineates the responsibilities of various GAs and private entities in implementing energy efficiency pursuant to the EEC Act. It also lays the foundation for creating the EEC ecosystem by:

- Defining DEs according to their energy consumption;
- Requiring Certified Energy Conservation Officers in all DEs;
- Supporting Certified Energy Managers, Certified Energy Auditors and Energy Service Companies (ESCOs);
- Instituting a Code of Practice for Energy Labeling of Products (COPE) and establishing Minimum Energy Performance of key appliances and equipment;
- Requiring an EEC Coordinating Officer within each Local Government Unit (LGU);

- Establishing the National EEC Database on national energy consumption;
- Promoting the use of energy efficient and renewable energy technologies;
- Making available critical information for the evaluation, analysis and dissemination of EEC information, and
- Formulating the National EEC Plan which is a comprehensive framework and governance structure for defining the EEC national targets, strategies, monitoring and evaluation.

It mandates the EE Rating and Labeling System, the EE Rating and Labeling for Products and Equipment, the Energy Labeling for Transport Vehicles and the system and procedures for examination, testing and verification.

2.3 Inter Agency Energy Efficiency and Conservation Committee (IAEECC)

The IAEECC was organized under Department Circular 2020-01-0001 and its members comprise DOE, DOTR, Department of Interior Local Government (DILG), Department of Finance (DOF), Department of Science and Technology (DOST), Department of Public Works and Highways (DPWH), DTI, Department of Budget Management (DBM), and the National Economic Development Authority (NEDA).

The IAEECC directs the GEMP in the following GAs (GA): National GAs, State Universities and Colleges, Legislative Branch, Constitutional Commission, Government Owned and Controlled Corporations, Foreign Service Posts, Judicial Branch, Local Government Units.

The GEMP directs the conduct of Energy Audits and improvements to each GA's IAEECC-approved GEMP. LGUs will also serve as the local authorities' arm for implementing their respective GEMP within the LGU premises as well as the enforcer of the EEC Act at the LGU level.

2.4 Energy Utilization Management Bureau (EUMB) Authority

Issued Department Circular 2020-01-0002 operationalizes the EUMB to be able to effectively perform its many responsibilities for implementing the EEC Act.

2.5 Designated Establishments (DEs)

Issued Memorandum Circular 2020-05-0001 directs the submission of Annual Energy Utilization Reports (AEUR) from all industrial, commercial and transport Designated Establishments (DEs) consuming more than one million fuel oil equivalent liters of energy annually. There are two types of DEs:

- Type 1 DEs have annual energy consumption of 500,000 kWh to 4,000,000 kWh for the previous year
- Type 2 DEs have annual energy consumption of more than 4,000,000 kWh for the previous year.

The AEUR shall include energy consumption data, plans for energy monitoring, management and control, and energy efficiency improvements. DEs must conduct regular energy audits and prepare periodic reports on the results of their energy consumption and conservation programs.

It covers all existing DEs classified as energy intensive industries by an earlier memorandum circular in 1993.

2.6 Philippine Energy Labeling Program (PELP)

Issued Department Circular 2020-06-0015, contains the PELP of the Department of Trade and Industry for importers, manufacturers, distributors, dealers, and retailers and puts DOE as the lead agency for implementing this program. It establishes the technical requirements of appliances and devices to a set Minimum Energy Performance for Products (MEPP) and the means to systematically inspect, monitor and verify the corresponding appropriate energy labels of energy consuming products (ECPs).

The covered ECPs are room air conditioners, refrigeration units, television sets and lighting products. The inclusion of other ECPs in the future shall be subject to EUMB recommendation after public consultation with the Department of Environmental and Natural Resources (DENR) and the DOTR.

The PELP contains a new Code of Practice for Energy Labeling of Products (COPE) that supersedes a similar one in 2016. The COPE establishes the computation methodology for deriving the MEPP for each ECP, the registration and application

process for energy labeling and the reporting requirements for compliance by the ECP manufacturers and suppliers. It also stipulates the penalties and fees for violation or non-compliance.

The following DOE divisions and supporting units strengthen the role of the EUMB and its divisions in implementing the EEC Act, and give them the following functions:

a) **Alternative Fuels and Energy Technology Division (AFETD)** shall be responsible for the formulation, development and updating of the MEPP, COPE, fuel efficiency testing guidelines, fuel economy performance and other related policies in support of National Energy Efficiency Conservation Program.

b) **Energy Efficiency and Conservation Management Program and Technology Promotion Division (EPMPD)** shall be responsible for the promotion and IEC activities of the PELP.

c) **Energy Efficiency and Conservation Performance Regulation and Enforcement Division (EPRED)** shall be responsible for the development of guidelines for on-site inspections, conduct of monitoring, verification and enforcement activities, processing of applications such as Company Registration, Produce Registration, Energy Label Issuance in compliance with PELP.

d) **Energy Efficiency and Conservation Public Sector Management Division (EPSMD)** shall be responsible for the promotion and IEC activities for the public sector

e) **Energy Research Testing and Laboratory Services - Lighting and Appliances Testing Division (ERTLS-LATD)** assists in assessing the eligibility of testing laboratories and evaluates testing services for ECPs.

f) **Field Offices** refers to DOE offices in Luzon, Visayas Islands and Mindanao. They are responsible for enforcing and monitoring industry players' compliance to PELP, in coordination with LGUs, and submits reports to EUMB

g) **Information Technology Management Services supports to EPRED** in maintaining the National Energy Efficiency Conservation Program and the online PELP services

h) **Legal Services** – General Legal Services Division is responsible for the adjudication of violations under the EEC Act, the EEC-IRR and related department circulars and implementing guidelines

2.7 Minimum Energy Performance of Products (MEPP)

Established under Department Circular 2020-06-0016, the MEPP requires importers, manufacturers, distributors, dealers and retailers to meet minimum efficiency performance standards. It also binds DOE, in consultation with concerned GAs, LGUs, commercial, industrial and transport sectors and relevant stakeholders, to be the lead agency responsible for planning, formulating, developing, implementing and enforcing the energy efficiency rating and labeling system for products, equipment and transport vehicles, examination, testing and verification of efficiency ratings. DOE shall publish biannually an updated list of MEPP-compliant ECPs. It establishes Technical Working Groups that update the MEPP (one TWG for each ECP), subject to the approval of the EUMB. Adjustments to the MEPP should be directed towards increase in energy efficiency and improvement in energy performance.

2.8 ESCO Guidelines and Certification

Issued Department Circular 2020-09-0018 established guidelines for the application, evaluation, certification, and the classification of ESCOs into the following two categories:

1. **Registered ESCO** is an ESCO seeking accreditation of professional services for the first time that meets the minimum of requirements on legal and technical capacity. The Certificate of a Registered ESCO shall be valid for three (3) years.

2. **Certified ESCO** is an ESCO which, in addition to meeting the requirements of a Registered ESCO, also has proven performance or results-based projects savings experience and with proven customer experiences. This includes the ESCO having successfully completed a minimum of three (3) IGAs projects and a minimum of three (3) projects implemented within three (3) years. Penalties and fees for violation and non-compliance are also stipulated. The Certificate of a Certified ESCO shall be valid for five (5) years. Once certified, they must submit a report annually on their ongoing projects with the energy savings of completed energy efficiency projects.

2.9 Energy Conserving Design Guidelines of Buildings

Issued Department Circular 2020-12-0026 establishes the guidelines applicable to Type 1 and Type 2 DEs with more than 10,000 square meters of Total Gross Floor Area (TGFA) and at least 112.5 kVA of total connected electrical load. The guidelines consider the cost effectiveness, building function, health, safety and productivity of the occupants in relation to the building envelope, electrical systems and mechanical systems of the building. An important factor is the thermal performance of the building since cooling is energy intensive. It encourages the use of two methodologies for evaluating the solar heat gain of buildings: the Overall Thermal Transfer Value (OTTV) method, and the Prescriptive method.

It also encourages efficient tropics-friendly building designs to apply the use of shade and shading devices, cross ventilation, moisture, air pressure and distribution, and heat reflection of roofs, windows, and walls. Thus fans, refrigeration, lighting, air conditioning and ventilation are important considerations. For commercial and industrial buildings, the optimal combination of energy usage by heating and cooling equipment and motors are important inputs to EEC.

2.10 Transport Sector Fuel Economy and Related EEC Policies

Issued Department Circular 2020-10-2023 prescribes the "Policy Framework for the Development of the Fuel Economy Rating, Fuel Economy Performance, and Related Energy Efficiency and Conservation Polies for the Transport Sector and other Support Infrastructures". Under this program, the Electric Vehicle (EV) ecosystem of manufacturers, importers, distributors, and dealers of EVs and EV charging stations (EVCS) shall be structured to facilitate safe operation and growth, while ensuring non-discriminatory and open access for all. The circular also seeks to empower the consumers to choose fuel efficient transport vehicles, realize energy savings by reducing fuel consumption. It leads to the phase out of fuel-inefficient transport vehicles, and the reduction of GHG emissions.

2.11 Development, Establishment and Operation of EVCS Guidelines

Issued Department Circular 2021-07-0023 establishes the guidelines for the establishment, use, and operation of electric vehicle charging stations (EVCS). It harmonizes all existing issuances to ensure the safety, efficient operations, and

system reliability of EVs. It also aims to accelerate investments in EVCS in the country. DOE collaborates with partner GAs in supporting the formulation and adoption of related policies for the transport and EE sectors. These GAs are:

- **DTI Bureau of Product Standards (DTI-BPS)** leads the development of promulgations related to Safety of Roads and EVs, EVCS, Safety Management Systems, and Intelligent Transport Systems.

- **Department of Transportation (DOTR)** is the implementing agency of an inter-agency collaboration under the United Nations Development Program's (UNDP) technical assistance project "Determining Green Routes under the Local Public Transport Route (LPTRP)." It supports the country's Public Utility Vehicle Modernization Program (PUVMP). The LPTRP is instrumental to enabling low carbon transport, creating a planning and policy environment at the local government level, and potentially expanding the market for low carbon road vehicles such as EVs and hybrid EVs (HEVs). It also aims to improve public transport services and integrate it to land use strategies. The PUVMP stipulates the adoption of Euro 5 and 6 fuel standards for public vehicles.

- **Department of Science and Technology–Philippine Council for Industry, Energy and Emerging Technology Research and Development (DOST-PCIEERD)** and the University of the Philippines Electrical and Electronics Engineering Institute – with whom DOE made a Memorandum of Agreement (Tripartite MOA) to establish a framework for research collaboration activities for the review, evaluation, monitoring and implementation of programs under the Science and Technology Application (STEA). They intend to identify appropriate emerging technologies for EVs that are aligned to the needs of the industry and EV Roadmap. With DOST-PCIEERD, DOE also studied the use of solar-assisted plug-in electric motor-powered boat.

- **DOST –Industrial Technology Development Institute (ITDI)** under the project called "Establishment of Fuel Research and Development and Testing Facility" will create an R&D facility dedicated for the conduct of performance and durability testing of various fuel cells technologies.

DOE is also actively collaborating with the above GAs, LGUs, academe and private sector industry groups on alternative fuels and energy efficient transport technologies in IEC activities even throughout the pandemic through virtual

platforms. The Senate Bill 1382, or the "Electric Vehicles and Charging Stations Act", was passed in May 2021. It is not yet enacted into law until the counterpart equivalent, House Bill 4075, is approved by the House of Congress.

2.12 Guidelines for Endorsement of EEPs to Board of Investment (BOI)

Issued Department Circular 2021-05-0011 establishes the rules and procedures on the endorsement of EEPs to the BOI for registration and grant of fiscal incentives to proponents such as income tax holiday and pioneer incentives. The entitlement to Income Tax Holiday (ITH) shall be determined according to the below Table 6.

Table 6. Income Tax Holiday Entitlements

Annual Energy Savings at the Project Boundary	ESCO or TPPD/Project SPV EE (Rate of ITH)	Self-Financed Amount of ITH
Less than 15%	0% but registration shall not be cancelled	None, but registration shall not be cancelled
15% to 20%	50%	30% of the cost of installed equipment system
20% and up to 25%	75%	40% of the cost of installed EE equipment or system
More than 25%	100%	50% of the cost of installed equipment or system

An EEP must be able to meet the minimum 15% energy savings at the project boundary and a minimum Project Investment Cost of PhP 10 million (USD 200,000). The 'project boundary' refers the energy savings computed based on comparing the energy consumption before and after implementation of the EEP when operated on its full commercial basis.

The income eligible for ITH of an ESCO, Third Party Project Developer (TPPD) or Project SPV shall be limited to the income of the entity directly attributable to the energy saving generated by the registered EEP. The rate of ITH shall begin from the start of operation of the EEP.

2.13 Energy Efficiency Excellence Award Guideline

Issued Department Circular 2021-09-0014) establishing the guidelines for GAs to win the annual GEMP Award. In 2020, the top 5 awardees were the: National Power Corporation, National Electrification Administration, Development Academy of the Philippines, Center for International Trade Expositions and Missions, and National Transmission Corporation.

2.14 LGU Energy Code

The LGU Energy Code aims to establish and integrate the national energy plans, programs, policies, and mechanisms into the local development plans, with respect to:

- Energy safety practices
- Energy efficiency and conservation
- Energy resiliency
- Energy planning, including energy access and resource development.

LGUs, through their Local Development Council, must activate the Energy Sector Committee to implement the Code. While most of the provisions are geared towards the identification and development of conventional and renewable energy potential, it also highlights the importance of incorporating EEC in the local development plans. The Code also mandates all LGUs to conduct IEC campaigns to disseminate and capacitate its concerned stakeholders and constituents on the four energy topics listed above, with support from DOE and DILG.

3. EE MARKET BARRIERS

Most of the following market barriers, common to developing countries in Asia, like Indonesia, Vietnam and Thailand, deter the widespread implementation of EE in the Philippines:

3.1 Lack of EE Knowledge and Facility Owner Demand

a) **Low awareness and low priority.** Despite decades of EEC campaigns by DOE, there remains an extremely low level of EE knowledge with most stakeholders in the Phillipines, especially with Facility Owners in the primary industrial, commercial and governmental energy consuming sectors. There is a general lack of market knowledge of EE technologies and solutions, the importance of EE for sustainability, ESCO business model and other types of implementation structures, contractual and financial arrangements. Particularly critical to the Philippines is the fact that the public is also not very aware of the EEC Act at this time.

Residential households are not totally aware of the purpose or benefits of energy labels, and since they tend to be price sensitive, they buy the cheaper, less energy-efficient appliances.

The industrial and commercial sectors may have a better understanding of EE technologies, but they do not understand their benefits and risks, leading to EE being a very low priority for their Facility Owners to invest capital or utilize their credit capacity to finance EEPs versus their core business activities. Most Facility Owners prioritize investments on production/income generation versus EE (savings generation), unless they can pass on the cost to their clients/tenants. The low priority for Facility Owners also emanates from a fundamental perception that EEPs are equipment infrastructure investments which only need to be made if and when they break, coupled with the fact that their investment and savings amounts are relatively limited. Also, EEPs have to compete with other capital expenditures; so even when they generate very attractive ROIs of 25-50%, they are typically unable to compete with the one-year internal hurdle rates of core business investments. This situation is further aggravated by the pandemic environment in which businesses tend to prioritize financial resources for expenditures that will support their core business operations and business recovery.

b) **Small scale transactions and perceived high complexity and risk of EEPs**. The average investment for EEPs is very small (less than USD 1 million), and most EEPs typically contain multiple energy savings technologies/measures each of which can require a separate M&V protocol. These very small transactions and

benefits, coupled with the perceived M&V complexities, make it challenging for Facility Owners and LFIs to want to focus on EE. They also create a perception with LFIs that the lending market potential is small, time consuming to access and will require high transaction costs. This results in an unwillingness by many LFIs to invest the time and resources to learn about EE or to develop the internal capacity needed to assess the risks and cash flow benefits from EEPs and create attractive financing structures.

c) **Lack of confidence in an EEP's estimated future savings being achieved or accurately measured and verified** by Facility Owners, LFIs and investors, caused by them not having sufficient knowledge to understand or believe the estimated future savings can be achieved and verified. This results in their unwillingness to fund the implementation of EEPs. Removing this barrier is critical to scaling up EE investment and financing in the Philippines. Another fundamental issue is that bank lending in the Philippines is still largely based on the borrower's financial condition and its ability to provide guarantees and/or collateral to fully securitize the loan. This makes it hard for SME project hosts or SME ESCOs to secure a loan even if the EEP is good.

d) **Lack of awareness and understanding of the requirements, processes and procedures to comply with the EEC Act** by GAs, private-sector Facility Owners, LFIs and mostly all EE stakeholders. In the financial sector, there is a fundamental lack of awareness of the existence of the EEC Act and a basic understanding of EEPs that would allow them to be conversant about the EE.

3.2 Limited Technical Capacity to Develop 'Bankable' EEPs

One of the most significant barriers to scaling up the implementation and financing of EE in the Philippines is the lack of knowledge and experience of EE services providers (i.e. ESCOs, energy consultants, etc.) to perform the following critical tasks uniquely required to develop a 'Bankable' EEP and build a EE pipeline:

a) **Preparation of an IGA** is the most critical thing for an EEP to be successfully implemented. An IGA is a much more detailed energy audit that typically includes one or more individual energy savings measures (technologies) at an energy consuming facility, and is the technical and economic foundation of a ready-to-implement EEP. The IGA contains all critical assumptions, facility-based measurements and calculations supporting the EEP's estimated savings

and capital cost (CAPEX), and includes a M&V plan for each energy savings measure bundled into an EEP. It must contain all information required for a Facility Owner, developer, LFI and/or investor to be able to understand/evaluate the technical and economic feasibility of the proposed EEP.

b) **M&V of energy savings** is critical to documenting the actual achieved savings and the resulting IRR of an EE investment. M&V is the meter of an EEP, and it should follow the generally accepted and best-practice M&V principles contained in globally-published documents like the International Performance Measurement and Verification Protocol (IPMVP®) owned by the Efficiency Valuation Organization (EVO®). EVO's most current IPMVP October 2016 Core Concepts document, as well as its previous versions containing M&V application examples, can be found and downloaded for free on EVO's website at www.evo-world.org.

c) **Inadequate EE Professional Certifications**. The above IGA and M&V capacity gaps are compounded by the lack of internationally credible EE certifications that adequately test and verify the competency of professionals being able to prepare bankable IGAs and develop reliable M&V protocols for EEPs. Recognizing this gap, moving forward, the EEC Act is requiring new EE and ESCO certifications to be developed that will contain robust verification and testing of competencies to be met as a condition for issuing the certifications.

In addition, and very specific to the Philippines, the capabilities, organizational and physical infrastructure for DOE and other GAs to perform the required processes and procedures set forth in the EEC Act are inadequate and need further technical assistance and considerable enhancements.

While DOE has promoted the development of the ESCO industry and there are 29 registered ESCOs in the Philippines including foreign-owned ones, none is 'certified' yet because no standardized process exists to evaluate the competencies of ESCOs required for certification.

There are several professional organizations that are involved in developing EEPs such as the Philippine Society of Mechanical Engineers, Institute of Integrated Electrical Engineers, PE2, ENPAP 4.0, and Philippine Institute of Energy Management Professionals. However, there are no standardized training and certification programs developed for the missing IGA and M&V skills needed to prepare 'Bankable'

EEPs. Consequently, there is a huge need for professionals who can develop 'bankable' EEPs for DEs to implement measures to reduce energy consumption as required by the EEC Act.

3.3 No Paid-From-Savings EEPs in Government Facilities

ESCOs and other private sector entities are not able to implement and/or finance EEPs in government facilities on a paid-from-savings basis (as stated in the EEC Act) because GAs:

- Cannot legally commit/make multi-year Savings Payments;
- Cannot retain multi-year Savings in its Budgets, and
- Are required to use ***'lowest cost'*** versus ***'best value'*** procurement method.

The DBP LFI stated it experienced the procurement barrier in its failed attempt in 2020 to provide a loan to a LGU on a streetlighting EEP. DBP was unable to make the loan because:

- Contracting and procurement rules required the LGU to select the lowest bidder versus the most efficient technologies and would have resulted in cheaper inefficient technologies being implemented, and
- Accounting and auditing rules that do not recognize the ESCO Energy Savings Performance Contracting (ESPC) scheme.

The EEC Act was specifically designed to overcome these barriers by containing the following overarching language:

"IAEECC shall include savings-based services and payments as through additional modality *for pursuing GEEPs* and shall *adopt relevant guidelines*, in coordination with relevant government agencies and stakeholders, for this purpose." **AND FURTHER**:

"Such modalities shall include GAs and LGUs *being able to repay ESCOs* undertaking energy efficiency projects through applicable repayment schemes *based on the cost savings* to be *generated from the* projects and other sources, in accordance with the guidelines issued by the DBM on multi-year contracts and other applicable laws."

However, the barriers still exist, because the new procurement and other required paid-from-savings procedures are not included in the current GEMP Guidelines

expected to be approved by the IAEECC within 2021 or in early 2022. Consequently, despite the EEC Act mandating GAs and LGUs to implement EE, they are severely hampered in being able to comply due to their inability to access the private-sector financing and EE services that most do not possess.

A very brief overview of current government regulations that preclude ESCO or paid-from-savings EEP financing is as follows:

- Government Procurement Law applicable to GAs only allows them to engage in capital intensive projects through the General Appropriations Act. They may propose budgets for simple EEPs like replacement of lamps or air conditioning units every year. For projects that might require multi-year disbursements, GAs are required to seek a Multi-Year Obligational Authority (MYOA) from the Department of Budget and Management (DBM) prior to entering into contracts to cover the total project costs of multi-year programs, activities and projects (whether locally funded or foreign-assisted projects). The MYOA to be issued by the DBM is currently the only basis or reference for the Approved Budget for the Contract referred to under Section 5 of R.A. No. 9184 (Government Procurement Reform Act).

- Capital expenditure-intensive projects, like EEPs, are bid out and must satisfy least cost criteria and the zero-budgeting process. Under the zero-budgeting scheme, government procurement does not allow savings as a criterion for pursuing a project. Likewise, government cannot commit on savings beyond one (1) year since at the end of each year, all savings generated are reverted to the National Treasury due to its zero-budgeting policy. This presents a serious limitation for GAs to use a Guaranteed Savings or a Shared Savings type of contractual arrangement with an ESCO.

3.4 Limited EE Implementation Capacity of Nascent ESCO Industry

DOE has been continuously supporting the capacity building of EE practitioners through tie-ups with DOE-recognized training institutions in the country and with the help of various donor programs. DOE has a database of 1,982 EE practitioners preparing to or have become certified energy managers (CEMs), certified energy conservation officers (CECOs), and certified energy auditors (CEAs) from those programs. Considering that the Philippines has 1,488 municipalities as of June 30, 2021, each of which must have a CEM and a CECO, a continuous build-up of EE professionals is needed to support the growth of the EE market.

As of November 2021, there are 43 DOE-registered ESCOs, 29 of which are certified under the old scheme that did not require any proof of IGA or EEP paid-from-savings competency or prior experience. Consequently, there are no ESCOs that are certified under the new EEC Act requirements, which will verify their competency to develop, finance and implement EEPs on a paid-from-savings basis through an evaluation of their past implemented ESPC type of EEPs. Despite the ESCO industry in the Philippines becoming a national priority, it is still very nascent due to the fact that most ESCOs are small and medium sized enterprise (SME) companies with limited credit history and insufficient capital resources needed to develop, finance and implement savings-based EEPs on a scalable basis. They also do not have the capacity to provide the equity or collateral required to secure debt from LFIs for financing their EEPs. This is compounded by the market-wide lack of demand for EE/ESCO services caused by the many EE market barriers described earlier. Consequently, only a few ESCOs are operating in the Philippines who have limited experience, competencies, resources and the ability to access project financing.

3.5 No Commercially-Attractive EEP Finance

One of the most significant global barriers that exists in the Philippines is a lack of commercially-attractive EE financing, which needs to be '*project-based*' in order to be '*attractive*'.

This financing gap is *not caused by a lack of available funds*, but rather the inability of EEPs to access the existing funding capacity of LFIs on their current lending structure. There is a "*disconnect*" between the traditional lending practices of LFIs and the project-based financing structure needed by Facility Owners, ESCOs and other developers of EEPs. LFIs typically apply their traditional "asset-based" corporate lending approach for EEPs that limits the amount they will lend to a maximum of 70% to 80% of the EEP's CAPEX, but more critically requires full collateral on the entire loan amount. Unfortunately, there is very little collateral value in EE equipment after being retrofitted in a facility; rather, its value is limited to the ongoing cash flow that it can generate over its useful life of 10 to 25 years. The disconnect occurs from LFIs not recognizing the significant future cash flow generated from EEPs because they do not believe or are not satisfactorily assured that such new future cash flow can be relied upon to repay the related loan. Consequently, LFIs generally assign no value to the future cash flow of EEPs, which requires borrowers (e.g. Facility Owners, ESCOs, etc.) to finance them from their existing credit capacity or secure them with

marketable asset collateral or repayment guarantees, both of which are very unattractive to the borrower.

To date, most LFIs have not recognized the future cash flow generated from EEPs, and they do not believe that such cash flow can be relied upon to repay a related loan. Consequently, except for the Development Bank of the Philippines (DBP), LFIs generally assign no value to the future cash flow of EEPs and consequently require borrowers to finance them from their existing credit capacity or to securitize the loan with marketable collateral of guarantees equal to the EEP loan amount. This disconnect results in most LFIs not being willing to structure EEP loans that consider the future cash flow as the primary source of loan repayment and is caused mostly by LFIs:

- Not being familiar or comfortable with the EE technologies generating the savings, nor with an ability to measure and verify the savings;
- Not knowing how to properly evaluate the risks and benefits of EEPs; and
- Not knowing how to structure low-risk EEP loans that are attractive to Facility Owners, ESCOs and other project developers.

Before the pandemic, most LFIs offered interest loans (> 4% pa) which is not attractive to would-be EEP implementors. The collateral requirements for EE loan applications have been a long-standing barrier for most borrowers and especially for ESCOs, who are mostly SMEs with minimal assets. The only LFI offer project financing for EEPs is the DBP under its E2SAVE program which accepts an assignment of receivables from energy savings for a portion of the collateral needed from EE borrowers.

3.6 Limited Enforcement of Regulatory EE Mandates

The EEC Act is relatively new, having been passed into Law in 2019. While the implementing rules and regulations and EE mechanism guidelines, such as those listed in Chapter 2, have been formulated, there is still limited enforcement of the mandatory provisions. DOE is building its capability and resources to enable the full enforcement of EE regulatory mandates. However, it is currently focusing on building the awareness of DEs on their responsibilities under the EEC Act, as well as enhancing capabilities of EE practitioners to support DEs. As such, the focus is not yet on

enforcement but in building the EE ecosystem to enable end-users to comply. The on-going pandemic has also slowed down EE efforts with a focus on recovery.

4. CURRENT AND PAST DONOR EE INITIATIVES

4.1 Current Donor EE Initiatives

The following donor EE initiatives are currently active in the Philippines.

a. **USAID – Energy Secure Philippines (ESP) Project** is a 5-year program that aims to contribute to the achievement of the Philippines Energy Sector Strategic Directions 2017-2040 and to the goals of the U.S. Government's Asia Enhancing Development and Growth through Energy (EDGE) Initiative, particularly in pursuing enhanced energy security through a transparent, market-driven, and resilient energy sector. Asia EDGE aims to expand access to affordable, reliable energy, including highly efficient conventional fuels, nuclear, and renewables, which reduce poverty, foster inclusive economic growth, and promote sustained prosperity.

   The ESP Project began in 2020 and it targets two market sectors: i) electric utilities and ii) LGUs. For electric utilities, ESP activities are planned to:

   - Introduce methodologies, tools, cutting-edge analytic systems, and other technology applications to upgrade performance standards, improve operational efficiencies, and strengthen the financial and operational position of power distribution utilities.
   - Promote integrated resource and resilience planning with comprehensive risk and vulnerability assessments, including a focus on countering cyber security threats.
   - Supports the operationalization of existing laws, regulations, and policies that support the extensive use of advanced energy systems, which will result in a more efficient and affordable electricity market with a variety of products and services.
   - Works to broaden the number of market participants to balance large firm dominance and lower the threshold for retail competition to reach the household level.

- Supports the adoption of a minimum set of standards for quality equipment and services and to enforce transparent, competitive procurement processes to level the playing field for all vendors, suppliers, and service providers in the energy sector. Doing so enhances the benefits of competition and reduces electricity costs for consumers.

For LGUs a grant component targets ESCOs and LGUs to work together on innovative EEC projects which will:

- Design, implement, and document an innovative EEC model that harmonizes policy, technology, financing, procurement, and capacity building in LGUs. Applicants will evaluate the EEC policies in their proposed LGU and from there determine needs and gaps. Such policies can include a Local Energy Code, a Local Energy Plan, or a Local Energy Efficiency and Conservation Plan. These will be based on national policies particularly the EEC Act. From these policies and plans, the Applicant will develop an EEC road map in cooperation with the LGU using methodologies and templates from DOE. From this road map, a detailed EEC transition plan or a scale-up plan will be prepared by the Applicant and will serve as the anchor of the actual EEC model. The Applicant will then flesh out the transition or scale-up plan by providing appropriate and cost-effective support which may include technical assistance, technology, equipment, systems development, capacity building, and viable financing mechanisms that takes into account government procurement requirements.

- Financing options will also include the careful study and consideration of other funding mechanisms including but is not limited to the Energy Regulation 1-94 or ER 1-94 fund, National Wealth Tax, municipal and green bonds, and other applicable funding options. The EEC transition plan may include the buildings and premises, commercial establishments, and other energy intensive facilities that is under the management of the LGU. The Applicant will carefully document all processes and will establish a baseline, progress milestones, and project life targets in terms of energy consumption. Finally, the Applicant will develop a sustainability plan and will be expected to continue the EEC service provision within the same LGU. In this regard, a long-term performance contract between the ESCO and partner LGU is anticipated.

- Study, compare, and present different options for EEC technology applications and prepare a menu of solutions applicable to LGUs. In the course of

developing and documenting the EEC model, the Applicant will develop a matrix of solutions or a menu for EEC initiatives that would be useful for LGUs. This menu of solutions is expected to feature the elements stated above including indicative costs and savings and will be graduated from entry level to full-scale implementation to accommodate different levels of LGU capacity for EEC transition. These options will be prepared into a user-friendly material that can be available in print and online.

- Recommend policies and/or policy enhancements that can improve the adoption of EEC in LGUs. In the process of developing and implementing the EEC model, the Applicant will observe, document, and report on how pertinent policies are either facilitating or hindering the promotion and adoption of EEC. In the interest of enhancing these policies or formulating new ones, the Applicant will also prepare detailed recommendations to further establish or strengthen policies that enable the implementation of EECs.

- Develop and deploy communication and marketing strategies and materials that promote EEC adoption in LGUs. Finally, the Applicant in close cooperation with the USAID ESP Communications Team will conduct audience / stakeholder analyses, formulate IEC strategies and approaches, and conduct events and activities that will promote EEC adoption in LGUs.

This grant prioritizes ESCOs in need of support and who are registered or are about to register with DOE. Applicant ESCOs are required to partner with at least one LGU. Energy innovators, technology providers, enterprises, civil society organizations, community-based organizations, businesses, commercial establishments, academic institutions, and research institutions can also apply as long as they have a formal and active partnership with an ESCO.

b. **UK ASEAN Low Carbon Energy Programme (LCEP)** is a 3-year GBP 18 million TA program provided by the UK Prosperity fund to implement Green Finance and EE interventions in 6 southeast Asia countries (Philippines, Indonesia, Thailand, Vietnam, Malaysia and Myanmar) that ends in March 2022. The ongoing TA program in the Philippines supports DOE in developing guidelines, procedures and processes to guide the implementation of the mandates of the EEC Act. The major completed and ongoing EE activities provided to DOE are the following:

- Developed the process and criteria for the Registration and Certification of ESCOs, as well as assisting DOE in drafting of the enacted Department Circular 2020-09-0018.

- Provided draft GEMP Guideline language to DOE for the finalization and submittal to the IAEECC for its approval expected in Dec-2021/Jan-2022). LCEP's draft language included creating the new regulatory procedures needed for GAs to use in applying the new financing and ESCO modalities in the EEC Act targeted to remove the GAs' private sector engagement barriers in the Section 3. LCEP's draft language included the modification of existing and creation of new regulations to revise GA's budgeting and procurement procedures to accommodate the following unique aspects of paid-from-savings EEPs:

  - Procurement based on '***value for money***' versus lowest upfront CAPEX

  - Use cost savings in existing operating budgets;

  - Defined and transparent savings M&V (meter of EEP);

  - Allowance for cost-effective creative options to be provided from private sector, and

  - Elimination of 'non-applicable' processes performed by GAs.

  - Regrettably, to minimize potential resistance from the IAEECC in approving the GEMP Guidelines, LCEP's draft language was deleted.

- Providing EE Capacity Building that include:

  - Recently conducted an EEP finance training to PhilGuarantee;

  - Conducting a future IGA and M&V training to DOE staff, and

  - Conduction a future training to DOE staff on becoming evaluators for ESCO certification and EEPs, and on other EEP related tasks required of DOE in GEMP Guidelines.

- Supported the promotion of more commercially-attractive EEP-based financing to LFIs that will enhance access by ESCOs and project hosts by:

  - Presenting de-risking products to DOE for possible future development that include Energy Savings Insurance (ESI) and Partial Credit Risk Guarantee (PCG) products

  - Evaluating existing EE finance programs of the Development Bank of Philippines and Landbank to determine gaps versus what prospective EE borrowers desire/need

- Updating the National Energy Efficiency and Conservation Program 2020-2040 that was drafted in 2013-2014 with the TA support of another donor program. The goal is to include the activities and programs supporting the mandates of the EEC Act and estimating project implementation targets and investments in the short and medium term.

- Developing an Energy Efficiency Accelerator tool which aims to introduce SME stakeholders in the Food and Beverage sector opportunities for energy efficiency and guide them at different stages of their energy management journey.

c. **Japan International Cooperation Agency (JICA)** launched, in conjunction with the National Electrification Administration (NEA), the implementation of a smart-grid distribution automation system technology that will help improve the distribution system reliability of electric cooperatives (ECs) in the country. The project is working with the private sector to disseminate Japanese technologies for electricity distribution system and management in the Philippines. The Batangas II Electric Cooperative, Inc. (BATELEC II) was selected as the pilot site to demonstrate the effectiveness of smart-grid technology, designed to reduce the duration of power outage and improve the distribution system reliability through automation. This technology from Japan is hoped to effectively address specific technological challenges of ECs that affect their operational efficiency, more particularly the distribution system reliability.

   JICA also supported project from 2009-2012 entitled “Developmental Study of Energy Efficiency and Conservation in the Philippines” (implemented which provided support for an organizational framework on energy efficiency and conservation promotion and assisting the design of an energy efficiency and conservation bill.

4.2 Past Donor EE Initiatives

Prior to the EEC Act, the voluntary National Energy Efficiency Program of DOE in conjunction with renewable energy initiatives have been assisted by the following programs:

a. **European Union-Access to Sustainable Energy Program (EU-ASEP)** supported EE initiatives in the Philippines from 2014 to 2020 through its Access to Sustainable Energy Program (ASEP), which was jointly implemented by the Philippines' DOE and the EU Delegation. The overall objective of ASEP is to assist the Philippine government in expanding its sustainable energy generation to meet the growing economic needs and provide energy access to the poor. The specific objective is to generate more electricity from renewable energy, increase EE use, and increase access for the poor to affordable, disaster-resilient energy systems.

   ASEP had three (3) components one of which is the Technical Assistance focused on RE and EE. On EE, feasibility Studies were conducted in several generation facilities of the National Power Corporation-Small Power Utilities Group aimed to determine opportunities for improving the efficiency of operation of the generation facilities currently using conventional fuels. Sample Electric Cooperatives were likewise studied for the same purpose. Losses from poorly constructed and maintained distribution lines were looked into. Specific recommendations to improve efficiency of operation were provided.

   ASEP led DOE's initiative to develop the Guidelines for Energy Conserving Design in Buildings which is now a document officially adopted by stakeholders in the building sector.

b. **International Finance Corporation (IFC):** The IFC provided its Sustainable Energy Finance (SEF) Program in the Philippines from 2009 to 2016 via advisory services under its risk-sharing facility (RSF) to BPI and BDO banks. The IFC sought to increase local sources of sustainable energy financing to stimulate private sector investment through IFC's partner banks and reduce GHG emissions. A summary of the results is as follows:

   - Both banks followed their own business-as-usual terms in providing SEF loans;

- The RSF loss product provided by IFC to BPI included 50% loan losses covered by IFC and 50% by BPI with IFC covering 10% of first losses from its 50%.
- BPI's SEF loans were mostly provided to existing mid-size commercial and industrial corporate clients, larger clients where infrastructure project finance was provided, and some SMEs with solar rooftops.
- BDO's SEF loans were provided to large grid-connected RE Projects with Power Purchase Agreements to Special Project Companies owned by existing customers.
- Both banks required collateral, but since BPI's loans were primarily provided to existing customers, it already had all of their assets secured. BDO required the typical total collateral and guarantee coverage from the new Special Purpose Companies, supported by power purchase agreements with the grid-connected RE projects.
- BPI provided PHP 35 billion (USD 700 million) of SEF loans on 260 total projects (148 EE and 112 RE). Its RSF covered PHP 3 billion (USD 60 million) SEF loans.
- BDO provided PHP 12 billion (USD 240 million) of SEF loans, representing 2% of its total loan portfolio.

The major benefits both BPI and BDO felt they received from the IFC program were project evaluation capability, capacity building, and access to IFC's global experts at little to no cost.

c. **United Nations Industrial Development Organization (UNIDO)** funded an industrial EE program in cooperation with DOE and the Department of Trade and Industry (DTI), called "Philippine Industrial Energy Efficiency Project (PIEEP)", which was completed in March 2019. PIEEP's aim was to introduce the ISO 50001 Energy Management Standard along with system optimization approaches for the improvement of industrial EE in the Philippines. It trained local experts in the optimization of steam, compressed air and pumping systems and energy management, and introduced these concepts to participating industrial enterprises for possible project implementation. The project had three components:

i. **Energy Management.** The purpose of this component was to provide an enabling environment to encourage the industrial sector adopt energy management standards (ISO 50001) compliant energy management systems;

ii. **Systems Optimization.** The purpose of this component was to build the capacity of the industrial sector to implement the optimization of its process systems;

iii. **Enhancement of Financing Capacity.** The purpose of this component was to train financial institutions on the financial aspects and appraisals of industrial EEPs.

d. **World Bank (WB)** recently completed the project ***"Options for Energy Financing in Public Buildings in the Philippines"*** with the aim of identifying options for addressing barriers to financing, and for scaling up EE implementation in public buildings in the Philippines.

   The WB also implemented a Chiller EEP in the Philippines from June 2010 to January 2017 that was aimed at reducing greenhouse gas (GHG) emissions by replacing old inefficient chillers that included the retrofit of both Chlorofluorocarbon (CFC)-based chillers and non-CFC-based chillers.

e. **Asian Development Bank (ADB**) implemented the Philippine Energy Efficiency Project (PEEP) from 2009 to 2014 with the Asian Clean Energy Fund. It was a USD 35 million program supplying 13 million compact fluorescent lamps to homeowners and businesses, retrofitting government office buildings and public lighting systems with efficient lighting and establishing a "super ESCO" to provide financial and technical support to firms planning to cut on their energy consumption;

   ADB also implemented an Electric Tricycle Project. This market transformation through the introduction of "Energy Efficient Electric Vehicles (E-Trike) Project" replaced 100,000 gasoline-burning tricycles in the Philippines with clean, energy efficient e-trikes in Metro Manila and other urbanized and urbanizing centers. Tricycles are motorcycles with passenger sidecars that serve as short-distance taxis in the country

f. **GIZ** implemented the "Eco-Industrial Development of Philippine Economic Zones" project in 2009 to provide a management framework for planning and operating clustered or networked industries in 2 economic zones. Its purpose was to reduce environmental impact and enhance business competitiveness (such as closed-loop models for energy and material recycling, recovery and re-use).

5. EE MARKET GAPS

In terms of regulatory, administrative and policy support from the government, DOE is on track to fulfill its EEC Roadmap shown in Figure 4. However, although the government support and EEC Act are in their early stages, even when implemented, they will not overcome most of the EE market barriers in Section 3. Furthermore, despite several donor programs having addressed some of the EE barriers, several major gaps remain that need to be filled in order for EE to be widely implemented throughout the Philippines as needed to meet it targets, which are summarized below.

5.1 Limited Programs to Create Private-Sector EE Awareness and Demand

a) **EE Awareness**. DOE conducts the following 3 levels of IEC activities to create EE awareness:

- *#EPower* Mo - provides the basic know-how on energy utilization and covers *#ESafety, #ESecure and #EDiskarte*;
- *#Energy Ability* - which is a call or invitation to make energy efficiency and RE as a 'way of life', and
- *#Enerhiyang Atin* - which points to the goal of energy security, self-sufficiency and accountability from energy users and industry players.

DOE also has IEC activities and programs to integrate EEC at the LGU level and in the Learning and Education System. In addition, LCEP's initiative to provide pro-bono energy audits to SMEs in the food and beverage sector has the potential to provide an understanding and appreciation by Facility Owners on the opportunities and potential benefits from EEPs. Despite these initiatives,

much more effort and programs are needed to disseminate EEC information and overcome most barriers that include the following:

- Lack of awareness of the EEC Act, its mandates and key stakeholders' responsibilities/roles;
- Extremely low level of EE knowledge with most stakeholders in the Phillipines, including its sustainability benefits among engineers, architects, auditors, finance professionals, etc.;
- Limited knowledge of EE technologies, EE business models like ESCOs and other relevant contractual and financial solutions and arrangements leading to EE being a very low priority for private sector Facility Owners to invest capital or utilize their credit capacity to finance EEPs versus their core business activities;
- Lack of household awareness of the purpose or benefits of energy labels on appliances to convince them to purchase the more expensive EE products with good paybacks;
- Lack of in-house technical capabilities for most DEs – EE Officers are typically part of a small group within an establishment, and
- Unwillingness of SMEs to prioritize EE over their operational/business investment needs.

b) **EE Demand**. There is very low demand for EE products or services and no meaningful financial incentive programs exist to create EE demand for the private sector beyond the Income Tax Holiday scheme, which provides a relatively minor benefit. Financial incentives (carrot) are needed to offset the cost of the more expensive EE appliances, equipment and services and to motivate end-use consumers to purchase them. The carrot incentives are also needed to offset the penalties (stick) that can be impin the EEC Act for non-compliance.

5.2 Insufficient EE Capacity Building Programs

DOE has relentlessly pursued capacity building initiatives for LGUs to have their own CECOs, CEMs and CEAs. However, these neither cover the private sector nor contain

the missing upgraded IGA and M&V training content needed for professionals of ESCOs and EE Service providers to prepare 'bankable' IGAs with reliable M&V Plans.

Other Capacity Building needs include:

- Training LFIs on how to evaluate the benefits and risks of EEPs and structure project-based financing that mitigates the risks for financiers and provides attractive terms to Facility Owners;
- Developing ESCO industry ESPC templates and tools;
- Expanding the capabilities of testing laboratory staff and facilities to expedite the development of product standards on common equipment like chillers and boilers, and
- Expanding the capacities of LGUs to implement simple EEPs in their own buildings, such as retrofitting their current CFL lighting to LEDs, old air conditioning units to inverter types, etc.

5.3 Inability of Gas to Apply EE Financing Modalities in EEC Act

As explained in Section 3, despite the EEC Act mandating GAs and LGUs to implement EE, they are severely hampered in being able to comply due to their inability to access the private-sector "paid-from-savings' financing and EE services they desperately need and do not have. This is caused by new EEP procurement and paid-from-savings procedures not being included in the current GEMP Guidelines expected to be approved by the IAEECC within 2021 or in early 2022.

5.4 Limitations of DOE to Implement the EEC Act

There are some major challenges in DOE's infrastructure not being able to implement the EEC Act, despite the enacted regulations already being in place. The EUMB is understaffed relative to the activities that it needs to carry out, and its laboratory/testing capabilities and designated test centers need to be enhanced. DOE's IT infrastructure is inadequate to receive, build up and support the EE energy consumption database among other relevant information, reporting and auditing requirements in the EEC Act. Manual processing of huge data input that will be coming from DEs on their annual energy consumption is not an option for this recurring activity.

- EE Stakeholders look to EUMB for technical advice. Examples include:
- LFIs requiring that ESCO loan applications be accredited by DOE.
- The new DC prescribing ESCOs to be either Registered or Certified and not just accredited has tasked DOE to evaluate ESCOs to be either Registered or Certified. EUMB must have the capacity (which it currently does not have) to implement the more rigorous certification process which requires the evaluation of past EEPs completed by the applicant ESCO.
- DOE needing to endorse EEPs to the BOI that qualify for incentives requiring DOE to have the technical and financial capability to evaluate the EEPs.

All these increased tasks and responsibilities in carrying out the mandates of the EEC Act require additional experienced, trained personnel to be hired. Unfortunately, these new personnel, even if coming from other bureaus and divisions within DOE, need capacity building training to get them up to speed in performing the tasks of EUMB. Outside donor support is critically needed to train current and new inexperienced staff and to cover reduced operating budgets caused by COVID.

5.5 No Commercially-Attractive EE Finance

EE Risk-Mitigation Financing Products are critically needed to overcome the huge collateral and confidence barriers of financing EEPs by LFIs, Facility Owners, ESCOs and other EEPs developers. While DBP's E2SAVE offers several attractive features, it has only disbursed USD 1 million to-date, due in large part to the above EE market barriers. DBP believes having access to new credit enhancement (de-risking) financing products is the primary solution to overcoming their barriers, especially the major one related to their difficult collateral requirements. The de-risking products needed are a Partial Credit Guarantee (PCG) and Energy Savings Insurance (ESI). There is a PCG in the market place being offered by PhilGuarantee, a GA, to private-sector LFIs on loans taken out by the private sector companies. However, PhilGuarantee has no prior experience with EEPs and his limited by being prohibited from providing guarantees to loans for GAs or by government-owned financial institutions.

5.6 Limited ESCO Experience and Market Credibility

DOE has been strongly supportive of the emerging ESCO industry by involving it in policy development and multi-stakeholder consultations before issuing guidelines and circulars. DOE also created business toolkits for ESCOs improving their competencies to make feasibility studies on EEPs and participate in capacity building of CEMs and CECOs. However, these budding ESCOs lack knowledge and experience on preparing the much more detailed IGAs and M&V plans as well as on implementing paid-from-savings EEPs. Since the ESCO applying the 'shared savings' and 'guaranteed savings' models in government EEPs is still not possible, ESCOs need support to create the EEP capacity and templates until such time as they are developed with the regulatory revisions needed for GAs to be able to access their paid-from-savings services.

New capacity building programs for IGAs, M&V and ESCO project development and financing need to be developed and offered to ESCOs and all other key EE service providers in the Philippines market

5.7 Environmental, Social and Governance (ESG) Compliance

Currently there is no common ESG framework for the private sector. Common indicators must be put in place for the assessment of EE impacts. Currently, about 90% of publicly listed companies submit sustainability reports annually on a comply-or-explain basis. DOE may work with the Securities and Exchange Commission (SEC) in terms of targeting publicly listed companies who are already undertaking sustainability reporting so that they would consider RE and EEPs to mitigate GHG emissions.

6. RECOMMENDED INTERVENTIONS

Taking into consideration the EE Gaps identified in Section 5 and eliminating those covered by Donor programs in Section 4 to avoid duplication, the below EE interventions are recommended for the Philippines. They are prioritized from highest to lowest potential impact in being able to create EE demand and scale-up the implementation of EE in the Philippines. It should be noted that DOE, as the designated GA responsible for all EE in the Philippines, will be the lead counter-party agency with which all interventions are to be coordinated and approved.

6.1 Support DOE's Implementation of the EEC Act

Provide various types of support to EUMB staff to facilitate its development of Department Circulars, processes, procedures, etc. as needed to perform its implementation requirements under the EEC Act. Strengthening the technical capacity of DOE's EUMB personnel is needed to allow them to effectively perform their tasks and enforce the mandates of the EEC Act.

It would also include assisting DOE in automating its reporting requirements, receipt of energy consumption data, processing the data, establishing baselines and analyses for setting up targets for energy savings. DOE needs IT infrastructure and personnel dedicated for this purpose. Streamlining the reporting process and being able to feedback to Designated Establishments on their compliance or non-compliance to submitting reports on time may entice more end-users to comply with the reporting requirements.

The support in this intervention is a top priority to enable DOE to perform its many new tasks in the EEC Act direly needed for its effective implementation and dissemination.

6.2 Develop/Implement/Fund Demonstration EE/ESCO Projects

Demonstration projects are desperately needed to illustrate to all EE stakeholders in the Philippines how to successfully apply global best-practices in the development, implementation and financing of EEPs in both the governmental and private sector.

Since the GEMP Guidelines will not enable GAs to access the needed ESCO "paid-from-savings' funding and EE services, an alternative suggestion from DOE is to develop and implement demonstration projects that create/apply the new ESCO procurement and paid-from-savings procedures needed to overcome the ESCO barriers to implement EEPs with GAs. It is thus recommended that the first one be a demonstration Street Lighting Project with a LGU, due to its size and easy replicability to many other LGUs. In addition to templates, new procurement and budgeting processes, the demonstration projects may also:

- Enable use of energy savings (or energy OPEX budgets) as basis to procure ESCO contracts or EE improvements in government facilities

- Develop a scheme that will manage risks associated with ESCO/EE multi-year contracts
- Develop public-private partnership business models
- Develop or promote joint venture agreements with government-owned and controlled corporations (GOCCs) and water districts

In addition, this intervention would also include identifying/securing EEPs with private-sector facility owners for an international deeply-experienced EE team to develop, finance and manage the implementation of EEPs that (i) apply 'global best practices' and (ii) bundle multiple 'proven' technologies to maximize the level of EE savings and ensure targeted savings are achieved. The support would be turnkey in nature and include but not be limited to the following tasks for each Demonstration EEP:

- Prepare a '*bankable*' IGA;
- Prepare an M&V plan that would include obtaining, analyse data and perform initial M&V of savings from each Demonstration EEP;
- Prepare a project-based financing structure and presenting it to LFIs for consideration of a project-based loan;
- Prepare performance-based procurement procedures for selection of a local contractor or ESCO to implement each Demonstration EEP, and
- Perform project management services to oversee the selected contractor or ESCO's implementation of each Demonstration EEP

This intervention would include the creation of a relatively small fund (~USD 10-20 million) that would fund the development and implementation of several EEPs in different industries to facilitate development of the private sector EE and ESCO market. This intervention is critically needed to create EE demand by unlocking the current knowledge, technical and financial gaps on how to successfully develop, implement and finance an EEP in a cost-effective and low-risk manner.

6.3 Develop Automated Annual Energy Consumption Reporting by DEs

At this point, compliance by DEs to submit reports on their annual energy consumption data to DOE as mandated by the EEC Act is low. One of the possible reasons is the manual procedure for data submission. While there is a prescribed template to use in providing the data required by DOE, transmittal is by email. Even with the small volume of data so far collected by DOE, the agency is struggling with its manual data processing. Also, there is lack of uniformity in "annual" coverage of data. Some establishments use their fiscal year for data coverage while some use the calendar year. The lack of data uniformity has resulted in problems on data interpretation and difficulty in establishing baselines.

The recommendation is to have an automated system for data collection and a software for data processing allowing quick analysis of different parameters that will provide baseline energy consumption data and basis for future policies and programs. This intervention is a priority because of the urgent need for DOE to collect and analyze the tremendous amount of energy consuming data coming from the DEs to establish baselines, targets, and potential investments needed.

6.4 Deliver EEP Development Capacity Building

Work with DOE to implement a national EE Capacity Building Program (EECBP) that would train and certify the competency of individual professionals to develop 'bankable' EEPs for implementation in public and private energy-consuming facilities in the Philippines. It would also train bankers how to evaluate and structure commercially-attractive EEP Loans. It is important to certify the individuals, and not just the company, and then require that those certified personnel personally certify the results of a study/investigation.

Existing local and international best-practice training and certification materials will be modified to comply with the requirements of DOE and other GAs. The EECBP will provide the new EE knowledge/skills needed to prepare detailed IGAs containing reliable savings and CAPEX estimates and M&V plans, as follows:

a) **Certified Energy Manager (CEM):** Applies local existing training materials and certification process certifying those individuals who demonstrate their

knowledge/ability to analyze energy consumption, identify significant energy users, and establish an energy management system according to ISO 50001.

b) **Certified Energy Auditor (CEA):** Applies local existing training materials and certification process, certifying those individuals who demonstrate their knowledge/ability to audit energy-consuming facilities and identify preliminary EEPs with estimated savings.

c) **Certified Investment Grade Auditor (CIGA):** Applies existing global IGA training materials and TÜV NORD's Exam. TÜV NORD will certify as CIGA those CEAs who demonstrate their competence to prepare IGAs in compliance with generally accepted EE engineering practices.

The CIGA program teaches existing CEAs to prepare 'bankable' IGAs on EEPs for 'Decision Makers' and addresses the current market gap for CEAs to be able to develop ready-to-implement EEPs with reliable estimated CAPEX and energy savings based on measurements, supporting calculations including a M&V plan. The 4-day curriculum includes an exam requiring candidates to prepare an actual IGA. The CIGA exam will be conducted online according to international certification standards as outlined in TÜV NORD's procedures.

d) **Certified Energy Saving Verifier (CESV):** Applies existing M&V training materials and Exam from Efficiency Valuation Organization (EVO). EVO will certify as CESVs those CIGAs who demonstrate their competence to certify an EEP's estimated/achieved savings and M&V plans. The CESV program teaches existing CIGAs to prepare M&V plans that comply with generally accepted M&V principles and calculate the interdependency effect on estimated savings from bundling multiple technologies into a single EEP. CESVs will address the Philippines' current 'low confidence in EE savings' market gap by providing high-grade EE engineers with certified skills to verify estimated savings and M&V plans in IGA reports. The 7-day curriculum includes 3 days of teaching M&V fundamentals needed due to the market-wide M&V knowledge void and an exam requiring the evaluation of an existing IGA.

e) **EEP Finance Professional (EEPFP)** is a training workshop that teaches staff of financial Institutions and ESCOs how to evaluate the benefits and risks of EEPs and structure project-based financing that mitigates risks for financiers and yet is attractive to Facility Owners.

f) **ESCO Project Development Professional** is a training workshop that teaches staff of current and prospective ESCOs how to develop, finance, implement and mitigate risks of EEPs under an ESPC.

This intervention addresses a critical EEP development gap that needs to be overcome in order for the development of bankable EEPs and meaningful pipeline that can be implemented to deliver the Philippines' EE targets. It will likely require a relatively large amount of effort and time to coordinate the programs with the EEC Act's current training and certification programs and also to persuade DOE and the local certifying bodes to accept new international-based programs.

6.5 Develop EE Finance De-Risking Products

a) Develop an Energy Savings Insurance (ESI) product which is critically needed to overcome the huge collateral and confidence barriers of financing EEPs by LFIs, Facility Owners, ESCOs and other EEPs developers. The ESI mitigates the performance risk against any shortfalls in an EEP's savings versus its debt service payments to LFIs and/or investment returns to Facility Owners. It instills confidence with both Facility Owners and LFIs that the estimated future cash flow savings from an EEP will be realized. It also establishes energy savings as a reliable new future cash flow for LFIs to accept as a source of loan repayment, increased credit capacity and reduced collateral requirements of borrowers. The ESI product will be provided by a locally-respected insurance company (**Insurer**) that would pay the shortfall in an EEP's actual savings versus its related debt service payment to a LFI. Its design follows Chubb's 100% financial coverage successfully implemented in US 20+ years ago versus the partial product-warranty coverage of the Inter-American Development Bank's ESI program. The ESI will be structured as a "zero loss" insurance product with fees charged to the EEPs that cover the long-term losses in order to ensure sustainability. A first-loss fund will be included to share initial losses with the Insurer until such time as an experience ratio is determined.

b) Work with PhilGuarantee to have its Partial Credit Risk (PCG) product extended to loans taken out from the GFIs. As it is, PhilGuarantee' PCG program is accessible only by loans taken out from private commercial banks.

This intervention addresses a critical EEP financing gap that needs to be overcome in order for the scaled-up implementation of EEPs and meaningful pipeline that can be

implemented to deliver the Philippines' EE targets. It will very likely require a large amount of effort and time to work with the many stakeholders to get the ESI product designed/accepted by the local market and implemented with support of international donors and other entities. This would include but not be limited to DOE, bank regulators, insurance regulators and providers, LFIs, and private sector EE vendors and service providers, etc.

6.6 Develop Cash Incentive Programs to Drive Private-Sector EE Demand

The EE energy market in the Philippines is private sector led. Thus, its EE market development must be directed towards providing economically viable solutions supportive of SMEs and their growth or recovery from the negative effects of the pandemic. Increased demand for EE in the industrial and services sectors is needed to enhance the relatively high energy rates. It is thus recommended to create and implement two types of EE Cash Payment programs that will provide private end-use energy consumers with an attractive enough incentive to shift their behavior to purchasing more EE Products and implementing EEPs. They will be designed to provide private end-use energy consumers with an attractive enough incentive to shift their behavior to purchasing more EE Products and implementing EE Projects. A brief summary of each one is as follows:

a) **EE Product Incentives** that reflect a cash rebate paid to private purchasers of retail products that minimally offsets the higher cost for household consumers to buy the more expensive EE appliances instead of the less expensive inefficient ones.

b) **EEP Incentives** that reflect a cash payment to private Facility Owners, ESCOs and other developers who implement EEPs with the amount based on the actual kWh and thermal reductions calculated pursuant to generally accepted M&V principles like the IPMVP and verified by CESVs.

The potential positive impact of these cash incentives on creating a large EE demand in the Philippines can be significant to delivering its national EE targets. However, it is a lower priority because of the significant effort and time anticipated to work with the many stakeholders to get EE Product and EE Project cash incentive products designed/accepted by the local market and to secure an acceptable funding scheme. It also is not as critical due to the relatively high electric rates in the market place,

which already provide attractive investment returns. The stakeholders would include not be limited to DOE. DBM, DENR, DOE, DOF, DOST, DTI and also key NGOs and trade associations that include PE2, and private sector DEs, EE vendors and service providers and potential international donors.

EXHIBIT A: DEFINITIONS[9]

1. **Certified Energy Conservation Officer (CECO)** refers to a professional who obtains a certification as a CECO after demonstrating high levels of experience, competence, proficiency, and ethical fitness in the energy management profession, and who shall be responsible for the supervision and maintenance of the facilities of Type 1 DEs for the proper management of energy consumption and such other functions deemed necessary for the efficient and judicious utilization of energy under the EEC Act

2. **Certified Energy Manager (CEM)** refers to a licensed engineer who obtains a certification as a CEM after demonstrating high levels of experience, competence, proficiency, and ethical fitness in the energy management profession, and who shall be chosen by Type 2 DEs to plan, lead, manage, coordinate, monitor, and evaluate the implementation of sustainable energy management within their organizations

3. **Designated Establishment** refers to a private or public entity in the commercial, industrial, transport, power, agriculture, public works, and other sectors identified by DOE as energy intensive industries based on their annual energy consumption in the previous year or an equivalent annual index; the amount of consumption is indicated in the EEC Act and subject to adjustment by DOE as it deems necessary

4. **Distribution utility** refers to any electric cooperative, private corporation, government-owned utility, or existing local government unit (LGU) which has an exclusive franchise to operate a distribution system including those whose franchise covers economic zones

[9] Source: 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".

5. **Department of Energy (DOE)** refers to the agency created through Republic Act No. 7638, otherwise known as the "Department of Energy Act of 1992", and whose functions were expanded by Republic Act No. 9.136, otherwise known as the "Electric Power Industry Reform Act of 2001"

6. **Energy** refers to all types of energy available commercially including natural gas (liquid natural gas and liquid oil gas), all heating and cooling fuels (including district heating and district cooling), coal, transport fuels, and renewable energy sources

7. **Energy audit** refers to the evaluation of energy consumption and review of current energy cost to determine appropriate intervention measures and efficiency projects in which energy can be judiciously and efficiently used to achieve savings. It may refer to a walk-through audit, a preliminary audit, or a detailed audit

8. **Energy auditor** refers to individuals or entities certified by DOE who have proven credibility and competence to conduct an energy audit, subject to the guidelines in the certification of energy auditors developed by DOE upon consultation with stakeholders

9. **Energy conservation** refers to the reduction of losses and wastage in various energy stages from energy production to energy consumption through the adoption of appropriate measures that are technologically feasible, economically sound, environmentally-friendly, and socially affordable

10. **Energy Utilization Report (EUR)** refers to the periodic report submitted to DOE by Type 1 and Type 2 DEs, distribution utilities, and the transmission utility with regard to the National Energy Efficiency and Conservation Plan containing, among others, energy consumption, energy loss, and status of energy use. The comprehensive contents of the report are specified by DOE

11. **Energy efficiency** refers to the way of managing and restraining the growth in energy consumption resulting in the delivery of more services for the same energy input or the same services for less energy input

12. **Energy Efficiency and Conservation Office (EECO)** refers to the office to be established in each LGU mandated to oversee and monitor the implementation

of their respective Local Energy Efficiency and Conservation Plan (LEECP), which may be part of the planning and development office

13. **Energy Efficiency and Conservation Officer (EEC Officer)** refers to the head of the EECO responsible for overseeing the implementation of the Local Energy Efficiency and Conservation Plan (LEECP) at the local government level, who may be designated from the existing personnel of the LGU

14. **Energy efficiency projects** refer to projects designed to reduce energy consumption and costs by any improvement, repair, alteration, or betterment of any building or facility, or any equipment, fixture, or furnishing to be added to or used in any building, facility, or vehicle including the manufacturing and provision of services related thereto. Such projects shall be cost-effective and shall lead to lower energy or utility costs during operation and maintenance

15. **Energy end user** refers to all individuals and entities which consume energy to include households, industrial and commercial customers, power plants, distribution utilities, and transmission utilities

16. **Energy labeling** refers to the Philippine Energy Standards and Labeling Program (PESLP) which requires manufacturers to attach an energy label on their products to inform consumers about the energy performance and efficiency of the product

17. **Energy management** refers to the process of designing and implementing an optimal program of purchasing, generating, and consuming various types of energy based on the end user's overall short-term and long-term management program, with due consideration of factors including costs, availability, economics, and environmental impact

18. **Energy Service Company (ESCO)** refers to a legal entity that offers multi-technology services and goods towards developing and designing energy efficiency projects, delivering and guaranteeing energy savings, and ensuring cost-effective and optimal performance. Their services include energy supply and management, energy financing, technical engineering expertise and consultancy, equipment supply, installation, operation, maintenance and upgrade, and monitoring and verification of performance and savings. Their goods include lighting, motors, drives, heating, ventilation, air conditioning

systems, building envelope improvements, and waste heat recovery, cooling, heating, or other usable forms of energy control systems

19. **Government energy efficiency projects** refer to energy efficiency projects carried out by all government departments, government-owned and-controlled corporations (GOCCs), state universities and colleges, hospitals, and other instrumentalities of the government which have been evaluated and endorsed by DOE for approval of the Inter-Agency Energy Efficiency and Conservation Committee (IAEECC) created under the EEC Act

20. **Government Energy Management Program (GEMP)** refers to the government-wide program to reduce the government's monthly consumption of electricity and petroleum products through electricity efficiency and conservation, and efficiency and conservation in fuel use of government vehicles, among others

21. **Local Energy Efficiency and Conservation Plan (LEECP)** refers to a collaborative and multi-stakeholder comprehensive framework, governance structure, and programs prepared by the LGU for local energy efficiency and conservation with defined targets, feasible strategies, and regular monitoring and evaluation., which shall be aligned with the EEC Act and the NEECP.

22. **Local government units (LGUs)** refer to the government units created through Republic Act No. 7160, otherwise known as the "Local Government Code of 1991"

23. **Minimum Energy Performance (MEP)** refers to a performance standard which prescribes a minimum level of energy performance for the commercial, industrial, and transport sectors, and energy-consuming products including appliances, lighting, electrical equipment, machinery, and transport vehicles that must be met or exceeded before they can be offered for sale or used for residential, commercial, transport, and industrial purposes

24. **National Energy Efficiency and Conservation Coordinating Officer (NEECCO)** refers to the person appointed by the Department of the Interior and Local Government (DILG) upon the recommendation of the league of LGUs from among all the EEC Officers of different local governments, who shall be responsible for integrating all the LEECPs

25. **National Energy Efficiency and Conservation Database (NEECD)** refers to a centralized, comprehensive, and unified database on national energy consumption, the application and use of energy efficient and renewable energy technologies, and other critical and relevant information to be used for evaluation, analysis, and dissemination of data and information related to energy efficiency and conservation

26. **National Energy Efficiency and Conservation Plan (NEECP)** refers to the national comprehensive framework, governance structure, and programs for energy efficiency and conservation with defined national targets, feasible strategies, and regular monitoring and evaluation, which shall be aligned with the EEC Act and shall be a result of a collaborative and multi-stakeholder consultative process. It shall be regularly reviewed and revised as determined by DOE

27. **Transport vehicle** refers to land, air, or sea vehicles conveying cargo or passengers, regardless of size or weight classification

28. **Specific energy consumption** refers to the energy consumption volume required per unit, such as production volume, sales amount, transportation kilometer, transportation tonne-kilometer, floor space, and such other indicators relevant to energy consumption; and

29. **Transmission utility** refers to any private corporation or government-owned utility which has an exclusive franchise to operate the system of wires for the conveyance of electricity through a high voltage backbone line.

Diagnostic Review and Analysis of Energy Efficiency Development in Vietnam

Final Report: 31 January 2022

Supported by: The Energy Transition Partnership (ETP)

Prepared by: EPS Capital Corp.

ENERGY TRANSITION PARTNERSHIP

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ACRONYMS

ADB	Asian Development Bank
AE	Accredited Entities
AEE	Association of Energy Engineers
AFD	Agence Française de Développement
AIIB	Asian Infrastructure Investment Bank
APEC	Asia-Pacific Economic Cooperation
ASEAN	Association of Southeast Asian Nations
BAU	Business as Usual
BIDV	Bank for Investment and Development of Vietnam
CFC	Chlorofluorocarbon
C&I	Commercial & Industrial
CEA	Certified Energy Auditor
CEM	Certified Energy Manager
CESV	Certified Energy Saving Verifier
CHP	Combined Heat and Power
CIF	The Climate Investment Fund
CIGA	Certified Investment Grade Auditor
CMSC	Committee for Management of State Capital at Enterprises
CPI	Consumer Price Index
CRAFT	Climate Resilience and Adaptation Finance Technology Transfer Facility
DEG	Deutsche Investitions und Entwicklungsgesellschaft

DEU	Designated Energy Users
DMC	Developing Member Countries
DOIT	Department of Industrial and Trade
DPSD	Dedicated Private Sector Programs
EE	Energy efficiency
EEBC	Energy Efficiency Building Code
EEP	Energy Efficiency Project
EEPFP	EE Project Finance Professional
EESD	Energy Efficiency and Sustainable Development
EIB	European Investment Bank
EOR	Energy Outlook Report
ERAV	Electricity Regulatory Authority of Viet Nam
ESCO	Energy Service Company
ESG	Environmental, Social, and Governance
ESI	Energy Savings Insurance
EU	European Union
EV	Electric Vehicles
EVN	Electricity of Vietnam Group
EVO	Efficiency Valuation Organization
FDI	Foreign Direct Investment
GAs	Government Agencies
GABC	Global Alliance for Buildings and Construction
GCF	Green Climate Fund

GDP	Gross Domestic Product
GEF	Global Environment Facility
GFA	Ground Floor Area
GHG	Greenhouse gas
GIS	Geographical Information Centre
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
GVN	Government of Vietnam
HEPS	Highly Energy Efficient Product
IBRD	International Bank for Reconstruction and Development
ICSID	International Center for Settlement of Investment Disputes
IDA	International Development Association
IFC	International Finance Corporation
IGA	Investment Grade Audit
IIEE	Institute of Integrated Electrical Engineers
INDC	Intended Nationally Determined Contribution
IPMVP	International Performance Measurement and Verification Protocol
IRR	Internal Rate of Return
ISO	International Organization for Standardization
ITDI	Industrial Technology Development Institute
IZ	Industrial Zone
JCM	Join Crediting Mechanism
JICA	Japan International Cooperation Agency

LATD	Lighting and Appliances Testing Division
LCEP	Low Carbon Energy Program
LEAP	Leading Asia's Private Infrastructure Fund
LEEC	The Law on Energy Efficiency and Conservation
LEED	Leadership in Energy and Environmental Design (Green Building certification)
LFI	Local Financial Institution
LOTUS	Green Building Rating System developed by Vietnam Green Building Council
LULUCF	Land use, Land use change and Forestry
M&V	Measurement and Verification
MEPS	Minimum Energy Performance Standards
MIGA	Multilateral Investment Guarantee Agency
MOC	Ministry of Construction
MOF	Ministry of Finance
MOIT	The Ministry of Industry and Trade
MONRE	Ministry of Natural Resources and Environment
MOST	Ministry of Science and Technology
MOT	Ministry of Transport
MPI	Ministry of Planning and Investment
MRV	Monitoring-Reporting and Verification
NAPA	National Adaptation Programs of Action
NCCS	National Climate Change Strategy
NDC	Nationally Determined Contribution

NGO	Non-governmental Organization
NGGS	National Green Growth Strategy
NSCC	National Strategy on Climate Change
O&M	Operation and Maintenance
ODA	Official Development Assistance
OFID	OPEC Fund for International Development
OPEX	Operating Expenses
PC	Power Company
PCG	Partial Credit Guarantee
PDP 8	Power Development Planning VIII
PPP	Public Private Partnership
PSF	Private Sector Facility
PSSA	Private Sector Set-Asides
PVN	Vietnam National Oil and Gas Group
RE	Renewable Energy
REF	Reference Scenario
RECP	Resource Efficiency and Cleaner Production
RES	Retail Electricity Suppliers
RSF	Risk Sharing Facility
RTS	Rooftop solar system
SBV	State Bank of Vietnam
SCCF	The Special Climate Change Fund
SDG	Sustainable Development Goals

SEC	Securities and Exchange Commission
SGRM	Smart Grid Road Map
SME	Small Medium Enterprise
TA	Technical Assistance
TES	Total Energy Supply
TFEC	Total Final Energy Consumption
VAT	Value Added Tax
VBSCD	Vietnam Business Council for Sustainable Development
VCCI	The Vietnam Chamber of Commerce and Industry
VEEIP	Vietnam Energy Efficiency For Industry Project
VEIS	Vietnam Energy Information Security
VEPG	Viet Nam Energy Partnership Group
VGBC	Vietnam Green Building Council
VINACOMIN	Vietnam Coal and Mineral Industry Group
VNEEP 3	National Program on Energy Efficiency and Conservation 3
VSD	Vietnam Securities Depository
UK	United Kingdom
UNIDO	United Nations Industrial Development Organization
USAID	United States Agency for International Development
WB	World Bank

UNITS AND CURRENCIES

GBP	British Pound Sterling
GWh	GigaWatt hour
kTOE	kilotonnes of oil equivalent
kW	kilowatt
kWh	kilowatt hour
$MTCO_2e$	Million Tons of CO_2 Equivalent
MTOE	MegaTonne of Oil Equivalent
USD	United States Dollar
VND	Vietnamese Dong

EXECUTIVE SUMMARY

This report presents the current energy and energy efficiency (EE) landscape of Vietnam in which relevant policies, regulations, market barriers and gaps are discussed. The on-going donor's initiatives on EE are also reviewed to eliminate duplication in new interventions that can be implemented in delivering the way forward for low carbon technologies adoption.

Vietnam continues to experience high economic growth compared to regional and global economies. Average gross domestic product (GDP) growth rate reached approximately 7 % during 2001-2010, dropped to around 5.8 % during 2011-2015 and gradually recovered to 6.8 % from 2016 to present. This economic growth, in combination with urbanization and rapid population growth, has boosted demand for energy in general and electricity in particular.

In 2015, total primary energy (PE) supply in Vietnam was 70,588 kiloton of Oil Equivalent (KTOE). Since 2010, the Total Final Energy Consumption (TFEC) grew by 4.3% per year to reach 61,853 KTOE in 2019. However, the growth rates were relatively higher in 2018 (11.86%) and in 2019 (6.7%) and resulted in a total final PE supply by GDP in 2018 of 0.35 TOE/1000 USD while the average of other countries in the region are at 0.21 TOE/1000 USD. Also, energy consumption intensity has not decreased much, which indicates that Vietnam's energy efficiency is very low and needs to be improved soon.

Vietnam has a high level of energy intensity compared to other international contexts. In 2019, the Total Energy Supply (TES) by GDP was 15.2 GJ/1000USD (IEA[1], 2021), while the world average amounted to 8 GJ/1000USD of GDP, equating to 0.363 TOE for Vietnam versus the world average of 0.191 TOE (almost double). The fact that energy intensity has not decreased much indicates that Vietnam's EE is very low.

According to the final draft National Power Development Plan for the period 2021-2030 in Vision 2045, Vietnam's power demand is forecasted to increase on average by 9.1% and 7.9% annually for the period 2021-2025 and 2026-2030, respectively. Accordingly, domestic supply capacity of electricity would need to increase almost

[1] https://www.iea.org/countries/viet-nam

twofold, from 69,258 MW in 2020 to 137,662 MW in 2030. This growth rate is considered high compared to the region and the rest of the world.

The Government of Vietnam (GVN) is well aware that it needs to balance the need for increasing energy supply for socio-economic growth with ensuring energy security and environmental protection. This requires working different strategies that include enhancing EE to allow for savings and improving energy performance to reduce future supply needs and current losses. GVN recognizes that with the overall shortage of power, one of the main benefits of implementing EE would be a reduction of the total energy system cost by significantly reducing fuel costs and demand on the electrical power system.

One of the central EE policies issued in March 2019 is the National Program on Energy Efficiency and Conservation for the period 2019-2030 (VNEEP 3), and it targets a reduction of TFEC by 5-7% in 2025 and 8-10% in 2030 compared to the baseline development. VNEEP 3 also has many different detailed targets for reducing electricity losses, achieving EE and energy savings in various industrial subsectors, green building programs, industrial units with energy management systems, fuel economy for vehicles, etc. VNEEP 3 also contains a legal framework, enhancement of legislative enforcement, promulgation of EE standards, establishment of ESCO technical/financial capacity building support, plus creating energy information systems and establishing an EE fund. Unfortunately, VNEEP 3 is only a policy and not a law that can be legally enforced by GVN.

VNEEP 3 is followed by Vietnam's commitment at the 26th United Nations Climate Change Conference of the Parties (COP26) in Glasgow to target net zero emissions by 2050. Vietnam also introduced stronger measures to reduce greenhouse gas (GHG) emissions on its own abilities as well as with international support in terms of finance and technology transfer. It also vowed to continue implementing its stated goals in the Paris Agreement. In 2022, Vietnam will provide updates for the country's NDC commitment that features the initiatives and efforts to green the energy mix and support the further adoption of EE.

A rough estimate of the potential EE investment and energy savings market opportunity is provided in the below Table 1. It shows a total EE investment potential for the industrial, residential and governmental primary energy consuming sectors of USD 4.359 billion and an average annual energy savings of USD 361 million over the 12-year period ended 2023.

Table 1. Estimated EE Market Savings and Investment[2]

Sector	2018-2030 Cumulative Investment (USD Million) under current policy	Energy savings potential (%) by 2030	Average annual investment needs (Million USD)
Industrial Sector EE	2,551	7.40%	210
Residential Sector EE	1,246	11.60%	104
Commercial Sector EE	562	5.10%	47
TOTAL USD million	**4,359**		**361**

Unfortunately, the status of the Vietnam EE market is that very little EE has been or is being implemented in any of its sectors, which makes the achievement of the above estimates quite challenging. One of the most significant contributors to the low EE penetration is the limited awareness and market demand for EE in Vietnam caused by the same common barriers faced by many countries in Southeast Asia and other developing countries around the world, plus the additional significant barrier to EE of having low electric rates. However, there are good EE policies, but they are not effectively enforced and none of them contain any incentives or removal of regulatory barriers in the Governmental sector that could significantly drive EE demand or overcome many of the EE barriers currently facing Vietnam.

Taking into consideration the EE market barriers that are creating the EE Gaps identified in section 6 and eliminating those gaps that are being addressed by current Donor programs in section 5, to avoid duplication, the following EE interventions are recommended for Vietnam. They are prioritized from highest to lowest potential impact in being able to create EE demand and scale-up the implementation of EE in Vietnam, except for the creation of a government EE/ESCO market in section 7.7, which will require delayed implementation until MOIT determines it is a priority within VNEEP 3. It should be noted that MOIT, as the designated GA responsible for

[2] Vietnam Times Model Energy Sector Final report

all EE in Vietnam, will likely be the lead counter-party agency with which all interventions are to be coordinated and approved.

1. Develop/Implement/Fund Private-Sector Demonstration ESCO Projects
2. Develop New Cash Incentives to Drive Private-Sector EE Demand
3. Deliver EEP Development Capacity Building
4. Develop EE Finance De-Risking Products
5. Develop an Industrial EE Benchmarking System
6. Create/Deliver 'EE Product' Awareness and Promotion Programs
7. Remove EE Regulatory Barriers for GAs
8. Create a Robust ESCO Association

1. ENERGY EFFICIENCY (EE) MARKET

1.1 Status and Potential

Despite the rapid industrialization and the large potential of energy saving and GHG emission reduction in Vietnam, the Energy Efficiency (EE) market is still nascent, due to many barriers, that include limited market awareness and demand, lack of capacity to develop 'bankable' EE projects (EEPs), limited access to financing and insufficient financial capacity of local financial institutions (LFIs), industrial enterprises, ESCOs and government entities. The local banking sector is experiencing undercapitalization and suboptimal resource allocation making a capital allocation for new lines of business like EEP finance very unlikely and limited.

There have been a number of national EE initiatives of the Government of Vietnam (GVN) and support programs implemented by development partners, but they are not sufficient to push the EE market forward beyond its current early stage. To deal with growing energy intensity and carbon emission of the industrial sector in conjunction with a shortage of power generating capacity, the GVN and local players are in need of effective interventions that will open up the wide-spread implementation of a sustainable EE market.

Foreign studies and scientists have verified that saving energy is a cheaper investment than building a power plant to satisfy additional electric demand with new generating capacity. Therefore, using energy economically and efficiently is the top priority solution. In Vietnam, it was reported that after implementing the National Target Programs on EE during 2006-2010 and 2011-2015, total energy consumption decreased by 3.4% and 5.6%, respectively compared to Business as Usual (BAU) scenarios. However, in the context of exhausting the available domestic energy resources to accommodate the high/increasing demand for energy consumption and ensuring energy security, the ability to meet commitments to the Paris Agreement creates major challenges for the energy industry in Vietnam. On March 13, 2019, the Prime Minister approved the National Energy efficiency and conservation program from 2019 to 2030 (VNEEP3) in Decision No. 280/QD-TTG, which targets 8-10% energy savings of total commercial energy consumption for 2019-2030.

Vietnam has a high level of energy intensity compared to other international contexts. In 2019, the Total Energy Supply (TES) by GDP was 15.2 GJ/1000USD (IEA[3], 2021), while the world average amounted to 8 GJ/1000USD of GDP, equating to 0.363 TOE for Vietnam versus the world average of 0.191 TOE (almost double). With the issuance of GVN's Law on Energy Efficiency and Conservation in 2010, many EE activities were carried out throughout the country covering different economic sectors, with good progress in applying EE measures for user appliances and partly in industrial facilities. The GVN believes the Amended Law on Environmental Protection, effective January 2022, together with the Investment Law 2020, VNEEP 3's policies and its commitments will create a foundation of mechanisms and methods to increase EE and reduce GHG emissions as needed to meet the international targets to which GVN is committed to achieve.

Vietnam's pending PDP8 power development plan will have a broad-sweeping, positive impact on RE, LNG, and coal projects as well as on Vietnam's COP 26 announced goal to be carbon neutral by 2050. It will also improve the ability of many companies to meet their growing energy requirements with energy efficient and carbon-neutral solutions. Researchers and ministries are looking at developing a roadmap to zero carbon, along with a newer NDC proposal in 2022.

In 2010-2017, total GDP increased by 6.1% per year with the highest growth rate being in the industrial sector (7.4%) followed by the commercial sector (6.8%). This

[3] https://www.iea.org/countries/viet-nam

economic growth resulted in increased energy consumption, with the industrial sector showing the most significant increase of 9.3%, followed by the commercial and transportation sectors at 6.4% and 5.2%, respectively. On the other hand, the final energy consumption in the residential sector decreased mostly due to a trend involving displacing traditional biomass use with electricity and other fossil fuels (especially for cooking purposes in rural areas). In 2019, the industrial sector represented 51.3% of Total Final Energy Consumption **(TFEC)**, followed by the transportation and residential sectors at 23% and 12%, respectively.

In 2010-2019, TFEC grew by 4.3% per year to reach 61,853 KTOE in 2019. However, the growth rates were relatively higher in 2018 (11.86%) and in 2019 (6.7%) and resulted in a Total final energy supply by GDP in 2018 of 0.35 TOE/1000 USD for Vietnam while the average of countries in the region are at 0.21 TOE/1000 USD. The energy consumption intensity has not decreased much, showing that Vietnam's energy efficiency is very low and needs to be improved soon.

With Vietnam's overall shortage of power situation, one of the main potential main benefits of implementing EE measures would be a reduction of the total energy system cost by significantly reducing fuel costs and power demand of the system. The latest Vietnam Energy Outlook Report 2019 (EOR19) provides a scenario-based foundation for policy action on the development of the energy system towards 2050 targets. These scenarios feature an increased application of industrial combined heat and power (CHP) plants, based on biomass and natural gas. Even though the additional investment in EE technologies is estimated to be USD 7 billion by 2030 and 16 billion USD by 2050, a large share of fuel costs and assets in the power sector can be saved, thus resulting in an overall reduction of the annual total system cost of 8.9% and 10.6% in 2030 and 2050.

EOR 19 estimates that the application of EE measures can save up to 15 MTOE by 2030 and 47 MTOE by 2050 in the TFEC, which is based on energy use intensities of current technologies in 2014 and an assumed limited penetration of EE demand technologies. This would result in a reduction in TFEC of 12% in 2030 and 20% in 2050, primarily due to decreased oil consumption in the transport sector and power demand in the industry and residential sectors. As a result, the EE activities can save annually a total of 83 Mt CO2 by 2030 and 237 Mt CO2 by 2050, in the power, industry and transport sectors. In addition, a large share of fuel costs and investments in the

power sector can be saved that could result in an overall reduction of the annual total system cost of 8.9% and 10.6% in 2030 and 2050.[4]

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Industrial EE measures include:

- Process heat efficiency improvements (primarily more efficient boilers and furnaces)
- Cogeneration
- Industrial process improvements, which reduce the amounts of process heat or motor drive energy needed for a unit of production
- Motor drive efficiency improvements (primarily variable speed drives)
- Facility/Other efficiency improvements (primarily more efficient air conditioning)

[4] Vietnam Energy Outlook Report
[5] Vietnam Times Model Energy Sector Final report

- Biomass utilization in boilers & furnaces

Residential EE measures include:

- Solar water heater
- Use of high-performance refrigerators, AC, Lighting, appliances, water heater
- Clean cooking fuels

Commercial EE measures include:

- Solar water heater
- Use of high-performance AC, Lighting, water heater, office equipment

1.2 EE Improvement in Primary Energy Consuming Sectors

According to the 2021 Electricity of Vietnam Annual Report[6], industry and construction consumed 54% of Vietnam's total power consumption and buildings consumed 39% in which ~34% was consumed by residential and administrative buildings and 5% by commercial, hotel and bank buildings.

c) Industry

Cement, iron & steel, pulp & paper, food and textile are the main industrial subsectors with the most opportunity for EE improvements. It is expected that of the total potential energy to be saved by 2030, 61% will come from EE measures in heat processes, 21% from new EE machine-driven equipment and 18% from EE retrofits in facilities. In the period to 2050, EE improvements in the process heat use by the cement, iron and steel, pulp and paper, food, and textile subsectors are the most critical area for realizing the energy savings potential. EE improvements of the machine-driven equipment that includes efficient motors and variable speed drive are essential in all subsectors, especially for iron and steel and textile production. New EE LED lighting is expected to implemented in all industrial subsectors.

Technological solutions related to industrial ecology and circular economy, which have co-benefits of energy savings and GHG emission reduction, are at the initial

[6] EVN Annual Report 2021

stage of implementation in some industries. By 2019, 60 solutions had been identified in the Ninh Binh, Da Nang and Can Tho industrial parks, of which 2 solutions have been implemented, 5 are in the development phase and 5 are in the planning phase. Although there is no information on the specific technological solutions, it was reported that about 25 million kWhs of electricity and 135 TJ of fossil fuels have been saved, reducing GHG emissions by about 35,000 tCO2e[7].

Some of the manufacturing in Viet Nam is dominated by foreign companies via foreign direct investment (FDI). Policies to encourage technology transfer are needed, such as the creation of knowledge hubs through collaborative R&D funding. Ensuring technical transfers that benefit domestic players and encourage a domestic market for EE equipment will help the emergence and strengthening of local manufacturing companies (Climate Works Australia & Vivid Economics 2020).

According to an unpublished business survey in the context of COVID-19 effects, the number of enterprises in Viet Nam applying the National Energy Management Standards or the ISO:50001 International Energy Management Standards certification is very limited, focused mainly on building management and garment enterprises. The potential for EE and of GHG emissions reduction is to invest in the production lines, air conditioning, energy management and wastewater treatment areas. Different sectors will have different energy saving potential, implementing different energy saving solutions. The current technologies and equipment in the agriculture, aquaculture processing, paper and garment industries is outdated, and thus have a higher potential for EE than the garment and building management sectors. The motivation to apply new technology is mainly due to competitive pressure and to meet the requirements of foreign customers.

Lighting equipment and steam systems are mainly supplied from domestic enterprises, while refrigeration systems, production lines and machinery are imported from countries such as USA, Thailand, China, Japan, India, Germany, and Belgium. The agricultural product processing industry uses mainly equipment and production lines manufactured by domestic mechanical companies. When investing in new equipment and systems, companies are most interested in getting the needed

[7] VNCPC (2021). This amount of GHG emission reduction is relevant to all resource efficiency solutions in 73 enterprises in Ninh Binh, Da Nang and Can Tho.

capacity and consumption of input materials at the lowest upfront cost, and they are not so interested in the amount of energy consumed.

d) Transportation

Road transport is one of the main areas for EE improvements with significant contributions expected from cars, motorbikes and other commercial vehicles (buses and trucks) mainly due to the introduction of higher fuel economy standards. An increasingly large share of oil products for transportation is expected to be imported, thus making EE in vehicles a significant focus area.

The international trends in the development and cost reduction of e-vehicles support the expectation that electro-mobility might become a focus area for Vietnam. The master plan on e-vehicle in under development by Ministry of Transport. If the expansion of RE supplies the electrified transport, it will potentially increase EE, reduce air pollution and reduce oil import dependency. There is a draft amendment of Decree No. 140/2016/ND-CP to reduce registration fee of EVs, making the passenger vehicle registration fee for electric car about 50% of the fee of a similar conventional vehicle.

Vinfast, the largest domestic moped and car producer, formed in 2017 has been selling e-bikes for some years. E-bikes are also widely imported from China and used by students. Some companies are also already producing, importing electric buses for use in the big cities, including Vinfast. Vinfast is also starting to sell Electric Vehicles (EVs) in Viet Nam, the US and some European countries (late 2021 and 2022). The model they are promoting in the USA and possibly other markets is that they would sell the e-cars but rent out the batteries against a monthly fee which would make the purchase price of the cars very competitive with internal combustion engine cars a lower operating cost with reduced energy consumption over the lifetime of the car. Another Vietnam company, Thaco, is importing (assembling) Korean EVs. Luxury brands have been importing hybrids and plug-in e-cars into Vietnam for some years but only in very small numbers due to there not being a charging network in the country, having to rely on charging at homes.

Charging of EVs can take several forms: smart charging, fast charging, and dynamic charging. Vinfast has made an agreement with PetroLimex at their nationwide petrol station network. Several charging stations have been built by Vin Group for the

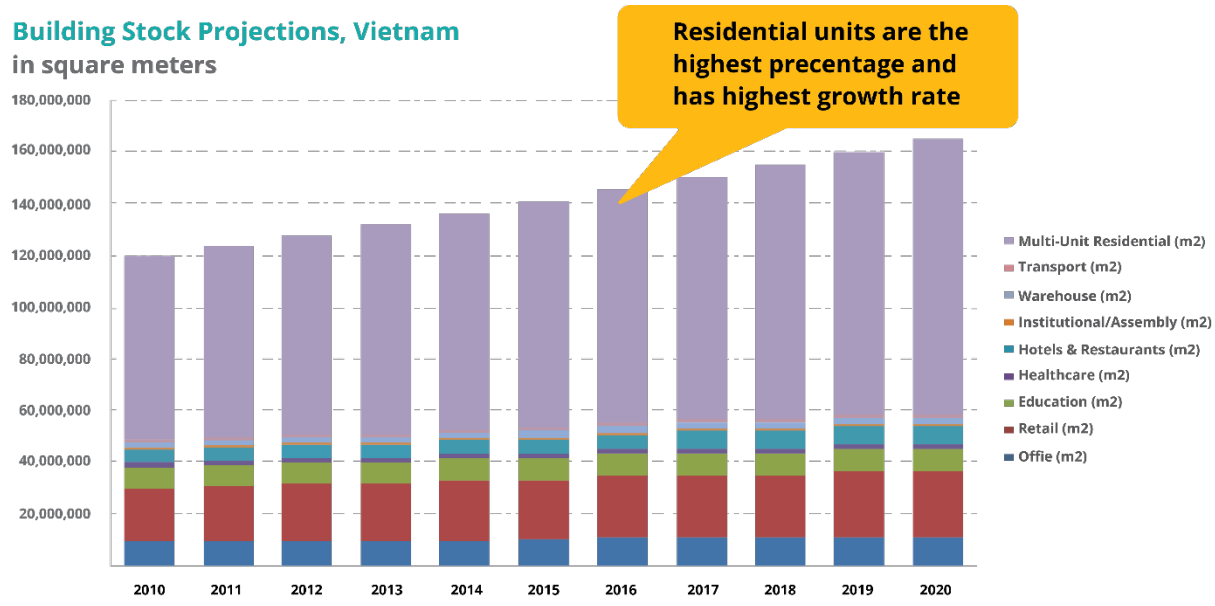
operation of Vinbus and are located in e-bus depots in Hanoi, Ho Chi Minh and Phu Quoc.

e) Buildings

Buildings consume 39% of Vietnam's total power consumption in which ~34% was consumed by residential and administrative buildings and 5% by commercial, hotel and bank buildings The electricity in commercial and residential buildings is subsidized with concessional tariffs. LED lighting is the main area for EE improvement with cooking and space cooling (efficient air conditioning) being the other main areas for energy savings.

The Vietnam construction sector is still booming with a 6% growth rate compared to 5.5% growth rate of the entire economy. Data on building stock in Viet Nam is dispersed among different agencies and organizations responsible at national and provincial levels making it very difficult to get reliable data. The most comprehensive available data comes from the revised 2013 Energy Efficiency Building Code (EEBC) which focused on large buildings and showed there was about 2.8 million m^2 of Office Buildings and 1.8 million m^2 of Shopping Centers. This is very outdated based on an important observation is that, in the last ten years, the number of buildings has increased by a factor of six. This increase in new buildings has obviously increased energy use demand and will in the future.

Figure 1. Building growth rate – Pike research



Source: Pike Research

A recently completed project of the Ministry of Construction (MOC) and UNDP "Energy Efficiency Improvement in Commercial and High-Rise Residential Buildings in Viet Nam 2021 (EECB)" showed that there is a very considerable amount of energy savings possible, which would have positive effects beyond reduced energy, for example the value of buildings, reduced operation and maintenance (O&M) costs and health benefits from improved indoor air quality. It applied 75 energy saving solutions in 23 new and existing high-rise buildings and concluded the resulting reduced energy consumption and GHG emissions and cost savings could be paid back in less than 4 years. The primary Energy Savings Measures (ESMs) wee LED lighting, efficient air conditioning, water heating, reflective film on windows, and rooftop solar PV generation.

The LED lighting system has been used to replace fluorescent, compact fluorescent (CFL), halogen and high pressures sodium vapor (HPS) lamps, saving up to 60% of electricity with a payback period of 2 years. Efficient air conditioners with built-in inverter save up to 35% of electricity. Heat pump used for hot water system in replacement of resistor and boiler can save up to 60% of energy for heating water, and solar water heaters can bring 100% of energy savings with a payback period of 3 years. Application of heat resistant, double glazing to replace ordinary glazing can save 10% of energy for air conditioning, with co-benefit of noise reduction. Some grid-connected solar power systems can generate up to 3-4 kWhs of electricity per day with a payback of 5 years.

In residential buildings, efficient cooking, space cooling and lighting are the three main areas for EE improvements. Employment of efficient cookstoves and fuel switching to LPG and electric cooking stoves in rural households is significant to reallocate biomass resources from residential use to more efficient industrial CHPs or other central power plants. In addition, with the projected increase in the cooling demand, the introduction of efficient air conditioners plays a significant role in reducing energy consumption in the residential sector.

A list of the primary measures identified in Vietnam's May 2020 NDC Technical Report that can reduce emissions and increase EE is provided in EXHIBIT A, along with the targeted 2030 savings and costs of each.

1.3 Energy and Carbon Emission Reductions under BAU Scenario

(See also EE target under VNEEP 3 and Carbon Emission target under NDC)

In 2017, The Ministry of Industry and Trade (MOIT) requested World Bank support to assist them in developing its energy sector emission reduction targets and pathways contributing to the national NDC targets. Under this support, a study was prepared containing the following 2 scenarios:

a. **Business-As-Usual (BAU) Scenario** represents the baseline scenario in line with MONRE's revised NDC-2 BAU depiction[8] of the power and other energy sector emission profiles, particularly with respect to sectoral emissions, generation mix, and electricity demand.

b. **EE and RE Policy Scenario (EE & RE Policies)** reflects ambitious RE targets by 2030 (12 GW of solar PV and 6 GW of wind) set in GVN's latest Power Development Plan (PDP-7r) approved in March 2016 after the NDC submission, and the recently approved (in February 2019) Vietnam National Energy Efficiency Program (VNEEP 3) that set an EE target to reduce final energy consumption 8-10 % below BAU from 2021 to 2030. MOIT regards this scenario as conditional, as they expect international support to implement the PDP-7r and VNEEP 3.

The conclusion from that study is that the EE&RE Policies scenario, based on the VNEEP 3 and PDP-7r, could reduce energy consumption by 9.8% and GHG emissions by 17.8 % below BAU by 2030 for the entire energy sector, including power, industrial, residential, commercial and transport (assuming the medium mitigation scenario for Transport sector of 15 % below BAU by 2030).

In early November 2021, the Prime Minister announced at the UNFCCC that Viet Nam aims for net-zero emissions by 2050, contingent on international support. Viet Nam's leaders also announced a plan to "hardly develop new coal" by substituting coal-thermal power plants with LNG and phasing out coal power generation in the 2040s. The Prime Minister also announced that Viet Nam will increase its share of clean energy in the total primary energy supply to 20% by 2030 and 30% by 2045, which are the higher targets in the National Green Growth Strategy (NGGS). Some or all

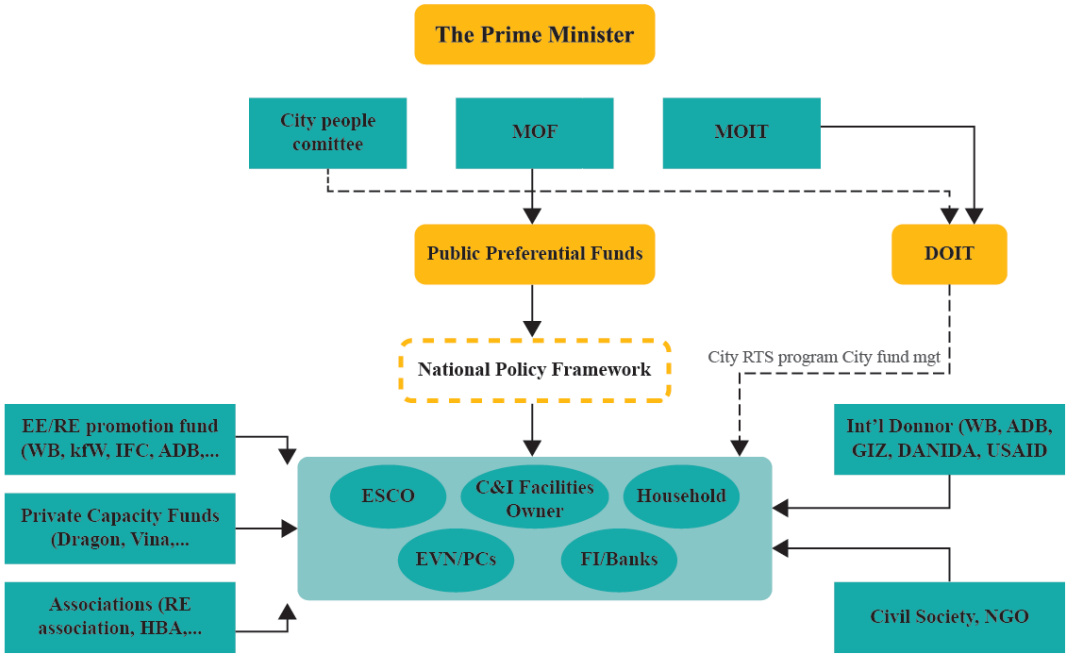
[8] Review and Update of Viet Nam's Nationally Determined Contribution for Energy Sector, published by GIZ, 2017.

those targets are likely to be articulated in VNG's forthcoming National Climate Change Strategy (NCCS).

1.4 EE Stakeholders

A mapping of all primary EE Stakeholders in Vietnam is shown below in Figure 1 followed by a brief description of each major one.

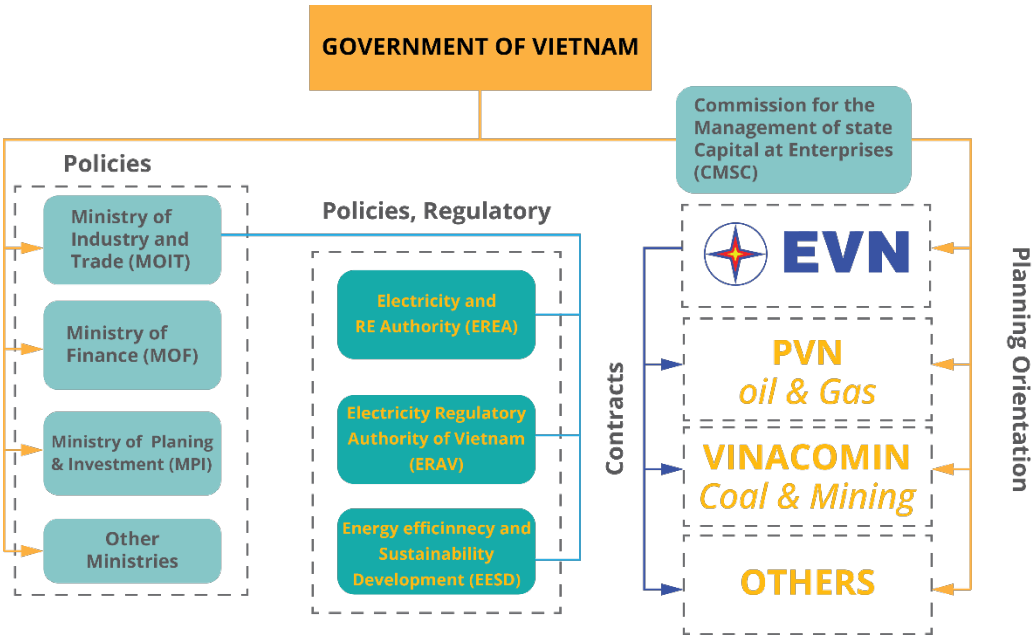
Figure 2. EE Stakeholder Mapping



a. The Prime Minister

In February 2018, the Prime Minister (synonymous with the Government of Vietnam or "**GVN**") established the Committee for Management of State Capital at Enterprises (**CMSC**) to oversee the financing of its 19 state-owned groups and corporations. The CMSC is responsible for managing those enterprises which are 100% owned by the GVN, as well as joint stock and limited liability companies in which it an investor with others. This includes companies in the energy sector such as EVN, PVN, VINACOMIN. However, the primary government agency responsible for EE and RE in Viet Nam is the Ministry of Industry and Trade (**MOIT**), which takes the lead of the other stakeholders discussed below. The new 2018 structure of Vietnam energy sector is as follows:

Figure 3. 2018 Government and Energy Companies Structure



b. Ministry of Industry and Trade (MOIT)

Pursuant to Decree 98/2017/ND-CP, MOIT performs GVN management functions in the following areas: electricity, coal, oil and gas, new energy, renewable energy, industries management and industrial promotion; trade and promotion; public services its management. In particular, for the energy sector (electricity, coal, oil and gas, new energy, renewable energy and other energies; economic and efficient use of energy), MOIT manages the investment and construction of GVN energy projects, reports on status of production and business, publishes a list of energy work and projects under the planning of electricity development, coal, oil and gas industry, new and renewable energies to attract construction investment.

As an industry management agency, MOIT has implemented many EE solutions from policy, consulting, financial, technical and technological support to information promotion, propaganda and achieved particular results. Working with the World Bank on VNEEP 3, MOIT studied the possibility of allocating the national energy savings target to localities in Vietnam, divided into seven groups with different energy saving goals based on similar characteristics of energy saving potential, economic structure, population characteristics, etc. On that basis, the MOIT and localities now determine annual and periodical goals for each province and city, attaching the

responsibility of the local head for ensuring the implementation of the agreed upon defined targets.

c. Ministry of Finance (MOF)

The MOF is responsible for performing the GVN's management of the financial sector and setting the Public Preferential Fund budget, which supports RE and EE activities. This includes coordinating with the MOIT and other relevant agencies the development of the financial management and funding mechanisms to promote the economical and efficient use of energy.

MOF is also involved in the co-development of incentive/penalty scheme(s) and other financial mechanisms to support Energy, RE and EE. Therefore, MOF indirectly promotes GVN's energy goals and is a critical stakeholder in the broader landscape.

d. Provincial People Committee and DOIT

The Provincial (city level) People Committee decides on the important guidelines and measures to promote local potential socio-economic development and fulfill local obligations towards the whole country. As a part of its responsibilities, the Provincial People Committee authorizes the Department of Industrial and Trade (DOIT) to perform the GVN's management functions in the following fields: electricity, coal, oil and gas, new energy, renewable energy, industries management and industrial promotion; trade and promotion and public services in sectors and fields under its management authority.

Regarding electricity and energy field, DOIT will:

- Organize the implementation of power development planning and develop the application of new and renewable energies in the province.
- Organize the dissemination and training of legal knowledge on electricity activities and use for electricity units in the province.
- Organize the implementation of the province's electricity price plan after competent authorities' approval.
- Coordinate with competent GVN agencies to conduct specialized inspection and inspection of electricity according to law provisions.

e. Other Government Agencies

- Ministry of Planning and Investment (MPI) arranges the development of investment capital needed to implement Energy and EE in accordance with the current budget decentralization.
- CMSC is responsible to manage SOEs and other GVN investment companies.
- Ministry of Science and Technology (MOST) participates in developing policies and providing technical advice on EE standards for energy intensive appliances and equipment and the provision of technology transfer.

f. Utilities (EVN/PCS)

Vietnam Electricity (EVN), as the main state-owned enterprise (SOE) in the power sector, dominates the electricity market. EVN controls 46% of the power generation market, while in the wholesale market, EVN holds a monopoly as the single-buyer through its subsidiary National Power Transmission Corporation, and controls the distribution of more than 90% of the electricity in the retail market. The remainder is purchased by local utility providers.

EVN is organized as a corporation with a series of wholly-owned subsidiaries that include the 7 regional Power Companies (PCs), which oversee the distribution grid from 110 kV downwards. Other key entities under EVN's control include 4 Power Transmission Companies, 4 Power Engineering Consulting Companies, the National Load Dispatch Center, and several equipment manufacturing companies.

g. Commercial & Industrial (C&I) Facility Owners

Commercial and industrial facilities consist of commercial complexes, hotels, resources and industrial facilities. They are end-use consumers of large amounts of electricity and other forms of energy, and are the 'gate keepers' for making decisions on implementing the bulk EE targeted to be implemented in Vietnam by GVN. C&I Facility Owners have many business-model options for applying EE technologies.

h. Energy Services Companies (ESCOs)

An ESCO can be defined as a service-based commercial business that ***turn-key*** identifies, develops, implements and finances EE Projects in end-use energy consuming facilities on a 'performance' basis. The ESCO's primary performance

requirement is that some or all of its payments are directly dependent on the savings from its implemented EEP being realized.

An ESCO's specialty is its ability to provide complete and comprehensive performance-based EE solutions to facility owners. ESCOs are sophisticated EEP developers who assume responsibility for an unusually wide spectrum of tasks which includes performing rigorous Measurement and Verification (M&V) on the energy savings over an EEP's financing repayment term in order to manage its risk for the savings to be sufficient to repay the investment.

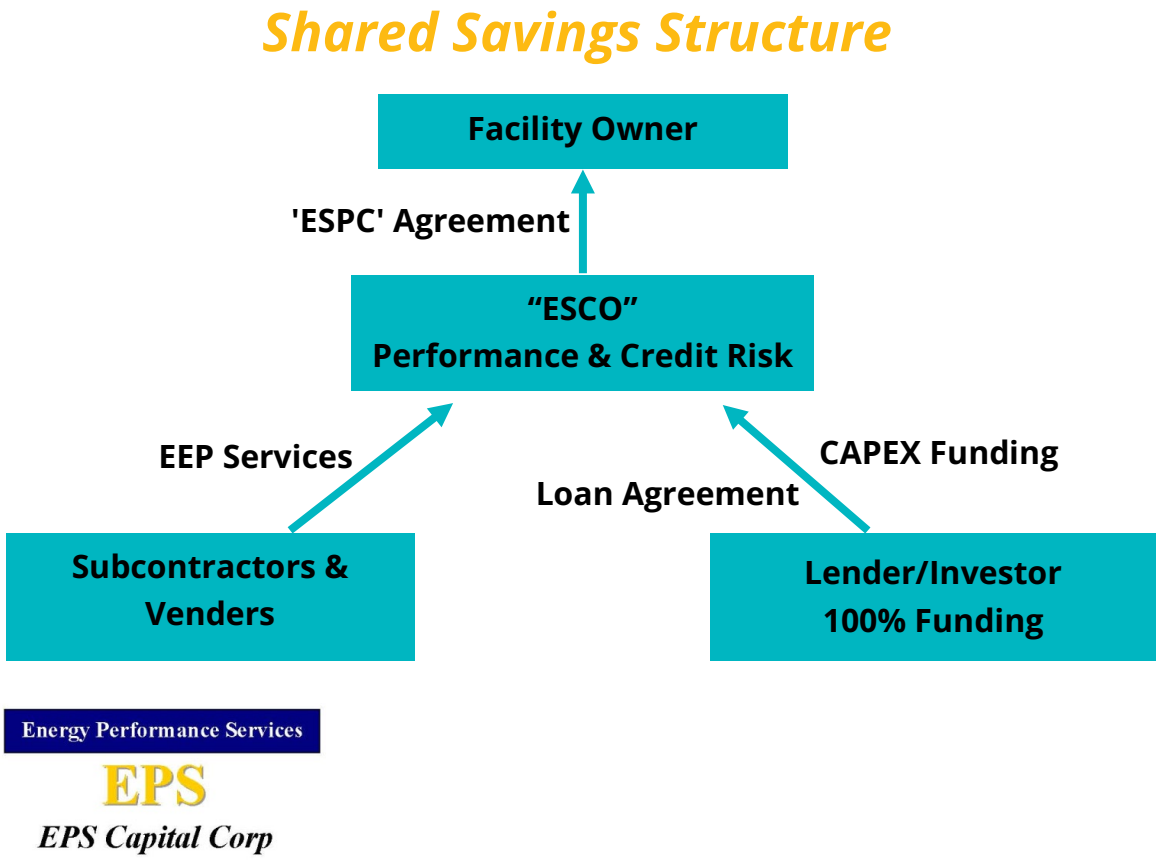
While the ESCO business model is popular in many parts of the world, it is still not developed in Vietnam even though suppliers, manufacturers, public lighting companies, and local governments recognize its benefits. Decision 280 on VNEEP 3 sets a target on legalizing the ESCO model in Vietnam. The GVN (through MOIT, MOF, MPI, etc.) is now working to solve barriers that require international experience and support.

Two performance-based financing structures have emerged globally as the most common ones used by ESCOs: "***Shared Savings***" and "***Guaranteed Savings***". Guaranteed Savings is the predominate structure used in mature markets like the United States, China, Canada, Australia and the EU while Shared Savings is the predominant one used in most developing markets (like Vietnam). A brief description of each is provided below.

1) ***Shared Savings*** is an arrangement whereby the ESCO (as opposed to the Facility Owner) finances the total upfront CAPEX of the project and is totally responsible to repay the Lender. The Facility Owner pays a fixed percentage or amount of its realized savings from the project to the ESCO which is large enough for the ESCO to repay its debt service to the Lender, cover M&V costs, and compensation to ESCO for performing its ongoing EEP services. Under this structure (versus Guaranteed Savings), the Facility Owner has no contractual obligation to repay the Lender; but the ESCO does. It should be noted that this structure creates a lot more risk for the ESCO because it not only assumes the project performance risk, but also Facility Owner credit risk. The Shared Savings approach typically requires an equity investment, which in combination with the

higher risk assumed by the ESCO, carries a much higher CAPEX (interest rate) than the Guaranteed Savings structure (see the below diagram in Figure 4)[9].

Figure 4. Shared Savings ESCO Structure

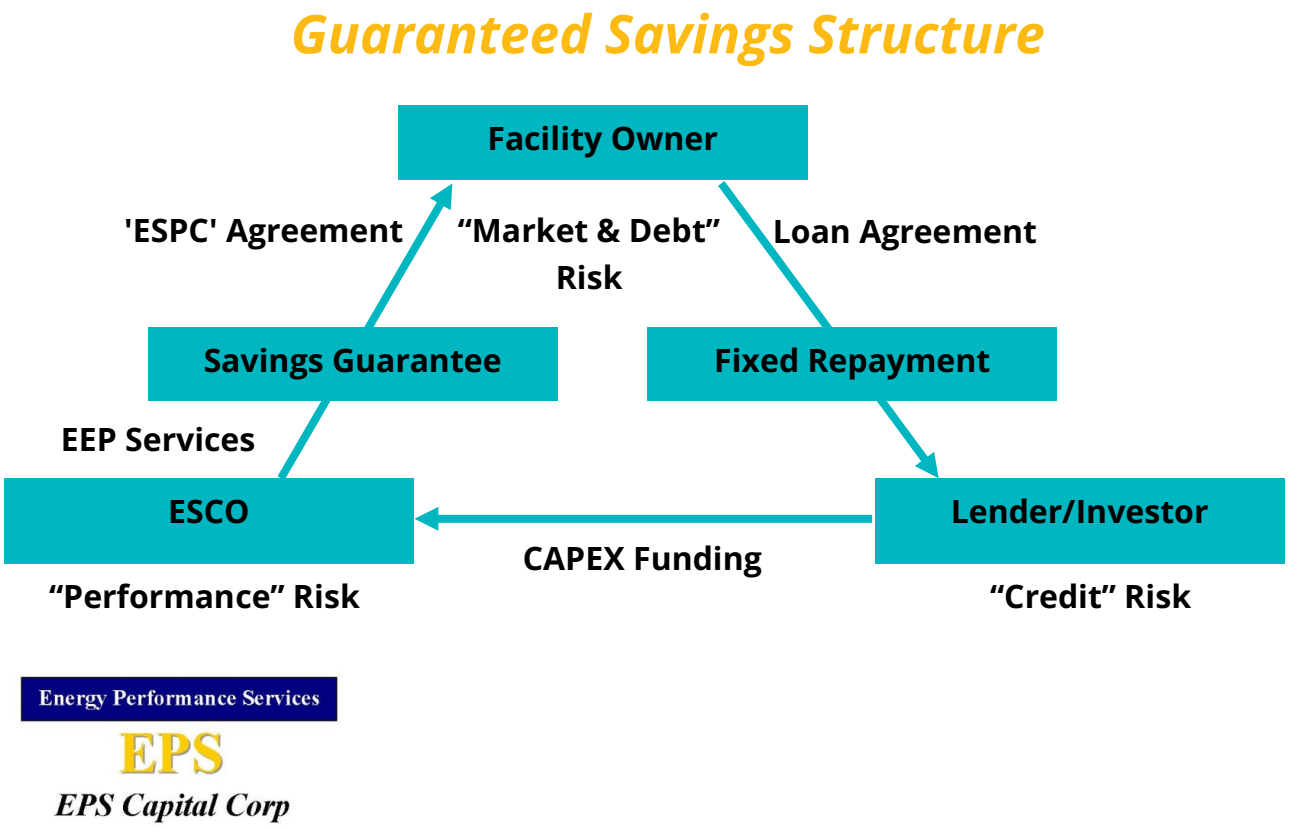


The Shared Savings Structure is a typical introductory structure for developing markets like Vietnam because Facility Owners, with low knowledge and confidence in EEPs and ESCOs, do not want to risk their core capital or credit capacity on EEP investments. ESCOs (mostly SMEs) are forced to try to raise substantial amounts of equity for their EEPs in order to grow, resulting in balance sheets that more resemble banks and leasing companies than what they are, service companies. However, it should be noted that even ESCOs with relatively large balance sheets (e.g. Siemens and Honeywell) are unwilling to assume the Facility Owner credit risk required in this structure. Consequently, the Shared Savings Structure limits long-term market growth for ESCOs and LFIs.

[9] Thomas K. Dreessen Presentations

2) ***Guaranteed Savings*** is an arrangement whereby the Facility Owner finances the EEP directly with a LFI or other type of third-party entity **("Lender")** in exchange for the ESCO providing a guarantee to the Facility Owner it will realize sufficient savings to cover its debt service payments to the Lender. If the realized savings fall short of the debt service payments, the ESCO will reimburse the Facility Owner for the shortfall. If the realized savings exceed debt service, the ESCO typically shares a portion of the excess, usually expressed as a % share with the amount depending on the risk taken and the extent of ongoing services provided by the ESCO. It should be noted that under the Guaranteed Savings approach the ESCO bears no direct contractual obligation to repay the Lender, but that the Facility Owner does. In other words, the ESCO's guarantee is not a guarantee of payment to the Lender; but is a guarantee of energy savings to the Facility Owner (see the below diagram in Figure 5)[3].

Figure 5. Guaranteed Savings ESCO Structure



The Guaranteed Savings structure is typically viable only in countries with a high degree of familiarity and confidence with EE technologies, local implementation

expertise and the availability of commercially attractive financing. The Guaranteed Savings concept is difficult to initiate in markets where EE is not well known or the ESCO concept is being introduced because it requires Facility Owners to assume investment repayment risk of the EEPs based on the savings performance of unknown EE technologies. This structure fosters the long-term growth of the ESCO and finance industries because it enables ESCOs, mostly small and medium sized enterprises **("SMEs")**, with limited credit history and capital resources, to develop and implement savings based EEPs. Guaranteed Savings evolved in the U.S. from the initial Shared Savings structure in response to government Facility Owners, who could access low-cost, tax-exempt financing and desired to significantly reduce interest costs. It was embraced by smaller ESCOs and financial institutions to allow them to grow their respective industries. The primary benefit of this structure is that it reduces financing cost and enables a lot more investment in the EEPs to be made for the same debt service level. The public sector normally prefers this structure in order to maximize the amount of infrastructure investment made in its facilities that can be repaid from utility costs in its operating budget.

i. Households

Households in Vietnam often consume most of their energy for household activities in the evening such as cooking, lighting, pumping water, heating and cooling. Much propaganda and dissemination of actions for the safe and economical use of electricity have been implemented in Vietnam with good effect in raising people's awareness.

In the last ten years, newly-built homes have solar hot water systems and induction cookers installed; some rural areas still use coal, LNG and firewood for heating/cooking. In more recent years, most light bulbs have been converted to LED, a few still use compact fluorescent lights, and incandescent bulbs are only used for certain heating functions. Air conditioners are commonly used and EE is applied depending on the manufacturer's EE technology and price differences. It is more common for families in the South to install 5-10 kW Rooftop solar system (RTS) in their homes than in the North where RTS efficiency is less due to fewer hours of sunshine. They use the generated solar energy to eliminate household electricity purchased from the grid and/or sell excess solar-generated electricity to the grid.

j. Financial Institutions

Local banks and financial institutions (LFIs), private funds and asset managers can provide positive impacts on EE development by funding the project development and standardizing/upscaling the market through their investment grade criteria. To reduce the investment and project performance risks and enhance investment return, LFIs and funding entities tend to create disciplined steps to select/verify customers and EEPs, as well as set terms, conditions and obligations of each party, qualify and standardize installers/EPC contractors and their performance requirements.

The capital markets in Vietnam remain small and underdeveloped but are growing. As reported by the MOF at the end of 2016, the combined stock market and bond capitalization was 71 percent of GDP, compared to 56.5 percent in 2014. Capitalization remains low compared to other countries in the region, such as 106% in Thailand and 136% in Malaysia in 2014. Total GVN bond issuance volume in 2016 was estimated to reach VND 280 trillion (USD12 billion). Vietnam's formal market is highly retail in nature with more than 98% of accounts registered by individuals with the Vietnam Securities Depository.

Access to loans from commercial banking sector is not easy because banks lack the technical knowledge of energy saving and EE and thus perceive their financing of EEP as a high risk.

Low inflation and declining deposit rates may also motivate many retail depositors to switch to higher-yield investment channels such as stocks and properties. The State Bank of Vietnam (SBV) has used several monetary policy tools to lower lending rates, such as (i) requiring LFIs to reduce lending rates by cutting and managing their operating costs and (ii) keeping low discount rates, thereby encouraging low interbank rates. To date, Vietnamese Dồng lending rates to prioritized sectors are commonly set at 6-9% per annum (p.a.) for short-term loans, while medium to long-term rates charged by state-owned commercial banks remain in the 8-10% p.a. range. Lending rates to normal manufacturing and business sectors commonly range from 7-10% for short-term loans and 9-12% for long-term loans.

k. International Donors

International donors refer to foreign government-owned institutions and agencies that provide official development assistance (ODA) funds and support programs to promote developing countries' economic development and welfare. A summary of the many ODA entities available to Vietnam is attached as EXHIBIT B.

Such programs or donors like USAID, GIZ, WB, ADB, and DANIDA use their resources to support objectives such as the stability of macro economy; capacity of government agencies to implement responsible socio-economic policies; transparency and accountability in Vietnam's public finance; and reforms in its banking and financial systems to achieve environmentally and socially sustainable development.

With respect to energy and EE fields, international donors provide Technical Assistance (TA) to fund consultants to assist government agencies (both national and provincial level) in designing and implementing policies and legal frameworks and funding promotion programs and engaging private sector actors to achieve its strategic targets. For EE Sectors, international donors are currently supporting many programs such as developing specific energy consumption standards and policies, implementing Voluntary EE Programs for such things as financial incentives, EE investment, etc.

l. Associations

Associations represent and unite various types of private sector people and entities, who are their members, to promote business development, protect or advocate the legitimate rights and interests of its members, act as representatives to coordinate with relevant agencies within the framework of the law and support of each other to operate effectively in contributing to the socio-economic development of the country.

Associations also promote scientific and technical research, research in investment, science and technology transfer and commercial services; consulting, organizing and cooperating to organize conferences and seminars on branches and fields related to the association's activities according to law provisions. For EE, the association can help to organize awareness-raising events, training workshops, and providing technical expertise in industrial process and support the regulation compliance.

Recently, The Vietnam Chamber of Commerce and Industry (VCCI) has organized many seminars to support businesses to update information on policies, projects, tools and solutions to support business investment and implement RE and EE. Their seminars have contributed to new ideas and proposed solutions to contribute to the GVN on incentive mechanisms in the field of EE. From there, businesses can have a deeper access to opportunities to reduce costs and increase production and business efficiency, and at the same time create motivation for cooperation in the field of RE and EE.

In some exceptional cases, associations can sign a joint petition to send a petition to the Prime Minister, proposing measures to support and solve policy problems. Not only in the energy issue, in September 2021, when the Covid pandemic enters its second year, 14 business associations proposed strategies to prevent and control the Covid-19 epidemic and safely resume production and business in the context of the new anti-epidemic environment.

m. NGOs and Civil Society

Non-governmental organizations (NGOs) and civil society are independent of any government and typically act for non-commercial purposes. Such organizations are formed with many different purposes, usually to promote political and/or social goals. The objectives for power and RE could be to protect the natural environment, improve air quality, or promote RE development. NGOs can provide valuable comments on social and other impact assessments of EE initiatives.

Vietnam Business Council for Sustainable Development (VBCSD) is one of the most prominent NGOs in Vietnam. VBCSD's executive board consists of 21 presidents of large enterprises in Vietnam, so the Council's voice is very reputable in the business community. The official members can attend a meeting with the Deputy Prime Minister, Chairman of the National Council on Sustainable Development and Competitiveness Enhancement every six months to report on the Council's performance, proposing issues of sustainable development and competitiveness of enterprises and receiving directions from the GVN. VBCSD's primary objective is to be a forum for the business community to share knowledge, experience and good practices on sustainable development.

In September 2015, leaders from 193 UN member states formally adopted the 2030 Agenda with the focus on the 17 Sustainable Development Goals (SDGs) containing

goals directly related to EE such as: Clean and Sustainable Energy, Responsible Consumption and Production, Climate Action, Sustainable Cities and Communities, Industry & Infrastructure Innovation. VBCSD played a role in spreading and guiding the business community to implement the 17 SDGs in Vietnam by strengthening Business-Government-Society partnerships, communicating and disseminating policies and training to raise the awareness of businesses and society on SDGs, and create a premise for the implementation of the SDGs in Vietnam.

2. ENERGY AND EE POLICY

2.1 Overview

The policy landscape in Viet Nam has recently started to evolve regarding climate change and greenhouse gas (GHG) mitigation, particularly from the energy sector, encompassing national GHG emission reduction target for the period of 2020–2030, as part of the global effort to reach an agreement on post-2020 climate regime. In the landmark UNFCCC Paris Agreement in 2015, Vietnam committed to an 8% GHG emission reduction by 2030 compared to the BAU scenario in its Intended Nationally Determined Contribution (INDC) report submitted to the UNFCCC secretariat. It was agreed that this reduction would increase to 25% with international support.

Several strategic documents have been adopted, namely the National Strategy on Climate Change (NSCC) in 2011 and the National Green Growth Strategy (NGGS) in 2012. While the NSCC prioritizes climate change adaptation, the NGGS sets overall targets for GHG emissions and energy consumption reductions for period from 2012 to 2020 and 2030.

In December 2011, Viet Nam approved the National Climate Change Strategy (Decision 2139/QD-TTG dated 05 December 2011) in which energy saving and efficiency are clearly highlighted as the key area for GHG emission reduction to protect global climate system.

In Viet Nam, while some actions as stipulated in the Master Plan could trigger GHG emissions reductions, the Plan is a strategic document which only sets out government plans and aspirations; the actions have not been supported by legally binding obligations.

The Energy Efficiency and Conservation Law (in 2010) and the Law of Environmental Protection (2020) provide binding legal frameworks for environmental taxes and energy audits that could incentivize energy savings in the industrial and building sector and reduce greenhouse gas emissions.

In 2021, the Ministry of Natural Resources and Environment reviewed its content and reported to the GVN on the draft National Environmental Protection Strategy to 2030 to ensure consistency with the content of the Decree guiding the implementation of the Law on Environmental Protection 2020. The strategy aims to promote the application of clean technologies, cleaner production processes and the use of less polluting, more environmentally sound fuels and materials. By 2030, to prevent and reverse the trend of increasing pollution and environmental degradation, solve urgent environmental problems, and gradually improve and restore ecological quality; prevent the loss of biodiversity; capacity building, step by step proactively responding to climate change; ensure ecological security, build and develop a green, low-carbon economy, towards achieving the country's 2030 sustainable development goals.

On October 1, 2021, the Prime Minister issued Decision 1658/QD-TTg approving the National Strategy on Green Growth for the 2021-2030 period, with a vision to 2050. The overall goal of the Green Growth Strategy 2021 is to promote economic restructuring associated with growth model innovation to achieve economic prosperity, environmental sustainability, and social equity; towards a green, carbon-neutral economy and contribute to the goal of limiting global temperature rise.

MOIT is responsible for bringing policy into action, formulation, development and implementation of national level Energy Efficiency and Conservation (EE&C) policies and programs in Viet Nam. However, various other government agencies (GAs) have been involved in directing and implementing EE in different sectors, e.g., MOC for the building construction sector, the Ministry of Transport (MOT) for the transport sector, the Ministry of Natural Resources and Environment (MoNRE) for the environment sector, GHG emission reduction.

The Prime Minister approved the Viet Nam National Energy Efficient Program 3 (VNEEP 3) (2019-2030) on 13 March 2019, which is a policy (not a law) summarized as follows:

- Establish targets for reducing electricity losses, specific EE targets by sector, green building programs, industrial energy management systems, fuel economy for vehicles, etc.
- Establish a government steering committee for EE chaired by deputy prime minister for coordination and monitoring;
- Provide a legal framework to enhance legislative enforcement, promulgate EE standards, and create energy information systems;
- Develop a financing mechanism including public-private partnerships (PPP) and establish a dedicated EE fund, and
- Promote development of the Energy Service Company (ESCO) industry by supporting ESCO technical/financial capacity building programs.

In November 2021, Vietnam participated in many critical initiatives at COP 26, such as a commitment to build new coal power, forest protection and rational land use, and participation in the global climate change adaptation alliance. One of the highly appreciated statements at COP26 is Prime Minister Pham Minh Chinh's affirmation that Vietnam is strongly committed to achieving net emissions of "zero" by 2050. It also vowed to continue implementing its stated goals in the Paris Agreement.

2.2 EE Targets

Under the Vietnam National Energy Efficiency Program (VNEEP), the GVN set targets for energy savings through efficiency and conservation measures implementation of 3%–5% from 2006–2010, 5%–8% during 2011–2015 and 8%–10% from 2019-2030 (VNEEP 3), relative to BAU conditions.

Total funding for VNEEP 1 in the years 2007 to 2010 was VND 169 billion (USD 7.4 million) of which VND 124 billion (USD 5.4 million) was for non-business funding and VND 45 billion (USD 7.4 million) was for investment in projects. As a result, **VNEEP 1 achieved energy savings** of **3.4%** (equivalent to 4.9 million TOE) for the period 2006-2010. The funding for VNEEP 2 in the years 2011 to 2015 was VND 349 billion (USD 15.2 million). As a result, the **VNEEP 2 achieved energy savings** of **5.96%** (equivalent

to 11.88 million TOE) for the period 2012-2015.[10] All two programs in the past met their targets.

The EE target set for each specific sector in VNEEP 3 is listed below:

- Reduce electricity loss to less than 6%
- Reducing the average energy consumption for industrial sub-sectors compared to the period of 2026-2030, specifically:
    i. For steel, 5 to 16.5% depending on the type of product and production technology;
    ii. For chemical, minimum 10.00%;
    iii. For plastic, from 21.55 to 24.81%;
    iv. For cement, minimum 10.89%;
    v. For textile and garment, at least 6.8%;
    vi. For the wine, beer and beverage, 4.6% to 8.44% depending on the type of product, production scale, and
    vii. For paper, 9.90 to 18.48% depending on type of product and production scale.

2.3 NDC Targets and Climate Change Commitments

Vietnam is a rapidly growing lower-middle-income country experiencing increased pressure on its environmental, economic and energy resources and the negative impacts from rapidly growing GHG emissions. Its NDC estimates that without additional policies, national GHG emissions will triple by 2030 to 927.9 million tons of carbon dioxide equivalent (CO2e) from 284 million tons of CO2e in 2014

In the updated NDC published in July 2020, the national GHG emission reduction measures compared to the BAU scenario for the 2021-2030 period have been identified for energy, agriculture, LULUCF (Land use, Land use change and Forestry), waste, and IP sectors. In addition, the contributions to GHG emission reduction are

[10] VNEEP performance evaluation report 2011-2015, MOIT

calculated for two scenarios: with domestic resources only and with international support through bilateral, multilateral cooperation and implementation of new mechanisms under the Paris Agreement.

Under the domestic scenario, the amount of GHG emissions reduction is estimated for each sector; however, in implementing the updated NDC, adjustments will be made to estimates to ensure they are in line with the actual situation and the national contribution objectives are met.

The updated NDC aligns with the country's national and sectoral socio-economic development strategies to 2050, in which all sectors development paths are towards a low carbon economy and decarbonization strategies. The energy sector is the pioneer in this path, with a clear target for renewable energy and changing energy production structures. The agriculture, forestry, building, and transport sectors are also initiating their action plans to contribute to the NDC and implement low carbon strategies. Other sectors are also intensively making the transition to a low carbon development path. The NDC also indicates the use of a Consumer Price Index (CPI) to enhance the ambition and effectiveness of GHG emission reduction efforts, especially in energy-consuming sub-sectors such as steel, cement, building, thermal energy production, etc. Appropriate CPIs will be used, following a specified roadmap, in various sectors with high potential for GHG emission reduction. It is also highly supported by the private sector as an effective way for NDC implementation and increasing private sectors efforts in technology advancement towards a low carbon development path.

2.4 Fiscal Incentives for Energy Efficiency

There are some existing economic instruments in Viet Nam that can be adjusted to support re-duction of GHG emissions in Viet Nam, namely the environmental protection tax and environmental protection fees. There are also on-going studies and pilots on carbon pricing initiatives such as bilateral carbon offsetting (JCM) or emission trading system (PMR). Each of the instruments has its own benefits and barriers in achieving CO_2 emission reductions. However, a more specific taxation such as a carbon tax would be more effective in supporting wider mitigation actions and investments.

There is no license and/or permit that is specifically applicable to EE transactions in industry. PFIs will be selected, upon the selection criteria agreed with the MOIT, MoF, and SBV, among those that already have required licenses as financial institutions.

Taxation incentives that could be relevant to industrial EE include:

- Loss Carryforwards in Enterprise income tax: Taxable income is defined as total revenue minus deductible expenses (depreciation, cost of goods sold, research and development costs, interest). Losses may be carried forward up to 5 years.
- Exemption of Value Added Tax (VAT): Applies to most goods, uses credit method. Exemptions include agricultural production, salt, some imported equipment, credit, business services, education.
- Selected exemptions and reductions of Import duties: Levied on CIF price, average tariff is about 8%. Some exemptions for aid, goods in transit, education, research, for export processing, and certain machinery & equipment. (Rates vary from 0% to 60%, with most in the 1%, 3%, 5%, 10%, 15% brackets)
- No EE Export duties: Levied on a few items only (Oil: 4%. Wood: 5-20%. Cashews: 4%).

There are tax incentives and other forms of support to be offered by law to manufacturers and producers of EE products and technologies. Article 41 of the Law on Energy Efficiency and Conservation prescribes that "Organizations and individuals that manufacture energy-saving products and invest in production lines or expand production with energy- saving technologies are entitled to incentives and supports" which include:

- Incentives on import and export duties and enterprise income tax under the tax law;
- Incentives under the land law;
- Concessional loans from various sources such as the development bank, the fund for science and technology development support, the national fund for technological renovation and the environment facility and supports from the national programs on hi-tech development and economical and efficient use of energy, and

- Other incentives under this Law and relevant laws.

Industrial enterprises investing in EE products and equipment are expected to benefit from the cost saving of the manufacturers and producers.

3. EE REGULATIONS

3.1 Legislative and Regulatory Framework

Since 2003, energy efficiency improvements and the rational energy use have been addressed as critical items of Vietnam's energy development policy, initially with issuance of the Government Decree on Energy Conservation and Energy Efficiency. In 2006, the Prime Minister approved the Vietnam National Energy Efficiency Program (VNEEP) for 2005-2015, a first-ever comprehensive plan to institute measures for improving EE in all sectors of the Vietnamese economy. In 2010, The Law on Energy Efficiency and Conservation (LEEC) was released following several legal guidance documents, such as the Decree 21 on detailed requirements and measures to execute the LEEC and Decree 134 on sanctioning administrative violations in the power sector, dam security and EE&C. Under the LEEC, circulars have been issued to give concrete direction on critical issues such as planning and reporting on the implementation of EE&C plans (Circular 08); EE&C measures in the industrial sector (Circular 02); energy labeling for energy-consuming devices and equipment (Circular 07); preparing plans for economic and efficient use of energy and reports on the implementation thereof, and of energy audits (Circular 25/2020).

The following table briefly describes the regulatory frameworks in force (building code, standard and labeling, etc.), their status and implementation year.

Table 2. Legislative and Regulatory Framework

Laws & Regulations	Status	Year	Name of Law/ Regulation	Description
Law of EE	Adopted	2010	Law No. 50/2010/QH12 on Energy Efficiency and Conversation.	The Law sets forth the roles and responsibilities for all actors in government and society concerning energy efficiency: industry, residential, construction, transport, etc. The Law regulates the duties of key energy consumers to report and conduct energy audits regularly to the Department of Industry and Trade. According to this Law, MOIT shall be responsible for recommending which equipment should be

Laws & Regulations	Status	Year	Name of Law/ Regulation	Description
				subject to energy labeling and implementing the energy labeling procedure. Under the Law, many regulations and guidelines have been established to regulate energy efficiency issues.
	Adopted	2011	Decree 21/2011/ND-CP on Designated Energy Unit	Defines the DEU with annual energy consumption of more than 1000TOE for industrial and more than 500TOR for the commercial sector
	Adopted	2011	Decision 68/2011/QD-TTG on release a list of EE equipment for public procurement	List of equipment with EE label. All purchases using state funding should comply with this regulation. The list targets all public organizations to purchase energy efficient goods and equipment.
	Adopted	2011	Circular 39/2011/TT-BCT	Regulates training, certification of energy manager and energy auditors
	Adopted	2020	Decision 1577/QD-TTG	Releases the list of DEU based on energy consumption 2019
	Adopted	2020	Circular 25/2020/TT-BCT	Rules for preparing plans for economic and efficient use of energy and reports on the implementation thereof, implementation of energy audit
Building Code	Adopted	2013	Vietnam Energy Efficiency Building Code: QCVN 09:2013/BXD	VEEBC was released with the technical support of IFC, USAID, DEA. The code set up standards for building envelop, lighting system, air conditioning system, and other electricity consumer system in building with total floor space larger than 2,500sqm.
Standards and Labelling	Adopted	2011	Decree No. 21/2011/QD-CP on detailing the law on energy efficiency and conservation and measures for its implementation	There are four groups of equipment be affixed with an EE rating label and an applied minimum energy performance standard (MEPS) as follows: ● Household appliance group including tube-type fluorescent lamps, compact fluorescent lamps, electronic and electromagnetic ballasts for fluorescent lights, air conditioners, refrigerators, washing machines, electric cookers, electric fans, television, solar water heater. ● Office appliance group including photocopy machine, computer monitors, printers, commercial refrigerated cabinets. ● Industrial equipment including boilers, distribution transformers and electric motors

Laws & Regulations	Status	Year	Name of Law/ Regulation	Description
				• Transportation vehicles including cars (7 seats or less).
	Adopted	2014	Circular No. 07/2014/TT-BCT	Defines the procedures for energy labeling, EE product testing, label certification granting and the method of label sticking. Accordingly, an endorsement label is used for products that meet a high-efficiency performance standard (HEPS) issued by the Ministry of Industry and Trade (MoIT) in a certain period. Certificate of EE labeling is valid for a maximum period of 03 (three) years. Three months before the expiry of the certificate, the enterprise must apply for re-certification.
	Adopted	2008/ 2009	Vietnam Quality Standard No. TCVN 7896:2008 and TCVN 8249:2009 and TCVN 7897:2008	These quality standards set out the energy performance standard for compact fluorescent, fluorescent lamps and the electronic ballasts and magnetic ballasts in fluorescent lamps.
	Adopted	2010 2013	3 phases distribution transformer (Vietnamese Standard TCVN 8525:2010); Electrical Motor (Vietnamese Standard TCVN 7450-1:2013) Industrial boiler (Vietnamese Standard TCVN 8630:2010)	These quality standards set out the minimum energy performance and a method to determine the minimum energy performance for the 3 phases distribution transformer, Electrical Motor, Industrial boiler. Accordingly, and concerning the decision No 78/2013/QD-TTG, all equipment that have lower energy efficiency than the minimum energy performance should be phased out.
Agriculture sector	Adopted	2013	Circular 19/2013/BNNPTNT	Regulates EE solution in agriculture sector
Transport sector	Adopted	2014	Transportation vehicle under 7 seats	Regulates the minimum energy performance and EE labelling for car with under 7 seats
	Adopted	2011	Circular 64/2011/TT-BGTVT	Regulates EE solution in transportation sector
	Adopted	2013 2014	Car (Vietnamese standard TCVN 9854:2013	Regulates minimum fuel consumption for car and motor bikes

Laws & Regulations	Status	Year	Name of Law/ Regulation	Description
			Motorcycle (Vietnamese standards TCVN 7356:2014	
Regulation to phase-out of old technologies	Adopted	2011	Decision No. 78/2013/QD-TTG	The Decision No. 78/2013/QD-TTG indicates a list of energy consuming vehicles and equipment that needs to be eliminated if the energy efficiency is lower than indicated according to Vietnam Quality Standard.
Regulation to apply advanced technology	Adopted (with weak enforcement)	2011	Decision No 1488/QD-TTG	This is the Master Plan for cement sector requiring all cement plants with capacity greater than 2500 ton/day of clinker to install the Waste Heat Recover system before 2015. However, up to now, there are only 6 plants that already implemented this solution. The major barriers are lack of financing sources and difficult economic context.
Other industrial sector benchmarking/ specific energy consumption	In development	2017	Circulars shall be issued by the MOIT	Under CPEE Program, benchmarking studies have been conducted for intensive energy sectors. Circulars indicate the requiring the energy performance of the sectors to be issued for the industry. In 2016, the 3 circulars for steel, beer and beverage, plastic were issued and in 2017, 3 others for food processing, pulp and paper were issued.
	Adopted	2014	Circular 02/2014/TT-BCT	Regulate EE in Chemical industrial including SEC
	Adopted	2016	Circular 19/2016/TT-BCT	Regulate EE in beverage industry including SEC
	Adopted	2016	Circular 20/2016/TT-BCT	Regulate EE in steel industry including SEC
	Adopted	2016	Circular 38/2016/TT-BCT	Regulate EE in plastic industry including SEC
	Adopted	2017	Circular 24/2017/TT-BCT	Regulate EE in paper industry including SEC
	Adopted	2018	Circular 52/2018/TT-BCT	Regulate EE in seafood industry including SEC
	Adopted	2019	Circular 39/2019/TT-BCT	Regulate EE in sugar industry including SEC

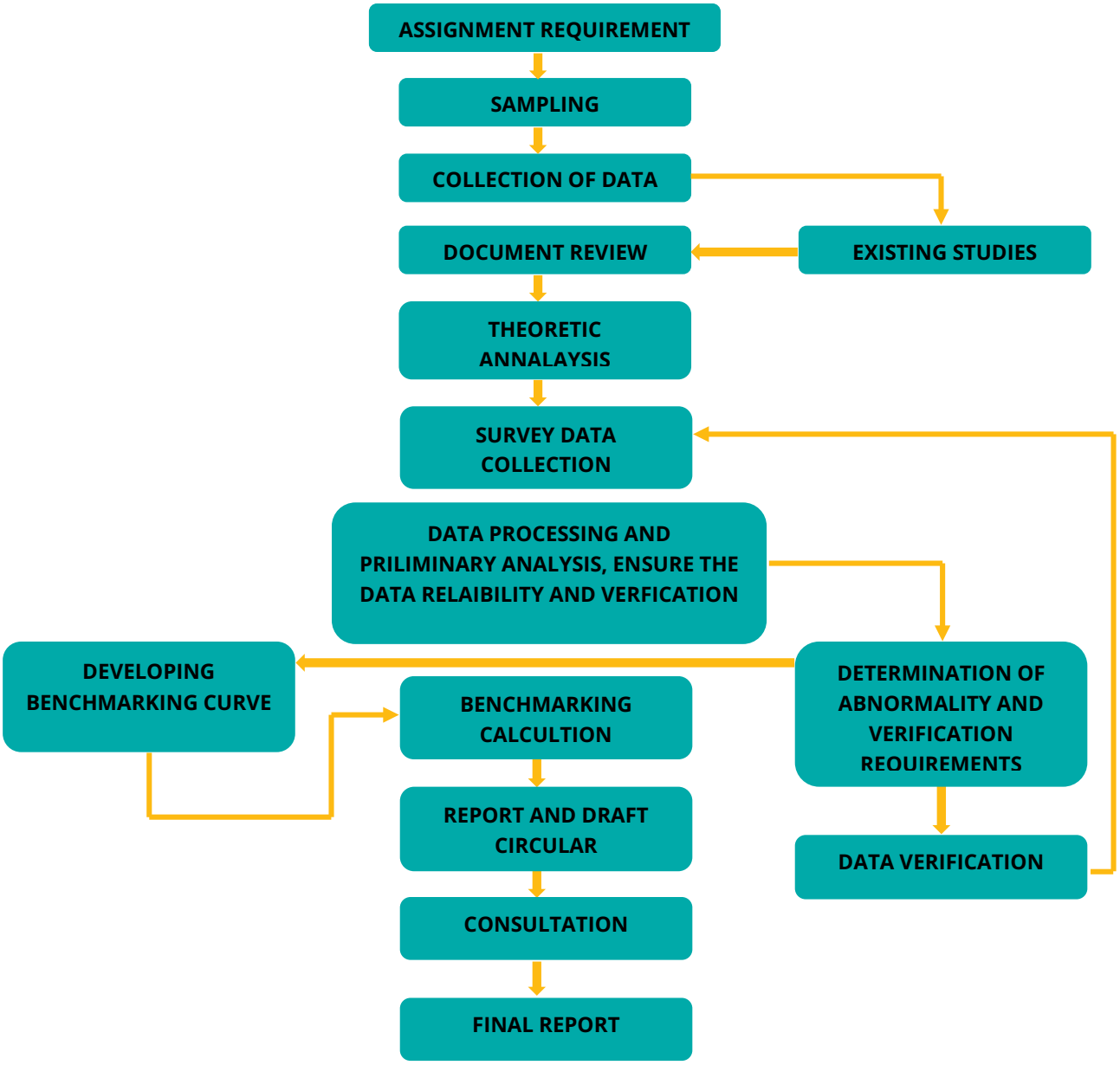
3.2 Energy Benchmarking Legislation

In Vietnam, benchmarking has been developed from various EE indicators on 7 industrial sectors and become valuable tools for both government and facilities to

manage energy consumption. The somewhat limited benchmarking results have been used by MOIT to formulate EE policies under circulars. The processes used to develop the energy benchmarking in Vietnam are show in the figure below.

Figure 6. Energy Benchmarking Approach for Industrial Sector

(Source: RCEE – NIRAS, 2020)



All energy benchmarking used the standard metric calculation method based on a relation between yearly energy consumption and a production unit. This method is used in the Article 25, Circular 02/2014/TT-BCT issued on January 01, 2014, which

regulates the handling of MEPS by sector, technologies, production size, and other typical characteristics of industrial facilities over specified periods. The benchmarks developed were based on Vietnamese conditions, reflecting the typical output of the production industry, specialized products and converted to equivalent products.

The benchmarking will help the management authorities and enterprises easily control and manage energy use. It also helps the competent agencies to develop and plan energy policies suitable for the industry. the energy benchmarking approach is not regulated strictly in any legal framework. However, all energy benchmarking in Vietnam is a bottom-up approach based on data collected from sectoral facilities through a survey questionnaire and validated through double-check and energy audit. Standards have so far been developed for the following products:

- Chemicals: Circular No. 02/2014/TT-BCT of MOIT on regulating EE;
- Beer and beverages: Circular No. 19/2016/TT-BCT of MOIT on the SEC benchmarks;
- Steel: Circular No. 20/2016/TT-BCT of MOIT on the SEC benchmarks;
- Plastics: Circular No. 38/2016/TT-BCT of MOIT on the SEC benchmarks;
- Paper: Circular No. 24/2017/TT-BCT of MOIT on the SEC benchmarks;
- Fish and shrimps: Circular No. 52/2018/TT-BCT of MOIT on the SEC benchmarks;
- Sugar cane: Circular 39/2019/TT-BCT issued by MOIT for on the SEC benchmarks.

Table 3. List of Industrial Sub-Sectors Regulated by MEPS

Steel sector	Pulp and paper	Seafood processing	Chemical	Beers and beverages	Plastic	Sugar
• Coke oven • Sinter plant • Blast furnace • EAF • Long products • Flat product • Hot dipped galvanized steel sheet • Color sheet • ERW pipe • Galvanized steel pipe	• Pulp • Kraft • Printing and writing paper • Newspaper • Tissue and joss paper	• Catfish • Shrimp	• Rubbery in primary form • NPK fertilizer • Paint	• Beer • Beverages	• Bags • Bottles • Packaging • Plastic building materials • Household plastics	• Sugar mills

Normally MEPS circulars are proposed and regulated in two 5-year periods. The first period is generally implemented more easily, as it has less ambitious targets than the second one. MOIT established the first period to improve both companies' and provincial authorities' readiness for the implementation and compliance of the standards, so that the inspections and sanctions will be conducted with rigor by both MOIT and local DOITs. It is expected that regulated enterprises will strengthen compliance in the 2nd phase with the requirement to implement the measures identified in the plans, report the resulting SECs to DOIT/MOIT and – by the end of the period, and comply with the standards. Here it should be noted that the level of the MEPS established may not always sufficiently reflect the situation in the specific sector and may therefore not be achievable in some sectors. VNEEP3 aims to

enhance policy enforcement by providing technical assistance and creating a more favorable environment for investments in energy efficiency.

The above circulars assign the Energy Efficiency and Sustainable Development (EESD) under MOIT to be the responsible body to:

- Assume the prime responsibility, and coordinate with the concerned agencies, in guiding, inspecting and supervising the implementation of the circulars' provisions;
- Coordinate with the local DOITs to check the implementation of the standards and the feasibility of plans to ensure the standards will be met as regulated per periods;
- Summarize and report to MOIT management on the implementation of the circulars and propose measures to handle cases of non-compliance in line with the provisions of the circulars.

The role of the provincial DOITs is to coordinate with MOIT to guide, promote and inspect the implementation of the provisions of the circulars, to conduct annual inspections of compliance with the standards and the feasibility of the plans to ensure future compliance (for non-compliant production facilities) and to summarize the compliance with the standards of local establishments and report to MOIT. MEPS compliance reported by enterprises is very important input for Vietnam Energy Information Security (VEIS) and also energy Monitoring-Reporting and Verification (MRV) in terms of sectoral energy consumption and its energy saving achievements, however it is unclear how VEIS will gather this input. Every year, MEPS regulated entities are responsible for reporting their implementation of energy performance on MEPS. There are reporting forms provided by respective Circulars on MEPS issued by the MOIT. Provincial DOITs are responsible for reporting on the implementation of the MEPS of the local regulated entities. The report shall be submitted to the MOIT Department of Energy Efficiency and Sustainable Development annually.

Under VNEEP 3, MOIT plans to conduct benchmarking and issue a series of MEPS for additional energy-intensive products as a measure to promote EE according to VNEEP 3's objectives.

3.3 VNEEP 3

On March 13, 2019, the Decision No. 280/QD-TTG on approval of the National Energy Efficiency Program (VNEEP) for the period of 2019-2030 was issued by the Prime Minister. This VNEEP 3 implements activities in the field of economical and efficient use of energy, with commitments at all levels of government, associations, businesses, organizations, individuals to EE in particular and to climate change resilience and environmental protection in general. The overall objectives of VNEEP 3 are:

- To mobilize all the national and international resources for EE through the implementation of technical assistance, science and technology research and product development, market transition, human resource training and development, and international support for EE, and
- To increase awareness for EE and to reduce energy intensive in a variety of economic sectors and industries with EE becoming a regular activity in key energy users and key economic sectors aiming for green growth and sustainable development.

Specific objectives were set for energy savings from the total energy required for normal development of the country at 5-7% savings from 2019 – 2025, and 8-10% from 2026 – 2030.

VNEEP 3 also aims to:

- Establish a fund to promote EE:
  - Promote mechanisms, policies and legal provisions in support of the ESCO business model;
  - Provide technical and financial support for investments such as installing, renovating, replacing equipment, integrating EE and RE energy solutions in urban lighting systems, and
  - Provide funding for implementation of the whole program: State budget: 4,400 billion VND; Financial institutions: 3,800 billion VND; Private and other sectors.

3.4 MEPS and HEPS Product Regulations

Minimum Energy Performance Standards (MEPS) and High Energy Performance Standards (HEPS) regulations are mandatory in Vietnam for the following products: Refrigerators, Fans, Washing machines, Rice Cookers, TVs, Lighting equipment: CFLs, TFLs, electronic ballasts, Air Conditioners, Three-phase Electric Motors and Transformers[11].

Compliance with MEPS is mandatory whereas labelling is, for the time being, implemented on a voluntary basis. EE labelling should gradually become mandatory in Vietnam. MEPS and labelling specifications are supposed to be reviewed every three to five years by the MOIT. MEPS have been gradually enforced since 2005 on targeted priority energy using products. MEPS for computer monitors, host computers and copiers are under development and MEPS for commercial refrigerated cabinets are under consideration for development.

MOIT has made great effort to improve EE performance and reduce energy intensity of the industrial sector by establishment of energy baseline consumption and sectorial benchmarks. EE benchmarks and MEPS indices have been established for chemical, beverage, plastic, steel, plastic, food processing and cement sectors as presented above.

The targets for the period 2015-2018 were to lower the average energy consumption for the following industrial subsectors compared to that in the period: (i) for steel: 3–10% depending on product type and production technology; (ii) For chemical: minimum 7%; (iii) For plastic manufacturing: 18–22; (iv) for cement: minimum 7.50%; (v) for textile and garment industry: minimum 5%; (vi) for alcohol, beer and beverage: 3–7% depending on product type and production scale; (vii) for paper: 8–16% depending on product type and production scale. However, there was no mentioned of any HEPS as well as no incentives, which should be a future priority.

[11] Compendium of Energy Efficiency Policies of APEC Economies. 2016.
Link: https://aperc.ieej.or.jp/file/2016/4/28/Viet_Nam_Compendium_2015_Final.pdf

3.5 EE Codes for New and Existing Buildings

On January 1, 2005, the Energy Efficiency Building Code (EEBC 09/2005/QD-BXD) came into effect. The code covers residential, commercial and public buildings with a gross floor area of 300 m^2 or more. The code applies to building envelopes, indoor and outdoor lighting systems, air conditioning and ventilation, as well as other power consuming and energy-managing equipment.

Three categories of building are defined according to gross floor area:

- Small buildings: from 300 m^2 up to 2,499 m^2;
- Medium-sized buildings: from 2,500 m^2up to 9,999 m^2;
- Large buildings: over 10,000 m^2.

The code specifications are different for each category. However, according to the Online Code Environment and Advocacy Network, “few in the industry know about the code and the MOC does little to enforce it” (OCEAN’s website, 2012).

In addition, the Viet Nam Green Growth Strategy approved in September 2012 (Decision No. 1393/QD-TTg) specifies promulgation of compulsory application of green building measures in new and retrofitted building and green material technology in construction as solutions to achieve Green Growth and low carbon economy. On October 1, 2021, the Prime Minister issued Decision 1658/QD-TTg approving the National Strategy on Green Growth for the 2021-2030 period, with a vision to 2050. The overall objective of the Strategy is to promote economic restructuring in association with renewing the model of economic growth, environmental sustainability and social justice. In particular, the National Strategy also sets out the goal of greening lifestyles and promoting sustainable consumption by 2030

EEBC 09/2005 has been superseded by an improved EEBC 09:2013 issued by MOC in late 2013, which added a National Technical Code for Building Energy Efficiency. In order to enforce the EEBC, several projects have been supported by IFC, DANIDA, USAID such as EEBC building demonstrations, training on integrated energy building design and EEBC compliance, etc. Another revised EEBC 09:2017 was issued by MOC in December 2017 that provides mandatory technical standards to achieve EE in the design and construction or retrofit of buildings (office buildings, hotels, hospitals,

schools, retails, department stores, residential buildings, among others), with gross floor area of 2,500 m^2 or larger.

3.6 Certification and Accreditation Schemes

ISO 50001:

Attention has been raised on energy management with the increase of ISO 50001 certifications issued to Vietnam enterprises from 16 in 2014 to 75 in 2018. However, this number is still very low as compared to the number of industrial enterprises in Vietnam.

Table 4. Number of Enterprises ISO 50001 Certified in Vietnam

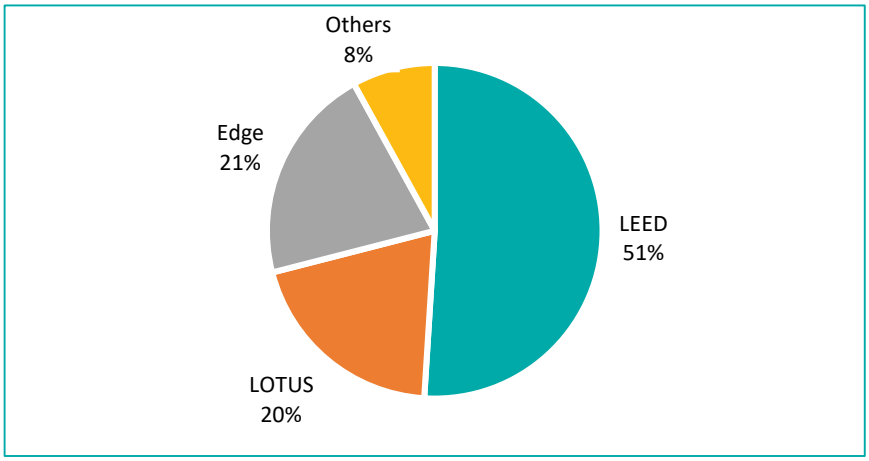
	2014	2015	2016	2018
Number of ISO 50001 certificates	16	45	60	75

Green Buildings:

By the end of 2018 Vietnam had 104 buildings with green certification, but the speed of green building development is still quite slow compared to Thailand, Malaysia and Singapore. Out of 104 green certifications, 53 have LEED certification (Council green program), 21 have LOTUS certification (Vietnam Green Building Council), 22 have EDGE certification (IFC, World Bank group), and 8 have other certifications (HQE-2, DGNB-1, BCA Green Mark-4, CTX Vacee-1).

The break-out of green building certifications is shown in Figure 6 below.

Figure 7. Green Building Certifications by Type



(IFC, Forbes: https://forbesvietnam.com.vn/tin-cap-nhat/bat-dong-san-bi-thu-lua-truoc-cac-cong-trinh-xanh-5952.html)

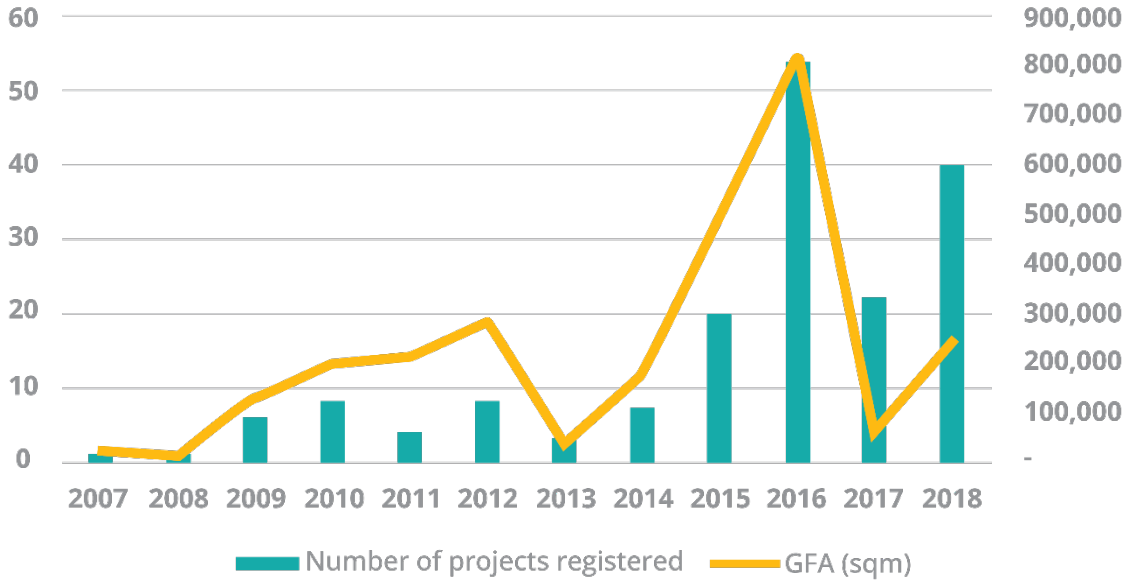
The number is low due to the main motivation in Vietnam comes from the "Social Responsibility Program" of large corporations, or a marketing strategy, product image products and brands, as well as aim to reduce operating costs (e.g. Big C Vietnam Group (retail), Taekwang Vina company (footwear), Intel Corporation (technology), Coca Vietnam Cola (beverages), and Pou Chen Group (footwear). However, the Green Building market in Vietnam is still regarded with a lot of potential growth opportunities in the coming years[12].

The efforts from the GVN and state agencies also deserve recognition by the training activities of the National Regulations on Building Energy Use Efficiency (NTR 09: 2013 / BXD), or the preferential land use coefficient for the work-friendly environment in the city.

The number of 'Registered" LEED projects peaked at 54 in 2016 when run under LEED v3 registration before moving to LEED v4 in 2017 when they dropped to 20 in 2018, signaling that the market was familiar with the requirements of the new LEED version 4 - see Figure 7. It is forecasted that in the next 1-2 years, the number of new LEED registered projects in Vietnam will fluctuate in the range of 40-50 projects, the total new GFA registered about 300,000 m^2.

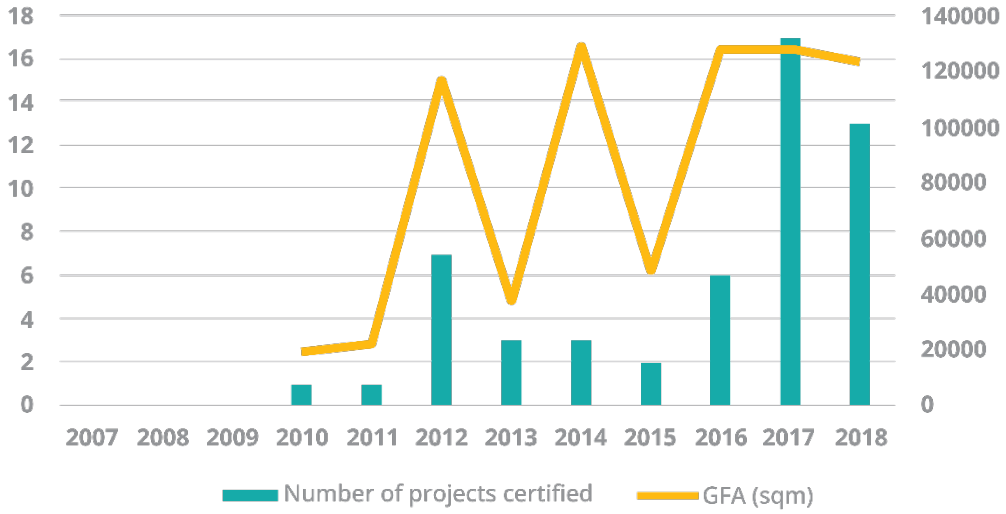
[12]http://www.ardorarch.com/news/detail-news/thi-truong-cong-trinh-xanh-tai-viet-nam-tiem-nang-va-co-hoi.html

Figure 8. LEED Projects 'Registered' in Vietnam 2007-2018 (Vgbc)



The number of 'Certified" LEED projects peaked at 18 in 2017. By the end of 2019, Vietnam had a total of 70 projects that had achieved LEED certification, of which industry accounted for the highest proportion (60%), followed by office block 23%, warehousing 6%, and are other industries

Figure 9. LEED Projects 'Certified' in Vietnam 2007-2018 (Vgbc)

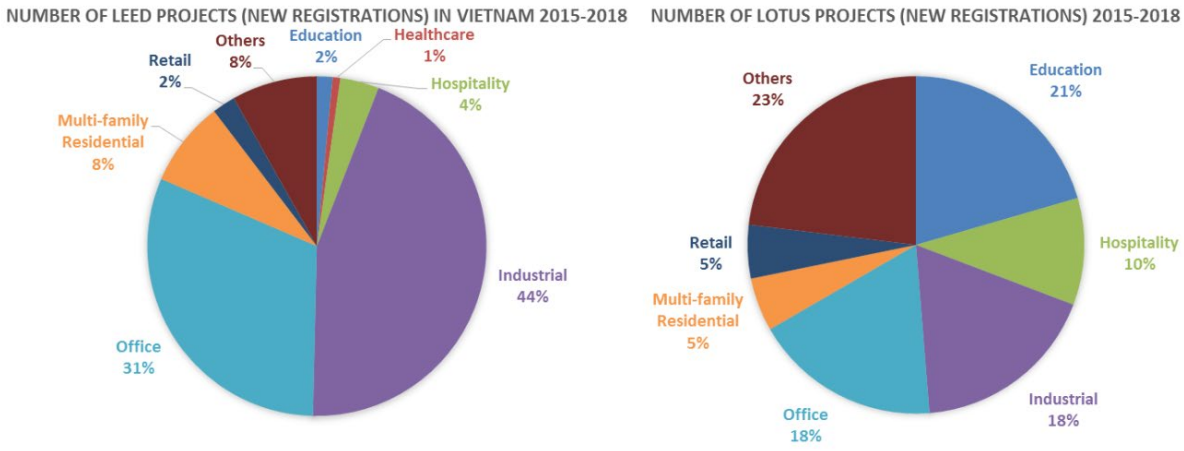


By contrast there were a total of 13 projects registered for evaluation for LOTUS Green Building certification in 2019, with a total floor area of 242,716 m^2.

Despite good growth in the past couple of years, LEED and LOTUS growth drivers may not be quite the same. Of the 135 LEED projects registered in Vietnam from 2015-2018, the industrial and office segments alone accounted for 75% of that number and 80% of the total floor area.

LEED is a global brand, often chosen by high-end office or factory projects that are highly demanded by European-American partners. For LOTUS, there is a more balanced distribution among segments (education, office, industry, apartments, etc. and it projects often target a balance between cost and real benefits from green buildings, while meeting social and environmental responsibility of businesses and organizations. Through LEED and LOTUS data, it can be seen that in the past 3 years green buildings have spread more widely in Vietnam's construction industry.

Figure 10. Proportion of Segments Registered for 2 Certificates (2015-2018)



When the number of projects is big enough and more investors have practical experience on green buildings, the green building movement in Vietnam will have a stronger foundation and soon a real green construction market. Demand now seems to be originating from internal supply and demand and is not only dependent on the requirements of foreign partners.[13]

[13] Báo Xây dựng - Sumarize green building market 2018

3.7 Mandatory Energy Reduction Program

Under the Law on Energy Efficiency and Conservation, MOIT issued Decision No.09/2012/QD-BCT on 20 April 2012 on the promulgation of plans and a reporting scheme on energy consumption and energy efficiency & saving measures for industries. According to this Decision, Designated Energy Users (DEUs) must submit a report on energy consumption and energy efficiency & saving measures. DEUs are defined in Decree 21/2011/ND-CP as: (i) industrial[14], agricultural and transport units with an annual energy use of more than 1,000 TOE and (ii) commercial and residential buildings[15] which with an annual energy use of more than 500 TOE. DEUs are required to submit 5-year EE plans, report annually on energy performance, employ an energy manager, establish an energy management system, and carry out a mandatory energy audit every 3 years. In compliance with Circular No. 09/2012/TT-BCT all DEUs must submit energy reports to their local DOIT, which summarizes the information in a report to be submitted to MOIT.

3.8 Voluntary Energy Reduction Programs

Voluntary Agreements (VAs) negotiated between the GVN and industry can be a promising policy instrument to address industrial energy use (or greenhouse gas emissions). In Vietnam, a voluntary agreement program is planned using a 3-staged approach:

- Formulation of industrial sector strategies and action plans;
- Demonstration of the approach's feasibility by conducting some pilot voluntary agreements;
- Roll-out of a scaled up voluntary agreement, subject to successful completion of the pilot phase.

The pilot program started in 2015 at selected companies, before potentially rolling out the pilot across the country to the rest of the DEU enterprises in Vietnam. Commitment EE targets are negotiated and agreed to between MOIT and the participating voluntary enterprises. Specific energy consumption reduction is

[14] Including energy industry, i.e. also electricity generation

[15] Used as offices and houses; educational, medical, entertainment, physical training and sports establishments; hotels, supermarkets, restaurants and shops.

compared to a base line energy consumption. The VA particpants are supposed to receive financial incentives and technical assistance from the pilot program. However, of the 5 participants in the pilot VA, none of them has received any financial incentives, but only technical assistance (audit, awareness raising).

Some Lessons learned from the Pilot VA include:

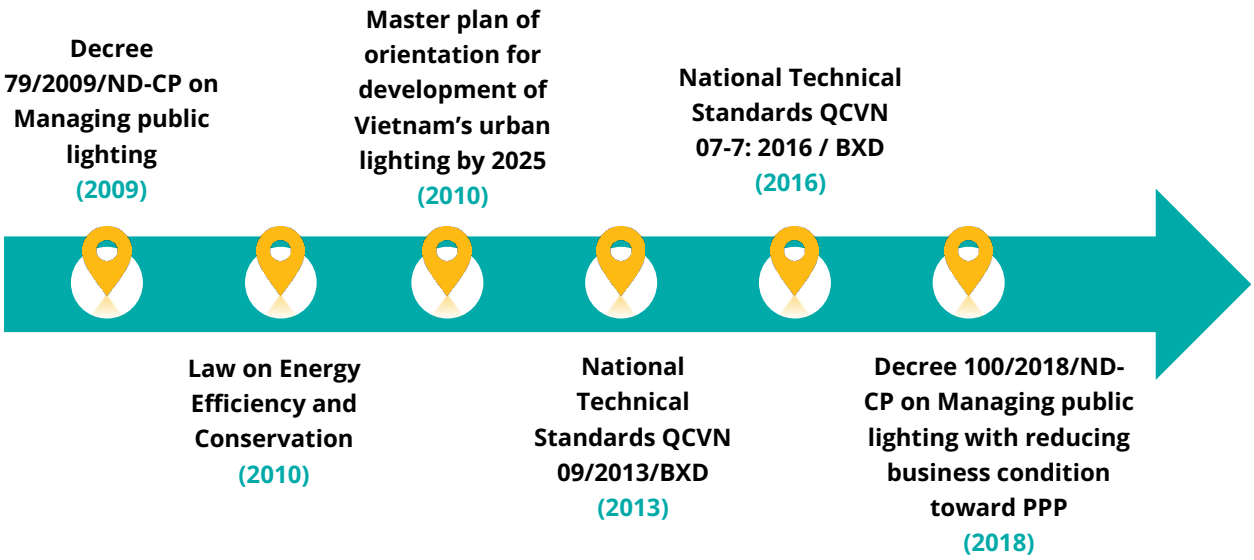
- There was a lack of clarity on the available incentives at the time of Pilot company selection and VA target negotiations
- There was a lack of agreement or understanding of the monitoring approach at the time of negotiating the targets and signing the Pilot agreement, which led to an inability to reliably monitor the project's performance;
- The timeframe was too short to establish a robust MRE system in the company and carry out capacity building for operating it;
- The timeframe was too short to gather sufficient quality data or to allow for meaningful conclusions and lessons learned, and
- The VA program is not scalable since the pilot program was not implemented.

3.9 Public Lighting EE Policy Landscape

Urban public lighting is being managed by central GVN, ministerial and provincial stakeholders with the supported of a series of legislative EE regulations shown in the below figure.

Figure 11. Timeline of National EE in Public Lighting

Source: Vietnam Urban Energy Security – USAID/Vietnam 2020



Decree 79/2009/ND-CP was issued on September 28, 2009 by the Prime Minister on managing public lighting and was validated on November 19, 2009. This was later amended to enable the private sector to invest, manage and operate the public lighting sector by Decree 100/2018/NĐ-CP issued on September 15, 2018. This Decree clearly states that urban lighting systems must use electricity economically, effectively, safely, while protecting the environment and complying with technical regulations. In addition, the decree encourages organizations and individuals of all domestic and international economic sectors to invest in, produce and use high-performance, energy-efficient lighting products. At the same time, this Decree also stipulates that when repairing, replacing, or installing new light sources and lighting equipment that use state budget capital, only products that have energy-saving certificates or labels granted by competent agencies may be used. Before Decree 100, public lighting was a state company that had less capacity to implement EE

projects in the sector. With Decree 100, there is now a legislative foundation to encourage efficiency in the public lighting sector.

In the interest of gradually modernizing and improving the efficiency and quality of urban lighting and public lighting systems, the GVN has produced a master plan for the development of Vietnam's urban lighting by 2025 under Decision 1874/QD-TTG, dated October 11, 2010. Accordingly, the decision promotes the application of new technologies and renewable energy sources in urban lighting activities that increasing EE and environmental protection. It also encourages organizations and individuals of all domestic and international economic sectors (e.g. public sector, private sectors, ESCOs, etc.) to invest, produce and use high-efficiency lighting products and states the following goals for 2025:

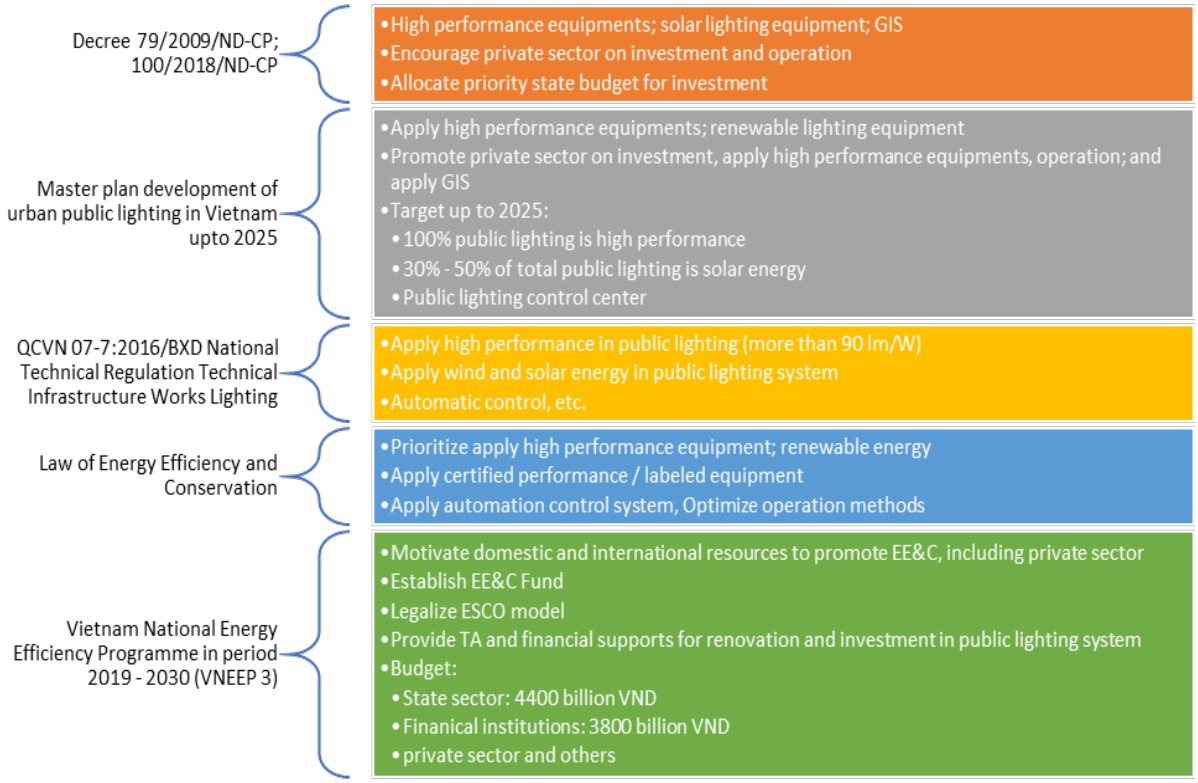
- 100% of public lighting systems shall apply high performance and EE technologies;
- 30%-50% of systems shall apply renewable energy sources (e.g. solar and wind);
- Set up a Public Lighting Control center at provincial level;
- Financing:
  - Local governments should give priority to allocate budget for public lighting investments;
  - Private sector should be encouraged to use and invest in high-performance and RE bulbs, and operating systems based on Geographic Information System (GIS).

Although the master plan has set some specific technological goals at the national level, the city goals have not been determined yet which must be set by city individually. In addition, the master plan only mentions investment budgets should be prioritized, but the budgets are annually allocated budgets meant to manage and operate the current public lighting system and do not leave room for investing in new projects.

The GVN has issued a series of regulations shown in the below Figure 13 to manage/promote EE in public lighting including VNEEP 3, which identifies public lighting as an important component of provincial and national energy savings goals

and also identifies the MOC's Department of Construction at cities/provinces as the entity responsible to carry out the designated regulation.

Figure 12. Existing Landscape of National Public Lighting Policies



In order to unify the management, investment and operation of public lighting systems, the Ministry of Construction issued QCVN 07-7: 2016/BXD National Technical Regulation on Technical Infrastructure Works Lighting standard in May 2016. This regulation requires public lighting operators to apply EE measures in public lighting systems, to adopt minimum 90 lumen/Watt of luminous flux efficiency, and to use wind and solar energy, and deploy automatic controls for efficiency. However, compliance to this regulation has often only been applied to new roads while existing systems are only renovated annually with the limited local budget.

4. EE MARKET BARRIERS

Vietnam faces most of the same barriers as most countries in Southeast Asia and in other developing markets, plus a few additional ones that are unique to Vietnam (main one being low electric rates), which are summarized below.

4.1 Limited EE Knowledge and Demand

a. Limited EE knowledge with most stakeholders in Vietnam, especially with owners of energy consuming facilities **(Facility Owners)** in the industrial, commercial and governmental sectors make it very challenging to implement more extensive EE solutions. From 2015 to now, the difficulties of the EE industry are mainly the lack of understanding, motivation and long-term investment resources in the business sector. So continuous efforts should be made to conduct effective awareness-raising campaigns as they can have a significant impact on EE. Different information materials and the website should be disseminated on the technical knowledge and best practices for replication.

   The limited EE knowledge in Vietnam has led to the following major market barriers, which are described in more detail in this report:

   - A general lack of understanding and confidence with Facility Owners, LFIs and investors in the estimated future EE savings being achieved and verified, which has led to their unwillingness to implement/fund EEPs and thus a fundamental lack of EE market demand;

   - Lack of project-based EEP development skills and technical capacity with local engineers, vendors, consultants and staff of ESCOs resulting in energy audits that only identify a rough estimate of EE opportunities which are not ready to implement and not 'bankable' due to their unreliable savings estimates caused by insufficient data, inaccurate energy baseline, and supporting calculations, plus no M&V plans;

   - Lack of national regulations that mandate EE implementation and remove existing regulatory barriers for the governmental sector to be able to engage ESCOs to implement and finance EEPs on a paid-from-savings basis, and

   - No commercially-attractive financing offered by LFIs.

   - A major contributor to the reduced EE demand is the low electricity tariff in Vietnam because it does not motivate end users to effectively use energy or electric EE technologies due to the relatively low level of cost savings that can be realized. This results in unacceptably long paybacks and a low internal rate of return **(IRR)** on any such investments, especially for industrial facility

owners. As of March 2021, the price of electricity in Vietnam is 0.083 USD per kWh for households and 0.078 USD for businesses, which includes all components of cost for the power, distribution and taxes. By comparison, the comparable average electric price of in the world is 0.135 USD per kWh for households and 0.124 U.SD for businesses.[16] There is need to determine reasonable energy and electricity prices that provide a reasonable profit for production and trading of energy and electricity, and also promote rational and economical use of energy and electricity.

4.2 Government Sector EE Regulatory Barriers

Government Agencies (GAs) who own and operate government facilities and energy consuming asset like public street lighting are unable to engage private sector ESCOs to implement EEPs on a commercially-viable basisl. This is due to existing regulations not allowing or being compatible with how EEPs are developed, implemented and financed by ESCOs and the private sector. Existing regulations result in the same 3 common barriers in Vietnam that also exist in Indonesia, the Philippines and Thailand, which preclude GAs from being able to engage the private sector to commercially develop, implement and finance EE Projects in their government facilities on a paid-from-savings basis, summarized as follows:

1) **No Multi-Year Contracts.** GAs in Vietnam cannot commit to make payments beyond the current budget year, and consequently are unable to execute an enforceable ESPC with ESCOs that require them to make multi-year Savings payments.

2) **No Savings Retention**. Vietnam's budgeting of energy costs for its government-owned facilities is typical of most other governments around the world whereby energy budgets are based on the prior year's actual energy costs. So, when an EE project is implemented that reduces energy costs, the subsequent year's budget is lowered to the reduced energy amount, resulting in no funds being available to make future savings payments to ESCOs.

3) **Inapplicable Procurement Procedures**. Vietnam's procurement method that must be followed by all GAs requires them to procure (purchase) equipment and services by selecting the company with the lowest upfront cost bid, which

[16] https://www.globalpetrolprices.com/Vietnam/electricity_prices/

is not applicable to selecting EEPs or ESCOs whose primary value is the net present value of future savings. In fact, the lowest upfront cost selection method typically results in much lower energy-efficient, lower quality and shorter life energy-consuming products and services having to be purchased. The procurement regulations also require all specifications and costs of the equipment and services being purchased to be identified and fixed upfront in very specific detail to make sure that all bids can be evaluated on the same basis. Unfortunately, this type of detail is not typically available for an EEP until after an IGA has been completed, which is relatively expensive and time-consuming because it contains all shovel-ready details (final design, etc.) needed for the EEP to be immediately implemented. Neither ESCOs nor any commercial is willing to perform an IGA at no cost until they have been selected due to the risk of them losing not only their cost to perform the IGA, but their design ideas to competitors. Therefore, different procurement procedures specific to EEPs and the ESCO's performance-based project development approach, all of which have been fully developed, adopted and are being widely used in many markets, need to be applied in order for ESCOs and other private-sector entities to be willing to submit proposals.

4.3 Limited Technical Capacity to Develop 'Bankable' EEPs

One of the most significant barriers to scaling up the implementation and financing of EE in Vietnam is the limited technical/financial experience and capabilities of most EE services providers (i.e. ESCOs and EE consultants) to prepare IGAs and perform other critical development tasks required for a ***'Bankable'*** EEP. There is also a clear gap in local energy auditors not knowing about the following requirements of IGAs and Measurement and Verification (M&V) plans:

- An IGA contains the core information needed for an EEP to be successfully implemented. It is a much more detailed energy audit that reflects one or more individual energy savings measures (technologies) at an energy consuming facility, containing all critical assumptions, facility-based measurements and calculations supporting the estimated savings and CAPEX, and a M&V plan for each energy savings measure bundled into an EEP. It must contain all information required for a Facility Owner, developer, LFI and/or investor to be able to understand/evaluate the technical and economic feasibility of the proposed EEP.

- The M&V of energy savings from an EEP is critical to documenting the actual achieved savings and the resulting IRR of the investment. M&V is the meter of an EEP, and it should follow generally accepted and best-practice M&V principles contained in globally published documents like the International Performance Measurement and Verification Protocol **(IPMVP®)**, owned by the Efficiency Valuation Organization **(EVO)** and available for free download at www.evo-world.org. In Vietnam, the number of EE experts who are trained and certified with IPMVP is very limited.

4.4 Small Scale, Complexity and Perceived High Risk of EEPs

The global average investment for bundled EEPs, with multiple EE technologies, is very small (less than USD 1 million), and they typically contain multiple energy savings measures each of which can require a separate M&V protocol to measure the savings return on its investment. These very small transactions and benefits, coupled with the perceived M&V complexities make it challenging for Facility Owners to want to focus on EE investments. They also create a perception with LFIs that the potential EE lending market is small, time consuming and will require high transaction costs, making them unwilling to invest the time and resources to develop the internal capacity needed to understand or assess the risks and benefits of lending to EEPs.

4.5 No Commercially-Viable EEP Financing

The main financial support for EE activities has been provided under the VNEEP plans, Vietnam Environment Protection Fund (VEPF) and several loan packages by development partners (WB, DANIDA etc.). The GVN also provides access to several international financing schemes supported by entities like the World Bank, but these are not as much dedicated to providing EE project-based financing as to providing capacity building. In addition, the Ministry of Industry and Trade (MOIT) recently provided funding for energy auditing, technical assistance, training, and the promotion for EE.

Often, LFIs classify EE lending as short-term lending (less than 1 year terms) and require guarantee assets and other collaterals for any long-term loans. One EE financing long-term loan option is the World Bank's Vietnam Energy Efficiency for Industrial Enterprises (VEEIEs), which has a key objective to improve EE in the industrial sector and achieve the GVN's EE and GHG reduction objectives. VEEIE has been operating since December 2017 and is scheduled to end on July 31, 2022. As of

June 2021, the participating LFIs (BIDV and Vietcombank), in cooperation with the World Bank, have provided technical support to 101 potential EEPs of which only 16% (16 projects) resulted in bankable EEPs and only 8 projects were granted loans for such items as: technology upgrading, waste heat recovery, rooftop solar system and other clean energy projects.

The best EEP financing options for a private sector Facility Owner are through self-financing from an ESCO. The major consideration in choosing the financing type is based on the assumed risks and desired benefits of the Facility Owner. Generally, ESCOs are desired when the CAPEX investment costs for implementing EEPs are high and the technologies used are unknown to Facility Owners. Large companies with EE knowledge and financing capacity tend to finance their own EEP investments. On the other hand, small and medium-sized **(SME)** companies who mostly have limited financing and difficulties in getting loans, will tend to choose financing through an ESCO. The basis for choosing the ESCO financing model is not only based on a Facility Owner's needs but also on its access to EEP financing.

Irrespective of who finances an EEP, one of the most significant global barriers (gaps) that also exists in Vietnam is a lack of commercially-attractive EE financing, which needs to be 'project-based' in order to be '*attractive*'. This financing gap is not caused by a lack of available funds, but rather the inability of EEPs to access the existing funding capacity of LFIs under their current lending structure. There is a "disconnect" between the traditional lending practices of LFIs and the project-based financing structure needed by Facility Owners, ESCOs and other developers of EEPs. LFIs typically apply their traditional "asset-based" corporate lending approach for EEPs that limits the amount they will lend to a maximum of 70% to 80% of the EEP's CAPEX, but more critically requires full collateral on the entire loan amount. Unfortunately, there is very little collateral value in EE equipment after being retrofitted in a facility; rather, its value is limited to the ongoing cash flow that it can generate over its useful life of 10 to 25 years. The disconnect occurs from LFIs not recognizing the significant future cash flow generated from EEPs because they do not believe or are not satisfactorily assured that such new future cash flow can be relied upon to repay the related loan. Consequently, LFIs generally assign no value to the future cash flow of EEPs, which requires borrowers (e.g. Facility Owners, ESCOs, etc.) to finance them from their existing credit capacity or secure them with marketable asset collateral or repayment guarantees, both of which are very unattractive to the borrower.

This disconnect results in LFIs not being willing to structure EE loans that consider the future EEP's cash flow as the primary source of loan repayment due in large part to LFIs:

- Not being familiar or comfortable with the future savings of EE technologies being generated or being reliably measured and verified;
- Not knowing how to properly evaluate the risks and benefits of EEPs, and
- Not knowing how to structure low-risk EEP loans that are attractive to Facility Owners, ESCOs and other project developers.

The current financing options in Vietnam do not apply a project-based lending approach for EEPs. Virtually all LFIs are reluctant to finance EEPs because of a perceived high risk, small transaction size, small market potential, high transaction costs and a lack of the internal evaluation capacity needed to assess the risks and cash flow benefits generated from EEPs. Given the questionable loan market size, LFIs are also reluctant to acquire new EE technical capacity and are unwilling to invest the time or resources to learn about EE on their own.

Since LFIs assign little or no value to the EEP's future cash flow and do not consider it as increased credit capacity from EEPs in their loan structures, Facility Owners interested in implementing an EEP are required to use their existing core business credit capacity and/or provide additional marketable collateral or guarantees to secure EE loans with LFIs. These requirements coupled with a lack of confidence in the EEP's future savings being achieved, has resulted in a significant barrier for Vietnam to tap into the huge EE opportunity of its industrial and commercial sectors. Most private companies have not even begun to look at or consider implementing EEPs in their facilities, which is why EE opportunities are so abundant for the most fundamental of EE technologies.

4.6 Limited Enforcement of Regulatory EE Mandates

There is lack of enforcement of the different Laws, Decrees, Circulars and Decisions issued by the Ministries and other agencies of the GVN. It has been observed that there are Designated Energy Units **(DEUs)** who do not follow the requirement of setting up an Energy Management System or providing the yearly reporting to the provincial DOIT.

- Monitoring, reporting and evaluation should be strengthened in terms of both human resources and institutional arrangement to ensure the implementation of energy efficiency and conservation from central to local level.

- MOIT is responsible to improve the energy reporting system and develop an online energy database to monitor and report the energy efficiency indicators for all economic sectors in Vietnam, including benchmarking data for energy intensive sectors.

4.7 Limited Implementation Capacity (Nascent ESCO Industry)

In the past few years, the ESCO industry has made strides with the participation of more and more companies providing energy services. More importantly, Vietnamese enterprises are no longer indifferent to the issue of energy conservation like before. According to a prominent ESCO representative, in the first six months of 2021, when the COVID-19 epidemic raged the most across the country, businesses were still receiving up to 300 investment proposals for solving problems. This can be considered a good signal for the future of the ESCO market. In addition, ESCO development gained momentum after the introduction of VNEEP3 due to the GVN recognizing the existence of 'ESCOs' to contribute to the achievement of its national EE target. The GVN started to help EE service providers to develop bankable projects and provided continued training and assistance on more comprehensive audits, performance contracting and financing options.

However, today, there are still only a few ESCOs who are engaging with a limited number of Facility Owners for their ESPC services. This is due to ESCOs facing the many EE market barriers previously identified plus the fact that most ESCOs are SMEs with limited credit history and insufficient capital resources needed to develop and implement savings-based EEPs on a scalable basis. Other barriers include:

- Lack of knowledge on how to develop, structure and finance performance-based EEPs;

- Lack of an adequate legal framework on business conditions, areas of business and service for ESCO activities, which is specifically needed in Vietnam, and

- Shortage of funds and financial institutions involved in ESCO activities.

- No access to government facilities, including by EVN power corporation, the largest electricity wholesaler in the Vietnam market with a number of large industrial customers. There is no mechanism for the operation and development of energy service companies (ESCO, lack of a mechanism for capital, handing over state assets to customers and how to do it). In addition, just like all other GAs, there is no mechanism for administrative agencies to use energy saving solutions provided by ESCO Company[17].

5. CURRENT AND PAST DONOR EE INITIATIVES

5.1 Current Donor EE Programs

1) MOIT/GIZ Energy Support Program: 4E Project Phase II: 2018-2021

This GIZ program reflects a strong Vietnamese-German cooperation that began in 2013 with the creation of the MOIT/GIZ Energy Support Program. The Program aims to contribute to Viet Nam's emissions reduction and green growth strategy by improving the existing regulatory framework for RE and EE and increasing the professional and organizational capacities of key institutions and stakeholders.

All activities which are carried out are under one of three action areas: i) Legal and Regulatory Framework Conditions, ii) Capacity Development, and iii) Technology Cooperation. The main objectives of current 4E project's Phase II are to improve the preconditions for the utilization of RE and the increase of EE at key stakeholders of the government and private sector; and to provide support to the Technical Assistance for the Implementation of the EU - Viet Nam Energy Facility. For further information about the Facility. Website: http://energyfacility.vn/

The Phase II focuses on the following RE and EE awareness and capacity building:

- **RE Capacity Building** for stakeholders strengthens the capacities of the Electricity and Renewable Energy Authority under MOIT and key energy companies to accelerate the deployment of new RE projects in Vietnam. Activities include the development of proposals for national steering mechanism for the expansion of new RE, studies and exchange between policy makers and

[17] The EU – VN Energy Facility 10/2020, VNEPG & GIZ Seminar ESCO market development to promote energy saving in Vietnam 2018, MOIT & WB

international professionals and trainings on policy development and technical problem solving.

- **EE Capacity Building** for stakeholders supports capacity building for the Department of Energy Efficiency and Sustainable Development under Ministry of Industry and Trade, industrial consumers, Energy Service Providers, and Energy Service Companies (ESCOs) to enhance Energy Efficiency in Vietnam. Activities include support to the assessment of potential EE support mechanism in Viet Nam, further development of EE database and Energy Performance Indicators, capacity development for energy managers and access to international expertise on EE policies.

- **EE and RE Awareness Raising** activities include the organization of National Energy Efficiency Industry Award and support to MOIT in communicating success stories about RE and EE.

Website of the program: http://gizenergy.org.vn/en/project/renewable-energy-and-energy-efficiency-phase-ii-4e

2) Vietnam Energy Efficiency for Industry Project (VEEIE): 2018-2022

The World Bank is supporting this project through Vietnam's MOIT, Ministry of Finance (MOF) and two commercial banks, Bank for Investment and Development of Vietnam (BIDV) and Joint Stock Commercial Bank for Foreign Trade of Vietnam (VCB). A USD 100 million loan was provided from the International Bank for Reconstruction and Development (IBRD) to MOF who re-loaned USD 50 million each of the participating banks (BIDV and VCB). They are supposed to use the USD 100 million to fund EEPs with a total investment of about USD 156 million to be implemented within 10 years.

The participating banks may lend to industrial enterprises or ESCOs to implement energy saving projects. Industrial enterprises may borrow capital to invest in EEPs that meet the project's criteria prepare and submit loan applications to commercial banks (BIDV/VCB). VEEIE is coordinated by MOIT and development partners since its inception in January 2018. The project is a convergence of resources and co-implementation between MOIT, the World Bank, LFIs (BIDV and Vietcombank) and the business community (industrial manufacturing companies and ESCOs) with and aim to improve EE at industrial facilities.

The type of EEPs developed under this program include:

- Replacing inefficient industrial technologies with energy-saving technologies such as industrial boilers, furnaces and high-performance heat exchange systems;
- Recovery and utilization of by-products and waste heat;
- Installation of high-performance electrical and mechanical equipment, including motors, lighting, pumps, heat and ventilation equipment;
- Optimization of industrial systems to reduce energy use;
- Use of RE to save electricity or fuel in industrial enterprises (cogeneration system, solar water heating system);
- Other projects approved by the World Bank.

With about 25 industrial enterprises expected to participate, VEEIE hopes to create a breakthrough in the industrial EE market in Vietnam, from credit and technology to training management and developing human resources. The coordination mechanism between state management agencies, credit institutions, international development partners, industrial enterprises and ESCOs implemented in the operation of the VEEIE project may become new model of effective EE operation deployment model.

3) VEPG (Viet Nam Energy Partnership Group): 2016 to Present

VEPG is a high-level energy policy and technical forum supported by the EU in cooperation with MOIT that aims to strengthen cooperation, dialogue and exchange of experiences and knowledge in the country's energy sector by providing a platform to:

- Have high-level policy and technical dialogues between GVN and Development Partners, as well as all stakeholders in the energy sector;
- Facilitate alignment of ODAs with Viet Nam's energy and climate change strategies, action plans, international commitments, and private investment in the energy sector;
- Facilitate implementation of development cooperation activities in the energy sector, and to reinforce coherence and effectiveness of international support while avoiding duplication and fragmentation of aid delivery, and

- Enhance learning through information sharing and communication between national and international participants.

4) Smart Grids for RE and EE: 2017-2021

This GIZ project supports experts of the Vietnamese power sector in developing a smart power supply system that will allow for the increased integration of RE and support greater EE. The project focuses on three main action areas that promote the participatory development of smart grid solutions, namely:

a) **Legal and Regulatory Framework.** The objective of this action area is to provide the Electricity Regulatory Authority of Viet Nam (ERAV) with information on improving the regulatory framework for a Smart Grid, which facilitates Res and increases EE. Experts who update the Smart Grid Road Map (SGRM) and shape respective regulatory requirements receive support through training. Technically this means understanding the usefulness of internationally proven legal and regulatory requirements and adjusting them to the conditions in Viet Nam.

b) **Human Capacity Development**. This action area aims to establish a Smart Grid knowledge hub, which helps Vietnamese experts and stakeholders to exchange knowledge about the development and management of Smart Grids, state-of-the-art technologies and international approaches. The exchanges also aim to promote awareness about Smart Grids between the government, policy makers, business, research institutes and civil society.

c) **Technology Cooperation.** Through activities in this action area, power sector experts will be presented with and exchange on available technology solutions for an intelligent power supply system, which facilitates the integration of REs and increases EE. The experts will learn more about the technologies that are available on an international level and will get insights into the benefits these technologies can have for the Vietnamese power sector. This will happen by evaluating the technologies theoretically, developing and testing pilot schemes and then testing and evaluating system configurations which integrate different technologies.

5) Southeast Asia Low Carbon Energy Programme (LCEP): 2020-2022 (March)

LCEP is a 3-year GBP 18 million TA program provided by the UK Prosperity fund to implement Green Finance and EE interventions in 6 southeast Asia countries (Philippines, Indonesia, Thailand, Vietnam, Malaysia and Myanmar) that ends in March 2022. The ongoing TA program in Vietnam includes the following interventions being implemented through MOIT:

a) Support the creation of a market for ESCOs to implement paid-from-savings EE projects in government facilities. This intervention attempted to establish new regulatory procedures for GAs to follow in order to legally procure and contract with ESCOs to develop, implement and fund EE projects in government facilities and receive multi-year payments from reduced energy costs (Savings). It was pursued under two parallel and independent approaches: 1) creation of new government procurement, contract and budget regulations and 2) synchronization of existing Private Partnership (PPP) regulations that already contain the 'salient features' applicable to an ESCO entering into an Energy Savings Performance Contract (ESPC) with a Government Contracting Agency (GCA).

   EPS Capital, member of the LCEP team, drafted new government procurement, contract and budget revisions that streamlined existing PPP regulations to accommodate paid-from-savings EEPs being implemented by ESCO and submitted them to GVN for inclusion in its June 2020 revision of PPP, but it was too late for their considerations. EPS Capital also conducted regulatory research and drafted/submitted to MOIT in late 2020 the key elements of a new national ESCO regulation to remove the government barriers, which MOIT supported but felt getting such ESCO regulation completed was well beyond LCEP's March 2022 program deadline.

b) Support MOIT to deliver the VNEEP3 – still in progress.

c) Develop a pilot EE project implemented by a cement company that demonstrates a bankable IGA and project-based financing – still in progress.

d) Promote improved EE target setting and performance by food and beverage companies through the adoption of Energy Management Systems

e) Support MEPS and HEPS for electric motors – still in progress.

6) GCF EE for Industry Risk Sharing Facility (RSF): 2024 (Approved by GCF but not GVN)

The World Bank is targeting this project to improve EE in Vietnam's industrial sector by encouraging private sector investment in EEPs and providing complementary technical assistance and capacity building to stakeholders in the EE market. The project will seek to contribute to:

- A paradigm shift in the nascent energy efficiency market, by providing know-how and experience, by strengthening capacity and by creating an enabling environment for local financial institutions and industrial enterprises to scale up investments in energy efficiency.
- Achieving the GVN's energy saving and greenhouse gas emission reduction objectives.

7) USAID – Vietnam Urban Energy Security: 2018-2033

This USAID project works closely with the GVN at the city, provincial, and national level to improve legislation related to clean energy, mobilizing investment and increasing the adoption and deployment of innovative energy solutions.

8) DANIDA – EE Program between Viet Nam and Denmark: 2020-205

DANIDA is coordinating with MOIT to try to develop low carbon in the industrial sector in order to further contribute to reducing Viet Nam's energy consumption and CO2 emissions needed to meet VNG's National Determined Contribution (NDC) obligations in the Paris Agreement, its national energy development goals to 2030 (Resolution 55) and the EE goals and targets in VNEEP3.

9) GIZ – EU Vietnam Energy Facility: 2018-2021

The aim of this GIZ project is to enhance governance of the energy sector with a view to facilitate a shift to a more sustainable energy development path in Viet Nam. The Project will also contribute to the implementation of the regulatory framework needed to achieve Viet Nam's commitment to reduce energy-related green gas emissions in the context of its NDCs.

The Facility is co-financed by the EU and the German Government.

5.2 Past Donor EE Programs

1) Southeast Asia Energy Sector Development, Investment Planning and Capacity Building Facility (2018-2021)

ADB The transaction technical assistance (TA) facility provided project preparatory assistance, technical support, policy advice, knowledge sharing, and capacity building to support the implementation of ongoing projects and strengthen due diligence and improve project readiness to Southeast Asian Developing Member Countries (DMCs) for a series of lending projects and programs identified in the country operations business plans, 2018-2020. The TA facility also provided technical knowledge services and capacity building support to ongoing projects, especially for renewable energy grid integration, battery storage system, ESCO development, LED street lighting, rooftop solar project, and other needs as arise.

In Viet Nam, the project had provided support for LED Street lighting project in some big cities such as Da Nang and Ho Chi Minh city.

2) Programme for Energy Efficiency in Building (PEEB) (2018-2020)

This ADEME/AFD/GIZ PEEB program was initiated jointly by the French and German Governments at the COP 22 in November 2016 and was catalyzed by the Global Alliance for Buildings and Construction (GABC). As such, PEEB supports the implementation of the GABC roadmap "towards low GHG and resilient buildings" as one of its first partner countries with Mexico, Morocco, Senegal, and Tunisia. The project promoted the creation of regulatory and normative framework conditions, which were a prerequisite for the transformation into a low-emission building sector and an important driver for the development of an EE market.

In addition, PEEB proposed a soft loan and EE incentive scheme to the NAMA facility to mobilize private sector investment in EE in buildings which was rejected by GVN. PEEP also supported the MOC in developing a NDC roadmap for the building sector and in designing an EE housing program with funding planned from AFD). This enabled the MOC to submit a project application for a housing project (EUR 17.3 million) to the NAMA Facility. Lastly, PEEB developed a feasibility study for green financing program for Energy Efficiency and Low Emission Housing in Viet Nam.

3) Energy Efficiency Improvement in Commercial and High-Rise Residential Buildings in Viet Nam (EECB) (2016-2020)

UNDP cooperated through the Ministry of Construction (MOC) Project to have this project focus on reducing the intensity of GHG emissions from the building sector in Viet Nam. This project's specific objective was to improve the energy utilization performance of commercial and high-rise residential buildings in Ho Chi Minh and Hanoi by implementing the following three components:

i. Improvement and Enforcement of Energy Efficiency Building Codes;

ii. Building Market Development Support Initiatives, and

iii. Building EE Technology Applications and Replications.

Each component comprised a number of complementary activities designed to remove barriers to the stringent enforcement of the revised EEBC, and to the greater uptake of building EE technologies, systems, and practices in commercial and residential buildings. At end of the project, the GEF investment catalyzed direct GHG emission reductions of about 37,680 tCO2e. The cumulative direct reduction in GHG emissions over the lifetime of the project is envisioned to be 236,382 tCO2e.

4) Vietnam Low Emission Energy Program (V-LEEP): 2016-2020

The United States Agency for International Development (USAID) program was coordinate through MOIT to support GVN's green growth and low-emission energy development in Vietnam by supporting the formulation of policies and mechanisms to encourage low emission development in the energy sector, and at the same time, attracting public-private investment in developing RE and EE. Among the objectives of the Project, Module 3 focused on implementing the goal of strengthening the energy-efficiency implementation capacity for energy-intensive industries and construction Vietnam. The results were summarized as follows:

- Performed a review 4 key sectors including steel, garments, cement, and sugarcane to support inspection Energy audit aims to identify the potential and effective energy use solutions;

- Coordinated with Vietnam Textile and Apparel Association to organize the workshop "Technical support for low emission technology application for the textile and garment industry" in 2017; with the participation of more than 80 enterprises and consulting units, international suppliers and organizations;

- In coordination with Vietnam Textile and Apparel Association, Vietnam Steel Association organized a training course to improve energy management capacity for industrial enterprises: Organizing workshops on cost optimization and improving energy efficiency for more than 50 attendees from industrial enterprises, ESCOs, credit institutions, professional associations, management agencies and international organization;

- Provided technical support for a number of ESCOs in Vietnam to promote ESCO projects in industrial enterprises;

- Working with credit agencies including Bank for Foreign Trade of Vietnam (VCB), Bank for Investment and Development of Vietnam (BIDV) to develop a coordination mechanism to provided technical assistance in reviewing proposals for loans for energy saving projects, and

- Coordinated with the Association of Energy Engineers (AEE) to organize the first training course on certification of Energy Efficiency and Evaluation (CMVP) projects in Vietnam. After the training, there were 18 experts who were recognized and certified by EVO with global value.

5) Promotion of Energy Efficiency Industrial Boiler adoption and operating practices in Vietnam: 2015-2019

UNIDO coordinated through MOIT to implement this program aimed at reducing energy consumption and GHG emissions through promoting the widespread adoption of EE boilers and best operation practices in industry.

6) Implementation of Eco-Industrial Park Initiative for Sustainable Industrial Zones in Viet Nam: 2014-2018

UNIDO in coordination with MPI implemented this program designed to increase the transfer, deployment and diffusion of clean and low–carbon technologies and practices for the minimization of GHG emissions, release of persistent organic pollutants (POPs) and water pollutants as well as improved water efficiency and the sound management of chemicals in Industrial Zones (IZ) of Vietnam.

7) UNIDO-UNEP Global Program on Resource Efficiency and Cleaner Production (RECP) in developing and transition countries (Vietnam component): 2013-2018

Through the Vietnam Cleaner Production Centre, this program supported the GVN to identify and fill gaps for the ratification of the Kigali Amendment to the Montreal

Protocol and ensure the early compliance of the country vis a vis the new obligations. The primary activities included a Cost and Benefit Analysis required when Vietnam ratified the Kigali Amendment in September 2019 as well as reporting of HFC consumption.

8) Clean Production and Energy Efficiency Project: 2013 -2018

This World Bank program, coordinated through MOIT to attempt to define a strategy for GVN to develop ESCOs, develop an efficient EE framework for EE targets and Mandatory EE regime.

9) Promoting Investment Market for EE in Industrial Sector in Viet Nam: 2018-2019

The Korea International Cooperation Agency (KOICA) supported this project aimed at developing ESCOs and facilitating the implementation of EEPs by developing feasibility studies for EE projects in some coal-fired power and heavy process plants. While studies were completed it is not known if any has resulted in an implemented EEP to-date.

6. EE MARKET GAPS

The current regulatory, administrative and policy support from the government has been in large part not effective, and thus has not assisted in overcoming the EE Barriers in section 4. Furthermore, despite several donor programs having addressed some of the EE barriers, there are several major gaps that need to be filled in order for EE to be widely implemented throughout Vietnam, which are summarized below.

6.1 No Incentives or Mandates to Drive Private-Sector EE Demand

Financial incentives for EE products and services are needed to create interest and new demand for them from private sector Facility Owners. Current EE demand is currently very low due to their very limited knowledge/interest in EE, low return on investment (i.e. low electric rates) and higher price of EE products. Incentives are needed that can be quickly realized into a financial benefit and are significant enough to get the attention of business Facility Owners and their Chief Financial Officers.

6.2 Government EE Barriers and Lack of Demand

The inability of ESCOs and other private sector entities to implement paid-from-savings EEPs in government facilities is one of the major EE market gaps for both GAs and ESCOs that needs to be overcome. Vietnam's ESCO industry is nascent with low capacity resulting from limited market awareness, credibility and customer demand, and financing access. Opening up the large Government sector will create national market demand, awareness, credibility, capacity building (i.e. templates, certifications, etc.) and low-risk financing options for the ESCO industry. Fact is that robust ESCO markets mostly only exist in countries where its governmental sector is a primary, if not the primary user of the ESCOs' paid-from-savings ESPC business model. The ESCO industry needs to be developed in the government sector by removing the previously-described 3 common barriers of GAs:

1. Not being able to commit to multi-year Savings Payments;
2. Not being able to retain Savings in Budgets, and
3. Being required to use ***'lowest cost'*** Procurement Procedures

- One potential solution is to enact New National ESCO Regulation that defines the procedures, guidelines regulatory framework for ESCOs to be able to implement paid-from-savings EE projects in governmental facilities.
- A second potential solution is to streamline processes in existing Public Private Partnership (**PPP**) Regulation to allow ESCOs to turnkey develop, implement and fund EEPs on a 'paid-from-savings' basis in government facilities.
- A third potential solution is to revise each existing government regulation related to procurement, budgeting and multi-year contracting, as needed to allow ESCOs to turnkey develop, implement and fund EEPs on a ***'paid-from-savings'*** basis in government facilities. This third option is very problematic due to the significant challenges and time required to obtain approval by the potentially many GAs that need to change their existing regulations.

6.3 No Commercially-Attractive EE Project Finance

EE Risk-Mitigation Financing Products are critically needed to overcome the huge collateral and confidence barriers of financing EE Projects by LFIs, facility owners, ESCOs and other EEPs developers. These are needed for LFIs to revise their traditional lending practices and starting offering project-based lending to EEPs

6.4 Insufficient EEP Development Capacity Building

There is a lot of project-based development capacity building needed for EEPs in Vietnam to provide the missing IGA and M&V skills through the training and certification of professionals of ESCOs and EE Service providers. This is critically-needed to have the market be able to develop 'bankable' IGAs on EEPs with reliable M&V Plans. Other Capacity Building needs include training LFIs on how to evaluate the benefits and risks of EE Projects and structure project-based financing that mitigates risks for financiers and yet is attractive to facility owners.

6.5 Limited ESCO Implementation Capability

The nascent ESCO industry lacks the performance-based project development knowledge and experience and is not aware of how to prepare 'bankable' IGAs and reliable M&V plans as well as financing EEPs on a paid-from-savings basis. Providing the above new capacity building programs for IGAs, M&V and ESCO project development and financing is critical to the growth of the ESCO industry.

7. RECOMMENDED INTERVENTIONS

The successful and cost-effective transition of the energy system requires both higher penetration of renewable energy and a reduction in energy consumption through EE and energy conservation measures. As this report shows, Vietnam has a large potential for EE to significantly reduce energy consumption, costs and GHG emissions. It also can reduce total energy system costs through investments in end-use EE devices (e.g. industry and residential sectors) by reducing the energy demand and need for additional power plant capacity investments. However, Vietnam is not able to exploit its full EE potential due to the institutional and financial barriers identified in this report.

Taking into consideration the EE Gaps identified in section 6 and eliminating those covered by Donor programs in section 5, to avoid duplication, the below EE interventions are recommended for Vietnam. They are prioritized from highest to lowest potential impact in being able to create EE demand and scale-up the implementation of EE in Vietnam, except for the creation of a government EE/ESCO market in section 7.7, which will require delayed implementation until MOIT determines it is a priority within VNEEP 3. It should be noted that MOIT, as the

designated GA responsible for all EE in Vietnam, will likely be the lead counter-party agency with which all interventions are to be coordinated and approved.

7.1 Develop/Implement/Fund Private-Sector Demonstration EEPs

Demonstration projects are desperately needed to illustrate to all the EE stakeholders how to successfully apply global best-practices in the development, implementation and financing of EEPs in both private and governmental sector. Since the implementation of EEPs in government facilities will have to wait until the 3 existing regulatory barriers are removed in the section 7.7, it is recommended to pursue EEP demonstration projects in private energy-consuming facilities.

This intervention would include identifying/securing EEPs with private-sector facility owners for an international deeply-experienced EE team to develop, finance and manage the implementation of EEPs that (i) apply 'global best practices' and (ii) bundle multiple 'proven' technologies to maximize the level of EE savings and ensure targeted savings are achieved. The support would be turnkey in nature and include but not be limited to the following tasks for each Demonstration EEP:

- Prepare a 'bankable' IGA and the included M&V Plant;
- Implement the M&V plan by obtaining, analyzing data and performing initial M&V of savings;
- Prepare proposed EEP financing materials and presenting them to LFIs for consideration of a project-based loan;
- Prepare performance-based procurement procedures and facilitate the selection of a local contractor or ESCO to implement the EEP, and
- Project manage the selected contractor or ESCO's implementation of the EEP.

This intervention would also include the establishment of a relatively small fund (~USD 10 million) that would fund the development and implementation of several EEPs in different industries to facilitate development of the private sector EE and ESCO market. This intervention is critically needed to create EE demand, especially in a market with low electric rates, by unlocking the current knowledge, technical and financial gaps on how to successfully develop, implement and finance an EEP in a cost-effective and low-risk manner.

7.2 Develop Cash Incentive Programs to Drive Private-Sector EE Demand

Develop two new EE Cash Incentive Programs to create private-sector EE market demand and scaled-up implementation, which are extremely low due to the lack of incentives mechanisms Vietnam's low electricity price. They will be designed to provide private end-use energy consumers with an attractive enough incentive to shift their behavior to purchasing more EE Products and implementing EE Projects. A brief summary of each one is as follows:

a) **EE Product Incentives** that reflect a cash rebate paid to private purchasers of retail products that minimally offsets the higher cost for household consumers to buy the more expensive EE appliances instead of the less expensive inefficient ones.

b) **EE Project Incentives** that reflect a cash payment to private Facility Owners, ESCOs and other developers who implement EEPs with the amount based on the actual kWh and thermal reductions calculated pursuant to generally accepted M&V principles like the IPMVP and verified by CESVs.

The potential positive impact of these cash incentives on creating a large EE demand in Vietnam is huge and critical to delivering GVN's EE targets. However, it will require a lot of effort and time to work with the many stakeholders to get EE Product and EE Project cash incentive products designed/accepted by the local market and to secure a funding scheme acceptable by GVN. Potential stakeholders would include not only GAs like MOIT, MOF, CMSC, MPI, EESD, ERAV, and EVA, but also key NGOs, VNEEP 3 participants, private sector EE vendors and service providers and potential international donors.

7.3 Deliver EEP Development Capacity Building

To create a pipeline of EEPs, it is necessary to create/implement a national EEP Development capacity building program that trains and certifies the competency of individual professionals working for EE consulting firms, ESCOs, vendors and other EE service providers on how to develop 'bankable' EEPs for implementation in public and private energy-consuming facilities in Vietnam. It also needs to train bankers how to evaluate and structure commercially-attractive EE project-based loans. It is important to certify the individuals (where the knowledge/skills reside) and not

companies, and then require that those certified individuals to personally certify the results of a study/investigation.

Existing local and training and certification materials will be modified where possible to comply with the requirements of MOIT and other GAs. The EEP development capacity building program will also provide the new project-based EE knowledge/skills needed for the local professionals to learn how to prepare detailed IGAs containing reliable savings and capital expenditure (CAPEX) estimates and M&V plans. A brief summary of each proposed program is as follows:

a) **Certified Energy Manager (CEM):** Applies local existing training materials and certification process certifying those individuals who demonstrate their knowledge/ability to analyze energy consumption, identify significant energy users, and establish an energy management system according to ISO 50001.

b) **Certified Energy Auditor (CEA):** Applies local existing training materials and certification process, certifying those individuals who demonstrate their knowledge/ability to audit energy-consuming facilities and identify preliminary EE projects with estimated savings.

c) **Certified Investment Grade Auditor (CIGA):** Applies existing global IGA training materials and TÜV NORD's Exam. TÜV NORD will certify as CIGA those CEAs who demonstrate their competence to prepare IGAs in compliance with generally accepted EE engineering practices. The CIGA program teaches existing CEAs to prepare 'bankable' IGAs on EE Projects for 'Decision Makers' and addresses the current market gap for CEAs to be able to develop ready-to-implement EE projects with reliable estimated CAPEX and energy savings based on measurements, supporting calculations including a M&V plan. The 4-day curriculum includes an exam requiring candidates to prepare an actual IGA. The CIGA exam will be conducted online according to international certification standards as outlined in TÜV NORD's procedures.

d) **Certified Energy Saving Verifier (CESV):** Applies existing M&V training materials and Exam from Efficiency Valuation Organization (EVO). EVO will certify as CESVs those CIGAs who demonstrate their competence to certify an EE Project's estimated/achieved savings and M&V plans. The CESV program teaches existing CIGAs to prepare M&V plans that comply with generally accepted M&V principles and calculate the interdependency effect on estimated

savings from bundling multiple technologies into a single EE project. CESVs will address Vietnam' current 'low confidence in EE savings' market gap by providing high-grade EE engineers with certified skills to verify estimated savings and M&V plans in IGA reports. The 7-day curriculum includes 3 days of teaching M&V fundamentals needed due to the market-wide M&V knowledge void and an exam requiring the evaluation of an existing IGA.

e) **EE Project Finance Professional (EEPFP)** is a training workshop that teaches staff of financial Institutions and ESCOs how to evaluate the benefits and risks of EEPs and structure project-based financing that mitigates risks for financiers and yet is attractive to facility owners.

f) **ESCO Project Development Professional** is a training workshop that teaches staff of current or prospective ESCOs how to develop, finance, implement and mitigate risks of EEPs under an ESPC.

This intervention addresses a critical EEP development gap that needs to be overcome in order for the development of bankable EEPs and meaningful pipeline that can be implemented to deliver GVN's EE targets. It will likely require a relatively large amount of effort and time to persuade MOIT to accept revisions to its current training and certification programs and accept new international-based programs. However, the belief is that MOIT will recognize that this intervention will fill the huge missing EE project development capability in the market place.

7.4 Develop EE Finance De-Risking Products

In order to enable LFIs to be willing offer attractive project-based EE financing the following two new EE Finance De-Risking Products are critically needed to overcome the huge collateral and confidence barriers experienced by LFIs, facility owners, ESCOs and other EEPs developers:

a. **Energy Savings Insurance (ESI)** product mitigates the performance risk against any shortfalls in an EEP's savings versus its debt service payments to LFIs and/or investment returns to facility owners. It instills confidence with both facility owners and LFIs that the estimated future cash flow savings from an EEP will be realized. It also establishes energy savings as a reliable new future cash flow for LFIs to accept as a source of loan repayment, increased credit capacity and reduced collateral requirements of borrowers. The ESI product will be provided

by a locally-respected insurance company **(Insurer)** that would pay the shortfall in an EEP's actual savings versus its related debt service payment to an LFI. Its design follows Chubb's 100% financial coverage successfully implemented in US 20+ years ago versus the partial product-warranty coverage of the Inter-American Development Bank's ESI program. The ESI will be structured as a "zero loss" insurance product with fees charged to the EEPs that cover the long-term losses in order to ensure sustainability. A first-loss fund of about USD 10 million will be included to share initial losses with the Insurer until such time as an experience ratio is determined.

b. **Partial Credit Risk Guarantee (PCG)** product is a common product that mitigates the credit risk assumed by a lender that a borrower will not make its agreed loan payments. A locally-accepted financial institution will be identified to guarantee to LFIs that a significant portion (minimum 50%) of their EEP loans will be repaid by the borrower. This will reduce the amount of collateral required from borrowers by LFIs.

This intervention addresses a critical EEP financing gap that needs to be overcome in order for the scaled-up implementation of EEPs and meaningful pipeline that can be implemented to deliver GVN's EE targets. It will very likely require a large amount of effort and time to work with the many stakeholders to get PCG and ESI products designed/accepted by the local market and implemented with support of international donors and other entities. This would include but not be limited to MOIT, MOF, CMSC, MPI, bank regulators, insurance regulators and providers, LFIs, World Bank, key NGOs and private sector EE vendors and service providers, etc.

7.5 Develop an Industrial EE Benchmarking System

The current EE benchmarking for each industrial sector should be further developed and updated regularly. In addition, an annual consumption report needs to be designed for the relevant EE benchmarking methodology of each sector with a mandated submittal by each large industrial end-use energy consuming facility owner. This will allow EE benchmarking results to be shared among the enterprises to encourage their EE improvement. Such feedback reported by each enterprise could provide an enormous benefit, and a computer-generated brief report could be an option for implementation by GVN's energy data center.

This intervention is a priority because of the industrial sector being the largest EE savings opportunity in Vietnam, this intervention should be able to be implemented with relative ease since it will leverage and create benefit to the current industry EE benchmarking regulation and work.

7.6 Create/Deliver 'EE Product' Awareness and Promotion Programs

The creation and delivery of 'EE Product' awareness and promotion programs are needed to continuously promote the transformation of the EE market for:

- Household, industrial and commercial products, and energy efficiency labeling activities. The labeling and MEPS program should continue as it shows effectiveness in recent years. MOIT also considers participating in regional and other international harmonization of testing and certification of EE. This will have double effects in terms of EE equipment promotion as well as trade growth as a function under MOIT's responsibility.

- Industry on EE investment projects, EE technology, and energy management system and ISO 50001 should be developed. This can be done by regularly technical workshops for energy managers in facilities in the same sector, and

- Financial packages for EE and capable ESCOs/EESPs should be well introduced to the market. MOIT/GDE could consider the collaboration of this promotion program with industrial associations or provincial campaigns locally implemented by DOITs.

This intervention will create increased demand for EE products and should be able to be implemented with relative ease since it will leverage and create benefit to the current MEPS regulations.

7.7 Remove EE Regulatory Barriers for GAs

Since Decision 280 on VNEEP 3 sets a target on legalizing the ESCO model in Vietnam, and the GVN (through MOIT, MOF, MPI, etc.) is now working to solve barriers that require international experience and support, it is recommended to create an EE and ESCO market in GVN facilities by eliminating the inability of ESCOs and other private sector entities to implement paid-from-savings EEPs in government facilities. This intervention would create a legal framework (with concomitant procedures) for

ESCOs to implement paid-from-savings EE projects in governmental facilities which currently does not exist due to the below three existing barriers.

Since PPP regulation is not a viable solution, it is recommended to work with MOIT to enact New National ESCO Regulation that leverages the extensive previous LCEP work already completed by EPS Capital Corp to remove the 3 aforementioned regulatory barriers:

1) GAs not being able to commit to multi-year Savings Payments;

2) GAs not being able to retain Savings in Budgets, and

3) GAs being required to use 'lowest cost' Procurement Procedures

This intervention entails introducing new ESCO-related procedures to be inserted into VNEEP 3's plan that will then have to be enacted into regulation which may require separate approval by each affected governmental agency (i.e. procurement, budgeting, etc.). Although the potential positive long-term impact of this intervention on the EE market is the one of greatest of all interventions, it is listed near the end because of the required delay to wait for MOIT and VNEEP 3 to make it a priority in their plans.

7.8 Create a Robust ESCO Association

Form a new ESCO association that plays a key role in creating market credibility by bridging collaboration between key stakeholders including government, private companies, ESCOs, financial institutions, donor agencies, and academics to encourage the improvement of implemented energy efficiency projects' portfolio under the ESCO scheme. The new ESCO association will have to hire competent staff so that it becomes a platform for discussion, development of EEPs and ESCO policy in Vietnam. The support needed should also include the establishment of a certification program similar to the 2-step process in the Philippines where ESCOs are first registered and then 'certified' after successfully implementing a few ESPC EEPs.

This intervention logically should not be vigorously pursued until sufficient demand is created for EE and ESCO services, which may not occur until many of the above interventions have been implemented.

EXHIBIT A: MEASURES THAT REDUCE EMISSIONS AND ENERGY CONSUMPTION

Table 5. Measures that Reduce Emissions and Energy Consumption.

Solution	Execution time	2030 Targeted Savings
E1. Use of household high efficiency air conditioners	2015-2030	By 2030, high-efficiency air conditioners will increase from 15% in 2014 to 75% of all households using air conditioners in urban areas and similarly from 8% to 55% in rural areas. High efficiency air-conditioning and refrigeration capacity cost about 30% more, but can save 30% in power consumption.
E2. Use a high efficiency refrigerator	2015-2030	By 2030, high efficiency refrigerators will increase from 15% in 2014 to 80% of all households using refrigerators in urban areas and similarly from 10% to 65% in rural areas. A high efficiency refrigerator with equivalent capacity costs about 15% more, but can save 30% in energy consumption.
E3. Use lights to save electricity	2015-2030	By 2030, use of energy saving lighting (LED) will increase from 17% in 2014 to 70% of total lights in 2030 to replace incandescent lamps (or other similar traditional lamps).
E4. Use a solar water heater	2015-2030	By 2030, solar water heaters will increase from 1% in 2014 to 30% of all urban households and similarly from 0.3% to 5% in rural areas.

Solution	Execution time	2030 Targeted Savings
E5. Using biogas instead of coal for household cooking in rural areas	2015-2030	By 2030, biogas equipment will increase from 0.7% in 2014 to 5% of all rural households to replace coal for cooking.
E6. Optimize clinker burning cycle	2015-2030	By 2030, combustion cycle optimization measures will be applied to production of about 50% of clinker production.
E7. Using vertical crusher in cement production	2015-2030	By 2030, the method of using a vertical mill will be applied to produce about 50% of the cement output.
E8. Applying innovative technology in brick production	2015-2030	By 2030, innovative technology measures to replace traditional technology will be applied to the production of about 70% of traditional brick production.
E9. Spray anthracite coal powder into blast furnace	2020-2030	By 2030, the method of spraying powdered anthracite coal into blast furnaces is applied to produce about 50% of the iron output.
E10. Preheat scrap steel before putting into electric arc furnace (EAF)	2015-2030	By 2030, the measure of preheating scrap steel before being put into electric arc furnaces will be applied to produce about 80% of steel output using arc furnace technology.

Solution	Execution time	2030 Targeted Savings
E11. Heat in steel rolling machine	2015-2030	By 2030, the heating method in steel rolling machines will be applied to produce about 80% of steel production using electric arc furnace technology.
E12. Recover heat from oxygen blower (BOF)	2015-2030	By 2030, gas heat recovery from an oxygen blast furnace (BOF) is applied to produce about 65% of steel production using blast furnace technology.
E13. Limits on fuel consumption for new imported and assembled motor vehicles	2022-2030	By 2030, the measure to apply fuel consumption norm will achieve: 100% of motorcycles sold reach the norm of 2.3 liters / 100km; 100% of cars sold meet the following standards: small cars (<1400cc) reach 4.7 liters / 100km, average cars (1400-2000cc) reach 5.3 liters / 100km; large car (> 2000cc) reached 6.4 liters / 100km.
E14. Change the mode of passenger transportation from using private vehicles to using public transport	2015-2030	By 2030, the transformation of means of transport from private to public will achieve the following results: To develop bus systems in 05 centrally-run cities (Hanoi, Ho Chi Minh City, Hai Phong, Da Nang and Can Tho); Newly operating 04 public passenger transport routes BRT in Hanoi, Da Nang & Ho Chi Minh City; Newly operating 03 public passenger transport routes by urban railway in Hanoi and Ho Chi Minh City

Solution	Execution time	2030 Targeted Savings
E15. Shifting the transport mode from road to inland waterways and coastal roads	2015-2030	By 2030, the volume of goods transported by inland waterways will increase from 127.8 billion tons-km to 128.8 billion tons-km (up from 20.6% to 20.8% of the total volume); rate of road transport decreased from 23.4% to 23.0%; The volume of freight transported by land converted to sea is assumed to be equal to the volume of freight transported from road to inland waterway during the same period.
E16. Using electric motorcycle	2015-2030	Newly sold electric scooters account for 07% of the total number of new motorcycles sold in the market annually.
E17. Encourage the use of biofuel	2015-2030	Average annual ethanol production is 145,000 m^3 used to produce biofuel E5 serving in Transport.
E18. Encourage use of CNG buses	2015-2030	By 2030, the total number of CNG buses is 623 cars, including 423 cars in Ho Chi Minh City and 200 cars in Hanoi.
E19. Using high efficiency electrical equipment in commercial service	2015-2030	By 2030, when using high-efficiency equipment, electricity demand will decrease by about 15% compared to BAU (WB-MOIT, 2019).

Solution	Execution time	2030 Targeted Savings
E20. Small hydropower development	2015-2030	The capacity of small hydroelectric plants could reach 3,800 MW by 2020; 4,900 MW in 2025 and 5,500 MW in 2030 to replace coal-fired power plants.
E21. Solar power development	2019-2030	Increase capacity from 4,464 MW in 2019 to 5,000 MW by 2020 (and maintain until 2030) to replace coal-fired power plants.
E22. Wind power development	2015-2030	Increase capacity from 304.6 MW in 2019 to 1,010 MW by 2020 (and maintain until 2030) to replace coal-fired power plants.
E23. Play electricity development - incineration	2020-2030	70 MW of waste electricity will be installed in 2020 and 210 MW and 350 MW will be installed in 2025 and 2030 to replace coal-fired power plants.
E24. Use cleaner fuels for rural cooking	2015-2030	By 2030, the number of rural households using LPG increases from 30% (in BAU) to 50% to replace coal for cooking.
E25. Improve energy efficiency in sub-sectors of industry (except for 3 sub-sectors of manufacturing brick, cement and iron and steel)	2015-2030	By 2030, measures to improve energy efficiency in industrial sub-sectors (excluding 03 manufacturing sub-sectors (brick, cement and iron and steel) through improving the efficiency of boilers, electric motors and electrical appliances can save up to 6.5% of energy demand.

Solution	Execution time	2030 Targeted Savings
E26. Use an electric car	2021-2030	By 2030, the number of new electric cars sold accounts for 30% of the total sales of cars on the market.
E27. Increase the load factor of trucks	2021-2030	By 2030, the freight load factor will improve from 56% to 60%
E28. Mode of transport from road to railway	2015-2030	By 2030, freight transport by railway will increase to 12.5% annually.
E29. Development of biomass thermal power	2015-2030	110 MW of biomass thermal power will be installed in 2020, 550 MW and 1,250 MW will be installed in 2025 and 2030 to replace coal-fired power plants.
E30. Development of electricity waste - landfill	2020-2030	10 MW of landfill power will be installed in 2020 and 30 MW and 50 MW will be installed in 2025 and 2030 to replace coal-fired power plants.
E31. Development of biogas electricity	2020-2030	10 MW of biogas power will be installed in 2020 and 30 MW will be installed by 2030 to replace coal-fired power plants.
E32. Development of supercritical thermal power technology	2015-2030	2,400 MW of supercritical thermal power will be installed in 2020, 10,800 MW and 27,600 MW will be installed in 2025 and 2030 to replace coal-fired power plants.

Solution	Execution time	2030 Targeted Savings
E33. Development of mixed gas turbines using LNG	2015-2030	LNG mixed gas turbines installed with 750 MW capacity in 2021, 3,000 MW and 12,750 MW will be installed in 2025 and 2030 to replace coal-fired power plants.
E16s. Using electric motorcycle	2015-2030	By 2030, electric motorbikes sold will account for 14% of the total number of new motorcycles sold in the market every year
E17s. Encourage the use of biofuel	2019-2030	E5 accounts for 40% of total gasoline sold; assuming no supply restrictions.
E21s. Solar power development	2021-2030	Increase capacity (increase from E21) to reach 9,500 MW in 2025 and 16,500 MW by 2030 to replace coal-fired power plants.
E22s. Wind power development	2021-2030	Capacity increase (increase compared to E22) to reach 3,500 MW in 2025 and 8,400 MW by 2030 to replace coal-fired power plants.

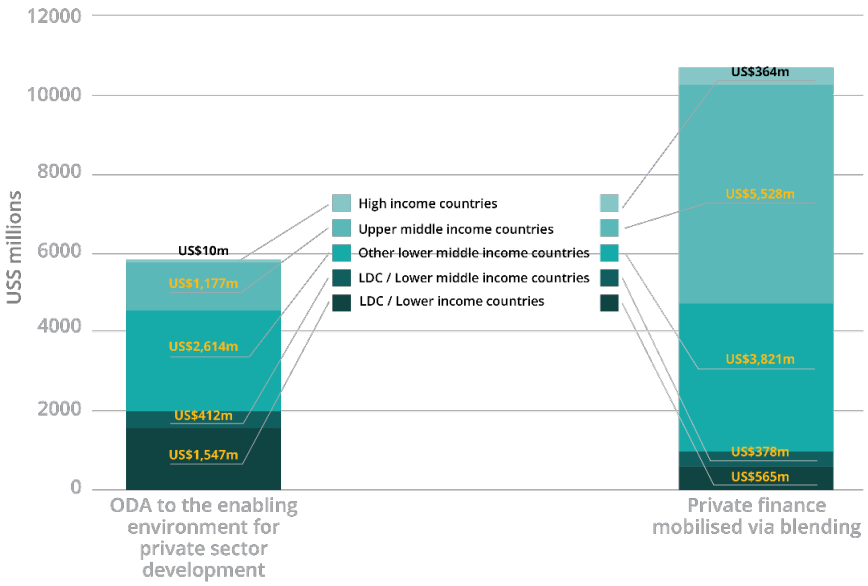
EXHIBIT B: OFFICIAL DEVELOPMENT ASSISTANCE (ODA) SOURCES

To develop a favorable EE environment, Vietnam needs financial development resources funding sources provided under Official Development Assistance (ODA). It is estimated that from 1993-2018 ODA provided USD 80 billion of funding for the development of favorable environmental programs and projects in Vietnam. These ODA sources are mainly used to finance institutional and policy reform development projects (employment reform, legal and regulatory reform, trade policy and

facilitation, etc.). ODAs have made a significant positive contribution to the socio-economic promotion, improving the quality of infrastructure, and ensuring social security, especially in remote and mountainous areas. They also promote technology transfer, absorbing science and technology, advanced management experience and creation of jobs.

Viet Nam was the eighth country to receive the most ODAs. The 25% of ODAs capital is for energy and industry equal to about 19.8 billion USD. However, ODA funding represents only a fraction of the potential for private funding. As a lower-middle country, Vietnam could receive significant additional financing as indicated in Figure 13[18].

Figure 13. Comparison of ODA Financing to Private Sector



Funds and banks represent essential sources of funding (in the form of loans, grants, and technical assistance) that can support Viet Nam's business sector in mainstreaming and implementing the National Energy Efficiency Program for both energy and climate change. Agencies representing potential sources of such funding are listed below followed by a brief overview of each.

[18] Ibid.

Multilateral Climate Funds	Development banks and equivalent	Regional funds and facilities
• *The Global Environment Facility (GEF)* • *The Special Climate Change Fund (SCCF)* • *The Climate Investment Fund (CIF)* • *The Green Climate Fund (GCF)*	• *ADB* • *AIIB* • *IFC* • JICA • *DEG* • *World Bank* • *EIB* • *Proparco* • GIZ	• *OPEC Fund for International Development (OFID)* • Leading Asia's Private Infrastructure Fund (LEAP) • *China-ASEAN Investment Cooperation Fund (CAF)*

a. The Global Environment Facility (GEF)

The GEF was established in 1992 on the eve of the Rio Earth Summit to help member countries finance their environmental projects, either through grants or financial catalysts. It is the financial mechanism of the three Rio conventions including the UNFCCC.

Since its creation, the GEF has funded more than USD21.1 billion in grants and mobilized an additional USD114 billion in co-financing for over 5,000 projects in 170 countries[19]. It has notably participated in the sustainable management of more than 352 million hectares of productive landscapes and seascapes, as well as in reducing the climate vulnerability of more than 15 million people in 130 countries.[20]

This multi-donor funding facility aims to long-term financing of national and regional activities by implementing partnerships with international institutions, CSOs and the private sector. It supports the position that the global significance of developing countries' eco-regions and their ecosystem services was, is, and will be the rationale for transfers between the international community and those responsible for maintaining ecological and cultural integrity.

The GEF work focuses on six main areas: Biodiversity, Chemicals and Waste, Climate Change, Forests, International Waters, Land Degradation. In the Climate Change

[19] http://www.thegef.org/about-us
[20] http://www.thegef.org/about-us

area, the GEF works both on mitigation and adaptation. Indeed, according to the GEF8 Programming Directions report (2021), "The focus must now be on scaled up and coherent implementation of climate mitigation action that minimizes trade-offs and risks, and maximizes synergies with other government priorities, including post-pandemic recovery measures, and benefits for the people and the planet".

Since the publication of the GEF-6 program, private sector engagement in Climate Change has become even more important for the GEF in its programs that include:

- Climate Change Mitigation: efforts to engage the private sector are focused on performance-based instruments, risk reduction for clean energy and smart grid applications, as well as sustainability of supply chain and access to energy for all.

- Climate Change Adaptation: opportunities include supporting technologies and business models for the adoption of climate/weather services and drought tolerant techniques and crops. Working with agencies and developers to improve land-use planning could also be considered.

Furthermore, the GEF funded a project in 2018 (GEF-6 period) to establish and mobilize resources for the Climate Resilience and Adaptation Finance Technology Transfer Facility (CRAFT)[21]. This project aimed to **set up the first private sector climate resilience and adaptation investment fund and technical assistance facility for developing countries**, in line with the goals of the Paris Agreement[22]. The total cost of the project was USD 2 million, including USD 1 million from the GEF in grants and USD 1.4 million co-financed.

In general, without considering the GEF-6 program, the fund has set five intervention areas to promote private sector engagement:

- Transform policy and regulatory environments (including feed-in tariffs for renewable energy, incentives that guarantee markets for new approaches and encourage long-term investments).

[21] https://www.thegef.org/project/structuring-and-launching-craft-first-private-sector-climate-resilience-adaptation-fund
[22] Ibid

- Develop innovative financial instruments (including demonstrations and incremental financing for low-emission, climate-resilient investments, enabling private sector investment to flourish).
- Help multi-stakeholder alliances to develop, harmonise and implement sustainable practices.
- Strengthen institutional capacity and decision-making to enhance information, participation and accountability in public and private decisions.
- Demonstrate innovative approaches, including the validation of a technology, policy measure or approach to tackling environmental degradation that could lead to wider adoption[23].

The GEF also promotes private sector engagement through innovative financing models, with the Non-Grant Instrument Program. The fund has launched a USD 136 million program that offers attractive financial terms exclusively to the private sector:

- Flexible concessional interest rate.
- Minimum level of concession to avoid displacing other finance.
- First-loss position if justified.
- Maximum maturity of 20 years.
- Flexible exit date for equity investments.[24]

These resources and benefits can only be used for projects that provide global environmental benefits in at least one of the GEF work areas, listed above. However, there is a funding gap for such projects, which is set at USD 15 million.

The project is more likely to obtain funding if it: (i) demonstrates innovative application of financial mechanisms, business models, partnerships and approaches that may be broadly adopted and can be scaled up; (ii) entails high levels of co-

[23] https://www.thegef.org/topics/private-sector
[24] https://www.thegef.org/topics/non-grant-instruments

financing and focuses on areas other than climate change.[25] As of 7-Sept 2021, the total GEF fund balance was USD 5.5 billion.

b. The Special Climate Change Fund (SCCF)

The GEF also administers, among others, the SCCF which was established under the UNFCCC in the 2021 Convention at the COP-7 and began operating in 2006[26]. The SCCF aims at supporting adaptation and transferring of climate-resilient technologies in all vulnerable developing countries.

It is a complementary entity to the Least Develop Countries Fund, which focuses solely on these group of countries. In addition to adaptation and the technology transfer areas, the SCCF also supports projects in the areas of energy, transport, industry, agriculture, forestry and waste management, as well as activities dedicated to economic diversification.

Table 6. Key Distinctions between GEF Trust Fund and SCCF[27]

	GEF	SCCF
Projects must generate global benefits	Yes	No*
Projects must generate adaptation benefits	No	Yes*
Funding allocated according to Resource Allocation Framework or STAR	Yes	No
Projects financed according to the "incremental cost" principle	Yes	No*

*Technology Transfer for Mitigation projects are excluded

[25] https://www.thegef.org/topics/non-grant-instruments
[26] IBID
[27] Source spécifiée non valide

With regards to project eligibility, the SCCF only finances activities, programs and measures that are related to climate change and complementary to the resources allocated by the GEF within its climate change working area. Furthermore, the project or program must be country-driven, cost-effective and aligned with national poverty reduction and sustainable development strategies, as well as the country's national communication or NAPAs (National Adaptation Programs of Action). Therefore, there is no specific restriction on the project size but it must focus on the "additional costs" caused by climate change in addition to basic development needs. The project application and project cycle for the SCCF are similar to that of the GEF Trust Fund[28] but some key distinctions on project characteristics can be noted, as illustrated in Table above Key distinctions between GEF Trust Fund and SCCF.

As of 7-Sept 2021, the total SCCF fund balance was about USD 58 million.

c. The Climate Investment Fund (CIF)

The CIF was established in 2008 by the World Bank to enable developing and middle-income countries to urgently address the impacts of climate change and achieve their Sustainable Development Goals **(SDGs)**. It is implemented by five Development Banks including the Inter-American Development Bank and the World Bank and is funded by a group of fourteen donors for a total of USD 8.5 billion as of November 2021. Furthermore, this pledge is expected to attract an additional USD 58 billion in co-financing for over 300 projects in 72 countries. The CIF has been investing in the private sector since 2009. Indeed, USD 2.3 billion have been allocated to private sector projects. Of all the other funds, the CIF has funded the most private sector projects in clean technology, climate resilience, sustainable forestry, and energy access programs in CIF countries[29].

The CIF provides technical advice to the private sector as well as various financial instruments such as equity, loans, guarantees, and local currency hedging to enable the private sector to engage more quickly and on a larger scale in the energy transition. The Fund helps to reduce the barriers to investment faced by businesses and reduce the risk associated with new low-carbon projects. These investments

[28] For more details about the SCCF project cycle: http://adaptasiapacific.org/sites/default/files/documents/SCCF_access_guide.pdf
[29] PRIVATE SECTOR | Climate Investment Funds

worldwide are expected to leverage over USD 18 billion in private sector co-financing[30].

CIF funds dedicated to the private sector are allocated through two different groups of programs, namely the Dedicated Private Sector programs and the Private Sector Set-Asides program. Development projects are listed in national or regional investment plans.

The Dedicated Private Sector Programs: (DPSD)

Created in 2013, these programs are funding windows of the CIF and aim to finance large-scale, high impact private sector projects in clean technologies, including "geothermal power, mini-grids, energy efficiency, and solar PV".[31] Their objective is to provide companies with risk-appropriate capital. These programs are used as a platform for the CIF and Multilateral Development Banks (MDBs) to work together and identify investment opportunities that could be deployed efficiently, quickly and in large quantities in CIF target countries. These programs support 22 projects representing more than USD 420 million in investment. They include for instance utility-scale solar energy in Honduras, energy efficiency in Mexico as well as geothermal in Turkey[32].

Private Sector Set-Asides (PSSAs)

The Private Sector Set-Asides assign concessional financing to private sector projects dedicated to forestry, climate resilience and to renewable energy with the objective of providing energy access in low-income countries. PSSAs aim to promote innovation and to allow flexible delivery of financing. The allocations provided amount to USD 106 million divided across 13 projects, including for instance a climate-smart hydropower plant in Tajikistan and water-efficient housing in Jamaica[33].

To be eligible for PSSAs, the project must be active in countries with an approved investment plan and must be implemented by private sector clients working through the private sector arms of the MDBs or by public sector entities working through the

[30] PRIVATE SECTOR | Climate Investment Funds
[31] Dedicated Private Sector Programs | Climate Investment Funds
[32] Ibid.
[33] Ibid.

MDB public sector arms (so as to achieve, indirectly, an increase in private sector investment)[34].

Although Vietnamese private sector actors have not benefited from the DPSD and PSSA programs yet, the GVN has received almost USD 135 million from the CIF, more precisely from the Clean Technology Fund. It included USD 50 million for the "Ha Noi Sustainable Urban Transport Program - Project 1: Ha Noi Metro System Line 3 project", USD 48.95 million for the same Transport Program – Project 2, and USD 30 million for the "Distribution Efficiency Project".

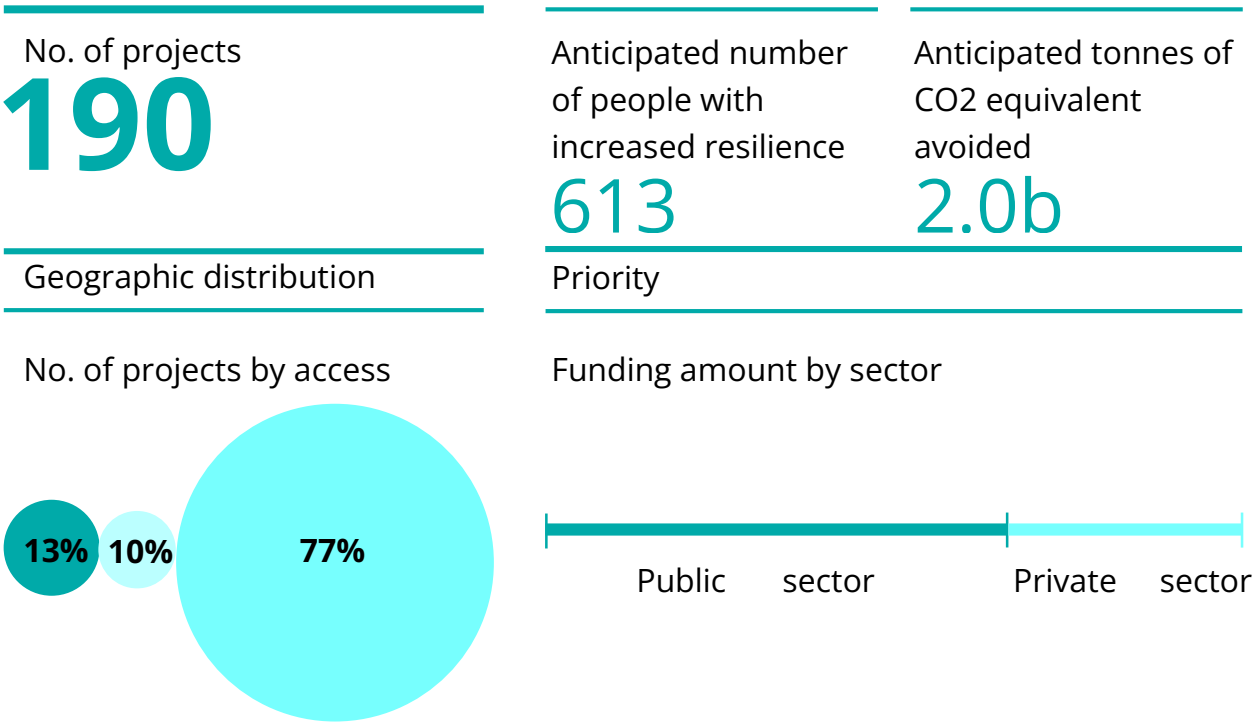
d. The Green Climate Fund (GCF)

The GCF is a financial mechanism of the UNFCCC established at the COP-16 in Mexico in 2010[35] to support developing countries in their response to the negative impacts of climate change. The GCF emphasizes a balanced portfolio by ensuring an equal split between mitigation and adaptation investments and by allocating 50% of adaptation investments to the most vulnerable countries which are the LDCs, the SIDS and African states[36]. The GCF has two strategic pillars: promoting the paradigm shift towards low-emission and climate-resilient development pathways and supporting the implementation of the Paris Agreement through climate finance.

The GCF seeks to engage public and private sectors in high-impact climate investments. Since the approval of the first project funding in 2015, GCF has made rapid progress in building a portfolio of over 100 projects with the public sector and 35 with the private sector, which represents a total funding of USD 3 billion.

[34] https://www.climateinvestmentfunds.org/sites/cif_enc/files/meeting-documents/ctf-scf-13_inf_5_rev_1_a_review_of_the_private_sector_set_aside_scf_nocrossref_12_16_2014_0.pdf
[35] http://www.greenclimate.fund/who-we-are/about-the-fund
[36] http://www.greenclimate.fund/who-we-are/about-the-fund

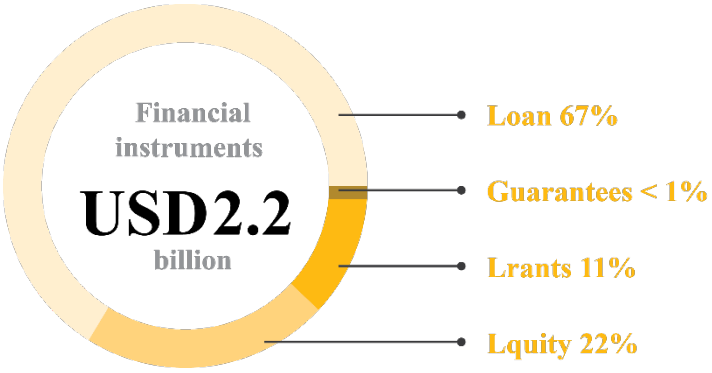
Figure 14. GCF Portfolio Dashboard as of GCF[37]



The Fund provides different flexible financial instruments that allow to respond to specific financial contexts and overcome conventional market barriers. The Fund acts to reduce financial risks by directing and securing private sector financial flows into low-emission and climate-resilient investments. To this end, the GCF has created the Private Sector Facility (PSF). This division finances and mobilizes the different types of private sector actors such as project sponsors, institutional investors, and financial institutions.

[37] Portfolio dashboard | Green Climate Fund

Figure 15. The Private Sector Project Map, 2019[38]



The PSF supports and promotes private sector investment through a number of concessional instruments. These include for instance "low-interest and long-tenor project loans, lines of credit to banks and other financial institutions, equity investments and risk mitigators, such as guarantees, first-loss protection, and grant-based capacity-building programs"[39]. To sort out these instruments, the PSF has defined different practices:

- **Financial Institutions**: enabling climate change considerations to be mainstreamed into the financial system.
- **Project Finance:** concessional finance to de-risk infrastructure projects targeting climate change.
- **Climate Funds:** sorting anchor investments into dedicated climate funds (equity/debt).
- Structured Finance: developing capital/carbon markets requiring tailored structuring solutions.
- **Climate Innovations:** scaling investments into high-impact climate innovations and technologies.

The application for funding is made through a phased process. A concept note is first developed which allows accredited entities (AEs) to ask the GCF Secretariat whether

[38] Green Climate Fund's Private Sector Facility
[39] https://www.greenclimate.fund/sectors/private

their proposal matches the objectives and mandate of the Fund. The second phase is the submission of the funding proposal to the GCF by the AE. An AE can submit a financial proposal to the GCF Board in response to a call for proposal or on its own initiative. The consultation of the proposal then follows a six steps process, detailed in the Figure 17 GCF Proposal Approval 3 below[40]. An AE carrying the project must specify the following elements:

- Financial adequacy and appropriateness of concessionally: each project must demonstrate that the proposed financial structure (amount of funding, financial instrument, tenor and duration) is adequate and reasonable, and that the structure provides appropriate concessionally.
- Amount of co-financing: the co-financing ratio (total amount of the GCF investment as a percentage of the project) must be indicated and detailed.
- Financial sustainability and other financial indicators: each project should also specify the economic rate of return (with and without project) and the financial rate of return (with and without GCF support).

Figure 16. GCF Proposal Approval[41]

[40] For more details about the approval process: http://www.greenclimate.fund/how-we-work/funding-projects

[41] http://www.greenclimate.fund/-/elements-01

Viet Nam has enjoyed a preferential accreditation with the GCF since July 2021. Indeed, the Viet Nam Development Bank is registered as a Direct access Accredited Entity. This AED status allows for a better access to funding compared to that of AE.

Although private sector actors from Viet Nam have never received GCF financing, the GVN has already benefited from the GCF for two projects. Firstly, a mitigation project was launched in 2018: "Scaling Up Energy Efficiency for Industrial Enterprises in Viet Nam". The GFC financed 17.4% of the project, which amounted to USD 11.3 million in grants and USD 75 million in guarantee[42]. Secondly, the project "Strengthening the resilience of smallholder agriculture to climate change-induced water insecurity in the Central Highlands and South-Central Coast regions of Viet Nam" was launched in 2020. The total project was USD 156.3 million including USD 30 million in grants of GCF funding and USD 126 million from co-financing partners[43].

e. Asian Development Bank (ADB)[44]

The Asian Development Bank is a regional development bank which aims to support the socio-economic development of Asia. Established in 1966, the bank now counts 68 members, 49 of whom are from Asia and the Pacific. ADB, backed by its AAA credit rating, focuses on projects that help promote private investments that will have significant development impact and will lead to accelerated, sustainable, and inclusive growth. ADB provides non-sovereign operations to eligible private-sector recipients in developing member countries, including the provision of loans, guarantees, equity investments or other financing arrangements. Recipients may be private state-owned sub-sovereign entities with or without government guarantee.

In 2020, the total outstanding balances and commitments of non-sovereign transactions funded by the ADB's own resource amounted to USD 14.3 billion. Moreover, ADB offers to mobilize co-financing from commercial and concessional sources. In 2020, ADB mobilized USD 1.9 billion of long-term project co-financing and USD 3.3 billion of co-financing through its Trade and Supply Chain Finance Program and Microfinance Program. ADB's Trade and Supply Chain Finance Program and Microfinance Program offers guarantees and loans to banks in order to support trade.

[42] https://www.greenclimate.fund/project/fp071
[43] https://www.greenclimate.fund/project/fp125
[44] https://www.adb.org/

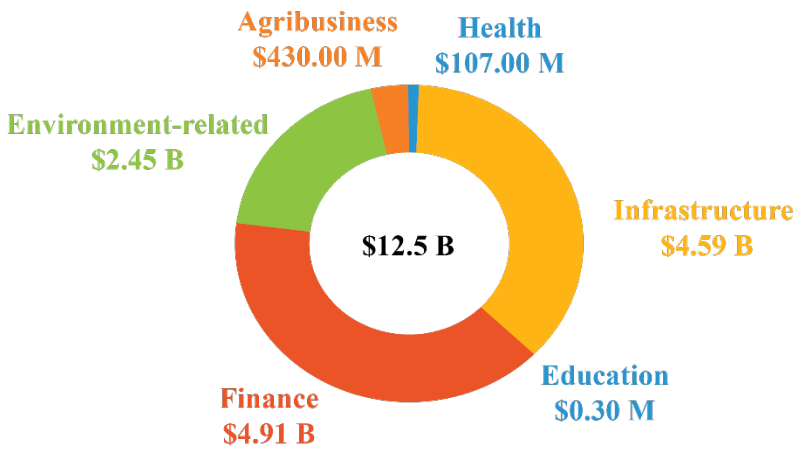
In addition to financial products, ADB also provides technical assistance (TA) for public and private entities on a selective basis. This assistance can be composed of Transaction TA (TRTA) aiming to directly benefit a project or develop public-private partnership. TA also includes Knowledge and Support TA (KSTA) including all TAs other than TRTA, such as policy advice, research development and general institutional capacity building.

For private funding, ADB has five core sectors:

- Infrastructure sector
- Financial sector and capital market
- Agribusiness sector
- Health and education
- Business development

The following figure highlights the amount given to each sector:

Figure 17. ADB's Private Sector Operations Portfolio, by Sector[45]



[45] https://www.adb.org/what-we-do/private-sector-financing/projects

The ADB project cycle is composed of the six following steps:

Figure 18. ADB's Project Cycle[46]

1. Preliminary Review

The transaction team prepares a preliminary concept review form (CRF) for PSOD management approval.

2. Concept Review

The transaction team presents the concept review package to the Concept Review Committee for clearance.

3. Transaction Review

The transaction team conduct due diligence to evaluate the key risk aspects of the proposed transaction.

4. Final Review

The transaction team prepares the documentation package to be presented to the Investment Committee for endorsement.

5. Management or Board approval

Following endorsement from the Investment Committee, the proposed ADB assistance is presented to the Management or to the Board of Directors for approval.

6. Closing

Following the Management or Board approval, the documentation for the transaction is finalized and signed.

[46] https://www.adb.org/what-we-do/private-sector-financing/project-approval-process

To support a private project, ADB does not provide a standardized form. However, the following information are typically required to obtain funding:

1. Executive summary
2. Project description
3. Feasibility study
4. Background on sponsor(s)
5. Project ownership structure
6. Project's implementation arrangements
7. Project operations
8. The market
9. Environmental and social aspects
10. Cost estimates
11. Financing plan
12. Financial model
13. Risk analysis
14. Permits and licenses

Regarding private sector development, ADB is very active in Viet Nam. In 2020, commitments from ADB's own funds amounted to USD 75.2 million. ADB provided support to a private equity fund, a water treatment expansion project, a pharmaceutical project and two renewable energy projects. The total balances and commitments of ADB's non-sovereign transactions in the country as at 31 December 2020 stood at USD 1 billion, or 7% of ADB's total non-sovereign portfolio.

f. Asian Infrastructure Investment Bank (AIIB)[47]

Created in 2016, the Asian Infrastructure Investment Bank (AIIB) is a multilateral development bank focused on economic and social development in Asia. The bank is composed of 87 members including Viet Nam and 16 prospective members. The AIIB offers financing and equity investments, backed or not by sovereign states.

AIIB offers financial support to private enterprises or sub-sovereign entities such as political or administrative subdivisions of a public sector entity. To obtain financing, entities must operate in the territory of a member, be compliant with the environmental and social standards of both AIIB and the host country. The project must also demonstrate potential economic benefits. AIIB usually responds to a project financing application within 30 working days.

AIIB finances, but is not limited to, six strategic priority sectors:

- Sustainable Energy for Asia Strategy.
- Strategy for Mobilizing Private Capital for Infrastructure.
- Strategy on Financing Operations in Non-regional Members.
- Strategy on Investing in Equity.
- Transport Sector Strategy.
- Sustainable Cities Strategy.

Viet Nam's private sector has already received financing from the AIIB. Indeed, in 2020, the bank approved the project "VP Bank COVID-19 Response Facility" for a total non-sovereign funding of USD 100 million.

g. International Finance Corporation (IFC)[48]

Founded in 1956, the International Finance Corporation is the largest global development institution focused on the private sector and operates in more than 100 countries. IFC provides investment, advice, and asset management services and received credit ratings of AAA. IFC provides multiple financial instruments such as

[47] https://www.aiib.org/en/index.html
[48] https://www.ifc.org/wps/wcm/connect/corp_ext_content/ifc_external_corporate_site/home

loans, equity and blended finance. In 2011, the IFC made USD 600 million in grants to IDA countries which include Viet Nam. In 2018, long term investment in the East-Asia and Pacific region reached USD 3.4 billion including USD 1.4 billion in funds from co-financing investors. Priorities areas in this region are: increasing opportunities for women, financial inclusion, reducing carbon footprint and global integration.

To be eligible for IFC funding, a project must meet a number of criteria. The project must:

- Be located in a developing country that is a member of IFC;
- Emanate from the private sector;
- Be technically sound;
- Have good prospects of being profitable;
- Benefit the local economy; and
- Be environmentally and socially sound, satisfying the IFC's environmental and social standards as well as those of the host country

Then, IFC identifies suitable projects and conducts an early review, a project appraisal and an investment review before starting the negotiations.

h. IFC operates in Vietnam mainly through the Vietnam's Improvement Program (VIP) which was created in 2015 and aim to provide funding to enterprises to develop factory projects. 28 enterprises were selected to receive support in order to improve their resource efficiency and reduce operating costs[49]. **Japan International Cooperation Agency (JICA)**

The Japan International Cooperation Agency is a governmental agency that provides Official Development Assistance for the government of Japan. JICA supports private sector and focuses on the following fields:

1. Developing policies and institutions for improving the business environment;
2. Promoting trade and investment;

[49] https://pressroom.ifc.org/all/pages/PressDetail.aspx?ID=17452

3. Improving the competitiveness of local companies; and

4. Promoting local economies and industries.

JICA offers various cooperation schemes including technical cooperation which is practical assistance to developing countries, ODA grants and ODA loans. To strengthen the development of the private sector, JICA implemented the Private-Sector Investment Finance (PSIF) which aims to provide loans and equity to private enterprises around the world with high development outcomes.

In 2002, JICA introduced a Partnership Program in Viet Nam to support the implementation of projects formulated by Japanese NGOs, Japanese local governments, and Japanese universities to utilize their accumulated knowledge and experience in assistance activities for developing countries.

Since 2002, JICA has implemented 123 projects in Viet Nam. As of May 2021, JICA supports 61 projects in Viet Nam including 28 projects by providing technical cooperation, 28 projects by offering loans and 5 projects by giving grant aid[50]. In the country, JICA has three priority areas:

1. Economic growth and strengthening international competitiveness

2. Response to fragility

3. Good governance

JICA has already supported the Vietnamese private sector through multiple projects including the Policy advisor on SME development, the Reinforcement of the SME Technical Assistance Centre (TAC) and the Project for Strengthening Public Functions for Supporting Small and Medium Enterprises.[51]

i. Deutsche Investitions und Entwicklungsgesellschaft (DEG)[52]

Formed in 1948, KFW is a German state-owned investment and development bank, based in Frankfurt. The headquarters are in Frankfurt, and they have two branches in Berlin and Bonn. It is the world's largest development bank. It is represented at

[50] https://www.jica.go.jp/Viet Nam/english/activities/c8h0vm0000anjq56-att/ongoing_en.pdf
[51] https://www.jica.go.jp/Viet Nam/english/office/others/c8h0vm0000cydg8v-att/sector_01_03_en.pdf
[52] https://www.deginvest.de/International-financing/DEG/

around 80 locations worldwide. It aims to improve economic, social and environmental living conditions. The bank offers bonds, equity investments and loans. In 2020, the bank provided a total of EUR 135.3 billion.

The branch providing private sector funding operating in developing markets is the Deutsche Investitions und Entwicklungsgesellschaft (DEG). DEG is one of the major development finance institutions for private companies, it provides financing to:

- Companies from the industry, agriculture and services sector;
- Private infrastructure companies in the energy, transport, utilities and telecommunications sectors;
- Financial institutions and private equity funds that provide reliable access to debt and equity financing, particularly to small and medium-sized enterprises on the ground.

DEG currently finances 700 companies around the world with approximately EUR 8.5 billion. They help the private sector to open up new markets, develop and compete successfully. In Viet Nam, DEG has financed the following 9 projects for a total of USD 168.3:

- USD 10 million long term senior secured loan for Anova Feed Joint Stock Company to strengthen the balance sheet structure.
- USD 30 million to the Ho Chi Minh City Development Joint Stock Commercial Bank to grow the bank and expand financing to SME customers.
- USD 30 million for the Viet Nam Prosperity Joint Stock Commercial Bank used for eligible climate-related projects.
- USD 25 million to Thanh Enova Cong Bien Hoa Joint Stock Company to re-finance the Company's short-term loans.
- USD 8.3 million to Tam Tri Medical JSC (TTMed) to support the expansion of the company.
- USD 20 million for the An Binh Commercial Joint Stock Bank (ABBANK) for on-lending to Vietnamese SME.

- USD 15 million to Kinh Bac Office and Factory Business one Member Company Limited to indirectly support Viet Nam attracting foreign direct investments.
- USD 10 million to FEM to expand business operations and increase the medical service reach.
- USD 20 million for Anova Feed Joint Stock Company to support the construction of two new production facilities.

j. World Bank[53]

The World Bank (World Bank) was founded in 1944 and is one of the world's largest development banks. With 189 member countries and offices in more than 130 locations, the WBG works in partnership with governments, the private sector, CSOs, regional development banks and other international institutions to reduce poverty and promote sustainable development. By 2030, the Group has set two global objectives: End extreme poverty by decreasing the percentage of people living on less than D1.90 a day to no more than 3% and promote shared prosperity by fostering the income growth of the bottom 40% for every country[54]. To do so, the WBG provides financial, institutional and technical support with low interest loans and credits and also grants to developing countries. In 2015, the Group made 302 commitments for a total of USD 60 billion.

The World Bank is composed of five institutions:

- The International Bank for Reconstruction and Development (IBRD);
- The International Development Association (IDA);
- The International Finance Corporation (IFC);
- The Multilateral Investment Guarantee Agency (MIGA) and
- The International Centre for Settlement of Investment Disputes (ICSID).

IBRD and IDA form what is commonly referred as the World Bank and provide financing, institutional and technical assistance to governments; while IBRD mainly

[53] (http://www.worldbank.org/)
[54] (http://www.worldbank.org/en/about/what-we-do)

focuses on middle income and solvable poor countries, IDA assists mainly the world's poorest countries. On the other hand, IFC, MIGA and ICSID focus on strengthening the private sector in developing countries.

In terms of private sector development, the World Bank works on four main focus areas:

- Creating markets and matching opportunities
- Building new markets for companies
- Promoting investment opportunities for investors and financial institutions
- Building relationships to advance common goals

As of March 22, 2021, the Bank has provided USD 24.94 billion in grants, credits, and concessional loans to Viet Nam through 209 operations. The current Country Partnership Framework for Viet Nam has four main objectives:

- Enable inclusive growth and private sector participation
- Invest in people and knowledge
- Ensure environmental sustainability and resilience
- Promote good governance

The CPF will introduce a strategic shift in the private sector by creating a comprehensive engagement to strengthen private sector development and participation across sector.[55]

k. European Investment Bank (EIB)[56]

The EIB is the European Union (EU)'s lending arm, through its European Investment Fund (EIF) and one of the largest providers of climate finance in the world. Its mission is to play a leading role among financial institutions in supporting the financing needed, both inside and outside the EU, to meet global commitments to limit global warming to 1.5℃. It aims to increase the capacity to adapt to the adverse effects of

[55] https://www.worldbank.org/en/country/Viet Nam/overview#2
[56] https://www.eib.org/en/

climate change and enable the EU to become carbon neutral by 2050, through climate finance.

EIB provides loans, equity, guarantees and advisory services to the private sector. EIB loans for the private sector have five key benefits: i) attractive pricing thanks to EIB's funding conditions, ii) long financing term to match the economic life of each project up to 10 years, iii) customized financing by providing secured or unsecured loans, iv) project support by offering financial and v) technical expertise to prepare the project and signaling effect by attracting additional investors.

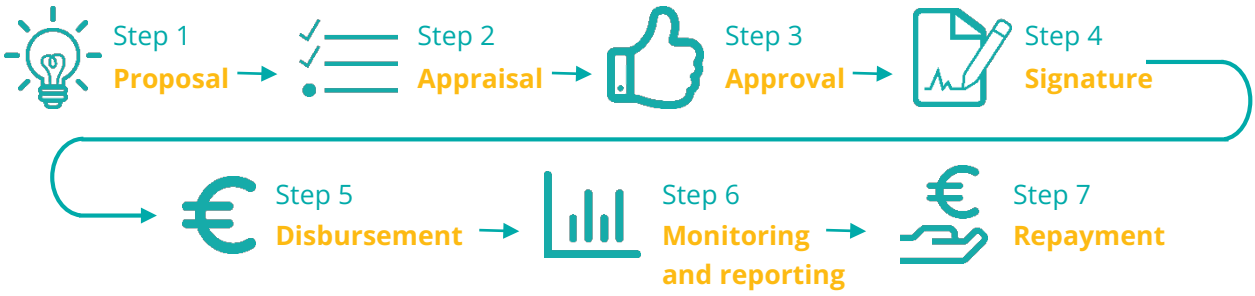
The EIB typically lends up to 50% of a project's total cost, typically starting at €25 million but in certain cases the EIB will consider lower amounts. EIB offers four financing options:

- Corporate loans
- Growth finance for mid-caps
- Project finance loans
- Corporate hybrid debt

These financial instruments are focused on four main areas: innovation and skills, small businesses, infrastructure, climate and environment.

A project financed by EIB typically goes through seven following major stages:

Figure 19. EIB's Project Cycle[57]



[57] https://www.eib.org/en/projects/cycle/index.htm

EIB has already offered support to the private sector in Viet Nam in the past. Indeed, in 2005, EIB provided a EUR 30 million loan to the Socialist Republic of Viet Nam to support investment by local companies, particularly SME investments undertaken by EU-owned companies, joint ventures or investments in which mutual interest is significant.

Furthermore, to promote investments in Asia, the EIB created the Asia Investment Facility **(AIF)** to mobilize loans and other support for those projects that struggle to raise the required funding on the market. The AIF has five priority sectors:

1. Energy
2. Water
3. Environment
4. Transport
5. Private sector development

Since its creation in 2010, the AIF has financed 39 projects, allocating EUR 241 million in grant resources and mobilizing in total EUR 5.6 billion. Between 2010 and 2018, Viet Nam received 13% of AIF financing for 6 projects representing EUR 31 million. Over the same period, the private sector received 10% of total AIF funding[58].

l. Proparco[59]

Created in 1977, Proparco is the private sector financing arm of Agence Française de Développement Group **(AFD)**, a public establishment that implements France's development and international solidarity policies. Proparco provides funding to business and financial institutions for developing countries. It focuses on four main sectors:

1. Infrastructure, mainly for renewable energies,
2. Agribusiness,

[58] https://ec.europa.eu/international-partnerships/system/files/ifca-aif-ifp-2017-18_en.pdf
[59] https://www.proparco.fr/en

3. Financial institutions,

4. Health and education

In order to contribute to the achievement of SDGs, Proparco finances companies contributing to creating jobs and providing essential goods and services and combating climate change.

Proparco provides a multi sectoral and geographical expertise and has the capacity to structure complex projects and offers risk management. In addition, the entity has an international network of clients and partners.

As of 2020, Proparco operates in 115 countries and has provided EUR 6.4 billion of financing. In Asia, Proparco financed at total EUR 802 million as of 2016. In 2020, an additional 2 billion of new operations was approved, mainly in loans, including EUR 433 million dedicated to Asia.

Proparco offers a wide range of financial instruments that include:

- Loans
- Equity
- Quasi-equity
- Investment funds
- Guarantees
- Technical assistance
- Delegated funds
- Concessional financing

Proparco has financed the following six private sector projects in Viet Nam[60]:

1. In 2015, EUR 13 million to Quadria Capital Fund to develop the hospital and pharmaceutical sectors in South and Southeast Asia.

2. In 2017, EUR 15 million to Manuchar to develop logistics and manufacturing infrastructures in Brazil and Viet Nam.

3. In 2019, EUR 18 million to Quadria Capital Fund II to develop the hospital and pharmaceutical sectors in South and Southeast Asia.

4. In 2020, USD 15 million in the Mekong Enterprise Fund IV, Proparco to support SMEs and midcap companies operating in the health, education and financial inclusion sectors.

5. In 2020, USD 50 million to VPBank in order to finance green and energy efficiency projects and supporting SMEs.

6. In 2020, EUR 4.3 million to help ETG, an agricultural company operating mainly in Africa and Asia to optimize its financing structure by increasing short-term credit lines.

Proparco also operates via investment funds in order to fund the private sector. Investment funds allow Proparco to finance actors that they could not directly support such as microenterprises, SMEs and start-ups. One of investment fund's added value is to offer business support to companies in their portfolio such as providing strategic advice, environmental and social policy and a network of financial partner.

m. GIZ (Gesellschaft für Internationale Zusammenarbeit)[61]

GIZ is the German development agency which provides services in the field of international cooperation for sustainable development and international education work. It has been particularly involved in projects supporting the implementation of the Paris Agreement and related NDCs, throughout the world. In 2019, GIZ generated a business volume of around EUR 3.1 billion.

[60] https://www.proparco.fr/en/page-region-pays/asia
[61] https://www.giz.de/en/html/index.html

The priority areas of GIZ's work are:

- Vocational training
- Energy and climate
- Health care
- Infrastructure / construction
- Water
- Good governance

GIZ supports the private sector by strengthening micro and small enterprises, promotes business relations and assists firms in the developing countries in complying with social and environmental standards. GIZ has a strong network of partners in more than 130 countries and can provide partnership opportunities and facilitate knowledge transfer to obtain funding. Moreover, from planning to evaluation of a project, GIZ assumes responsibility for project management. GIZ offers tailor-made solutions to the private sector that include:

- Corporate sustainability and responsibility
- Sustainable supply chains
- Market access
- Product development
- Capacity development
- Sectoral transformation

To improve dialogue between the private sector and international cooperation organizations and agencies, GIZ created the Private Sector Advisory Board.

GIZ has been working for more than 20 years in Viet Nam. It currently supports 51 projects in the country for a total of EUR 163.8 million[62]. Since the beginning of its

[62] https://www.giz.de/projektdaten/region/2/countries/VN

operation in Viet Nam, GIZ supported a total of 242 projects in Viet Nam, one of which supports the private sector and is going-on. It is the "Strengthening regional small and medium enterprises (SME) support structures in the ASEAN region", was created in 2018 and is supposed to be completed in 2022. It aims to develop SME promotion services within the framework of the ASEAN Economic Community. The total financial commitment is EUR 3.84 million.

n. OPEC Fund for International Development (OFID)

Established in 1976, OFID is a multilateral development finance institution composed of 12 Member Countries and 125 Partners Countries including Viet Nam. It finances projects that meet essential needs, such as food, energy, infrastructure, employment (particularly relating to MSMEs), clean water and sanitation, healthcare and education. The fund provides both private and public sector lending and subsidies.

For the private sector, beneficiary activities promote economic development through financing the establishment and/or growth of productive private enterprise and encouraging the development of local capital markets. OFID provides loans to companies for projects with developmental aims that are well defined, such as to improve industrial capacity and utilities, and strengthen infrastructure; direct equity investments or investments in private equity fund structures targeting the OPEC Fund's sectors of interest. Applications for OFID private sector financing must include project description and objective; outline of general market environment, the sectors concerned and future prospects; introduction to the organizational, ownership and managerial structures of the proposed project; background information on the economic environment and regulatory environment within which the proposed project will operate; and financial information on the proposed project, including level, type and justification of funding required.

OFID also offers grants. Under its grant program, OFID offers three types of grants:

- Grants for country-specific activities and projects;
- Grants for special development initiatives of global or regional scope; and
- Emergency aid grants in support of humanitarian relief operations.

The amount of OFID contributions varies according to the scope and the nature of the proposed grant activity or project. Eligible entities include government or non-

government bodies, co-financing partners, private sector entities, research institutes, and international NGOs. However, and with the exception of emergency aid and small grants in amounts of up to USD100 000, OFID's contribution to a stand-alone project does not exceed 50% of the total costs of the project. Member Countries are eligible for OFID's grant assistance. Partners that have been recently awarded an OPEC Fund grant for a project in the same country, which is still ongoing, should await its satisfactory completion before submitting a new grant application.

As of Mid-2021, OFID has provided USD 284.87 million to Viet Nam by supporting a total of 36 projects, mainly for transportation and agriculture. Currently, OFID has not yet supported the private sector in Viet Nam. However, OFID has supported the private sector in other Asian countries such as the project "Loan to Support MSMEs in Cambodia" for USD 20 million and the "Baynouna Solar Energy PSC in Jordan" for USD 17 million.

o. Leading Asia's Private Infrastructure Fund (LEAP)[63]

Created in 2016, the LEAP is an infrastructure co-financing fund expected to leverage and complement ADB's existing non-sovereign platform to fill financing gaps and increase access to finance for infrastructure projects in the region. Japan International Cooperation Agency (JICA) has contributed USD 1.5 billion in equity and ADB is in charge to deploy and administer the fund.

The aim is to provide funding for non-sovereign projects at different stages of development. Projects must demonstrate a strong development impact and be aligned with both ADB's and JICA's principles. It also supports public private partnership (PPP), joint venture, private finance initiative projects, privatizations as well as traditional project finance. The fund provides loans, equity investments and mezzanine finance transactions.

To be eligible, projects must be located in an ADB developing member country and be eligible for JICA assistance. Typical project types include the following infrastructure subsectors:

[63] https://www.adb.org/what-we-do/funds/leap

- Energy
- Water and other urban infrastructure and services
- Transport
- Information and communication technology
- Health

LEAP has financed numerous projects in Asia including the below six projects in Viet Nam for a total of USD 84.14 million[64]:

1. In 2018, USD 4.4 million for the Floating Solar Energy Project of the Da Mi Hydro Power Joint Stock Company.
2. In 2019, USD 10 million for the Tertiary Education Project implemented by Phinma Education Holdings.
3. In 2019, USD 7.6 million for the Gulf Solar Power Project developed by Gulf Energy Development Public Company Limited, TTC Energy Development Investment Joint Stock Company and Thanh Thanh Cong Group.
4. In 2019, USD 45 million for the Eastern Economic Corridor Independent Power Project developed by Gulf PD Company Limited
5. In 2020, USD 9.14 million for the B.Grimm Viet Nam Solar Power Project (Phu Yen Project) of the Phu Yen TTP Joint Stock Company.
6. In 2021, USD 8 million for the B.Grimm Viet Nam Solar Power Project (Dau Tieng Project) implemented by Dau Tieng Tay Ninh Energy Joint Stock Company.

p. China-ASEAN Investment Cooperation Fund (CAF)

Created in 2009, the CAF is a quasi-sovereign ~USD 1 billion equity fund sponsored by the Export-Import Bank of China and other institutional investors. The typical investment size is between USD 50 to 150 million with a preference for minority stake investments.

[64] https://www.adb.org/projects/country/vie?terms=Leading+Asia%27s+Private+Infrastructure+Fund

It targets sustainable equity-linked investments in ASEAN countries (including Vietnam) with a mandate to support commercially-viable infrastructure projects mainly in the following sectors:

Infrastructure:

- Toll Road
- Rail
- Container Port
- Airport
- Telecom
- Water / Wastewater
- Oil & Gas Pipeline
- Social Infrastructure

Energy/Power:

- Conventional
- Renewables

Natural Resources:

- Industrial metals: Ferrous and Non-Ferrous Metals
- Precious metals: Gold, Palladium, Platinum and Silver
- Plantation-related: palm oil, pulp and rubber