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Synthesis Study on the Effectiveness of Energy Efficiency Financing Mechanisms to Support the Energy Transition in Indonesia



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Synthesis Study on the Effectiveness of Energy Efficiency Financing Mechanisms to Support the Energy Transition in Indonesia

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Programme Contact:

Deni Gumilang
✉ Deni.gumilang@giz.de
Agus P. Tampubolon
✉ agus@iesr.or.id

Indonesia Counterpart:

Coordinator - Directorate of Electricity, Telecommunications, and Informatics (KTI), Ministry of Development Planning/ National Development Agency (Bappenas)

Yusuf Suryanto
✉ yusuf.suryanto@bappenas.go.id

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Authors:

GIZ Indonesia/ASEAN Energy Programme

Deni Gumilang
✉ deni.gumilang@giz.de
Fajrin Hanggoro
✉ fajrin.hanggoro@giz.de
Ichsan Loeksmanto
✉ Ichsan.loeksmanto@giz.de

Maysa Andarini
✉ maysa.andarini@giz.de

Anggia Anggreswari
✉ Anggia@iesr.or.id

Volker Bromund
✉ volker.bromund@prime-consultancy.com

Coordinating Ministry for Economic Affairs of the Republic of Indonesia

Sunandar, Asisten Deputi Utilitas dan Industri Manufaktur
✉ zicodir@gmail.com

Dwi Septi Cahyawati, Analis Kebijakan Ahli Madya
✉ dwisepticahyawati@gmail.com

Muhamad Hanif Bachtiar, Analis Kebijakan Ahli Muda,
✉ m.hanifbachtiar@gmail.com

Evangela Carolina, Analis Perekonomian,
✉ evangela1706@gmail.com

Contributing Authors:

Institute for Essential Services Reform (IESR)

The Ministry of National Development Planning/ National Development Agency (Bappenas), Directorate of Electricity, Telecommunications and Informatics

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List of Abbreviations

APBN	Anggaran Pendapatan dan Belanja Negara	MSMEs	Micro, Small and Medium Enterprises
BKF	Badan Kebijakan Fiskal	NBFI	Nonbanking Financial Institution
BOOT	Build-Operate-Own-Transfer	NDC	Nationally Determined Contribution
BPDLH	Badan Pengelola Dana Lingkungan Hidup	NUMP	National Urban Mobility Policy
CO2	Carbondioxide	OJK	Otoritas Jasa Keuangan
DFIs	Development Finance Institutions	O&M	Operation and Maintenance
EE	Energy Efficiency	P2P	Peer-to-peer
EECs	Energy Efficiency Certificates	PAYS	
EEPs	Energy Efficiency Projects	Model	Pay-As-You-Save Model
EPC	Energy Performance Contract	PCG	Partial Credit Guarantee
ESA	Energy Service Agreement	PT. PLN	PT. Perusahaan Listrik Negara
ESC	Energy Supply Contract	PT. SMI	PT. Sarana Multi Infrastruktur
ESI	Energy Savings Insurance	PBGs	Building Approval Fees
ESCO	Energy Service Company	PPP	Public-Private Partnership
EU	European Union	PSS	Product System Service
GDP	Growth Domestic Production	RE	Renewable Energy
GW	GigaWatt	ROS	Result-Oriented Services
HVAC	Heating, Ventilation, and Air Conditioning	RUPTL	Rencana Usaha Penyediaan Tenaga Listrik
IEC	Integrated Energy Contract	SDGs	Sustainable Development Goals
ITA	Investment Tax Allowance	SINERGI	Sistem Informasi Konservasi Energi
ITE	Income Tax Exemption	SKKNI	National Personnel Competence Standard
JETP	Just Energy Transition Partnership	SMEs	Small-Medium Enterprises
JCM	Joint Credit Mechanism	SNI	Standar Nasional Indonesia
LED	Light-emitting Diode	SPV	Special Purpose Vehicle
MEMR	Ministry of Energy and Mineral Resources	TFEC	Total Final Energy Consumption
MEPS	Minimum Energy Performance Standards	UOB	United Overseas Bank
MoF	Ministry of Finance	UOS	Use-Oriented Services
Mol	Ministry of Industry		

Introduction

Indonesia has set energy self-sufficiency or “*Swasembada Energi*” as its national priority under the new presidential administration. This presidential policy on energy self-sufficiency puts emphasis on the importance in reducing dependence on fossil fuels while making Indonesia the world's green energy superpower, particularly in the field of new and renewable energy (Prabowo & Gibran, 2024). Under this priority, the relevance of energy efficiency lies on how energy efficiency can reduce the demand and usage of energy, e.g., electricity, therefore producing economic savings i.e., producing the same quantity, by consuming less amount of energy. In addition, by producing energy savings, result in economic savings from costs normally allocated to purchase energy supply therefore also follows.

In an ideal context, economic savings from energy efficiency opens up opportunities for energy users to invest in renewable energy, thus also supporting the new administration priority on infrastructure development continuation, and the creation of jobs. Moreover, renewable sources such as geothermal and solar—which can substantially support the country's energy self-sufficiency, also require efficient systems for energy storage, transmission, and use in order to maximize their potential. Energy efficiency measures can therefore ensure that renewable energy is not wasted, enhancing the viability of self-sufficiency goals. Lastly, in line with the new administration priority on the acceleration of Indonesia's net-zero targets (Prabowo & Gibran, 2024), the country's Nationally Determined Contribution has also emphasised targets on energy efficiency as one of the key emission reduction efforts (see below)— which holds potential of 132.25 million tCO₂, the second biggest amount of emission reduction potential, second to renewable energy.

Considering that Indonesia have spent IDR 159.6 trillion IDR in 2023 for electricity subsidies and compensation, if implemented widely, energy efficiency also holds potential to free up fiscal space and help decrease energy imports. According to the MEMR (2024), energy management and energy efficiency efforts up to 2030 can potentially create IDR 9.4 trillion of energy savings for energy providers (3.5 million TOE) , IDR 20.8 trillion for the industrial sector (5.28 million TOE), IDR 4.2 trillion for the transportation sector (0.4 million TOE), and 0.9 trillion for the building sector (66 thousand TOE). Hence, these savings can support the country's vision for energy self-sufficiency, considering that these substantial savings can further redirected to support well-targeted subsidies and decrease demand for energy imports.

As a developing country, electricity demand in Indonesia is multiplying due to urbanisation and industrialisation. The rise in demand will require electricity energy supply to double by 2040. By implementing energy efficiency programs, the total required capacity may be reduced by 37 GW out of the planned 166 GW, as stated by the Minister of Energy and Mineral Resources (MEMR), thus saving considerable costs for building new power plants. The reduction would also be beneficial as the government can save land use, water and air pollution and social impacts related to new power plant projects (especially to low-income communities). An EE program may also help the country to achieve its climate commitment, which is to reduce total final energy consumption (TFEC) by 20% in 2035, reduce national CO2 emissions in 2035 by 3 million tons of CO2, and reduce energy intensity by 1% per year to promote energy saving. The National General Energy Plan mandates an energy efficiency target of 1% reduction/year in energy intensity by 2025. Furthermore, it aims to reduce final energy consumption/energy conservation compared to the Business-as-Usual scenario by 17.4% and 38.9% in 2025 and 2050, respectively.

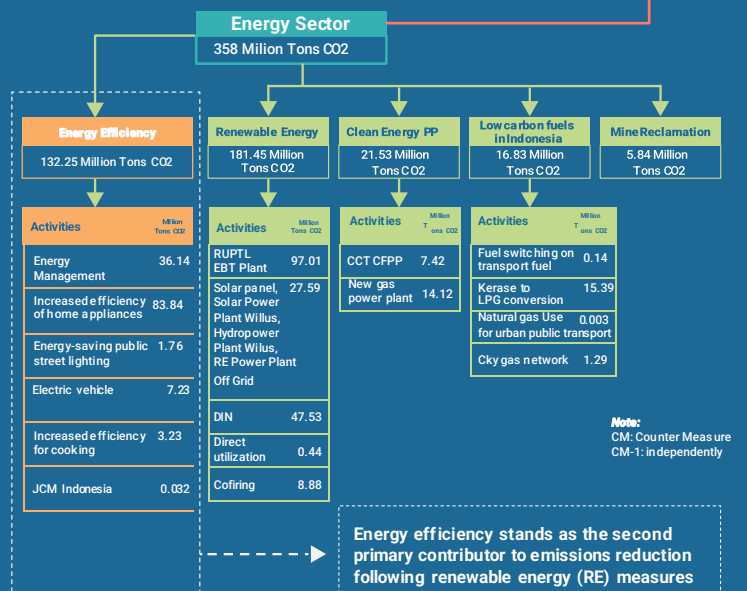
Furthermore, Indonesia has set its emission reduction target by 2030 at 31.89% (independently) and 43.20% (with international support) compared to the previous policy (the Updated NDC, 2021) – 29% (independently) and 41% (with international support).¹ Specifically in energy efficiency, Indonesia’s Enhanced NDC targets energy efficiency measures to be carried out by all energy consuming sectors (industry, commercial, transport, residential) through improvement of energy system as well as device efficiency including implementation of electric vehicles and its ecosystem. These specific focus are broken down into five components as listed below. It should also be highlighted that target aligning with the conditional climate mitigation target entails similar actions with the unconditional target although with further enhanced/expanded mitigation in energy efficiency measures.

1. Enhanced Energy Management Mandatory: Oil saving 71 million BOE (unconditional)
2. Energy Efficiency Improvement of Equipments: Electricity saving 15,187 GWh (unconditional)
3. Electric Vehicle (EV): 15,197,000 EV units (unconditional)
4. Street Lighting with Efficient Lamp: Energy saving 1,31 million BOE (unconditional)
5. Induction of Electric Stoves: 18,170,000 induction of electric stoves (unconditional)

Table 1 Enhanced NDC 2030²

Enhanced NDC 2030

No	Sector	GHG Emissions 2010 (Million Ton CO ₂ e)	GHG Emissions in 2030			Emissions Reduction	
			BaU	CM1	CM2	CM1	CM2
1	Energy	453.2	1,669	1,311	1,223	358	446
2	Waste	88	296	256	253	40	45.3
3	IPPU	36	70	63	61	7	9
4	Agriculture	111	120	110	108	10	12
5	Forestry	647	714	217	-15	500	729
	Total	1,334	2,869	1,953	1,632	915	1,240



¹ IESR (2023), The Earth Day and Indonesia’s Climate and Energy Agenda Forward. Available at: <https://iesr.or.id/en/tag/ndc-indonesia-en>

² From The Ministry of Energy and Mineral Resources (2023) Peraturan Pemerintah No 33 Tahun 2023 Tentang Konservasi Energi

Based on the Enhanced NDC, the energy sector has targeted to reduce approximately 358 million tons of CO₂ independently. To reach this target, it is imperative to acknowledge that the Government has outlined 5 mitigation measures, complemented by various actions. These encompass initiatives such as enhancing energy efficiency, integrating renewable energy, building clean energy power plant, adapting low-carbon fuels, and carry out the restoration of mining sites. As the second primary contributor to emissions reduction, accelerating the implementation of energy efficiency initiatives is critical for the country to achieve the realisation of the Enhanced NDC.

Low-carbon transport and efficient cities can lower emissions and deliver co-benefits. Reducing transport emissions through public transit and electric vehicles could have substantial development synergies, such as lower congestion and pollution reduction. Reducing the carbon intensity of the electricity grid will complement the uptake of electric vehicles. Steps towards these goals include developing a national urban mobility policy (NUMP) framework and an expanded green certification mechanism to increase energy efficiency in commercial and residential buildings.³

Energy efficiency offers clear benefits to Indonesia's emission reduction and energy resilience goals and overall support for economic and social development strategic objectives. Energy efficiency initiatives can also support jobs and opportunities to develop the local industry by creating a local market for energy-efficient appliances and services. Therefore, promoting energy efficiency is relevant to fuel economic recovery through job creation and improved competitiveness in the industrial and commercial sectors. Moreover, according to the International Energy Agency (2022), investment into energy efficiency has significant job creation potential. It is estimated that US\$1 million spent on energy efficiency can create between 6 and 15 jobs on average, depending on the sector. Considering that

most of jobs related to energy efficiency are labor-intensive and can be mobilized quickly, fiscal policies to stimulate investment in energy efficiency can to some extent compensate for job losses during the energy transition.

The current situation in Indonesia is that Local Finance Institutions (LFIs) are reluctant to finance Energy Efficiency Projects (EEPs) on a project basis because of their perceived high risk, small transaction size, small market potential, high transaction costs, and lack of the internal evaluation capacity needed to assess the risks and cash flow benefits generated from EEPs.⁴ The pervasive problem for energy efficiency is the perceived absence of a convincing business case. Energy savings do not create sales or cash directly but deliver a return by reducing costs relative to a counterfactual situation. This can be a hard sell, and homeowners, boardroom directors, and potential financiers do not regard energy savings as a transparent and trusted revenue stream.

Despite a significant energy savings opportunity, the status quo is that virtually no EE program 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 EE investments face the same common barriers faced by many Southeast Asian countries and other developing countries worldwide, plus a few additional ones unique to Indonesia.

EE funding in the governmental sector mostly comes from the government budget (APBN) or international aid funds (grants). EE funding in the private, industrial, and commercial sectors generally comes from facility owners and financial institutions, both banking and non-banking (such as multilateral institutions).

³ The World Bank (2023) *Indonesia Country Climate and Development Report*. Available at: <https://www.worldbank.org/en/country/indonesia/publication/indonesia-country-climate-and-development-report>

⁴ The Energy Transition Partnership (ETP) (2022) *Diagnostic Review and Analysis of Energy Efficiency Development in Indonesia*

A solution to get EE investments done is using ESCO (Energy Service Company) companies as professional EE service providers. An ESCO is a commercial business providing various energy solutions, including designing and implementing projects focused on energy savings, retrofitting, and conservation. ESCOs first appeared in the US in the early 1980s and have been developing around the world; the biggest ESCO markets are in China, the US, and the EU. The business model of ESCOs is Energy Performance Contracting (EPC) in various forms. EPC is a financial mechanism used to pay for today's facility upgrades with tomorrow's energy savings – often without tapping the customer's capital budget. An EPC constitutes a partnership between a facility owner and an energy service company (ESCO) and is considered a time and cost-effective method for completing comprehensive energy upgrades.⁵

Financing options for energy efficiency improvements with the support of an ESCO may be classified, in a broad sense, under two options: (1) the ESCO borrows the funds necessary for project implementation or uses its funds, or (2) the energy-user/customer takes a loan from a financial institution, which is secured by

an energy savings guarantee undertaken by the ESCO. The IAE overview of the global ESCO market states that, on average, ESCO projects deliver energy savings upwards of 25%.⁶ Most ESCO projects occur in the non-residential buildings sector, followed by industry, with very few projects in the transport sector.

This desktop study, "Synthesis Study on the Effectiveness of Energy Efficiency Financing Mechanism to Support the Energy Transition in Indonesia," reviews and synthesises available financing schemes and best practices of Energy Efficiency (EE) financing from multiple available studies. It provides a comprehensive and integrated summary of the existing research literature to identify key themes, trends, and knowledge gaps. It is supported by the GIZ Clean, Affordable and Secure Energy for Southeast Asia (CASE) program, which aims to drive change in the power sector in Southeast Asia (SEA) towards increased ambitions about climate change. CASE is funded by the German Federal Ministry for Economic Affairs and Climate Action (BMWK).

⁵ UNEP. (2020) Business models for energy efficiency - Energy Performance Contracting. Available at: <https://c2e2.unepccc.org/wp-content/uploads/sites/3/2021/01/business-models-for-energy-efficiency-energy-performance-contracting.pdf>

⁶ Ibid.

Executive Summary

Looking at all the initiatives and programs across many developing countries and projecting them to the Indonesian situation, the following summary can be given:

1. When it comes to initiatives towards Energy Efficiency, there are a lot of stakeholders in the government, financial services industry, associations and the end users who have to work together to achieve a visible outcome and practical benefit for all of them and the country – and this requires that there is a “coordinator and driver” who brings all the different aspects in a mutually beneficial economic environment for an Energy Efficiency initiative together – a powerful organisation (e.g. a ministry) should be given the task and take the lead to show the importance of this topic to all parties involved. India could be one of the references as it is taking the subject of Energy Efficiency exceptionally serious. The Government of India set up the Bureau of Energy Efficiency (BEE) on 1 March 2002. “The mission of the Bureau of Energy Efficiency is to assist in developing policies and strategies with a thrust on self-regulation and market principles, within the overall framework of the Energy Conservation Act, 2001, with the primary objective of reducing the energy intensity of the Indian economy.”⁷
2. There is no “one” magic scheme for EE financing which provides a solution which fits all situations, so a few tools, sectors and areas have to be chosen and implemented first to act as examples for priority sectors (one where the highest impact can be achieved first), for others to follow.
3. There are areas in Indonesia where there is an excess of electricity for the foreseeable future (e.g. Java and Bali) at relatively low-end consumer prices, which make investments into EE measures often unattractive for the end user due to a long payback period and high financing costs – here the focus should be on considerable energy consuming industries (metals, cement, chemicals, textile) and sectors (building, transportation) to cover the sectors with the highest impact first.
4. There are rural areas where there is a lack of affordable and reliable electricity, mainly in East Indonesia. There, the electricity is often still produced by diesel generators (costly for PLN, the government and the economy) – here, investments in energy efficiency devices and appliances will not only directly benefit low-income households and MSMEs but will also take away the burden from the government to provide ever larger power plants and investment into a sufficiently large, stable and reliable grid (hence reducing subsidies and freeing up capital for other investments).
5. ESCOs are one of the proven tools to support investments in EE (not yet developed in Indonesia). However, ESCOs are only successful if there are ESCOs with a proven track record, with reliable and established technology partners also offering attractive financing schemes.
6. Awareness building on all levels and institutions is needed as to why EE investments are needed (as an “alternative” for building new power plants) and what specific benefits for the end users and the society it will bring (fighting climate change, cost savings and having economic growth being strong arguments everybody should have in mind).

⁷ Bureau of Energy Efficiency (2023) Available at: <https://beeindia.gov.in/en>

7. Clear regulations on EE usage, consumption, and monitoring of its practical implementation is, besides financing and awareness building, a key driver for change – guidelines and directives must support economic benefits to create a fair and transparent playing field for all. The recently stipulated Government Regulation (PP) Number 33/2023 on Energy Conservation as well as its derivative regulations that are currently being developed showcased Indonesia's step towards the right direction in bolstering domestic energy resource sustainability and improving the efficiency of its utilisation.
8. State-owned enterprises in the financial services industry have to play a more dominant role by providing interesting and attractive financing schemes and offering risk mitigation instruments (e.g. Energy Saving Insurance schemes).
9. Digitisation, financial inclusion and innovative funding schemes specifically for the rural areas, MSMEs and farmers will help to bring EE appliances and technologies to this often underserved large sector of the population and economy.

A quote from 2004 by B. Broadman is still valid for many consumers and end users of electricity:



The market rarely delivers energy efficiency improvements spontaneously, if there is no market push. Consumers are not providing a pull towards energy efficiency, usually because they are ignorant of (or indifferent to) the range on the market or the implications of their purchase.”⁸

⁸ Boardman, B. (2004) *New directions for household energy efficiency: evidence from the UK*



01

The current state of energy efficiency (EE) financing mechanisms in Indonesia

Financial institutions still deem energy efficiency projects in Indonesia high risk and unprofitable. It is assumed that these projects have a long payback period, and there are misperceptions of the technology’s risk.⁹ Therefore, the Indonesian energy efficiency market is in early development. The Joint Credit Mechanism (JCM) from Japan and UOB’s ESCO finance schemes are rare examples of mechanisms which are operational out of numerous initiatives – both domestic (public sector players) and global parties (multilateral and bilateral agencies) – so far failed to establish a visible and prominent energy efficiency finance mechanisms in Indonesia.

1.1 The energy efficiency landscape

1.1.1 Barriers to EE deployment

The overarching barriers to Energy Efficiency Deployment across all developing countries are a complex combination of technical and financial barriers, combined with a lack of awareness and commitment.¹⁰

Barrier	Explanation
Awareness and commitment	Lack of knowledge and awareness of energy efficiency, scepticism and misunderstanding of benefits, conflicting priorities, and a lack of motivation across businesses stymie the potential demand. Linked to this is the lack of a convincing business case in contexts with cheap energy and absent regulation
Technical solutions and expertise	Insufficient technical capacity and a lack of commonality on best practices and standardisation of procedures and technologies, including difficulties in project assessment, monitoring, and verification, act as obstacles to delivering trustworthy energy efficiency solutions that minimise hassle
Financial resources	Perceived high investment costs and prohibitive risk and return calculations limit the supply of affordable capital and the demand for such investments
Low Energy Prices	If energy costs are not a real burden for the end user – in which this is the case for Indonesia due to energy subsidies investments in EE are of low priority, specifically if there are long payback times (3+ years)

Therefore, there is a need to reassess and reorient the focus of financing programs. There has been a common struggle across many programs worldwide to create sustainable private sector markets that effectively reduce energy demand and greenhouse gas (GHG) emissions, with very few undisputed examples of success. However, too often, programs have only addressed part of the problem, leaving other barriers deeply entrenched. **A more comprehensive approach must replace the narrow focus on finance, the provision of credit, and enhanced liquidity.**¹¹

⁹ ACE (2021) *Review of Policies and Measures for Energy Efficiency in Indonesia’s Industrial Sector*. ACE Policy Brief No. 05 / June 2021.

¹⁰ EEFIG (2022) *Report on The evolution of Financing Practices for Energy Efficiency in Buildings, SME’s and in Industry*. European Commission, Directorate C, Renewables, Research and Innovation, Energy Efficiency. Available at: <https://op.europa.eu/en/publication-detail/-/publication/a3032517-c761-11ec-b6f4-01aa75ed71a1/language-en/format-PDF/source-256242892>

¹¹ ADB (2018). *Energy efficiency finance programs: Best practices to leverage private green finance*. ADBI Working Paper No. 877, 2018.

Table 1.1 Barriers from Empirical Best Practices¹²

Barrier	Solution
Awareness and commitment barrier	Depending on the level of pre-existing awareness and the feasibility of reaching the target audience, policies such as advertising, educational events, or direct outreach can address the lack of knowledge and awareness of the benefits of energy efficiency
Technical solutions and expertise: project assessment, monitoring, and verification are complex without sector knowledge if there is insufficient capacity, commonality on best practices, and standardisation of procedures and technologies	To overcome this barrier, it is possible to train local suppliers of goods and services to access potential opportunities for a given business properly by understanding different technologies and building the capacity to conduct or at least understand key reports, such as energy audits. Alternatively, programs can install entities with existing experts to transfer skills to the local supply chain or outlast the programs
Financial resources: lack of familiarity and trust from end-users and investors in business models that monetise energy savings, such as ESCO (energy service company) service offers, can represent a crucial barrier. This makes raising capital difficult for companies based on these business models	To solve this problem, schemes can implement support for de-risking investments in ESCOs to encourage growth in their business model

¹² ADB (2018). *Energy efficiency finance programs: Best practices to leverage private green finance*. ADBI Working Paper, No.877

1.1.2 The relevance of different solutions to addressing the overarching barriers

Historically, the private sector has not invested heavily in energy efficiency relative to other opportunities. Public programs are therefore essential to overcome both the technical and the financial obstacles, stimulate energy efficiency markets to unlock the opportunity, and leverage the far more significant sums of private finance needed to scale up investments in EE.

Local banks are often the primary target investors for energy efficiency since they finance the public sector, businesses, and homeowners alike. Banks seek stable returns on low-risk investments. The disaggregated nature of many energy efficiency markets discourages investors: high transaction costs can erode limited returns.

To stimulate sustained private sector investment, a market for projects that adhere to attractive rates of risk and return and are structured in an accessible way for investors is necessary. The objective of a program is to influence perceived risk and/or actual returns positively and to structure the opportunity so that financiers invest in energy efficiency of their own accord. This demands an understanding of the risk-return profile of target investors.

A program can attempt to address this through project assessment, standardisation, incentives, or aggregation. However, it must consider how to influence the target market as a whole rather than just isolated projects and investigate whether there is sufficient scale to interest investors.

Table 1.3 List of Institutions based on Types Relevant with Energy Efficiency in Indonesia

Title of Program	Purpose	Method	Stakeholder	Barrier		
				Awareness and Commitment	Technical Solutions	Financial Resources
Awareness raising	Build a critical mass of demand by increasing the knowledge and understanding of the target market and among financiers	Advertising, educational events, or direct outreach depending on the level of pre-existing awareness and the feasibility of reaching the target audience	MEMR, EE Associations	Very relevant		
Project identification and pipeline generation	Develop and prepare a pipeline of bankable projects to establish a sufficient market scale to interest financiers	Training suppliers, facilitating interactions across the supply chain, tracking potential customers, and demonstration projects can all help to create market scale in different ways	MEMR, EEA, Technology Providers, Suppliers	Very relevant	Relevant	
Policy development	Tackle the fundamental drivers that subvert the business case to create a long-term, sustainable market environment	Advising on removing the pricing distortions of energy and carbon, introducing tax breaks, promoting policy roadmaps, and developing energy-efficient codes and standards	Government, MoF, MEMR, MoI	Very relevant	Slightly relevant	Relevant
Incentives	Temporarily alter the business case to encourage the demand or supply of finance	Concessional terms of finance, performance subsidies, tax breaks for energy-efficient equipment, and discounted TA	MoF, MEMR	Very relevant		Relevant

Project assessment, monitoring, and verification	Develop the local capacity and a track record for ensuring and measuring the profitability of projects to reduce the perceived risks	Training local suppliers of goods and services or installing entities capable of transferring skills or outlasting the program	MEMR, EE Associations, OJK	Relevant	Very relevant	Slightly relevant
Accreditation	Mitigate the perceived risks and consolidate trust in promised energy savings for financiers and end-users alike	Formal, authoritative qualifications based on historical performance for suppliers and equipment	Supplier, Mol	Relevant	Very relevant	Slightly relevant
Standardisation	Minimise the extra cost and hassle associated with unfamiliar transactions across the supply chain	Simple and replicable contracts between parties, user-friendly interfaces, and fast decision-making processes	MEMR, Mol, PLN	Slightly relevant	Very relevant	Slightly relevant
Support for monetising energy savings	Grow a market of suppliers that use energy savings within their revenue model, supporting confidence in the promised cash flow	Support for de-risking investments in ESCOs to encourage growth in their business model	EE Associations, Multilaterals	Slightly relevant	Relevant	Very relevant
On-bill financing	Overcome the lack of upfront capital and trust in energy savings as revenue for property owners	Integrating investment costs with pre-existing bills where energy savings prevent the former from exceeding the latter over the payback period	PLN	Relevant	–	Very relevant
Unsecured lending	Alleviate the need for end-users to provide collateral to secure financing for energy efficiency investments	Financiers will lend against a project's merits and predicted cash flow, not requiring assets as security	OJK, FinTech, P2P Lenders, Banking Industry	Relevant	–	Very relevant
Leasing	Free end-users from capital constraints associated with high upfront costs	Leasing parties will lend equipment as part of a service, possibly including maintenance or until the end-user pays off the cost and owns it outright	OJK, NBF, Banking Industry	Relevant	–	Very relevant

Insurance	Mitigate the risk of the technology not performing as expected	The premium that the end-user or supplier pays to cover potential losses, reducing the perception of high risk and possibly the cost of capital if financiers concur	OJK, Insurance Industry, Multilaterals	Slightly relevant	–	Very relevant
Guarantee	Risk-sharing facility to encourage financiers to expand into new markets that they perceive to be too risky under normal conditions	The program will cover a fixed percentage of the losses that financiers incur if their loans do not perform	DFIs, Multilaterals	Slightly relevant	–	Very relevant
Credit line	Address limited liquidity in financial institutions, increasing their willingness to use funds for energy efficiency	Injection of government, MDB, or other donor funds for on-lending, with specified terms for eligible projects attached	Multilaterals, DVIs, PT SMI	–	–	Very relevant
Aggregation	Increase the supply of capital in the market by reducing the relative transaction costs for investors through scale	Either “pooling” capital prior to identifying projects or “bundling” pre-identified projects ready for investment	Banking Industry, Suppliers, Industry	–	–	Very relevant

1.1.3 Stakeholders in Indonesia’s EE financing¹³

The NDC of Indonesia recognises energy efficiency as one of its key mitigation actions. While Indonesia attributes 65.43% of its total greenhouse gas (GHG) emissions to the energy sector, the market penetration of energy-efficient technologies and the ensuing energy savings have been long hampered by a range of barriers, such as access to finance, regulatory challenges, and a lack of capacity and awareness amongst relevant stakeholders.

Table 1.3 List of Institutions based on Types Relevant with Energy Efficiency in Indonesia (Authors’ Analysis)





Institution	Role
NATIONAL GOVERNMENT AGENCIES: ¹⁴	
	Coordinating Ministry for Economic Affairs of the Republic of Indonesia Ministry responsible for economic planning, policy co-ordination, and policy synchronisation. The following ministries are coordinated within the Coordinating Ministry for Economic Affairs: Ministry of Finance, Ministry of Industry, Ministry of Trade, Ministry of Agriculture, Ministry of State-Owned Enterprises, Ministry of Manpower, Ministry of Cooperatives and Small & Medium Enterprises, and Ministry of Land and Spatial Planning
	Coordinating Ministry for Maritime Affairs and Investment of the Republic of Indonesia The national coordinator of several ministries, including MEMR, thus plays a critical role in formulating any national EE policy/regulations and programs

¹³ Indonesian Journal of Business and Entrepreneurship (2021) Vol. 7


¹⁴ Energy Transition Partnership (2022) *Diagnostic Review and Analysis of Energy Efficiency Development in Indonesia*. Available at <https://www.energytransitionpartnership.org/resource/diagnostic-analyses-report-of-energy-efficiency-development-in-indonesia/>

	<p>Ministry of Energy and Mineral Resources (MEMR)</p>	<p>The primary GoI agency to coordinate all energy-related interventions through the following related agencies:</p> <p>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, standards, 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</p> <p>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</p> <p>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</p>
	<p>Ministry of National Development Planning / National Development Planning Agency (BAPPENAS)</p>	<p>Oversees the national development planning to assist the President in organising the national government with the following agencies that can impact EE:</p> <p>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 be involved in PPP – EEP</p> <p>Directorate of Innovative Funding Engagement is responsible for carrying out the formulation and implementation of policies, preparation of norms, standards, procedures, and criteria, providing technical guidance and supervision, evaluation and reporting, as well as control and supervision of the PPP scheme, so any EE infrastructure project using PPP scheme will be through this directorate</p>
	<p>Ministry of Finance (MOF)</p>	<p>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:</p> <p>Fiscal Policy Agency (BKF) provides support in preparing technical policy, analysis plans and programs regarding fiscal policy on EE, and further implementing analyses and providing recommendations on fiscal EE policy</p> <p>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</p>
	<p>Ministry of Manpower</p>	<p>The ministry plays a vital 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</p>

	Ministry of Law and Human Rights, especially BPHN (National Legal Development Agency)	<p>The ministry plays an important role in forming national laws and regulations as part of establishing a national legal system. Thus, all EE-related laws and regulations will be reviewed and evaluated through BPHN</p>
	Ministry of Home Affairs (MOHA)	<p>The ministry, especially the Directorate of Regional Revenue, plays a critical role in the formulation and implementation of policies, preparation of norms, standards, 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</p>
	Ministry of Industry (Mol)	<p>Mol coordinates/synchronises the formulation, determination, and execution of policies in the industry, as well as the execution of technical guidance and supervision of policy implementation in the industry. The ministry is leading in targeting and promoting EE programs in the industrial sectors</p>
	Ministry of Transportation	<p>The ministry, responsible for governing and regulating transportation in Indonesia, can significantly contribute to energy efficiency in the transportation sector by setting Fuel Economy standards and developing EE programs to reduce energy consumption</p>
	Ministry of Trade	<p>The ministry directs the formulation of policies to develop trade in Indonesia. It can help support EE programs on Minimum Energy Performance Standards (MEPS) and Labelling to ensure that all imported electrical appliances regulated in MEPS meet the minimum levels</p>
	Ministry of Environment and Forestry (KLHK)	<p>KLHK is responsible for managing and conserving that national's forests and can play a vital role in working with MEMR for EE programs that target emission reductions</p> <p>KLHK has national "PROPER" programs to ensure industries comply with environmental regulations and meet sustainability requirements, where energy efficiency is one of the crucial criteria for compliance</p>
	National Energy Council (DEN)	<p>Established by the GoI in 2007, DEN is responsible for designing and formulating national energy policy for approval by the Parliament. It can play a role in the rolling out of any new EE policies</p>
	The Environmental Fund Management Agency (BPD LH)	<p>BPD LH was officially formed in October 2019 to bring multiple funding sources together to be deployed through a variety of instruments across several different sectors (including forestry, energy and mineral resources, carbon trading, environmental services, industry, transport, agriculture, marine and fisheries). BPD LH is an environmental funding (EF) mechanism for channelling 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). BPD LH could play an important role in supporting EE programs, for example, on cash incentives</p>

	National Research and Innovation Agency/ BRIN (Badan Riset dan Inovasi Nasional)	<p>BRIN was formed by the Indonesian government in 2019 originally as a new agency of the Ministry of Research and Technology. It was controversially separated and established as a new cabinet-level government agency on 24 August 2021 and is now Indonesia's sole national research agency. BRIN is vital in developing new MEPS and evaluations and research of EE technologies, including their maximum utilisation and outputs, testing of EE equipment and providing technical EE experts on EE assessments, EE education, and technical training</p>
	National Standard Agency (BSN)	<p>A government institution that is not an agency or a ministry. BSN is responsible for standardisation, conformity assessment, accreditation, and metrology activities in Indonesia. The Agency took over the function and duty of the Standardisation Council of Indonesia and now plays a vital role in the development of National Standards for supporting EE policy and programs, such as in SNI for testing energy-efficient appliances, adoption of the international standards for national standard such as SNI ISO/IEC</p>
	National Public Procurement Agency (LKPP)	<p>LKPP is responsible for all government procurement activity in Indonesia, including formulating all government procurement policies and regulations and providing public procurement-related technical guidance and advocacy. LKPP plays a critical role in the new Presidential Regulation No. 33/2023 on Energy Conservation, replacing Presidential Regulation No. 70/2009, mainly on clauses of PP No. 33, which provides updates on the conduct of EEP Procurements under the PPP regulatory scheme</p>
OTHER EE STAKEHOLDERS:		
	PLN	<p>Typically, energy providers are trying to sell more electricity and produce it at a lower cost. The energy providers' economic interests may seem to be the most critical factor in the customers' dynamics involved in energy efficiency</p>
Energy Saving Companies (ESCOs)		<p>Support is needed to develop the concept of energy performance contracts in Indonesia to help create an ESCO market that financial institutions will have confidence to finance. ESCOs offer a solution for lowering energy costs, which is compensated by the performance of the deployed solutions ESCOs can help a project get funded by guaranteeing a certain amount of energy savings in the long run</p>
Energy Management System Certification Bodies		<ul style="list-style-type: none"> • 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
Universities		<p>Universities are also crucial to EE, as they educate future EE professionals, EE policy makers, and other professionals supporting EE programs</p>

Central Bank/Financial Services Industry Regulator/Funders

	Financial Services Authority (OJK)	OJK regulates and supervises the financial services sector and can play an important role in supporting national policy formulation on EE financing through its sustainable and green finance initiatives.
Banks or Financial Institutions		They are essential stakeholders in the EE market. Banks want to see stable and predictable cash flows. They are not technical specialists in energy efficiency and need a track record of energy efficiency to be confident with the retrofit asset's value-added energy savings and to lend against it.
Donors/International Agencies		ADB, DANIDA, USAID, IFC, UNDP, UNIDO, and other organisations that are crucial in providing EE technical assistance

Renewables and energy efficiency become the main measures to achieve the NDC target for Indonesia. Presidential Regulation No. 22/2017 on The National Energy General Plan (RUEN) mentions energy efficiency targets, which mandate a 1% reduction/year in energy intensity by 2025. Furthermore, it aims to reduce final energy consumption/energy conservation compared to the Business-as-Usual scenario by 17.4% and 38.9% in 2025 and 2050, respectively.

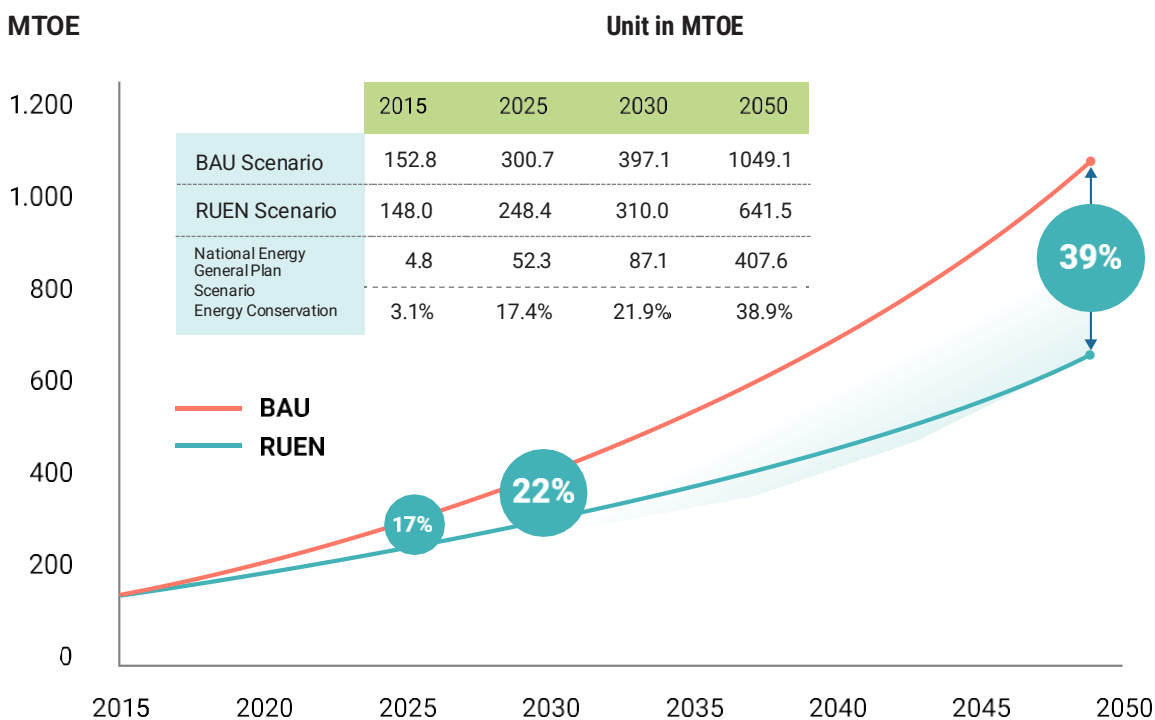


Figure 1.1 Energy Efficiency Targets based on The Presidential Regulation 22/2017 on National General Energy Plan

Projected mitigated emissions in the energy sector against BAU 2021-2030

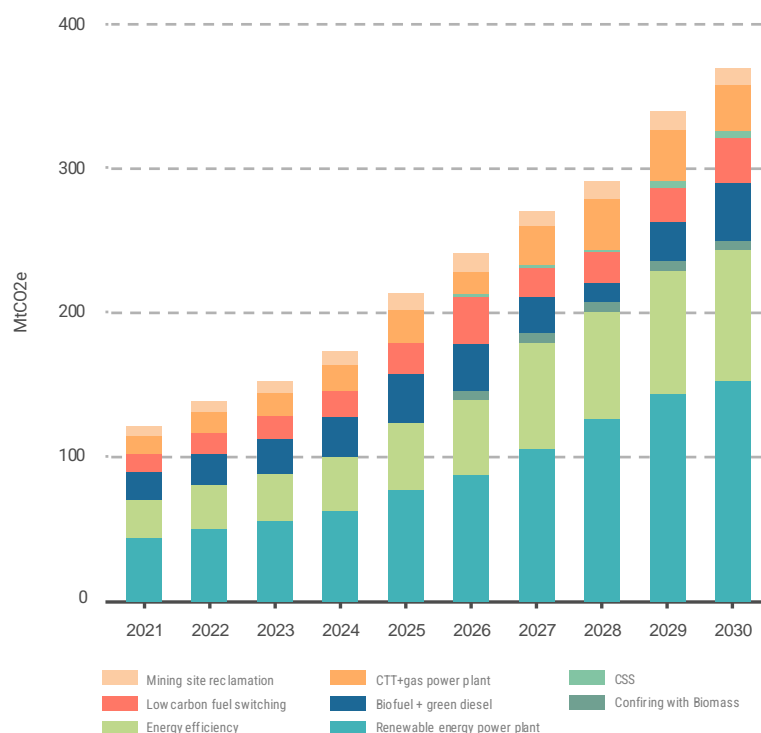


Figure 1.2 Projected Mitigated Emissions in the Energy Sector against BAU 2021-2030¹⁵

As previously listed in Table 1.3, several donors and international agencies are currently active in 2023, implementing energy efficiency initiatives in Indonesia. It is essential to highlight that donor interventions have been implemented sporadically with minimal emphasis and goals on improvements at the national level on how to effectively and holistically upscale the energy efficiency market.

- 1. USAID-SINAR:** SINAR project initiatives on EE include capacity building for the government to support the development of a new regulation on PPP procedures for Implementing Government Cooperation with business entities in providing energy infrastructure EEPs. New project proposal developments for EE projects are planned to follow existing PPP regulations and new EE projects' processes and procedures. In addition, USAID SINAR also aims to support new regulations and revisions of existing ones, such as a new MEMR regulation on ESCO and a revision of Regulation No. 14/2012 on Energy Management. Furthermore, the project also supports revisions of the National Personnel Competence Standard (SKKNI) for energy managers, energy auditors for energy efficiency and improvements in equipment standards.
- 2. AFD:** Working with Bappenas to map EE in the industrial sector through synchronising energy consumption databases available from the MEMR, Ministry of Industry, and the Central Bureau of Statistics (BPS). Additional support with Bappenas includes assistance in energy efficiency modelling through capacity building and modelling tool development.¹⁶ Furthermore, the AFD provides PT SMI with EUR 20-30 million in technical assistance funds for RE and energy efficiency project development.
- 3. Danish Energy Agency (DEA):** Supporting the development of energy efficiency in the building sector, providing energy management training and certification for public and commercial buildings, and developing energy-saving scenarios and

¹⁵ IESR (2022) *Indonesia Energy Transition Outlook 2022*. Available at: <https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2022>

¹⁶ Agence Française De Développement (2022) *AFD Energy Portfolio in Indonesia*. Available at: https://www.slideshare.net/OECD_ENV/afd-energy-portfolio-in-indonesiapdf

support to update energy efficiency targets in the national energy efficiency framework.

4. **UNDP through MTRE3:** Supporting the implementation of several EE projects, including for commercial buildings, Energy Management System (EnMS) for airports, seeking investments for projects (e.g. Mall Ratu Indah and Pullman Bali Hotel). In addition, MTRE3 also supports ESCOs through facilitation between ESCO, facility owner, and vendor using a leasing scheme and facilitating the completion of M&V documents.
5. **UNDP through ADLIGHT Programme:** Improving local LED quality, energy efficiency and affordability through MEPS, energy labelling for LED indoor and outdoor lamps.
6. **International Energy Agency (IEA):** Supports the MEMR by providing EE policy benchmarks and indicators, developing a roadmap for low-carbon buildings and construction in line with the Global Alliance for Building and Construction Methodology and pilot project for smart building, and developing a policy package for the textile industry and supporting capacities of the pulp and paper, and textile industries.
7. **CLASP:** Supports the MEMR through studies, including a market study for appliances, a study on the monitoring and compliance to lighting and AC for MEPS Regulation, and separate market studies on refrigerated display cases (RDC), chiller, and transformer distribution. CLASP further supports the dissemination of the implemented 4 MEPS and labelling for ACs, refrigerators, rice cookers, and fans while also supporting market and outreach efforts to producers and consumers on the Super-Efficient AC Marketing Campaign.
8. **World Bank in conjunction with the IFC:** Currently piloting a sustainable housing development programme with the Ministry of Public Works to develop technical guidance on implementing the green building principles in the national housing program.
9. **UN ESCAP:** Provide support on EE, specifically on Cooling Demand Assessment for modelling process and intervention scenarios in the following sectors: building space cooling, food cold chain, mobile-air conditioning, healthcare cold chain, and process cooling.
10. **OECD CEFIM:** The Clean Energy Finance and Investment Mobilisation (CEFIM) programme supports MEMR HR Development Agency, RE and EE Training, as well as the Financial Authority Services (OJK) to jointly organise training program focusing on Clean Energy Finance and Investment that will be held over the course of three years. Through the training, OECD CEFIM brings together EE developers, policymakers, and financial institutions to build the capacity needed to support the development and acceleration of energy efficiency initiatives in Indonesia.

1.2 Challenges in implementing Energy Efficiency Projects

Policies supporting incentives to specific sectors have resulted in significantly low and distorted energy prices, which is one of the critical barriers to energy transition moves, including promoting energy efficiency and conservation in Indonesia.

Developing energy-efficient projects is a significant challenge as industry players face a considerable hurdle to obtain low-interest rates and financial institutions to have a 'bankable' business. The following list below shows the challenges that prevent investors from funding energy efficiency programs:

1. Government and financial institutions lack access to reliable knowledge on energy-efficient technology potentials, including information on successful energy-efficiency investment and the necessary project pipeline. This point of challenge causes an inaccurate risk assessment of energy-efficiency projects.
2. The capacity of project developers is also limited, making it challenging for the technical role to develop high-quality projects and the financial role in evaluating projects and structure finance.

3. Financial institutions perceive EE projects as having high risks due to uncertain energy saving projections and lack of measurement and verification (M&V) protocols for energy savings, the MEMR is currently developing this standardisation in the Indonesian National Work Competency Standards (SKKNI).
4. Mandatory energy management system regulation lacks certainty and enforcement to ensure more significant energy savings in the country. Government grants to encourage R&D in energy efficiency are also lacking due to the limit of government funds. Incentives need to be improved as current ones do not provide much benefit/motivation in implementing energy efficiency measures.
5. Highly subsidised energy costs are still an issue in deploying clean energy as it promotes inefficient consumption. It is still vital to gradually remove subsidies on selected sectors to avoid the impact on low-income citizens. A reformation in energy costs may improve the government's fiscal situation and positively impact the country's budget.
6. High interest on loans and collateral requirements: Indonesia has consistently higher interest rates than other ASEAN countries. Consequently, the return value of energy efficiency is reduced, especially on capital-intensive investments.
7. Energy-efficiency technology performance is classified as unpredictable, causing a high-risk label on the project and financial institution, usually requiring huge collateral out of industry players' capacity. The high-risk label on the project and financial institution usually requires huge collateral out of industry players' capacity.
8. Lack of access to reliable information to enable appropriate risk assessments for EE projects (e.g. reference projects, information about EE technologies and their performance, and experience with EE service providers)
9. Current labelling system is not yet precise and comprehensive to ensure the potential of energy savings. In addition, although Minimum Energy Performance Standards (MEPS) for appliances such as air conditioners, rice cookers, fans, and refrigerators and LED lamps have been issued, MEPS for appliances such as washing machines, TV, induction cooker, water pumps, among others are still in development.
10. Transaction costs are too high due to limited project pipelines and EE projects that are too small, also further limiting the involvement of financial institutions. In addition, the nature of EE projects which are often unsuitable for conventional loan models
11. Cash flows from energy savings are not recognised as acceptable collateral.
12. Limited capacity amongst consultants/project developers to prepare 'bankable' business cases.
13. A lack of confidence when entering into off-balance sheet financed projects with EE project developers due to a lack of reference projects and experience with these service providers.
14. Many regions in Indonesia still have limited infrastructure, this limitation is also a challenge for the application of modern and energy efficient technologies. The lack of access to modern infrastructure (e.g., in villages and remote areas) also contributes to the high cost of energy-efficient systems' installation and maintenance.

1.3 Existing energy efficiency finance mechanisms in Indonesia

In 2017, Otoritas Jasa Keuangan (OJK), the Financial Services Authority, stipulated the OJK Regulation No. 51/2017 regarding Sustainable Finance, which obligated banks to apply sustainable finance principles and to submit yearly reports. In addition, OJK has also launched its second iteration of green taxonomy; Sustainable Finance Taxonomy (TBI), which also incorporate EE projects as credible sustainable portfolio for financial institutions and state-owned enterprises. Lastly, OJK has also stipulated POJK NO.18/2023 on Issuance and Requirements For Debt and Sukuk Securities Based on Sustainability, which specifically mentioned that EE projects can also be financed by green sukuk and green bonds (Art. 6). Based on these policy and regulatory frameworks, financial institutions are legally required to provide financial products, including loans for sustainable and green projects incorporating energy efficiency finance. However, since the regulation did not set specific targets and is not specifically targeted to support EE, financing towards energy efficiency efforts has not accelerated. The nationwide deployment of technologies with a high energy efficiency potential in the Indonesian industry area has been hindered due to several challenges described in the upcoming section of this study.

1.3.1 UOB EE financing scheme: U-Energy¹⁷

UOB has, in 2022, established a platform where it cooperates with partners to provide ESCO services. The advantage is that the bank has trusted partners for energy efficiency investments, and financing is integrated into their offerings.

The program has three primary goals:¹⁸

1. Promoting sustainability awareness to the public
2. Supporting players in an energy-efficient ecosystem with end-to-end solutions on the platform
3. Simplifying sustainable financing for end users

As Asia's first integrated financing platform for energy efficiency projects, U-Energy is designed to simplify the switch to energy-efficient appliances and fittings in residential and business premises. The Indonesia program follows the program's successful launch in Singapore, Malaysia, and Thailand. With U-Energy, the Bank will help businesses and homeowners save on electricity bills, cut carbon emissions, and achieve sustainability goals.

This is accomplished through:

1. Insights and tools to equip you with the knowledge to make informed decisions
2. Fast and seamless process for you to access sustainable financing
3. Tailored solutions that simplify the implementation of sustainable practices

U-Energy offers homeowners and businesses flexible financing options with minimal upfront costs and access to qualified energy service companies (ESCOs).

Until 2024, UoB has implemented EE initiatives for buildings in Singapore, Thailand, and Malaysia which has achieved average energy savings of 28.7% for UoB-owned buildings. While in Indonesia UoB has started measures to implement EE in UoB Plaza. In terms of financing model, the U-Energy platform utilizes account receivable financing scheme which mainly involves three stakeholders: Banks, ESCOs, and building owners. This model shifts property or equipment as collaterals to financing from receivable accounts.

UoB's experience in EE financing shows that these initiatives are not only feasible but also deliver significant savings and important environmental benefits. There is a need for collaboration between government, financial institutions and industry players to support the sustainable development of energy efficiency in Indonesia. UoB sees great potential in the industrial sector, especially in industrial energy consumption. Collaboration with international ESCOs is expected to accelerate the transfer of knowledge and best practices to the Indonesian market, which is attractive for investment.

¹⁷ UOB (no date). *Simplifying Sustainable Financing for You*. Available at: <https://www.uobgroup.com/u-energy/indonesia-en/index.page>

¹⁸ Luenam, P. (2022) *UOB Introduces New Energy Efficiency Financing Platform*. Available at: <https://www.bangkokpost.com/business/2285534/uob-introduces-new-energy-efficiency-financing-platform>

Cooperation with local energy service providers (ESCOs)

In Indonesia, the U-Energy platform will feature four local energy service providers that customers can tap into for energy efficiency projects, namely PT Amerindo Energy Solutions (also known as 'Synergy Efficiency Solutions'), Barghest Building Performance, G-Energy, and Schneider Electric. These U-Energy partners can support common energy efficiency projects such as improving chiller and air conditioning efficiency, installing solar panels on rooftops, switching to LED lights, optimising energy and power management systems, changing building facades to reflect direct sunlight to reduce heat absorption, as well as replacing elevators with energy-regeneration technology.

Energy efficiency projects for commercial building owners: With UOB's platform, businesses can easily connect with U-Energy partners (ESCOs) and finance their energy efficiency projects through the program's different financing options. U-Energy and its partners support: air-conditioning, chiller, elevator, energy and power management system, façade, lighting control and solar projects across commercial, industrial and public buildings. Supported building types: Data Centre, Hotel, Industrial, Mixed Development, Office, Public Building, and Retail.

Benefits the U-Energy platform offers:

1. An average of 20% cost savings with a more energy-efficient building.
2. Low or zero upfront payment: With different financing options available, the building can be energy efficient at low or zero upfront cost.
3. Seamless one-stop platform: U-Energy partners will handle the assessment, installation, and maintenance.
4. Trusted partners using quality equipment: U-Energy partners will provide quality equipment for energy efficiency needs.



Picture 1.1 UOB E-Energy Services

ESCO Service Partners for Commercial Buildings:



For Residential Homeowners

In addition to the advantages presented above, UOB has created a special scheme for their Credit Card holders:
 Interest-free monthly payments. Up to 36 months of interest-free payments for UOB Credit Card or UOB Cash Plus Card holders.

U-Energy Partners

UOB has partnered with these ESCOs to support you in building an energy-efficient home:



1.3.2 Japan’s Joint Credit Mechanism (JCM)

The Indonesian energy efficiency market remains in the early development phase. Only one initiative, the Joint Credit Mechanism (JCM) from Japan,¹⁹ is operational out of numerous initiatives of competitive players – both domestic (public sector players) and global parties (multilateral and bilateral agencies) – so far to establish energy efficiency finance mechanisms in Indonesia.

1.3.3 Leasing

There are many leasing companies (Multi-Finance Companies) which offer leasing of assets to their customers. The leasing company purchases the equipment and leases it to the customer. This is the most common leasing transaction. There is a Finance Lease structure and an Operational Lease structure.

Characteristics of Finance Lease in Indonesia

1. Total lease payment (principal + interest) deductible for tax purposes.
2. The minimum lease term is 2 or 3 years, which allows accelerated depreciation for tax purposes.

Table 1.4 Useful lifespan vis-à-vis Leasing Terms

Useful Life	4 years	8 years	16 years
Minimum Lease Term	2 years	3 years	3 years

3. A finance lease is generally a lease with a purchase option, allowing customers to purchase the equipment at the lease term.

¹⁹ Global Environment Centre Foundation (no date). *The Joint Crediting Mechanism*. Available at: <https://gec.jp/jcm/about/>

Operating Leases

Operating Leases are a scheme where the customer's lease payment is based on the asset's value less its residual value, the amount it is worth at the end of the lease term. In principle, the leasing company assumes the risk of the asset's future value. Accordingly, operating leases have the advantage of lower lease payments compared to finance leases.

Finance Leasing with the involvement of an ESCO company

The leasing company buys the device from the ESCO and pays to install it on the lessee's premises. The leasing company pays a small fee every month to maintain the device. The lessee can use the energy savings to pay monthly lease payments.

The ESCO will offer a technical guarantee on the minimum energy savings that the device would enable, which also comforts the leasing company. The guarantee also includes specific terms if the device breaks down and does not deliver as promised or if the device is left unrepaired by the ESCO. Because the ESCO will install the device, the lessee does not take on this responsibility and faces no construction cost risks. The contract minimises unknown factors in the detailed risk and returns calculation for all sides.

1.3.4 FinTech financing – Peer-to-peer lending

P2P lending can be an option to finance EE investments. There is no specific data on how much of the existing lending also goes into EE investments. However, the overall P2P volumes are impressive for Indonesia and can also be used to fund EE investments. Even ESCOs might obtain financing via P2P lending as the investor does not ask for collateral, which an ESCO usually does not have. Besides enabling consumers to invest in more energy-efficient household appliances, e.g. energy efficient ACs, electric ovens instead of gas-fired ovens, solar water heaters, and LED lighting, they also enable SMEs to invest, e.g. in energy efficient lighting, ACs, refrigerators, or freezers for their small businesses, electric motorbikes for transportation or even SolarPV panels to reduce their energy bill.

According to the Financial Services Authority (OJK) Institute, the performance of P2P Lending fintech has significantly improved in Indonesia, with the current number of licensed P2P Lending platforms in Indonesia reaching 102, including seven Sharia-based P2P lending platforms. The total loans accumulated in the past six years have reached IDR 528.01 trillion (USD 35 billion), with an outstanding value of IDR 51.12 trillion as of December 2022.

The number of P2P Lending users has reached 100.8 million, encompassing both borrowers and lenders. This means that nearly half of Indonesia's population has used the fintech P2P lending platform. In terms of assets, the overall assets of P2P lending fintech amount to IDR 5.51 trillion, with IDR 5.38 trillion in conventional provider assets and IDR 133.64 billion in Sharia-based provider assets. Meanwhile, the non-performing loan (NPL) rate stands relatively low at 2.78 per cent.²⁰

What makes peer-to-peer lending different from balance sheet lending and traditional banks? Simply put, peer-to-peer lending is faster, more convenient, and easier to access than traditional bank loans. P2P lenders provide much more flexible borrowing terms because they do not have to adhere to the strict regulations imposed by banks.

It is expected that P2P lending sites offer higher interest rates than conventional bank loans. The borrowers use peer-to-peer lending because they can either get a loan fast or because P2P lenders are more willing to provide financing to less creditworthy or unique borrowers than banks.

²⁰ Technode Global (2023) *Indonesia's Fintech P2P Lending Market Share Surges by 28 Percent in Six Months, Says YouGov*. Available at: <https://technode.global/2023/07/03/indonesias-fintech-p2p-lending-market-share-surges-by-28-percent-in-six-months-says-yougov/>

1.3.5 Public-Private Partnership (PPP) for government entities

The Indonesian PPP scheme can be applied in theory to Energy Efficiency Projects (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 sizeable 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 ample greenfield, revenue-based projects

(i.e. toll roads) that require significant time and costs incurred by an implementing Government Agency (GA). To finance the much smaller brownfield savings-based EEPs, the current PPP development (Planning and 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 by exempting PPP procedures that do not apply to EEPs (e.g. land acquisition).

1.3.6 EE financing via PT SMI, also through JETP

PT Sarana Multi Infrastruktur (SMI) is also mandated to finance EE projects within their lending guidelines. PT SMI's EEP loan products include: ²¹

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

PT SMI has been appointed as the Energy Transition Mechanism Country Platform (ETMCP) manager to manage the financing of the energy transition in Indonesia; the JETP climate funding for Indonesia agreed under the G20 Bali meeting in 2022. JETP aims to expedite advancements in the electrification sector and enhance energy efficiency, including through the establishing the Energy Efficiency Working Group. Insights from the JETP secretariat highlighted that currently JETP financing is limited due to local content requirement policies and capital is still mainly directed towards major companies and energy efficiency projects often have ticket sizes that are too small, therefore face challenges acquiring funds from development finance institutions and for small-medium enterprises to access low-cost financing.

1.3.7 Issuance of green bonds by financial institutions

As an example of how banks can refinance themselves to provide loans to Energy Efficiency investments of their customers, there is a recent example by Bank BTPN where IFC invested USD 500 million to support their green bond issuance.²² The International Finance Corporation (IFC) made a significant investment of up to USD 500 million in PT Bank BTPN Tbk (BTPN), consisting of a social bond and a green bond issuance by Bank BTPN.

The green bond issued by Bank BTPN will be utilised to fund various environmentally friendly projects, such as renewable energy, energy efficiency, green buildings, and clean transportation. It will play a crucial role in closing the financing gap for climate mitigation and adaptation, resulting in an estimated annual reduction of 137,326 tons of CO2 emissions.

²¹ Energy Transition Partnership (2022) *Diagnostic Review and Analysis of Energy Efficiency Development in Indonesia*. Available at: <https://www.energytransitionpartnership.org/resource/diagnostic-analyses-report-of-energy-efficiency-development-in-indonesia/>

²² Kavitha (2023) *IFC and Bank BTPN Collaborate on Groundbreaking Social and Green Bond Deal to Advance Climate Action and Foster Inclusive Development in Indonesia*.

Available at: <https://solarquarter.com/2023/06/23/ifc-and-bank-btpn-collaborate-on-groundbreaking-social-and-green-bond-deal-to-advance-climate-action-and-foster-inclusive-development-in-indonesia/>



02

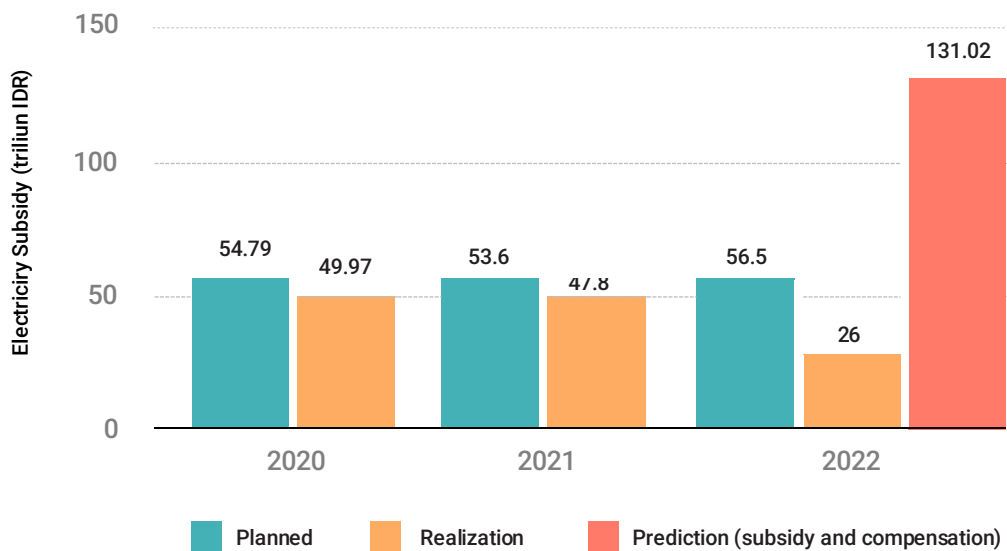
Drivers for energy efficiency investments in general

2.1 Government commitments and regulatory requirements

In countries like Indonesia, where energy production is de facto under the management of the Government, Energy Efficiency can reduce the need to add expensive new power generation or transmission capacity despite growing energy demand. It can also reduce pressure on energy resources as they are also limited.

Government-mandated energy efficiency targets increase the economy’s resilience towards energy price shocks (in case the government can no longer absorb higher energy prices – Indonesia has large allocations on energy subsidies when energy prices increase internationally, which heavily burdens the state budget). Reduction in energy consumption also strengthens its energy security.

Electricity Subsidy Allocations in Indonesia's Public Fund (Planned vs Realization)



Note: realization values for 2022 is only until July 2022

Figure 2.1 Energy Subsidy Allocation in Indonesia's Public Fund (Planned vs Realization) ²³

In 2022 Indonesia unveiled its new updated nationally determined contribution (NDC) under the Paris Agreement, which increases the country’s 2030 emission reduction target from 29% to 31.89% (unconditionally) and from 41% to 43.2% (conditionally), compared to a business-as-usual (BAU) scenario. Indonesia has issued several regulations to achieve this target, covering EE initiatives (see Chapter 3 in this study).

²³ IESR (2023) Indonesia Energy Transition Outlook. Available at: <https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2023>

2.2 Cost savings for industry players

As the electricity price in Indonesia is controlled and regulated by the government, electricity prices have not risen in the past few years, contrary to other countries – but that might not last forever: The average electricity selling price by PLN for industries in Indonesia from 2013 to 2022 (in Indonesian rupiah/kWh), about 6.6 Euro cents/kWh.

Despite that low price, of course, every kWh saved brings cost reductions – but the pressure on the cost side is still slight as long as electricity prices are highly subsidised.

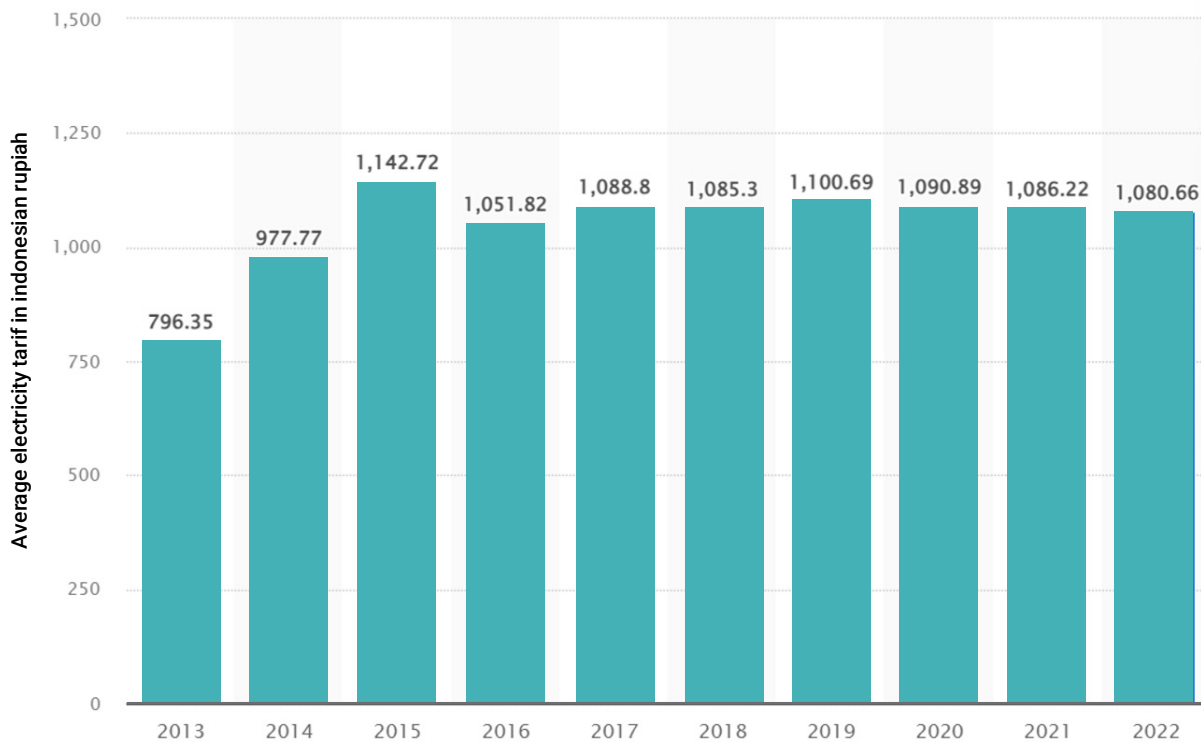


Figure 2.2 Electricity Selling Price in Indonesia (2013-2022) (in Indonesian Rupiah/kWh) ²⁴

2.3 Steady increase in electricity demand

Increasing electricity demand should be countered by energy saving rather than installing new power sources. Higher electricity demand will come from the switch from fossil fuels in the mobility sector (e.g. eMotorbikes, eVehicles, eBuses, and electrification of rail), digitalisation of the entire economy and private sector, usage of internet and streaming services, Industry 4.0, climate change with higher temperatures and increased usage of AC in buildings, to name some major trends.

2.4 Available financing for EE investments

Experience shows that the availability of (attractive) financing significantly supports EE investments. The more choices in financing customers have, the more likely it is that investments are made.

²⁴ Statista Research Department (2023) Average electricity selling price by PLN for industries Indonesia 2013-2022. Available at: <https://www.statista.com/statistics/1301384/pln-electricity-selling-price-for-industries/>

2.5 Subsidies provided for EE investments

Subsidies can play a significant role in influencing energy efficiency investment decisions. They can be a powerful tool to encourage individuals, businesses, and governments to invest in energy-efficient technologies and practices. Here is how subsidies can impact energy efficiency investment decisions:

- **Cost Reduction:** Energy-efficient technologies and practices often incur higher upfront costs than conventional alternatives. Subsidies can help offset these initial costs, making energy-efficient options more financially attractive and feasible for individuals and businesses.
- **Return on Investment (ROI):** Subsidies can improve the financial viability of energy efficiency projects by enhancing their ROI. When subsidies reduce the payback period for energy efficiency investments, it becomes more attractive for investors, as they can recoup their initial outlay more quickly.
- **Risk Mitigation:** New and innovative energy-efficient technologies might carry some uncertainty or perceived risk. Subsidies can help mitigate these risks by providing a safety net and encouraging more investors to take a chance on such technologies.
- **Market Transformation:** By providing subsidies, governments can help create demand for energy-efficient products and services. This increased demand can drive market competition and innovation, leading to further cost reductions and technological improvements.
- **Behavioural Change:** Subsidies can incentivise behavioural changes by promoting energy-efficient practices. For instance, residential energy efficiency subsidies might encourage homeowners to insulate their homes, use energy-efficient appliances, or install solar panels.
- **Environmental Goals:** Subsidies can align with environmental objectives by promoting cleaner and more sustainable energy consumption. They can contribute to reduced greenhouse gas emissions, decreased energy consumption, and a smaller overall environmental footprint.
- **Job Creation:** Energy efficiency subsidies can stimulate economic activity by creating jobs in sectors related to the design, manufacturing, installation, and maintenance of energy-efficient technologies.
- **Barriers Removal:** In some cases, subsidies can help overcome market barriers, such as information asymmetry, lack of awareness, and limited access to financing, which might otherwise hinder energy efficiency investments.

However, it is important to note that subsidies come with their own set of challenges and considerations:

- **Budget Constraints:** Governments may have limited budgets for subsidies, and allocating funds to energy efficiency might mean diverting resources from other critical areas.
- **Long-Term Viability:** Subsidies are often intended to be temporary measures. Relying solely on subsidies without a clear plan for transitioning to self-sustaining markets could lead to market disruption once subsidies are removed.
- **Market Distortion:** If not carefully designed, subsidies can distort market dynamics, potentially favouring certain technologies or companies over others and leading to unintended consequences.
- **Equity and Distribution:** Subsidies might not always benefit all segments of society equally. There is a risk that wealthier individuals or companies could disproportionately benefit from subsidies.

In summary, subsidies can be important drivers for energy efficiency investment decisions by making such investments more financially attractive and accelerating the adoption of energy-efficient technologies. However, a balanced and well-designed approach is crucial to ensure that subsidies effectively achieve their intended goals while minimising potential drawbacks.

2.6 Reduction of energy dependence

Investments in energy efficiency can play a crucial role in reducing energy dependencies for both individual nations and the global community. Energy dependency refers to the extent to which a country relies on external energy sources, such as imported fossil fuels, to meet its energy needs. Here is how energy efficiency investments can contribute to reducing energy dependencies:

1. **Reduced Energy Consumption:** Energy efficiency measures focus on using energy more effectively to achieve the same or better outcomes. By adopting energy-efficient technologies, industries, businesses, and households can decrease their overall energy consumption. This reduced energy demand can lead to decreased reliance on imported energy sources.
2. **Diversification of Energy Sources:** Investing in energy efficiency can encourage diversifying energy sources. For example, improving energy efficiency in buildings can reduce the need for heating and cooling, which often rely on imported fossil fuels. This can make transitioning to domestically available renewable energy sources like solar, wind, and hydropower easier.
3. **Lower Import Costs:** Countries that heavily rely on energy imports can face significant economic risks due to fluctuations in global energy prices. Countries can lower their import costs by investing in energy efficiency and reducing energy demand, making their economies less vulnerable to international price volatility.
4. **Enhanced Energy Security:** Energy efficiency investments can enhance a country's energy security by reducing its vulnerability to supply disruptions. When a nation is less dependent on imported energy, it becomes more resilient to geopolitical tensions, trade disruptions, and other external factors that could impact energy supply.
5. **Local Job Creation:** Implementing energy efficiency initiatives, such as retrofitting buildings or upgrading industrial processes, requires local expertise and labour. Investing in energy efficiency can create jobs and stimulate economic growth within the country, further contributing to reduced dependencies on external energy sources.
6. **Technological Innovation:** Energy efficiency investments often drive technological innovation, leading to the development of advanced energy-efficient technologies. This innovation can position a country as a leader in sustainable technologies, potentially enabling it to export these solutions to other regions.
7. **Environmental Benefits:** Energy efficiency measures often align with environmental goals by reducing greenhouse gas emissions and other pollutants. As countries invest in cleaner and more efficient technologies, they can decrease their reliance on polluting energy sources, both domestic and imported.
8. **Energy Sovereignty:** Energy efficiency investments can contribute to a sense of energy sovereignty, where a country has greater control over its energy destiny. By reducing the need for external energy sources, nations can have more control over their energy supply and policies.

It is important to note that while energy efficiency can significantly reduce energy dependencies, it might not eliminate them entirely, especially in cases where specific energy resources are unavailable locally. Nonetheless, a strategic focus on energy efficiency can help countries achieve a more balanced and resilient energy portfolio, enhancing their overall energy security and sustainability.



03

Existing government initiatives and measures in Indonesia which support EE

3.1 Government Regulation (PP) No. 33/2023 on Energy Conservation

Throughout 2007-2023, Indonesia has issued regulations on energy conservation and energy efficiency:

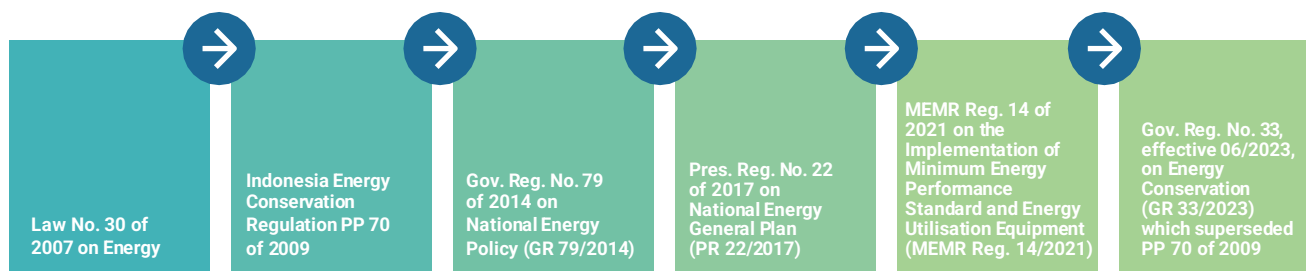


Figure 3.1 Regulations on Energy Conservation Issued throughout 2007-2023

New on the latest regulation GR 33/2023 is that Energy Conservation is defined as follows and includes Upstream and Downstream management:

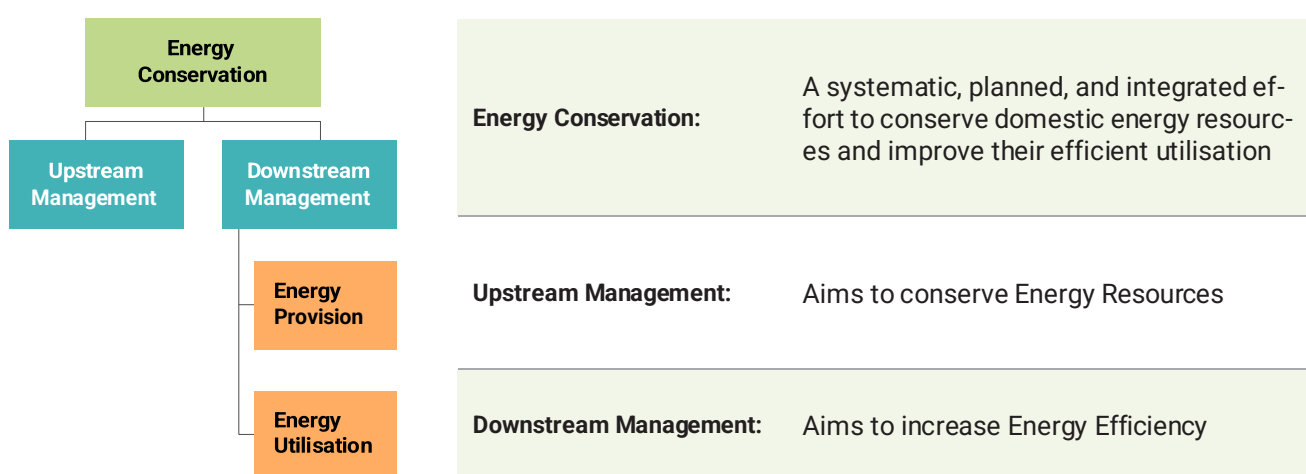


Figure 3.2 Energy Conservation Definition Based on Government Regulation No. 33/2023 on Energy Conservation

GR 33/2023 requires Energy Resource Users and Energy Users to carry out Energy Conservation in Energy Provision, including transportation, industry, household, and building sectors.

Government Regulation (PP) Number 33 of 2023 concerning Energy Conservation (replacement of PP 70/2009) was issued to regulate energy use efficiently, rationally and prudently to meet present and future energy needs. Changes stipulated through PP 33/2023 concerning Energy Conservation in comparison with the previous PP 70/2009 can be seen in Table 3.1.

Table 3.1 Comparison of Government Regulation No. 70/2009 and Government Regulation No. 33/2023

	PP 70/2009 Energy Conservation	PP 33 Energy Conservation
Responsibilities of central and local governments	Doing the same according to the scope of the region	Explains the subject, implementation, budgeting, and reporting
Scope of sectoral responsibilities	Not broken down by sector, only mentions energy and/or energy source users	More detailed scope of energy conservation with obligations on each sector including energy providers
Financing and reporting	Very limited and not comprehensive	Oversees budget utilization, public-private partnership (PPP/KPBU) schemes, as well as tiered reporting, monitoring, evaluation, and measurements
Incentives and disincentives	Incentives and disincentives are less applicable	Incentive and disincentive schemes clarified in accordance with authority
Data, information, coaching and monitoring	Data and information missing; coaching and monitoring aspects not detailed	Organizing access, distribution, and exchange of data/information; objects of coaching and monitoring as well as the formation of functional roles

In the latest Gov. Reg. No. 33 of 2023, Energy Conservation Financing is now also covered: Energy Conservation Financing can be sourced from:

1. Energy Providers and Energy Resource Users and/or Energy Users, or
2. Other legal financing sources in accordance with applicable regulations.

This provision indicates that Energy Providers, Energy Resource Users, and/or Energy Users can be financing companies. In particular, PP 33/2023 also elaborated on potential financing and investment sources supporting energy efficiency including through the public-private partnership (PPP/KPBU) scheme, as well as potential future fiscal support that will be regulated through upcoming Ministry of Finance Regulations. Furthermore, PP 33/2023 regulates the disincentives for energy conservation initiatives, in which the regulation stipulated that disincentives can be applied for energy providers and users which include revocation of incentives.

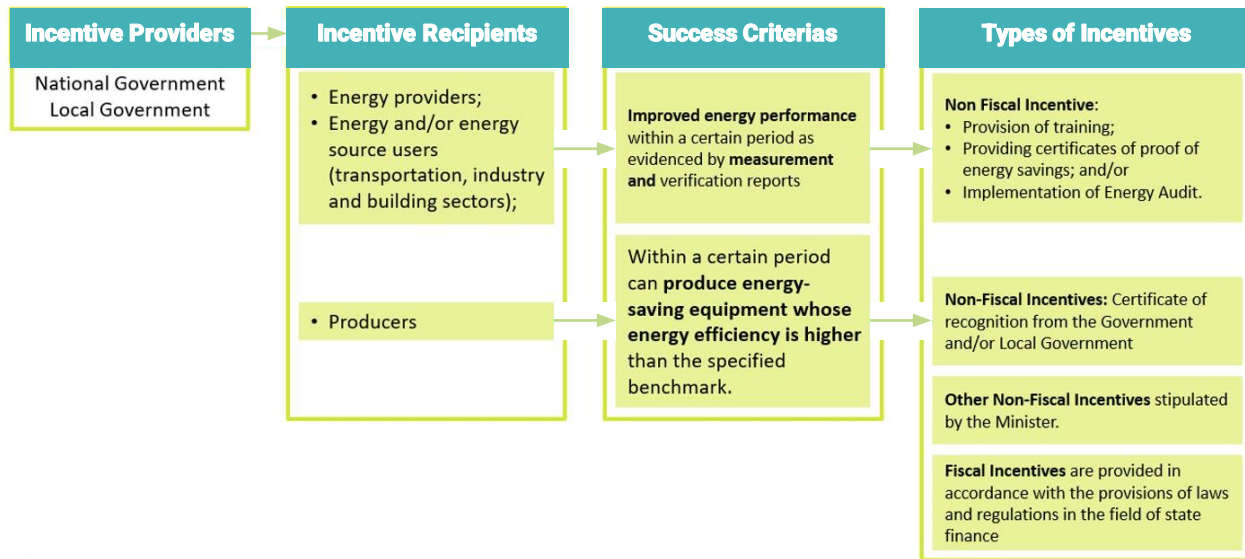


Figure 3.3 Incentives Under PP No.33/2023²⁵

Intelligent and efficient use of energy is essential in maintaining the sustainability of energy resources and protecting the environment. In this context, the government stipulates Government Regulation Number 33 of 2023 as a concrete step to regulate the use of energy resources, energy sources, and energy itself. The main objective of this regulation is to ensure the availability of sustainable national energy by implementing efficient energy technology, efficient and rational use of energy, and promoting an energy-saving culture. In the industrial sector, companies with energy consumption of 4000toe/year are now mandated to implement energy management measures. Furthermore, buildings with energy consumption of 500toe/year are now also mandated to implement energy efficiency measures.

Furthermore, the Ministry of Energy and Mineral Resources is currently in the process of formulating seven derivative regulations of PP 33/2023 on Energy Conservation in 2023, these seven regulations consist of:

1. Implementation of Energy Management (Mandated by Article 12);
2. Energy Service Companies (Mandated by Article 23);
3. Energy Conservation implementation by central government by local government (Mandated by Article 44);
4. Success Criteria of Energy Conservation (Mandated by Article 49);
5. Incentives and Disincentives (Mandated by Article 23);
6. Energy Data and Indicators (Mandated by Article 55);
7. Guidance and Supervision of Energy Conservation (Mandated by Article 61).

²⁵ From the Ministry of Energy and Mineral Resources (2023) Peraturan Pemerintah Nomor 33 Tahun 2023 tentang Konservasi Energi

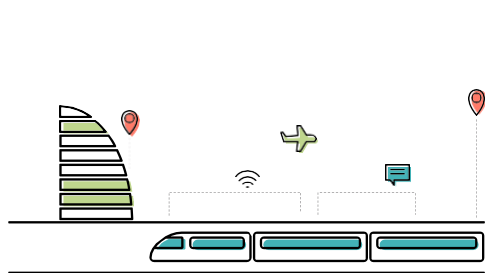
Insights acquired from the focus group discussion conducted in 2024 highlighted that the implementation of PP 33/2023 on Energy Conservation will require investments for the industry and buildings sector to implement retrofits or EE technology implementation. FGD participants also highlighted the need for new financing schemes respectively for low cost, medium cost, and high cost EE activities. This financing scheme is needed to support companies to implement EE measures and require collaborations and coordination between government institutions as well as financial institutions.

3.1.1 Definition and scope of energy conservation

Government Regulation Number 33 of 2023 provides a clear definition regarding energy conservation. Energy conservation is a systematic, planned and integrated effort to conserve domestic energy resources and increase the efficiency of their use. In addition, this regulation also regulates the conservation of energy resources, which is the management of energy resources while maintaining and increasing the quality, value and diversity of energy resources. The scope of energy conservation regulated in this PP includes energy management on the upstream and downstream sides.

Energy management on the upstream side is carried out through the conservation of energy resources in accordance with the provisions of the laws and regulations that apply in the sub-sector. Meanwhile, energy management on the downstream side includes energy supply and energy utilisation activities, which cover the transportation, industrial, household and building sectors.

The energy utilisation activities consist of the following sectors:



Transport



Household



Industrial



Building

3.1.2 Implementation of energy conservation

Implementing energy conservation in Government Regulation Number 33 of 2023 includes several important aspects. Several programs implemented in the energy management stage on the downstream side include: ²⁶

- **Energy Management**
This program aims to optimise energy use through good management. In this regard, companies and organisations are expected to implement an effective energy management system to identify, measure, and control energy consumption in a directed manner.
- **Energy Performance Standards and Energy Saving Sign Labels**
To encourage efficient energy use, this regulation regulates the establishment of energy performance standards and energy-saving labels for certain products and services. This standard will assist consumers in choosing products that are more energy efficient.
- **Energy Conservation Financing**
The energy conservation financing program encourages investment and implementation of energy conservation projects. As previously elaborated, Through an adequate financing scheme, it is hoped that the community and business actors can more easily access funds to implement profitable energy conservation projects.
- **Development of Energy Conservation Service Business**
Developing an energy conservation service business is one of the efforts to improve energy efficiency in various sectors. In this program, the government encourages and supports companies and professionals engaged in energy conservation services to continue developing expertise and quality services.
- **Increasing Awareness of Energy Conservation**
This program aims to increase public awareness of the importance of energy conservation and ways that can be done in everyday life. The government will conduct campaigns and outreach to provide accurate information regarding the benefits of energy conservation and practical steps that can be implemented.
- **Human Resources Capacity Building**
To achieve energy conservation goals, it is crucial to increase the knowledge and skills of human resources involved in the energy sector. This program will provide training and education to the workforce to implement energy conservation practices effectively.
- **Research and Innovation**
In the field of energy conservation, research and innovation play an important role in the development of more efficient technologies and methods. The government will support research and development in energy conservation to produce innovative solutions that can be implemented on a broader scale.
- **Cooperation in the Field of Energy Conservation**
The energy conservation cooperation program involves collaboration between the government, the private sector, academia, and the community to improve overall energy conservation performance. This framework facilitates the exchange of knowledge, experience, and resources, enabling more effective energy conservation goals.

²⁶ IEC (2023) *Mengenal Peraturan Pemerintah (PP) Nomor 33 Tahun 2023 tentang Konservasi Energi*. Available at: <https://environment-indonesia.com/mengenal-peraturan-pemerintah-pp-nomor-33-tahun-2023-tentang-konservasi-energi/>

It can be expected that this new law will boost the EE industry, as it also increases demand. For example, Article 34 demands that commercial buildings with an annual consumption of 500 TOE must implement energy management systems, including periodic energy audits. In addition, PP 33/2023 also regulates the implementation of energy conservation measures specifically in the context of national and regional governments' responsibilities (Figure 3.3), this is especially relevant with the implementation of energy efficiency including energy management measures in state-owned government buildings at the national and regional levels.

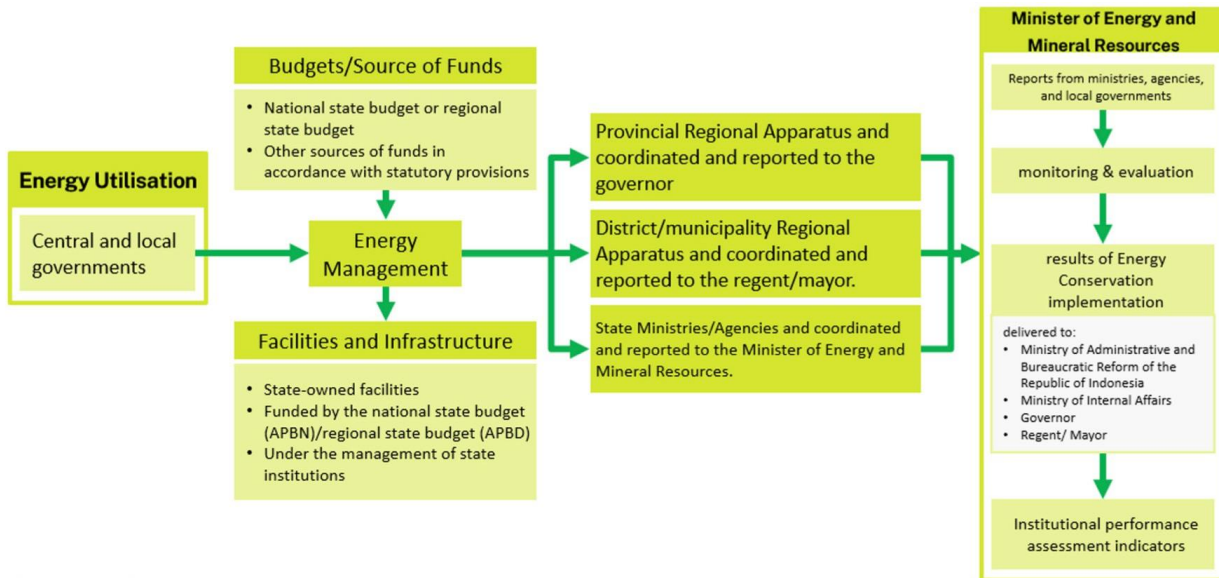


Figure 3.4 Implementation of Energy Conservation by the Central Government and Regional Government²⁷

Whereas, for the upstream side, energy efficiency measures regulated by PP 33/2023 include focus on the adjustments of: (1) adjustments or measures on energy resources that are prioritized to be cultivated and/or provided; (2) adjustments or measures on the amount of energy resources that can be produced; (3) limitation measures of energy resources that within a certain time limit cannot be cultivated. Summary on the implementation of energy conservation based on the newest PP 33/2023 is presented in the following figure:

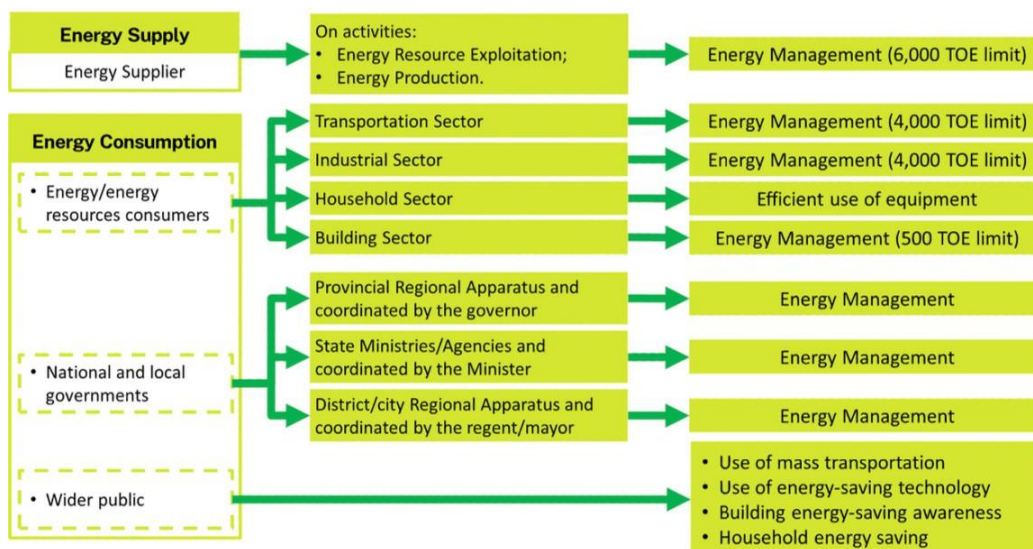


Figure 3.5 Energy Conservation Implementation in the Upstream Side based on PP 33/2023²⁸

²⁷ From the Ministry of Energy and Mineral Resources (2023) Peraturan Pemerintah Nomor 33 Tahun 2023 tentang Konservasi Energi.

²⁸ From the Ministry of Energy and Mineral Resources (2023) Peraturan Pemerintah Nomor 33 Tahun 2023 tentang Konservasi Energi.

3.2 The new Minimum Energy Performance Standard (MEPS) and energy labelling

3.2.1 Minimum Energy Performance Standard (MEPS)

The MEMR released Regulation No. 14/2021 on implementing MEPS for electrical appliances in June 2021, which regulates the implementation of MEPS and energy labelling for air conditioners, fans, refrigerators, and rice cookers. All standards for these appliances have already followed international best practices regulated in detail in four separate MEMR Ministerial Decrees. Specifically, the standard for air conditioners is already more stringent.

All appliances that are manufactured after June 2021 will follow this new regulation. To monitor the implementation, the MEMR will perform a spot check, i.e. randomly buy an electric appliance and test it in the laboratory to compare the result with the proper energy labelling.²⁹

MEMR works closely with the IEA in the Energy Efficiency in Emerging Economies (E4) Program. One of the activities conducted in 2021 was training on energy efficiency indicators in the industrial sector. The

activity aimed to enhance Indonesian policymakers' knowledge and skills in identifying energy efficiency needs and opportunities, developing and implementing appropriate energy efficiency policies, and measuring the impact of these policies.

It was identified that lack of awareness is still one of the main barriers for EE in Indonesia, for example, awareness of residential occupants on MEPS is only 6.5%. Therefore, to support the implementation of energy conservation in Indonesia, the Directorate General of Renewable Energy and Energy Conservation of MEMR launched Sistem Informasi Konservasi Energi (SINERGI) in June 2021. SINERGI is a 'one-stop energy solution' platform providing comprehensive information on energy efficiency and conservation in Indonesia. The online platform is intended to bring convenience to industry players in energy management reporting, which covers energy conservation, energy efficiency, and energy-saving status.

3.2.2 Energy Saving Sign Labels

The Energy Saving Label is a sign affixed to household appliances to educate consumers to choose energy-efficient products wisely. The Energy Saving Label also encourages Manufacturers to improve product quality to increase national energy efficiency. MEMR has set a target for issuing the MEPS regulation for each appliance, prioritising appliances with a large proportion of electricity consumption. Regulations for

ACs, rice cookers, fans, refrigerators, and LED lamps have been issued. In contrast, regulations for washing machines, TVs, induction stoves, water pumps, and others will be finalised by 2023. Efforts are needed to increase public awareness as Indonesian residential occupants have only 6.5% awareness of energy efficiency labelling (MEPS).

²⁹ IESR (2022) *Indonesia Energy Transition Outlook*. Available at: <https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2022>

3.3 Energy efficiency in buildings

Certified green buildings will receive incentives through reduced building approval fees (PBG) and reduced service fees from the local government (based on Government Regulation No. 16/2021). However, there is still no transparent incentive scheme from many local governments. Only five cities currently have local green building policies in place: Jakarta, Bandung, Samarinda, Semarang, and Bali (ongoing policy development).

The increased potential for space cooling increases the urgency to provide efficient air conditioning for homes, specifically as rising temperatures are also felt in Indonesia with hotter average temperatures and increased purchasing power of the population that can

afford AC systems in their homes. Studies show that all countries have a positive correlation between people’s income and AC ownership. The penetration and variety of household appliances also increase as monthly expenditure rises. Households spending over IDR 6 million/month have a much higher penetration rate for air conditioners and other high-power appliances. With national goals and forecasts calling for a rise in GDP per capita and per-capita income that will concurrently grow, and with the penetration of AC increasing by an average of 0.5% per year, the MEPS rating must be adjusted at regular intervals, so that with each new sales penetration, the appliance performance can be ideally increased.

Share of Energy Used from Residential Appliances

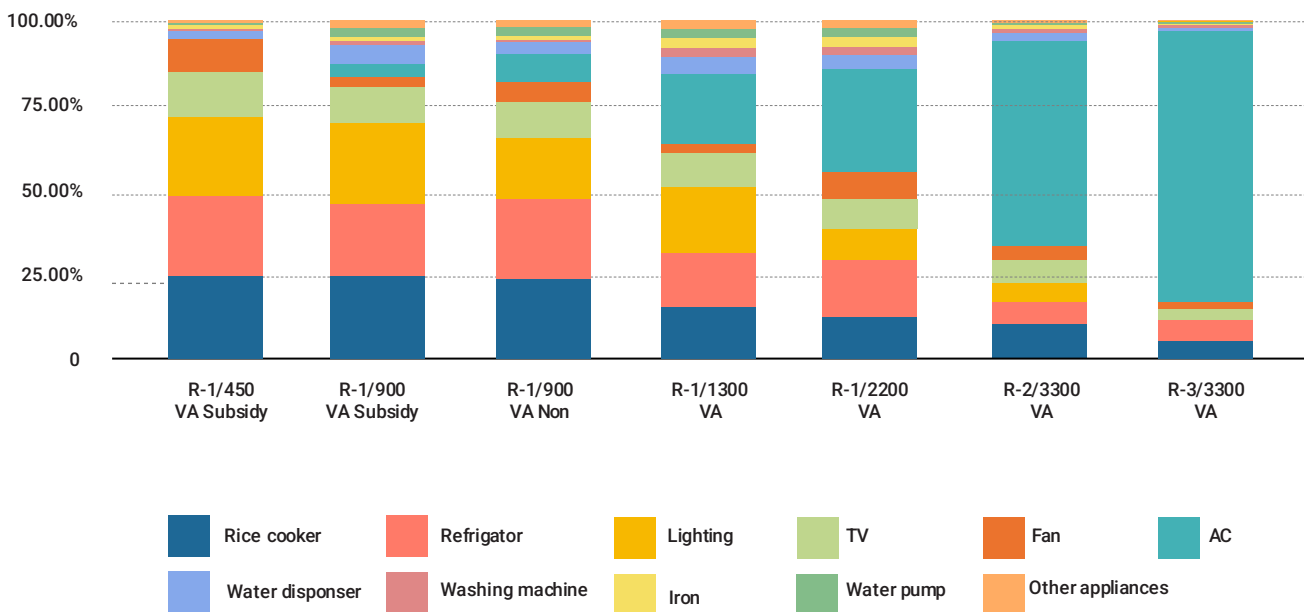


Figure 3.6 Share of Energy Used from Residential Appliances³⁰

To address the appliances’ energy efficiency issue, the MEMR applies energy labelling with several ratings for appliances called MEPS (Minimum Energy Performance Standards). By using AC with a 4.2 Coefficient of Performance, up to 21% of potential energy saving can be obtained by a building (equivalent to a reduction of up to 11.048 GWh of residential’s annual electricity consumption). However, this strategy will have an incremental cost of IDR 3.5 million/unit. Further reductions in electricity consumption can be achieved through greater use of MEPS-labelled appliances at home.

³⁰ IESR (2023) Indonesia Energy Transition Outlook. Available at: <https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2023>

Energy efficiency regulations in the building sector ³¹

Table 3.2 Energy efficiency regulations in building sector ³²

	Regulation	Building/Appliances (Mandatory)	Energy efficiency effort
Green building	Government Regulation 16 2021 on Green Building and Ministerial Regulation of The Ministry of Public Works and Housing of Republic Indonesia 21 2021 on Performance Assessment on Green Building	50.000 m ²	Mix-use buildings, Offices
		20.000 m ²	Health care
		10.000 m ²	Assembly (School, Religious, Civil, Clubs)
		5.000 r m ²	Shops, Restaurants, Cafes, Markets
		5.000 m ²	Warehouse, Carparks
		5.000 m ²	Factories & Laboratories
Minimum Energy Performance Standard (MEPS)	Regulation of Minister of Energy and Mineral Resources Number 14 of 2012 on Minimum Energy Performance Standard	HVAC	HVAC Standard by Ministerial Decree of Minister of Energy and Mineral Resources Number 103.K/EK.07/DJE/2021
		Refrigerator	Refrigerator Standard by Ministerial Decree of Minister of Energy and Mineral Resources Number 113.K/EK.07/DJE/2021
		Fan	Fan Standard by Ministerial Decree of Minister of Energy and Mineral Resources Number 114.K/EK.07/DJE/2021
		Rice Cooker	Rice Cooker Standard by Ministerial Decree of Minister of Energy and Mineral Resources Number 115.K/EK.07/DJE/2021
Behaviour	Regulation of Minister of Energy and Mineral Resources Number 14 of 2012 on Energy Management	Government	Energy management, Energy audit, Operational (HVAC, lighting, lift, computer, photocopier, water heater, capacitor bank, energy diversification), Incentives
		BUMN/State-Owned Enterprise (SOE)	
		BUMD/municipally-owned corporation	
		BUMN/State legal entities	

³¹ IESR (2023) *Indonesia Energy Transition Outlook*. Available at: <https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2023>

³² IESR (2023) *Indonesia Energy Transition Outlook*. Available at: <https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2023>

3.4 Just Energy Transition Partnership (JETP)

The Just Energy Transition Partnership (JETP) was officially launched for Indonesia during the G20 summit in November 2022. This program is a collaboration between the International Partners Group (IPG) and the Indonesian government, plus Denmark and Norway, co-led by Japan and the US during negotiations.

JETP pursues a net-zero power sector by 2050 and a 34% renewable energy share in the power sector by 2030. These goals are supported by the Indonesian government's decision to put the current CFPP project in RUPTL 2021–2030 on hold, limiting new coal fleets following Presidential Regulation No. 112/2022 and reducing fossil fuel subsidies. JETP is expected to accelerate the energy transition by providing support policy and strengthening the enabling environment for RE, energy efficiency industry development, and sustainable finance market expansion. To achieve these goals, Indonesia must adjust the high local content requirement, develop local renewable energy industries, and work with financial institutions to unlock massive investment potentials to reach a net-zero economy.

JETP Indonesia Comprehensive Investment Plan (CIPP) Launched in November 2023 outlined five investment focus areas: (1) Transmission lines and grid deployment; (2) Early coal-fired power plant retirement and managed coal phase-out; (3) Dispatchable renewable power development acceleration; (4) Variable renewable power deployment acceleration; (5) Renewable energy supply chain enhancement. Most importantly, in 2024 a sixth investment focus area is planned to be established following the formation of the fifth working group on Energy Efficiency and Electrification. This sixth investment focus area will be included in the subsequent 2024 version of the JETP CIPP, highlighting the importance of energy efficiency in better management of supply needs and support an ambitious decarbonization pathways. In addition, one of the key recommendations of the JETP CIPP 2023 related to energy efficiency involved how greater energy efficiency and premium for excessive consumption can help reduce current customer bills and reduce the cost of energy transition while also contributing towards the improvement of the State Electricity Company's financial sustainability.



04

Various financing schemes for EE measures, with a particular focus on ESCO financing

4.1 Main consideration for EE financing structures

A successful EE finance structure incentivises each of the main stakeholders involved. It balances the relative risks of implementing EE projects.

One of the primary considerations to opt for the one or other model for EE investments through an ESCOs is the question of who makes the investment and puts the asset on his balance sheet. Often, customers want that the debt resides on someone else's balance list (ESCOs, finance institution). Both public and private

customers benefit from off-balance sheet financing because the debt service is commonly treated as an operational expense and not a capital obligation; debt ratings are therefore not impacted. For highly leveraged companies, this is important because the obligation not showing up on the balance sheet as debt means that the company's borrowing capacity is freed up. Table 4.1 shows the classification of Product System Service (PSS) characteristics:

Table 4.1 Classification of Product System Service (PSS) characteristics

	Use-Oriented Services (UOS)	Result-Oriented Services (ROS)
Type of ESCO	Energy Service Performance Contract	Energy Saving Agreement
Customer segments	The ownership of the product not to be the owner of the product	Clients who prefer not to own physical products
Value Propositions	ESCO delivers the functional capability to the customer. The customer's access to a product	ESCO delivery on the functional result
Channels	A lease contract	Direct interface with the end client
Customer Relationships	A blend of transitional and relationship	Relationship-based
Revenue Streams	Payment is based on availability	Payment is based on per unit time or unit use
Key Partnerships	Long-term collaboration with service suppliers	Need to organise outsourced tasks efficiently
Key Activities	Need for new provider activities and management services	New activities related to how to design products and services according to the function required and how to extract customer requirements
Cost Structure	The need for capital is high	Risk premium (responsibility or total costs risks). There is a need to determine all lifecycle costs

4.2 Business model development for ESCOs

The most appropriate revenue stream in the energy efficiency industry was the Product System Service (PSS) business model that applies the business model as ‘usage-oriented’ and ‘result-oriented’. Revenue streams were generated using specific services. In the mid-twentieth century, result-based compensation was derived from performance-based contracting of public-

private partnerships (PPPs). Over time, it evolved and found its way. BASF Coatings was the first company to use the ‘cost per product’ revenue stream since the late 1990s. Xerox, an American maker of printers and photocopiers, was providing results-based payments. It evolved again Rolls Royce implemented this model; the program’s name was Power by Meter.

4.2.1 Shared Savings Model, also called Energy Service Agreement (ESA) or Energy Performance Contract (EPC)

An Energy Service Agreement (ESA) is a pay-for-performance, off-balance sheet financing solution that allows customers to implement energy efficiency projects with zero upfront capital expenditure. The ESA provider pays for all project development and construction costs through the ESA. Once a project is operational, the customer makes service charge payments for actual realised savings. The cost per unit of savings is a fixed output-based charge set at or below a customer’s existing utility price, resulting in immediate reduced operating expenses.

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. To fuel their growth, ESCOs (primarily SMEs) are forced to try to raise substantial amounts of equity for their EEPs. This leads to balance sheets that more closely resemble those of banks and leasing companies rather than their actual identity as service companies. 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 10 years. Unfortunately, the Shared Savings model is significantly limiting the ESCO industry’s growth when compared to 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 to cover its financing repayment.³³

Under an EPC arrangement, an ESCO develops, implements and finances (or arranges the financing of) an EE or RE project and uses the stream of income from the cost savings or the RE produced, to repay the project costs, including the costs of the investment. Essentially, the ESCO will not recover all its costs unless the project delivers all the energy savings guaranteed.

The Shared Savings model offers a key benefit in the form of an assured shared percentage of the monetary savings that the client pays the ESCO. This ensures that the ESCO can repay the loan.

³³ Energy Transition Partnership (2022) *Diagnostic Review and Analysis of Energy Efficiency Development in Indonesia*. Available at: <https://www.energytransitionpartnership.org/resource/diagnostic-analyses-report-of-energy-efficiency-development-in-indonesia/>

Shared Saving Model (ESA/EPC)

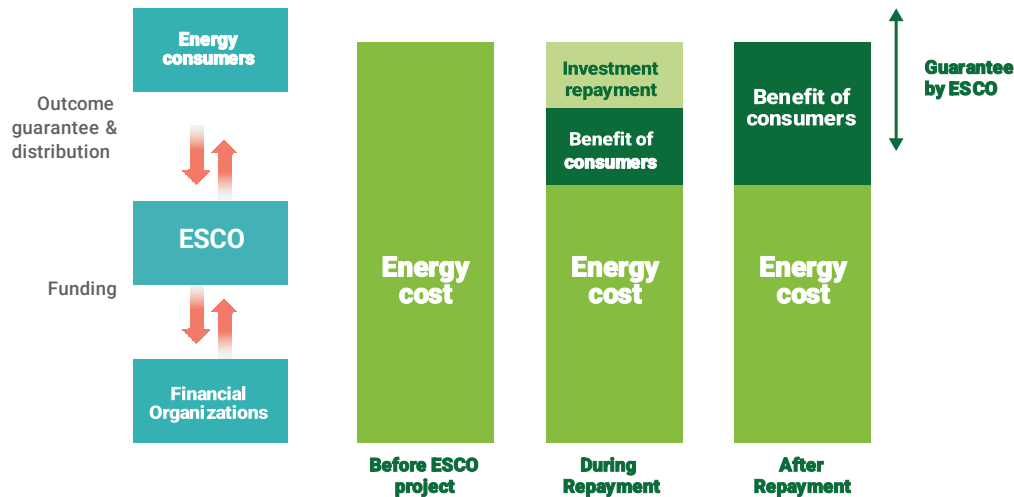
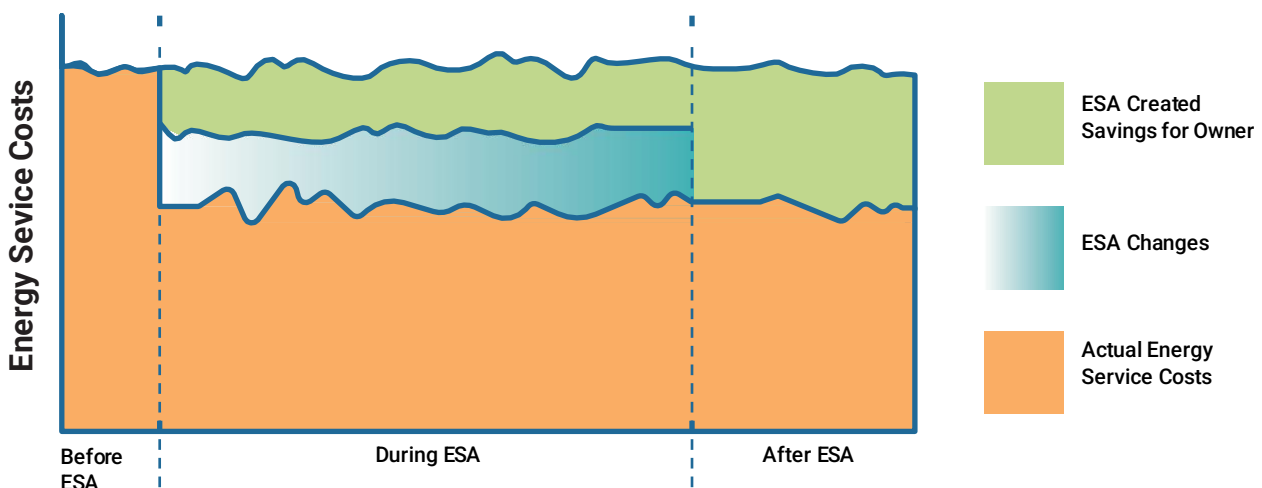


Figure 4.1 Shared Percentage of Monetary Savings through Shared Saving Model

What are the advantages?

1. **Avoided Capital Outlay** – ESA provider pays for all upfront project costs, enabling customers to conserve capital funds for investment in their core business.
2. **ESA Payments Treated as an Operating Expense** – The ESA is designed to be an off-balance sheet financing solution with regular payments similar to a standard energy utility bill or PPA.
3. **Energy Savings Pay for Projects** – The ESA enables customers to redirect a portion of their current utility spending to pay for efficiency improvements; ESA payments are based on realised energy and operational savings.
4. **Reduced Operating Costs** – ESA payments are set below the current utility price.
5. **Enhanced Reliability of Operations** – ESA providers pay for periodic maintenance services to ensure long-term reliability and performance of the project equipment.
6. **Flexible & Scalable Financing** – under an ESA, as new opportunities for savings are identified, they can be funded as they emerge.
7. **ESA providers can bundle multiple sites** with smaller-sized project opportunities (example, USD 500,000 or less) into a single ESA financing package (e.g. bundle 10 sites with USD 500,000 projects into a single USD 5 million ESA).
8. **The customer does not take project performance risk** since they only pay for savings actually achieved. Instead, the ESA provider takes the project performance risk and gets paid less if the project savings are less than expected.



Source : Associated Renewable

Figure 4.2 Profile of Energy Saving Costs through Shared Saving Model (ESA)

4.2.2 Guaranteed Saving Model, also called Outcome-Guaranteed Contract (Consumer-financed)

Under the guaranteed savings model, the client borrows money from a bank to buy and install the energy-efficient device from an ESCO. The device enables the client to gain some energy savings, resulting in monetary savings. The client will use this extra money to repay the bank loan. However, if the device fails to generate the energy savings promised by the ESCO company, it will provide a financial guarantee to the client. The guarantee implies that the ESCO will pay the client as much as the monetary difference between the promised and actual energy savings if the actual is less than the promised amount. The guarantee is valid for the duration of the contract, and depending on the level of the guaranteed saving amount vis-à-vis the actual saving amount, a cash transfer may be necessary. The following are the different scenarios:

Case 1:

When the guaranteed savings amount is more substantial than the actual savings amount, ESCOs will pay back the difference in cash.

Case 2:

When the guaranteed savings amount is lower than the actual savings amount, the difference distributed would be agreed upon between ESCOs and energy consumers.

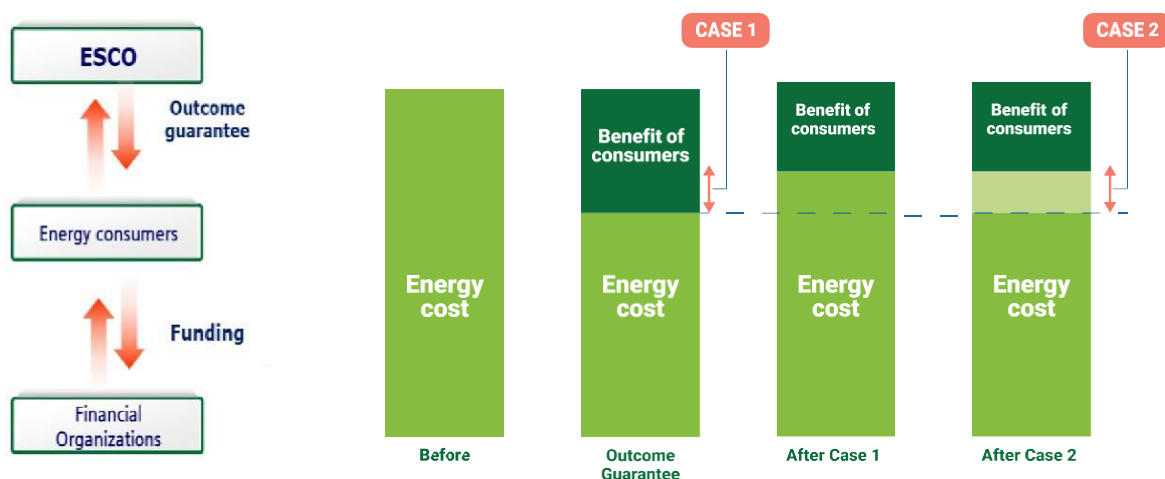


Figure 4.3 Different Scenarios Using Guaranteed Saving Model

Risk for the client:

The guaranteed savings model puts the client in a risky position because the client assumes the bank's debt risk. As such, the debt will be reflected on its balance sheet. This requires the client to be creditworthy by the bank's standards. A risk mitigation in the guaranteed savings model is providing a financial guarantee from the ESCO to the client, ensuring the client can repay the loan.

Advantage for the ESCO:

The ESCO can take up more projects because it is not liable to the bank. The ESCO is not leveraged as it does not assume debt. This model is usually prevalent in developed countries.³⁴

³⁴ Wijaya, M., Zeki, M., Siagian, A. (2021) *Exploring viable energy efficiency models in Indonesia*. Available at: <https://www.climatepolicyinitiative.org/publication/exploring-viable-energy-efficiency-business-models-in-indonesia/>

4.2.3 Special Energy Saving Performance Contracts (ESPCs) in the US with Federal Agencies ³⁵

Congress authorised Energy Savings Performance Contracts (ESPCs) to encourage federal agencies to become more energy-efficient and reduce energy use and costs through private investments. Under ESPCs, a private sector Energy Service Company (ESCO) is contracted to design, purchase, and install the necessary equipment and processes to increase energy efficiency at the facility. Federal agencies then pay the ESCO a share of the cost savings from the efficiency improvements over the contract's life. Contractors receive a predetermined share of the cost savings. They are only paid if actual savings result from the reduced energy use. In contrast, additional savings go to the Federal government. Generally, facilities undergoing comprehensive energy upgrades through ESPCs target a 50% or more reduction in energy use levels.

4.2.4 Pay-As-You-Save (PAYS) Model

The Pay-as-you-save (PAYS) model, or "On-Bill Financing," is a financing mechanism designed to promote energy efficiency upgrades and investments in buildings and facilities. The PAYS model aims to overcome the upfront cost barrier that often deters individuals and businesses from adopting energy-efficient technologies and making improvements.

In a Pay-as-you-save model, the basic principle is to allow customers to repay the costs of energy efficiency upgrades over time through the savings they achieve on their energy bills. The following is how it generally works:

1. **Energy Efficiency Upgrade:** A customer or property owner decides to implement energy efficiency improvements, such as installing insulation, upgrading lighting, HVAC systems, or renewable energy installations like solar panels.
2. **Financing:** Instead of paying the full upfront cost of the upgrades, the customer enters into an agreement with a financing entity, which could be a utility company, a third-party financial institution, or a government agency. The financing entity covers the upfront costs of the improvements.
3. **Repayment through Savings:** The customer repays the financing entity gradually over time. The repayment amount is based on the estimated energy savings from the implemented upgrades. This repayment is typically added to the customer's regular utility bill.
4. **Savings Guarantee:** To make the model attractive and viable, there is often an assessment of the energy savings potential of the upgrades before implementation. The estimated savings need to be enough to cover the financing costs while still leaving the customer with net energy bill savings.
5. **Transfer of Ownership:** In some cases, ownership of the improvements remains with the property, and the repayment obligation transfers to new occupants if the property is sold or transferred.

³⁵ IEA. (2017) Energy Savings Performance Contracts (ESPCs). Available at: <https://www.iea.org/policies/661-energy-savings-performance-contracts-espccs>

The Pay-as-you-save model offers several benefits:

1. **No Upfront Costs:** Customers do not need to pay the full upfront cost of energy efficiency upgrades, making such investments more accessible.
2. **Immediate Savings:** The upgrades are designed to generate energy savings from day one, and the savings often offset the repayment amount, resulting in immediate net financial benefits for the customer.
3. **Risk Mitigation:** By linking repayments to realised energy savings, customers are not financially responsible if the upgrades do not perform as expected.
4. **Market Transformation:** The model can stimulate demand for energy-efficient technologies, leading to market growth and innovation in the energy efficiency sector.
5. **Inclusive Approach:** The PAYS model can make energy efficiency improvements accessible to a broader range of customers, including those who might not have the means to finance upfront costs.
6. **Alignment with Goals:** It aligns with sustainability goals and energy efficiency targets set by governments, utilities, and organisations.

However, implementing a successful Pay-as-you-save model requires careful planning and coordination among stakeholders, including financing entities, utilities, property owners, and regulatory bodies. The accurate assessment of potential energy savings and the establishment of transparent mechanisms for repayment and accountability are essential for the model's effectiveness.

4.2.5 Example structure of the ESCO model for public lighting ³⁶

A special model was developed for public street lighting with an example from Brazil.³⁷ This model involves off-balance sheet financing for the municipality, where the investment is made by a third party (“third-party financing”). In this way, the investments for modernising the public lighting network do not affect municipal indebtedness limits. Below is a summary of the ESCO model.

Main Characteristics

1. The company or consortium of companies (SPV) raises funds, purchases, and installs LED luminaires in exchange for regular payment by the municipality using COSIP and/or the municipal budget.
2. The municipality is responsible for O&M services (on its own or outsourced).
3. Two modalities: (1) the ESCOs share the efficiency gains, or (2) the ESCOs receive a fixed payment for the investment made and present a product performance technical guarantee.

Risks

1. Lack of qualified municipal personnel to manage the project.
2. Lack of ESCOs’ financial capacity to ensure financing, thus reducing the scope and scale of the project.
3. Municipal credit risk.

Mitigating Factors

1. Capacity-building for municipalities.
2. Increase financing lines for ESCOs; focus on ESCOs that are subsidiary companies of electricity utilities; concentrate on small-scale projects.
3. Implement COSIP and credit guarantees.

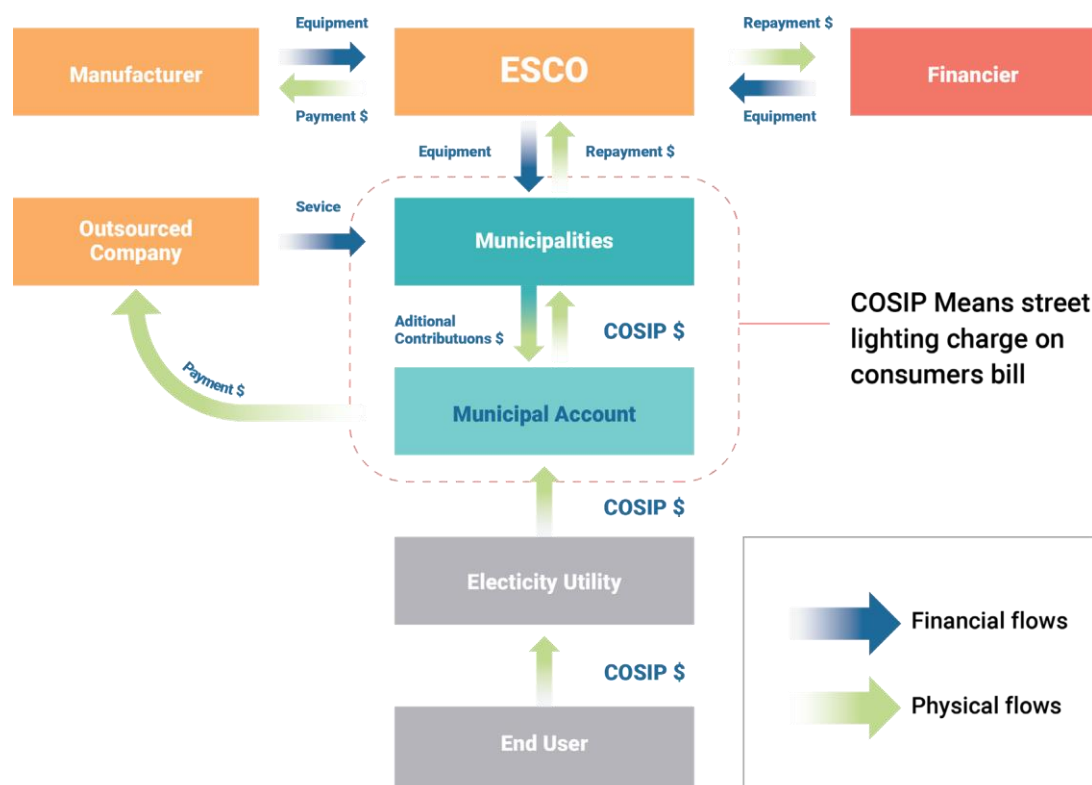


Figure 4.4 Brazilian Special ESCO Model for Public Lighting

³⁶ IMeyer, M., et al. (2017) *Lighting Brazilian Cities: Business Models for Energy Efficient Public Street Lighting*. Available at: <https://openknowledge.worldbank.org/entities/publication/244cea4e-dbde-5bdb-b733-ba150ac6834f>

³⁷ Ibid.

4.2.6 Super-ESCO Model – Example in India

A Super Energy Service Company (ESCO), often called a “Super ESCO,” is an advanced and larger-scale version of a traditional ESCO. An ESCO is a company that provides energy efficiency services, including designing, financing, implementing, and maintaining energy efficiency projects for clients. The main goal of an ESCO is to help clients reduce energy consumption, lower energy costs, and improve overall energy efficiency.

A Super ESCO takes this concept further by operating at a broader scale and often serving as a central entity to drive energy efficiency initiatives within a region or a country. Here are some key characteristics of a Super ESCO:

1. **Scale and Impact:** A Super ESCO is typically larger in scale and can implement a wide range of energy efficiency projects across various sectors, such as residential, commercial, industrial, and public infrastructure.
2. **Government or Utility Affiliation:** Super ESCOs are sometimes established by governments, utilities, or other major stakeholders in the energy sector. They may receive funding, regulatory support, or special mandates to accelerate energy efficiency efforts on a national or regional level.
3. **Aggregator of Projects:** A Super ESCO acts as an aggregator, bringing together multiple energy efficiency projects under one umbrella. By pooling resources and expertise, the Super ESCO can achieve economies of scale and drive down costs for both project implementation and financing.
4. **Standardised Approaches:** Super ESCOs often develop standardised approaches and templates for energy efficiency projects. This streamlines the process and helps ensure consistency and quality across many projects.
5. **Financing Mechanisms:** Super ESCOs may have access to various financing mechanisms, such as government grants, loans, bonds, and public-private partnerships. They can leverage these resources to provide attractive financing options to clients, making energy efficiency projects more financially feasible.
6. **Technology Deployment:** Super ESCOs may play a role in deploying advanced energy-efficient technologies and solutions that can transform the energy landscape. This could include technologies related to smart cities, renewable energy integration, and digital energy management.
7. **Capacity Building:** Super ESCOs often focus on building the capacity of local ESCOs, contractors, and professionals involved in the energy efficiency sector. They provide training, knowledge sharing, and technical assistance to enhance workforce skills.
8. **Market Transformation:** Establishing a Super ESCO can drive market transformation by creating awareness, building stakeholder confidence, and fostering a culture of energy efficiency within the region.
9. **Data and Monitoring:** Super ESCOs often emphasise data collection and monitoring to track the performance of energy efficiency projects and assess their impact over time. This data-driven approach helps validate the success of initiatives and refine strategies.

The concept of a Super ESCO is particularly relevant in regions or countries aiming to achieve ambitious energy efficiency targets or transition to a more sustainable energy future. It brings together the capabilities of various stakeholders to create a unified and impactful approach to energy efficiency. India’s EESL (Energy Efficiency Service Limited) is a government-backed Super ESCO example.

1. EESL is promoted by the Ministry of Power of India as a Joint Venture of four reputed public-sector undertakings.
2. Its primary business model is large-scale public purchase of efficient bulbs, air conditioners, water pumps, e-mobility, and others, and implementation of EE retrofitting projects.
3. Due to its government backing, EESL can obtain hundreds of millions of USD in funding from ADB, KfW, AfD, and the World Bank for energy efficiency activities; it also gets substantial funding from the Indian government.

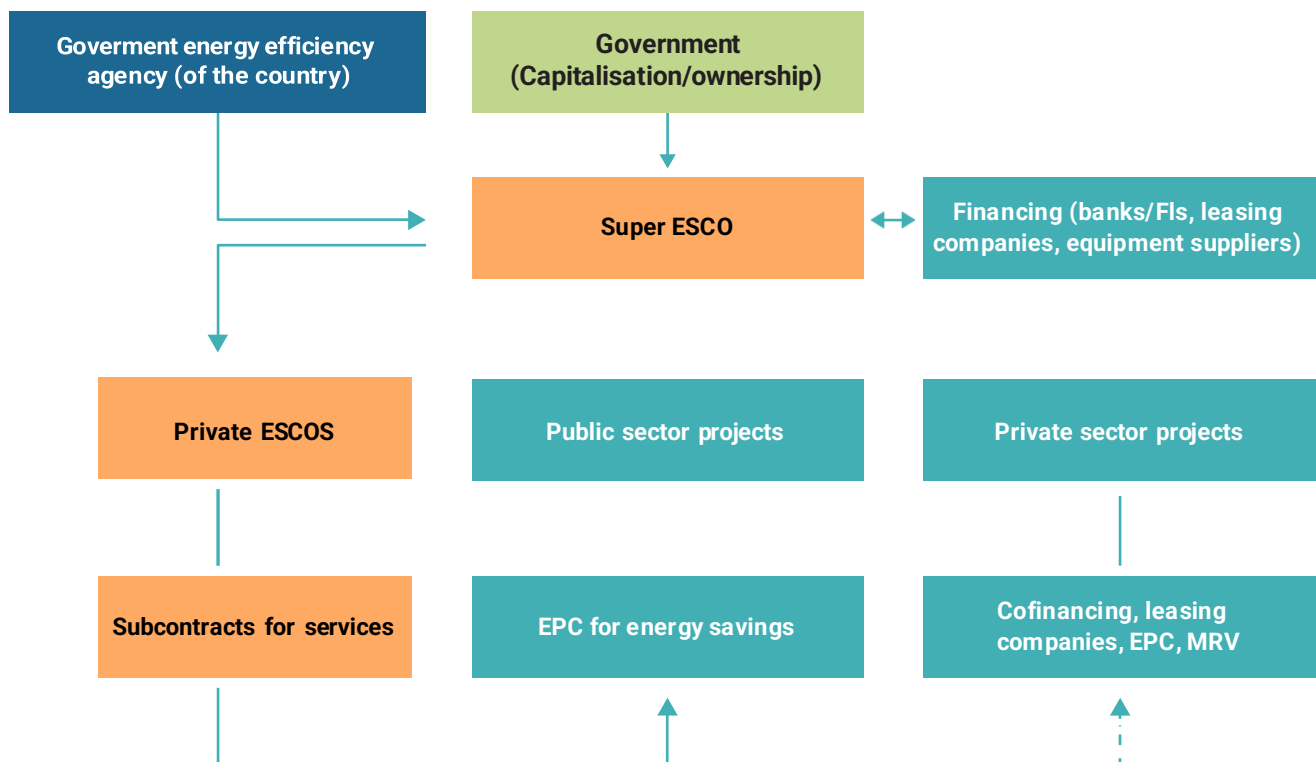


Figure 4.5 Different Scenarios Using Guaranteed Saving Model³⁸

³⁸ World Bank. (2018) *Transforming Energy Efficiency Markets in Developing Countries: The Emerging Possibilities of Super ESCOs*. Available at: <https://documents1.worldbank.org/curated/en/536121536259648570/pdf/129781-BRI-PUBLIC-VC-ADD-SERIES-6-9-2018-12-9-31-LWLJfinalOKR.pdf>

4.2.7 Chauffage contract

Another type of contract where ESCOs often engage is known as the ‘chauffage’ contract, where an ESCO takes over complete responsibility for the provision to the client of an agreed set of energy services (e.g. space heat, lighting, and motive power), for a fixed amount of payment which does not depend on the energy performances.

A chauffage, or comfort contracting, is a contract form developed to provide a “function” (for example, keeping a room at 21°C) and incorporates EE on both the supply and demand sides. However, demand-side EE measures are often “light” compared with EPC (chauffage does not include comprehensive retrofitting measures or equipment substitution). They are focused on managing and optimising the building’s operational conditions. A typical example is the ESCO implementing an energy management system at the customer facility and monitoring/managing its operating conditions (contracted functions).

This arrangement is an extreme form of energy management outsourcing. Firstly, the current cost baseline

will be accessed, analysing how much the customer pays to provide the function. The ESCO will then deduct an amount from what the customer is paying before the contract and offer the customer a flat or escalating rate lower than his current costs.

As in an energy supply contract (ESC), the ESCO will be responsible for everything needed to provide the function. This can include setting up heat boilers or coolers, fuel procurement, operation, service and maintenance of production facilities, and customer-side technical installations. To lower the cost of operation and maximise their earnings, the ESCO will optimise and implement supply-side EE measures.

Compared to EPC, chauffage contracts are generally less complex, with lower transaction costs and without the same need for costly measurement and verification. On the other hand, EPC contracts may have more comprehensive demand-side EE measures reaching a wider range of areas. They may be better suited for larger buildings.

4.2.8 Variable contract term EPC

With a variable contract term EPC, the ESCO designs, finances and implements the project. If the savings obtained are less than expected, the contract term can be extended to allow the ESCO to recover its full investment. In the First Out variation of this business model, the ESCO takes all the savings until it has received its full payment.

4.2.9 Energy Supply Contract (ESC)

An Energy Supply Contract (ESC) is a contract in which the ESCO assumes responsibility to provide the customer with a set of energy services (e.g. HVAC and lighting) at a certain level of service. The main difference between EPC and ESC is that EPC goes beyond ESC. Whereas ESC is based on a business model that guarantees energy supply, EPC is a business model focused on energy savings. The goal is to avoid wasting energy and to invest the savings in EE.

The ESCO takes over the operation and maintenance of the equipment and sells the output (useful energy) to the customer. The ESCO bears costs for all equipment upgrades, renewal, and repairs, but ownership typically remains with the customer. Typical examples are photovoltaics (PV), combined heat and power (CHP) or biomass heat supply installations. For example, in the case of heating, this includes planning

and installation of equipment, energy distribution, operation and maintenance of the production facilities, fuel procurement, and others.

The ESC focus is on the efficiency of energy supply, aiming to lower the cost of operation and maximise ESCO earnings while providing supply security. This way, supply-side EE is improved because the “useful energy” is guaranteed to the customer. The biggest weakness of ESC is that all the EE measures stay on the supply side, and there are no incentives to lower the demand side consumption.

ESC is generally oriented towards decentralised (local) power supply rather than larger centralised solutions. Energy savings are typically around 10–20%. Usually, energy services achieve economic and environmental benefits because renewable energy solutions are considered in the contracting approach.

4.2.10 Integrated Energy Contract (IEC)

An Integrated Energy Contract (IEC) is a combination of an ESC, for example, involving a CHP to supply heat and power, and an EPC, for example, involving lighting upgrades. This model extends the ESC model by including demand-side EE measures. Two objectives are combined: reduction of energy demand through the implementation of demand-side EE measures in the building (e.g. HVAC and lighting) and efficient supply of the useful energy demand, preferably from renewable energy sources.

Compared to ESC, the range of services and, thus, the saving potential are extended. Results to be achieved by the EE service now include the modernisation of the installations, lower consumption and maintenance costs and improvement of the energy indicators.

The IEC model prioritises making demand-side EE measures before moving on to supply-side measures and tries to solve some of the problems with EPC and ESC; EPC being overly complex and expensive for many projects and ESC being completely supply-side oriented.

4.2.11 Build-Own-Operate-Transfer (BOOT)

In the Build-Own-Operate-Transfer (BOOT) business model, the ESCO elaborates on the project, builds/deploys, operates with the owner, and transfers the installation/system to the customer at the end of the contract. As ESC, this type of contract is typical in projects that produce systems, such as CHP or PV. Customers enter into long-term supply contracts with the BOOT operator and are charged accordingly

for the service delivered; the service charge includes capital and operating cost recovery and project profit. This way, the ESCO investment and operational costs are covered by subscription fees. Due to the long-term nature of the arrangement, the fees are usually raised during the contract period. The BOOT model is similar to a loan made by the ESCO to the customer, including energy management during the contract period.

4.2.12 Summary of ESCO's existing business models

Table 4.2 Strengths and Weaknesses of ESCO's Existing Business Models

Business models	Strengths	Weaknesses
EPC with shared savings • Common in developing countries/markets	Shared Savings model (win-win situation for both the ESCO and the customer)	The ESCO finances the project's total investment and repays the loan
EPC with guaranteed savings • Prevalent in developed countries	Common in developing countries/markets	The customer finances the total investment of the project. The ESCO assumes the risk of the project's performance. The ESCO compensates the customer if the agreed target cost savings are not achieved
Variable contract term EPC	If the savings obtained are less than expected, the contract term can be extended to allow the ESCO to recover its full investment	The ESCO finances the project's total investment and repays the loan
Energy supply contract (ESC)	Prevalent in developed countries	The ESCO manages the cost and risk of delivering the contracted service
Chauffage	The key benefit for the customer is the cost efficiency of the solution, the standard quality of the service and the "no need to worry about" the installation and maintenance of the energy production facilities	The ESCO finances the project's total investment (however, lower than in an EPC) and is responsible for maintenance costs
Integrated energy contract	Compared to EPC, chauffage contracts are generally less complex, with lower transaction costs and without the same need for costly measurement and verification	The ESCO finances the project's total investment and repays the loan
Built-Own-Operate-Transfer (BOOT)	This model extends the ESC model by including demand-side EE measures. It combines two objectives: reduction of energy demand by implementing demand-side EE measures in the building and efficient supply of the useful energy demand, preferably from renewable energy sources	The ESCO finances the project's total investment and repays the loan. The ESCO is also responsible for the energy management and operational costs
Integrated energy contract	Customers are charged accordingly for the service delivered by the ESCO	New activities related to how to design products and services according to the function required and how to extract customer requirements
Built-Own-Operate-Transfer (BOOT)	The ESCO service charge includes capital and operating cost recovery and project profit	Risk premium (responsibility or total costs risks). There is a need to determine all lifecycle costs

4.3. Experiences with ESCO business models in Indonesia³⁹

According to CPI (2021), the two most common energy efficiency business models offered by energy services companies (ESCOs), shared and guaranteed savings, have not successfully addressed business challenges in Indonesia, this result is also documented in the study. The Shared Savings model in Indonesia is still uncommon, considering that ESCO companies must withdraw the bank loan in Indonesia. Most ESCOs in Indonesia are usually small and cannot convince the banks to give them loans. Most clients that engage in energy efficiency contracts in Indonesia are large green-conscious companies, and they can convince the banks. Therefore, the guaranteed savings practice is more prevalent.

Therefore, it is suggested by Climate Policy Initiative (CPI) that improved business models need to be explored to accelerate energy efficiency development. The CPI study found three viable business models to be scaled up in Indonesia, namely:

1. Service or device business model
2. Leasing and purchase business model
3. Quality-energy service business model

4.4. Public funding examples

4.4.1 Creation of a public bank to finance EE and RE projects in the UK

The UK government created a public bank to finance projects of EE and RE and mobilise other private sector capital into the UK's green economy. The Green Investment Banks has backed 74 green infrastructure projects, committing EUR 3 billion to the UK's green economy.

Several countries in Asia have taken steps to create public banks or financial mechanisms to finance energy efficiency projects. Here are a few examples:

1. **India:** The Energy Efficiency Services Limited (EESL) is a public sector energy service company that the Indian government established. EESL has implemented various energy efficiency and renewable energy projects nationwide.
2. **China:** The China Development Bank (CDB) and the Export-Import Bank of China (Exim Bank) have financed various energy efficiency projects related to renewable energy and environmental protection.
3. **South Korea:** The Korea Energy Efficiency Finance Corporation (KEEFC) was established to provide financial support for energy efficiency and renewable energy projects in South Korea.
4. **Japan:** The Japan Finance Corporation for Municipal Enterprises (JFM) has provided financial assistance for energy-saving projects in municipalities.
5. **Vietnam:** The Vietnam Energy Efficiency Program (VNEEP) has worked to promote energy efficiency projects in the country, and the Vietnam Development Bank (VDB) has been involved in financing such initiatives.
6. **Indonesia:** The Indonesian government established the Indonesia Infrastructure Finance (IIF) to support infrastructure development, which includes energy efficiency and renewable energy projects.
7. **Malaysia:** The Malaysian Green Technology Corporation (GreenTech Malaysia) has promoted and financed green technology projects related to energy efficiency.
8. **Thailand:** The Thailand Greenhouse Gas Management Organization (TGO) has funded energy efficiency projects in the country.

³⁹ Wijaya, M., Zeki, M., Siagian, A. (2021) *Exploring viable energy efficiency models in Indonesia*. Available at: <https://www.climatepolicyinitiative.org/publication/exploring-viable-energy-efficiency-business-models-in-indonesia/>

4.4.2 EE Funds in various countries

Several Asian countries have established energy efficiency funds to promote and support energy efficiency initiatives. Here are some examples of Asian countries that have implemented energy efficiency funds:

1. **Japan:** Japan has the “Energy Conservation Center, Japan” (ECCJ), which promotes energy efficiency and provides funding for various energy-saving projects.
2. **South Korea:** South Korea has the “Korea Energy Efficiency Fund” (KEEF) to finance energy efficiency projects and technologies to reduce energy consumption and emissions.
3. **India:** India has the “National Energy Conservation Fund” (NECF), which funds energy efficiency projects across different sectors.
4. **China:** China has established the “China Energy Conservation Investment Corporation” (CECIC), which supports energy efficiency projects, technology upgrades, and clean energy development.
5. **Thailand:** Thailand has the “Energy Conservation Fund” (ECF), established to promote energy efficiency and support projects that reduce energy consumption.
6. **Vietnam:** Vietnam has the “Vietnam Energy Efficiency Program” (VEEP), which supports energy efficiency projects in industries, buildings, and transportation.
7. **Malaysia:** Malaysia has the “Green Technology Financing Scheme” (GTFS), financing green technology projects, including energy efficiency initiatives.
8. **Taiwan:** Taiwan has the “Energy Conservation and Carbon Reduction Fund,” which supports energy efficiency projects, renewable energy, and carbon reduction efforts.
9. **Philippines:** The Philippines established the “Philippine Energy Efficiency Alliance” (PE2). This private sector-led group promotes energy efficiency investments and policies.



05

Best practice business models and structures for EE financing and ESCO financing in other countries

Even though ESCOs have already operated in Indonesia for a long time, their impact on the energy conservation sector is considered minimal, as Indonesian ESCOs struggle to obtain third-party finance due to their weak balance sheets and lack of collateral. In general, if companies in Indonesia are interested in pursuing energy savings, they would implement their own EE projects rather than do it with ESCO's support. This is partly because they are financially capable of carrying out their own EE projects and partly because only a tiny number of ESCOs are still qualified to perform EPCs. Therefore, looking into programs and structures implemented in other countries is worthwhile to consider viable approaches based on available international best practices to be implemented and/or referenced for developments in Indonesia.

5.1 ESCO models in ASEAN ⁴⁰

ACE has identified a significant potential for ESCO project implementation in energy-intensive industries (cement, iron, steel, chemical, pulp, and paper industries) to reach a good market size within the ASEAN Member States. Driven by promising energy-saving potentials, ESCOs have become paramount to successfully implementing energy efficiency and conservation policies and regulations in ASEAN by serving as EE solutions for commercial buildings and the industry.

5.1.1 Overview of ESCO development in ASEAN Member States

Table 5.1 ESCO Development in ASEAN Member States

Country	Financial incentives	ESCO Model
Indonesia	Industries/users conducting energy management 3 years in a row are eligible for incentives, such as reimbursement on energy audit costs and priority on energy supply	The Ministerial Decree of the Ministry of Finance No. 14/2016 clearly defines the Energy Saving Performance Contract (ESPC) as one of the business models for energy-saving programmes. Having based the energy savings direction on the cost agreement between the user and the ESCO, this regulation fundamentally impacted the development of ESCOs in Indonesia
Malaysia	<ul style="list-style-type: none"> Investment Tax Allowance (ITA) and Income Tax Exemption (ITE) for the period 2013–2020 The implementation of Energy Audit Conditional Grant Initiatives under the 11th Malaysia Plan. The government finances energy audits at selected installations, and the installations are required to conduct the ESMs from the audit report to produce 15%-savings for 3 years. Green Technology Financing Scheme (GTFS) 	Having identified the financial gap to implement ESCO projects, the government announced in 2014 that ESCOs can enjoy a 100% Investment Tax Allowance (ITA) of qualifying capital expenditure incurred for a green technology project and a 100 per cent Income Tax Exemption (ITE) of statutory income during the period 2013–2020. Then, the government set up the Green Technology Financing Scheme (GTFS). GTFS is eligible for companies that can be both green technology producers/suppliers and users. The maximum loan subsidised for producers is about RM 50 million per company (financial tenure is up to 15 years) and about RM 10 million for green technology users (financial tenure is up to 10 years). Since its introduction until 31 March 2016, 228 projects have secured RM 2.617 billion worth of financing assistance from 26 banks/financial institutions. GTFS – available until 31 December 2017 or upon reaching a total financing approval amount of RM 3.5 billion, whichever is earlier – facilitates the growth of local green businesses, generates new markets, and creates jobs

⁴⁰ ASEAN Centre for Energy. (2017) ASEAN ESCO Report. Available at: <https://aseanenergy.org/esco-report/>

Singapore	<ul style="list-style-type: none"> • Energy Efficiency Improvement Assistance Scheme (EASe) • The Grant for Energy Efficient Technologies (GREET) 	
Thailand	<ul style="list-style-type: none"> • The Thai Energy Efficiency Revolving Fund (RF) in 2003 for large companies • ESCO Fund Project in 2008 for small companies 	<p>Energy Conservation Promotion Act (ECP Act): The common EPC used in Thailand to date is the one with guaranteed savings. One of the ECP Act's measures under its Energy Conservation Promotion and Support is to support the operation of ESCOs (e.g. the use of funding from the Energy Conservation Promotion Fund to increase the line of credit given by the ESCO Fund) to alleviate the technical and financial risks of entrepreneurs wishing to implement energy conservation measures</p>
Vietnam	<p>USD 1 million EE Subsidy Fund, which provides up to 30% investment subsidies for EE projects with a subsidy ceiling of USD 250,000 for each project</p>	<p>Ministry of Industry and Trade (MOIT) secured a USD 1 million EE Subsidy Fund, which provides up to 30 per cent investment subsidies for EE projects with a subsidy ceiling of USD 250,000 for each project. The Government assumed that this would invite the growth of ESCOs. However, due to a lack of technical and financial capacity, ESCOs in Vietnam are not growing as expected. Today, there are less than 20 (twenty) ESCOs, most simply supporting in-house service projects</p>

5.1.2 The Malaysian example - The Green Technology Financing Scheme (GTFS)

The Green Technology Financing Scheme (GTFS) offers a 60 per cent guarantee of the financing amount and a rebate of 2 per cent on the interest or profit rate charged by the financial institutions – with the remaining 40 per cent of financing risk to be borne by participating financial institutions. The purpose is to accelerate the expansion of green investments by providing easier access to financing from both private and commercial financial institutions. The scheme, available until 31 December 2017, or upon reaching a total financing approval amount of MYR 3.5 billion, whichever is earlier, facilitates the growth of local green businesses and generates new markets and job creation.

GreenTech Malaysia and Credit Guarantee Corporation Malaysia Berhad (CGC) are the agencies tasked with administering the Scheme. GreenTech Malaysia is responsible for the promotion, assessment, certification and monitoring of producers and users of green

technology under the scheme. At the same time, CGC administers the guarantee and rebate payments.

GTFS is eligible for companies that can be both green technology producers/suppliers and users. The maximum loan subsidised for producers is about MYR 50 million per company (financial tenure is up to 5 years) and about MYR 10 million for green technology users (financial tenure is up to 10 years). Eligible green technology suppliers or producers are Malaysian companies that own at least 70 per cent of their capital. In contrast, eligible green technology users are legally Malaysian-owned companies that own at least 51 per cent of their capital. Companies are required to submit their project proposals for technical evaluation to GreenTech Malaysia. Upon passing the technical evaluation, companies may apply for financing from any participating financial institution.

Since its introduction up to 31 March 2016, 228 projects have secured MYR 2.617 billion in financing assistance from financial institutions. Currently, 26 banks/financial institutions are participating in GTFS, including the Malaysian Debt Ventures (a technology financier under the Ministry of Finance Incorporated), to facilitate the industry, especially the Small and Medium Entrepreneurs (SME), to embark on green technology ventures.

In the 2014 budget, the government announced the provision of an Investment Tax Allowance to purchase green technology assets and an Income Tax Exemption on the use of green technology services and systems. The government aims to further the development of green technology by encouraging companies to take up the incentives offered.

The Green Technology Incentive replaces the EE incentive schemes under the Promotion of Investments Act 1986, which expired on 31 December 2015. In addition, this incentive covers a broader scope of green technology activities in energy, transportation (Electric Vehicle services), building, waste management, and green supporting services.

The Investment Tax Allowance (ITA) is offered on a project basis. It aims to incentivise companies that undertake green technology projects involving capital investments incurred for business purposes or for own consumption, whereby such investments are expected to derive green results. The local companies that invest in EE or energy-saving equipment or technologies must apply projects that qualify for this incentive. Companies can enjoy an Investment Tax Allowance (ITA) of 100 per cent of the qualifying capital expenditure incurred on a green technology project from the year

of assessment in 2013 (the date on which the first qualifying capital expenditure incurred is not earlier than 25 October 2013) until the year of assessment in 2020. The allowance can be offset against 70 per cent of the statutory income in the assessment year. Unused allowances can also be carried forward until they are fully absorbed. The Income Tax Exemption is offered to companies that carry out services to support the implementation and operation of green technology projects. Eligible services include energy services related to EE, such as advising and consulting, energy audits and management, measurement and verification, testing and commissioning. Companies can enjoy an income tax exemption of 100 per cent of the statutory income from 2013 until the year of assessment in 2020. The government has also taken financial measures to support the Green Building Index. Building owners with a Green Building Index certificate are eligible for a tax exemption equivalent to 100 per cent of the capital expenditure to obtain the certificate. At the same time, the buyers are eligible for stamp duty exemption on instruments related to transferring ownership of such buildings. Although the incentive expired in 2014, in the 2014 budget, the government agreed to include green buildings as eligible for tax incentives, i.e. ITA, similar to the EE incentive scheme above. The industrial and commercial building owners are eligible to apply for ITA. These applications must be submitted to the Malaysian Investment Development Authority (MIDA).

The latest scheme is the implementation of the Energy Audit Conditional Grant Initiatives under the 11th Malaysia Plan. The government finances energy audits on selected installations, and the constructions must conduct energy-saving measures from the audit report to produce a 15 per cent saving for three years.

5.1.3 Energy Efficiency Revolving Fund in Thailand

In 2003, the Thai Government launched the Energy Efficiency Revolving Fund (EERF) as part of its wider Energy Conservation Program to stimulate investment from Thai banks for lending to energy efficiency projects. As of February 2012, 294 energy efficiency projects had been funded without any loan defaults, realising savings of 0.98 MtCO₂/year. In addition, the EERF was able to leverage private sector investment in energy efficiency projects with a 3:1 ratio. However, as of 2015, only 1 of the original 11 participating banks was still actively financing energy efficiency. This program fell under the Government of Thailand's policy target to reduce Thailand's energy intensity by 25% between 2005 and 2025. It also aimed to promote the competitiveness of Thai businesses by reducing their energy costs and dependence on oil imports from abroad. Though not a specified driver, the program also needed to redress the energy price distortions caused by historic subsidies for diesel and the longstanding Oil Stabilisation Fund that Thailand's Government had set up in 1973 to maintain the oil price and reduce the effects of price fluctuation.

The program has successfully realised significant energy savings, with over 7 billion THB disbursed to projects that have helped save 0.98 MtCO₂/year. However, there are questions regarding whether the program has effectively stimulated a self-sufficient market that can work without the incentives of concessional finance and technical assistance. It was initially effective in attracting interest from commercial banks, with the number of participants increasing from six to eleven during the program. However, their

interest was not sustained; as previously stated, only one bank actively finances energy efficiency projects. The market distortions of the concessional credit and technical assistance prompted the banks' initial interest. The concessional credit line means that the returns on their investments in energy efficiency are more attractive, whilst the technical assistance for assessing projects can help to build capacity and mitigate the high perceived risk.

However, it appears that the local banks have not gained sufficient experience and confidence in providing finance for energy efficiency projects. This could suggest that the technical assistance has resulted in a lack of skills transfer.

Part of the problem here could be the reliance on banks to move beyond their core business to assess the technical aspects of the projects. Given the immaturity of the supply chain, people could consider this process desirable. However, commercial banks are ultimately not geared institutionally to providing such a service. In addition, because the solutions are primarily aimed at increasing the supply of finance, they may not fully address the demand-side issues. Outside the banks selling cheap finance and raising awareness themselves, there is no provision for technical training of the supply chain to provide a reliable pipeline. This is evident. After all, even when the banks have lent money, they have tended to favour larger, energy-intensive companies because they see these as lower-risk entities. This situation left the original target market of SMEs underserved.

5.2 Commercialising Sustainable Energy Finance Program (CSEF) in Turkey

Table 5.2 Overview of CSEF Program

Tool	Leasing
Implementing party	Leasing companies
Target group	CSEF targeted the commercial, residential, and municipal sectors, particularly on SMEs and smaller energy efficiency projects
Support	Loan on commercial terms by IFC and CTF but with financial and technical assistance for the leasing companies
Advantages for leasing companies	The leasing model of the CSEF has helped to catalyse an increase in both the supply of and the demand for energy efficiency equipment, enabling Turkish leasing companies to progress from receiving concessional loans to receiving loans at commercial rates
Advantages for customers	SMEs can access the products through leasing but perhaps do not have strong enough balance sheets to be able to purchase equipment themselves
Was the program successful?	Yes

The Commercialising Sustainable Energy Finance Program (CSEF) was a leasing initiative that the IFC set up in 2010 with funding from the Clean Technology Fund (CTF) (\$21 m) and the IFC’s balance sheet (\$100m). The aim was to help local financial institutions (including leasing companies) develop the capacity to assess and finance energy efficiency projects. Phase II received approval in April 2015. People have considered the scheme to be a success. In its first four years of operations, leasing companies invested approximately USD 100 million of CSEF funds in over 50 energy efficiency projects. The expectation is that the CSEF will directly mitigate over 200,000t CO2 per year. The CSEF targeted the commercial, residential, and municipal sectors, particularly SMEs and smaller energy efficiency projects. SMEs represent a crucial sector within the Turkish economy, generating 25% of the country’s GDP and 10% of its exports. As the largest energy consumer, accounting for 33% of the total consumption, the residential sector was a key target market.

The leasing model of the CSEF has helped to catalyse an increase in both the supply of and the demand for

energy efficiency equipment, enabling Turkish leasing companies to progress from receiving concessional loans to receiving loans at commercial rates. Indeed, in 2014, the IFC provided Yapi Kredi Leasing with a USD 96 m loan on fully commercial terms. This was primarily thanks to the financial and technical assistance that the leasing companies received. Having addressed the supply-side challenges, the leasing companies, which already had extensive customer networks, could assess the technologies and market them to end users. The customers benefit as SMEs that can access the products through leasing but perhaps do not have strong enough balance sheets to purchase equipment themselves.

This growth in technical expertise has made leasing companies more confident in seeking finance for energy-efficiency equipment. To have a self-sustaining market, the awareness and expertise of Turkish commercial banks, which have traditionally been more reluctant to provide loans with lengthier tenors suited to energy efficiency projects, will need to match the confidence leasing companies generate.⁴¹

⁴¹ ADBI. (2018). *Energy Efficiency Finance Programs: Best Practices to Leverage Private Green Finance*. ADBI Working Paper 877. Available at: <https://www.adb.org/sites/default/files/publication/460091/adbi-wp877.pdf>

5.3 China Utility-Based Energy Efficiency Finance Program (CHUEE)

In 2006, the IFC blended its funds with the Global Environmental Facility (GEF) funds. The scheme was known as the China Utility-Based Energy Efficiency Program or CHUEE. It comprised two phases and ran from 2006 to 2012, with Phase III commencing in 2013. Banks lent USD 512 million until June 2009 (USD 384 million linked to the scheme's impact) to 98 projects, with 0 defaults, with estimated CO₂ savings of 14 Mt per year over the initial target.

The initial target market for the CHUEE scheme was SMEs, which traditionally found it difficult to access finance, particularly for energy efficiency, due to banks perceiving them as having high credit risks and the projects as having high-performance risks. However, large companies from energy-intensive industries, such as steel, chemicals, and cement, dominated the loan applications during the program. Small loans, intended for SMEs with more miniature balance sheets, represented less than 10% of the total loans disbursed.

Overall, the program exceeded its CO₂ savings target;

however, there were limitations in its design. The sustained change in the energy efficiency market in the PRC that this program drove has been modest. First, large companies from energy-intensive industries dominated the lending under the program rather than the initial target of SMEs. This was perhaps due to the guarantee mechanism mitigating the perceptions of performance risk related to energy efficiency technologies. However, with no distinction in the mechanism dependent on company size, the banks favoured the lower credit risk of larger companies over SMEs. Second, one of the two banks was responsible for 98% of the loans. This bank had a strategic desire to expand into the market and a viable customer base, mainly large customers in the energy-intensive industries, representing an accessible demand. By contrast, the other bank lacked this connection to the market. It was not as prepared to commit internal resources to developing the opportunity. Such a result emphasises the importance of involving the right participants.

5.4 Energy Efficiency Services Limited in India

The Ministry of Power and Government of India set up Energy Efficiency Services Limited (EESL), a joint venture company of power utilities, to offer street lighting solutions using LED lighting to municipal corporations (MCs) and urban local bodies (ULBs) via an energy-saving performance contract. EESL is billed as a "super ESCO" and intended to support activity directly and stimulate the ESCO market in India more generally. The program run by EESL aims to replace street lighting across multiple municipalities in India with LED lighting. The Government of India viewed this as particularly worthwhile, as it estimated that it would take only 2 years to replace the country's existing 35 million light bulbs with LEDs and save approximately 9000 million kWh annually from the time of installation. Given the estimate of India's electricity consumption in 2013 of 897 TWh, this 1% reduction is a sizeable opportunity considering the speed of LED installation. The EESL model is also expanding into other technologies and sectors. In 2001, the Government introduced the Energy Conservation Act (ECA) to provide a conducive regulatory and policy framework to catalyse market-based energy efficiency

implementation in India. In 2008, the Government followed the ECA with a National Mission on Enhanced Energy Efficiency, which promotes innovative policy and regulatory regimes, financing mechanisms, and business models for achieving energy efficiency in the national economy. The work of India's Bureau of Energy Efficiency (BEE) also supports municipal energy efficiency. The BEE has led projects across 15 states, finding that energy costs account for a significant proportion of their expenditure and identifying energy-efficient streetlights as an area of major saving potential. However, whilst the economic incentive is present, the upfront costs of replacing the existing lights constitute a major barrier for many municipalities that are in a challenging financial position.

The provision of standardised contracts without a minimum saving guarantee for Municipal Corporations (MCs), coupled with repayments as fixed annuities, is expected to encourage MCs to commit to contracts with longer payback times, as they do not face such stringent requirements, which are difficult to prove due to poor data availability. In addition, the capital

investments that EESL provides for manufacturers, with the backing of MC or state guarantees of payment, are likely to considerably reduce the risk of investment in LED lighting. However, though the scheme is ongoing, there are outstanding questions regarding its sustainability. These arise because manufacturers rely on the capital investment from the EESL to pay for LED lighting first and secondly because it is unclear how

effectively MCs will retain the technical assistance for installation, operation, and maintenance. To be both effective and sustainable in design, manufacturers will need to see a clear market case for energy efficiency – meaning that they no longer require grant financing. In addition, MCs will need to retain the technical knowledge required to install and maintain LED lighting once the technical assistance is withdrawn.

5.5 PROESCO in Brazil

The two main objectives of the PROESCO scheme were to support investments in energy efficiency equipment across Brazil’s industrial, public, and commercial sectors and to accelerate the development of its SME-sized ESCO market. These represented significant economic opportunities for boosting competitiveness and growing a new industry. PROESCO’s introduction occurred within a policy environment that had clear objectives to promote the growth of an energy efficiency market. Specifically 2001, the country introduced the Brazilian Clean and Efficient Energy Program to establish a dialogue between ESCOs and financial institutions.

The Brazilian Development Bank, BNDES, created the PROESCO program as a funding mechanism in 2006, providing ESCOs with direct concessional loans and guarantees and commercial banks lending ESCOs with guarantees covering credit risk. The objective was to enable investments in energy efficiency projects. The project witnessed minimal demand for its finances and eventually closed in 2015. This was due to several factors, such as an overly bureaucratic process when applying for finance, high collateral requirements limiting the capacity of small and medium-sized players to access it, and a general lack of technical assistance to build the pipeline of projects. The target clients of the program were ESCOs, utilities, and end-users interested in funding the purchase of energy-efficiency equipment for the commercial, public, and industrial sectors. These sectors accounted for approximately two-thirds of electricity consumption in Brazil in 2006.

Although there was no specific threshold, the intention was for PROESCO loans to be above R\$1 m, drawing from a credit facility of R\$100 m. Additionally, it was anticipated that the installed equipment would have a payback period of six years. The payback duration and the initial funds show that this scheme was intended for ESCOs at the larger end of the SME scale.

The solutions the bank developed for PROESCO largely failed to incentivise the uptake of energy efficiency projects. This was partly due to the fact that, despite guarantees to cover 80% of the project costs, the perceived risk for these projects made commercial banks unwilling to accept even the remaining 20% on their own. For SME-sized ESCOs, this was also problematic due to low awareness and low willingness to adopt energy efficiency upgrades, which made it challenging to secure finance. The collateral requirements of participating in the scheme further limited the demand for finance. In addition, the capping of interest rates at 9.1% for loans channelled through banks, whilst potentially decreasing the risk for ESCOs, also decreased the available returns for the banks, thereby disincentivising them from building their capability to appraise energy efficiency loan applications. Finally, the process by which ESCOs could obtain loans or banks could obtain guarantees was overly bureaucratic, hindering the uptake. Complex processes were particularly unwelcome given the perception of energy efficiency as a low priority due to the historically low energy cost.

5.6 Energy Saving Insurance (ESI) in Mexico

In Mexico, there is an increasingly positive policy framework for energy efficiency. The policies include subsidies for energy efficiency, efficiency standards for technologies, a national technology accreditation system, and standardised contractual arrangements for supply-side energy efficiency.

The ESI is a pilot program that commenced in 2015, which the Inter-American Development Bank (IDB) administered and the IDB, the FIRA (Mexico's Development Bank), and the Clean Technology Fund (CTF) funded, with additional support from the Danish Energy Agency. Separate pilots are also underway in Colombia and preparation in El Salvador. It is the first energy efficiency program to deploy an insurance mechanism mitigating the perceived performance risk in developing countries. A standardised performance contract, validation mechanisms, and processes designed to increase the trust between contracting partners, reduce the perceived risk, and ensure that energy savings are realised that can ultimately pay back a loan for an energy-saving project complement the insurance. This provided a de-risking solution aimed at aligning market participants' incentives and thereby creating a sustainable environment for increasing private investments in energy efficiency for the local market.

As this program is currently in the pilot phase, with several technology providers having received validation and the first projects undergoing the assessment process, there is insufficient information to judge the effectiveness of its design yet. However, combining standardised energy performance contracts, project assessment and verification, and insurance against potential energy-saving shortfalls represents an impressively holistic approach to de-risking the market. This could effectively build trust within the supply chain and, consequently, establish a self-sustaining market.

This multifaceted solution package requires a balancing act to align the benefits these solutions can provide and the transaction costs they may represent. In short, these extra processes need to sufficiently bring down the cost of capital for end-users to increase their energy efficiency investments and for financiers to supply finance at adequate rates. The aim is for the market to align with real rather than perceived risks, become more familiar with energy efficiency, and spur competition. The effects of these shifts would be a reduction in transaction costs and the expansion of both the supply and demand for finance in the long term.

5.7 Tarshid Saudi Arabia "Super ESCO Model"

In October 2017, Saudi Arabia's Public Investment Fund (PIF) created the National Energy Services Company (NESCO), also known as "Tarshid." This new Super ESCO was created with an initial capitalisation of over USD 500 million to increase the energy efficiency of, for example, government and public buildings and public street lighting and stimulate the growth of the country's energy efficiency industry, in line with the objectives of the Government's Vision 2030 to diversify the economy and drive environmental sustainability. All government entities are mandated to contract with Tarshid exclusively following a royal decree.

Tarshid covers at least 70 per cent of all projects in the country's energy efficiency sector, estimated to be a market of around USD 11 billion. Tarshid has set up a framework for competitively procuring the services of

private-sector ESCOs through EPCs to deliver energy-efficiency equipment and solutions in public buildings across the country. In this process, Tarshid is also helping build the capacity of local private-sector ESCOs and preparing transaction tools and EPC templates, as well as developing guidance for the M&V of energy savings in accordance with international benchmarks. Since early 2018, Tarshid has started developing and implementing energy retrofit projects in hundreds of public office buildings, schools, and mosques and has also started a street lighting program to replace 2.5 million existing streetlights with LEDs.

This Super ESCO model has proved to be a fascinating example of public ESCO-public sector end-user relations while still relying on private-sector ESCOs for project implementation.

5.8 Example of an ESCO company in Germany: Willbee Energy GmbH

An example of how an ESCO can promote their services are practices from Willbee Energy GmbH.⁴² Willbee works comprehensively – they identify opportunities, advise, design, implement the proposed solutions and monitor the client’s machinery and equipment. In addition, Willbee is able to finance investments in the EPC (Energy Performance Contract) or ESCO (Energy Saving Company) model. Their process is roughly as follows:

- **Step 1: Audit**

With tailor-made audits, they determine the potential for energy efficiency improvements in the company. The offer includes a simple walk-through audit, mandatory energy audits according to EDL-G/ DIN 16247-1, and in-depth energy efficiency audits. On this basis, they propose worthwhile changes and investments for the company.

- **Step 2: Project concepts**

After the engineers have identified the savings potential, they create design concepts and recommendations for implementing projects. Willbee evaluates the profitability of implementable projects considering the needs and possibilities of the customer.

- **Step 3: Financing methods**

Even if investments contribute to significant savings, and their pay-back period is very short, they often require large investment outlays to be available forthwith. We provide financing methods for such energy efficiency investments in the EPC (Energy Performance Contract) or ESCO (Energy Saving Company) models.

- **Step 4: Implementation**

Once an audit is performed and a project concept is presented together with a particular financing method, a project to improve energy efficiency is implemented – we put our recommendations in place. Depending on the client’s financial method, we may manage the project implementation entirely or partially. If a client decides to execute works autonomously, we may support them by estimating expenditures, managing or supervising a purchase process and, finally, by managing or supervising executive works as a project supervisor.

- **Step 5: Monitoring**

Machinery management and installation performance are prerequisites in every production plant. However, installing diagnostic systems for machines and units, metering and billing of energy consumption, and properly configured reports may pose a serious difficulty for production plants. Willbee Energy offers a proper solution and provides monitoring services.

⁴² Willbee Energy GmbH. n.d. Company Website. Available at: <https://www.willbeenergy.de/en>



06

Conclusions from the various programs

6.1 Awareness and commitment

In the case of awareness and commitment, there are several concluding points:

1. That programs should not focus solely on the supply of finance; they need to concurrently stimulate and scale up the demand.
2. To link the supply and demand, projects must be identified, prepared, and delivered to financiers in a commercially viable way. Moreover, timing and synchronisation with the other components of a program are paramount for using awareness-raising and pipeline-generation tools effectively.
3. There should be a mutually reinforcing relationship between policy development and action on the ground.
4. Incentives (such as concessional finance) can temporarily create an attractive business case. However, they are more suited to realising short-term energy demand reduction than sustainably transforming markets.

6.2 Technical solutions and expertise

The main conclusions and lessons from the best practices are the following:

1. Trust is the essential glue that binds together any supply chain, performing a crucial de-risking function for unfamiliar energy efficiency investments.
2. Properly assessing, monitoring, and verifying projects provide the raw data for achieving trust. However, these require standardising procedures, contracts, decisions, and technologies to aid in aggregating and scaling credible data.
3. Formal accreditation completes the process.
4. Implementing all, or even some, of the above requires skills and investment in the local supply chain.
5. As a general rule, it is necessary to maintain simplicity wherever possible. Regarding the financial resources barrier, programs should not use financial solutions to address non-financial barriers. Moreover, financial solutions are often limited to addressing one financial problem at a time, and a good understanding of their shortcomings is necessary. In addition, simplicity is a fundamental principle. Furthermore, to nurture a self-sufficient private sector market, any financial program needs to exit the scene with its conditions as close as possible to commercial conditions. Besides, implementing energy efficiency finance demands a close connection between the financial and the technical support to sell energy savings to justify investment.



07

Recommendations supporting EE initiatives include developing an ESCO market in Indonesia

EE risk-mitigation financing products are critically needed to overcome the considerable collateral and confidence barriers of financing EE Projects by LFIs, facility owners, ESCOs, and other EEP developers.⁴³

7.1 What can governments do to promote EPC and ESCO development?⁴⁴

The following list is sorted by priority according to the opinion of the consultant:

1. Mandate one government ministry or agency to be responsible for all aspects of EE and provide it with the authority for implementation measures across ministries and agencies.
2. Awareness raising and capacity building for all stakeholders to show the benefits for the users and importance to the government.
3. Supportive financing tools, e.g. special bank loans for EPC projects, guarantees and insurance products for EPC projects.
4. Establish markets for EE projects and tenders and provide transparency of successful projects to build trust and track records.
5. Using EPCs in the energy efficiency renovation and retrofitting of public buildings and facilities (e.g. street lighting and water supply) to create a track record of successful projects.
6. Training and accreditation of professionals, e.g. energy auditors and energy managers, and accreditation of ESCOs based on their qualifications and credit level.
7. For ESCO models to support standardisation of the relevant documentation (EPCs, energy supply contracts, and build-own-operate-transfer contracts).
8. Clear guidelines and standards on measurement and verification related to EPCs.
9. Preferential tax and subsidies for EPC projects.

7.2 Recommendations to support Energy Efficiency schemes in Indonesia

The following list is sorted by priority:

Table 7.1 Recommendations on the Main Barriers to a Successful EE Program

Topic	Explanation	Step
More Technical Assistance	Programs should devote more resources to technical assistance than they have allocated historically. Activities such as awareness raising, pipeline generation, and de-risking are essential to create sufficient demand and commitment to act. Careful synchronisation of technical and financial elements must also complement adequate attention and resources	1
Upskilling and equipping suppliers and technical advisors	Connecting the financial and technical aspects of energy efficiency is also critical to creating a sustainable, scalable, and bankable pipeline. Across the supply chain, they have the greatest inherent incentive in their business model to identify, appraise, and deliver viable projects ready for financing. Investing in local technological capacity and knowledge is key in the development of a vibrant and competitive local industry in energy efficiency. This is in line with supporting the widespread deployment of energy efficiency and electrification tools, technologies, and reforms, including through standards to access the resulting energy and cost savings. To support the energy transition, awareness building on the potential of GHG reductions as well as new and emerging technologies need to precede training	1

⁴³ ETP EE Diagnostic FINAL Report for Indonesia 2022.

⁴⁴ UNEP 2020 Business models for energy efficiency - Energy Performance Contracting.

Development of locally-fitting outcome-fixed contract ⁴⁵	Outcomes-based contracting, through which payments are linked to achieving outcomes, sits in a broader range of public service sourcing strategies. It is a form of Results-Based Financing (RBF). Payments are linked to the achievement of specified outcomes. Impact bonds are a subset of outcomes-based contracts in which private investors provide the upfront capital to cover service delivery costs. RBF approaches/ties payment to the achievement of pre-specified objectives. In some forms of RBF, payment is tied to outputs, such as the completion of an activity	1
Awareness building	Develop a portfolio of best-practice example case studies to build banks' capacity around EE loan assessment and the assessment of risks and a pipeline of investable industrial energy efficiency projects	1
Standardised contracting	Provide recommendations on reducing transaction costs to simplify loan assessment procedures, including the development of standardised contracting solutions between ESCOs and industries and ESCOs and banks	1
Introduction of customised Energy Saving Insurance (ESI)	Development of customised insurance covering energy saving, standards contracts, and energy savings validation methodologies	2
Provision of tax incentives to increase reprioritising of capital expenditure (CAPEX) budgets	Tax incentives can be provided to incentivise facility owners to prioritise CAPEX for energy projects. Such incentives, which reduce tax burdens on profitable companies, are ideal since such companies are less likely to require external funding to implement such projects. Internal funding is quick and avoids the associated funding due diligence issues	2
Provision of credit guarantees to financial institutions and equipment leasing companies in combination with the engagement of a global independent expert with a local presence in Indonesia as a Guarantee Advisor ⁴⁶	It is suggested to establish a guarantee facility that offers appropriate de-risking mechanisms currently absent from the market for successful energy efficiency trials of local FIs. Such a guarantee provides a credit guarantee for loan portfolios to LFIs (guarantee beneficiaries) through Multilaterals, backstopping credit risk for a specific sector. Priority areas for energy efficiency financing implementation should be identified with all stakeholders in such a program. It is also recommended to involve a global independent expert with a local presence in Indonesia as a Guarantee Advisor, who will provide professional monitoring services for each sub-project, related performance, and any change in credit risk with a full review of related contracts, including sub-project loan and Guarantee Agreements. It is recommended to guarantee up to 95% of the loan amount dependent on the credit standing of the target group (e.g. SMEs and ESCOs will be in the highest coverage target group)	2
Strong policy frameworks are needed. Energy efficiency finance schemes will not be enough to change markets	Strong policy frameworks with the proper economic and regulatory drivers to incentivise and bring about change need to strengthen business cases. Therefore, influencing such frameworks must be a key objective of future programs	2

⁴⁵ Government Outcomes Lab. n.d. Outcomes-based Contracting. Available at: <https://golab.bsg.ox.ac.uk/the-basics/outcomes-based-contracting/>

⁴⁶ Vitonia, D., Silitonga, R. (2021) Review of Policies and Measures for Energy Efficiency in Indonesia's Industrial Sector. ACE Policy Brief No. 05 / June 2021. Available at: <https://aseanenergy.org/review-of-policies-and-measures-for-energy-efficiency-in-indonesia-industrial-sector/>

7.3 Suggested stages for the implementation of energy efficiency activities

7.3.1 EE targets and their achievement

The National Energy General Plan (*Rencana Umum Energi Nasional, RUEN*) provides direction for implementing the National Energy Policy (KEN), these goals include:

1. An ambitious renewable energy target of a 23% contribution to Indonesia’s energy mix by 2025;
2. Reduction in energy intensity by 1% annually during the period of 2015–2025, and;
3. Reductions in the final energy consumption by 17% and 39% by 2025 and 2050, respectively.

The energy intensity target was achieved in 2021, but this is mainly attributed to COVID-19, as the latest figures for 2022 show a solid increase in electricity usage.

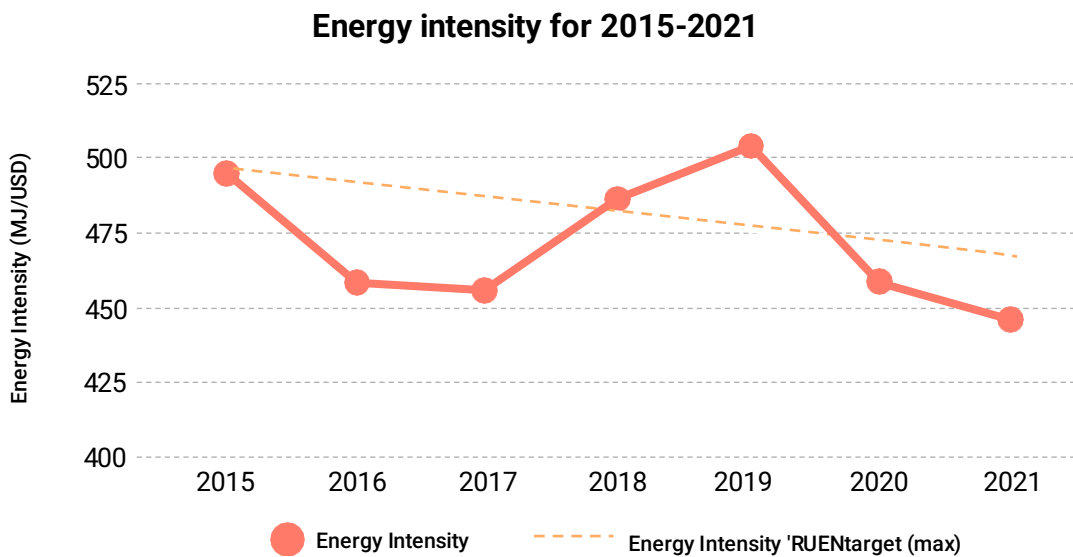


Figure 7.1 Indonesia Energy Intensity (2015 - 2021) ⁴⁷

⁴⁷ IESR (2023) *Indonesia Energy Transition Outlook*. Available at: <https://iesr.or.id/en/pustaka/indonesia-energy-transition-outlook-ieto-2023>

Strong growth in electricity demand:

Indonesia’s electricity demand is proliferating. As electricity demand grows, energy efficiency emerges as a critical tool for maintaining the target of reducing energy consumption. Similar to total energy consumption, the amount of electricity a country consumes in total is primarily reflected by population size and the average incomes of people in the given country.

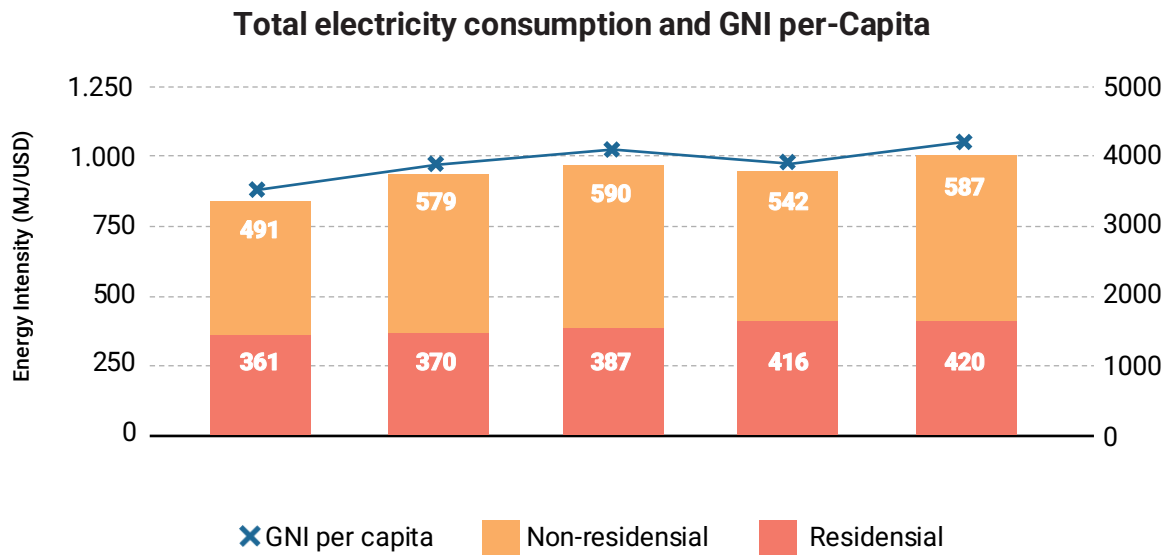


Figure 7.2 Total Electricity Consumption and GNI Per-Capita ⁴⁸

Electricity Generation is steadily growing:

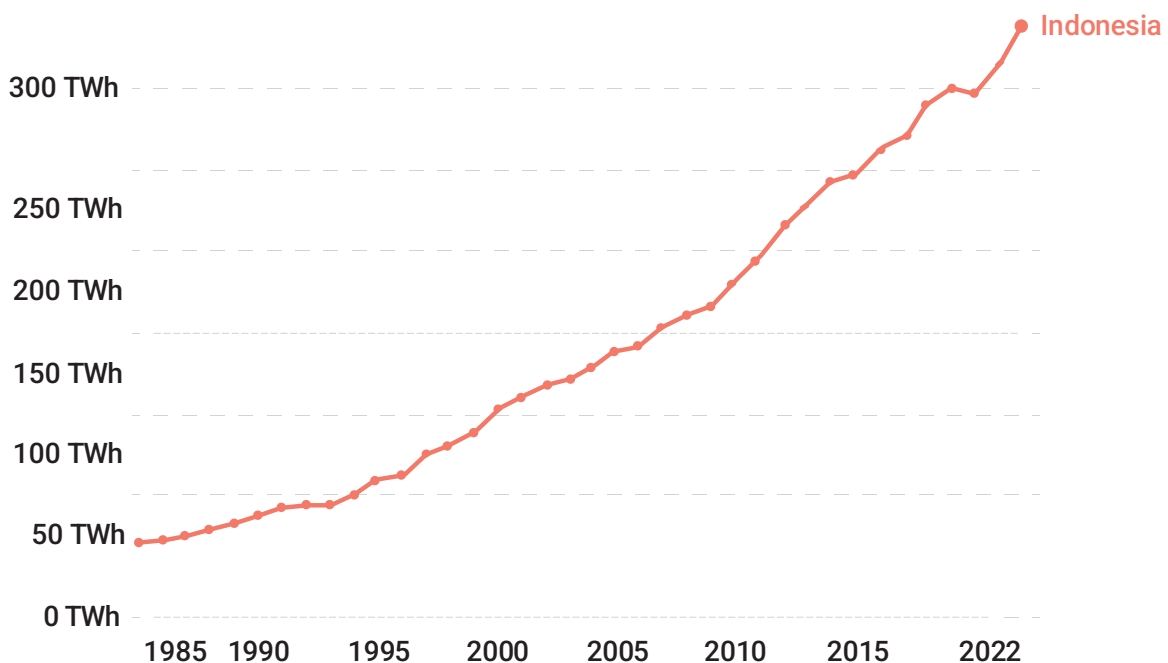


Figure 7.3 Indonesia Per-Capita Electricity Generation ⁴⁹

⁴⁸ Ibid.

⁴⁹ Ritchie, H., Roser, M. (2022). Indonesia: Energy Country Profile. Our World in Data. Available at: <https://ourworldindata.org/energy/country/indonesia#citation>
 Synthesis Study on the Effectiveness of Energy Efficiency Financing Mechanisms to Support the Energy Transition in Indonesia

7.3.2 Why there is an urgency to intensify EE activities now

The Gol's KEN and RUEN targets are to save a cumulative 11,300 PJ (petajoules) of source energy by 2025 in the BaU scenario.⁵⁰ If these targets are achieved, Gol 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). It also clearly demonstrates the direct potential of EE implementation to significantly reduce Indonesia's GHG emissions in the long term.^{51,52}

7.3.2.1 Energy demand increase in the consumer sector and energy saving potential

Domestic appliances and equipment, such as air conditioners (ACs), lighting, refrigerators and TVs, will increase energy demand in Indonesia by 2030, representing as much as 70% of the load during peak time at 8 pm.⁵³ In particular, with sales of air conditioners growing at 7.5% annually in Indonesia, over half of the potential savings could come from this product alone.

Regarding climate impacts, efficient appliances and lighting could achieve nearly 27% of the energy sector emission-reduction target. That is 84.5 million tons of CO₂ saved by 2030. This makes it an essential tool in quickly reducing carbon emissions (decarbonisation) in Indonesia's energy sector and deploying renewable energy (which takes considerably more time than EE measures). AC growth is an essential driver of energy consumption. However, millions buying cheap ACs as a quick fix to counter a hotter climate may also make the energy transition more difficult. More air conditioning will put more strain on local power supplies. It threatens efforts to shift energy sources from fossil fuels to renewables.

Indeed, cooling will be "one of the top drivers of global electricity demand over the next three decades," the International Energy Agency said in a 2018 special report. The organisation estimates that approximately 10 new air conditioners will be sold every second between now and 2050.

The logic behind the AC boom is simple. Economists note a spike in sales when annual household incomes near \$10,000, a tipping point many of the world's hottest places touched recently or will soon. Indonesia has passed the \$10,000 threshold already within the last decade.

7.3.2.2 Energy demand increase in the industrial sector and energy saving potential

The generally positive economic development goes hand in hand with its continuously increasing energy demand, especially in the industrial sector. However, Energy Efficiency technology is not yet pervasive. This results in significant savings potential, which the Indonesian Ministry of Energy (MoEMR) estimates at 10–30% for the key industries of chemicals, agricultural products, steel, textiles, pulp and paper, and cement production. Overall, a wide range of energy efficiency technology is required. This includes automation and control technology, lighting, air conditioning and refrigeration technology, motors and heat management.⁵⁴

⁵⁰ MEMR's Press release No. 018.Pers/04/SJI/2021.

⁵¹ Energy Transition Partnership. (2022) Diagnostic Review and Analysis of Energy Policy Development in Indonesia. Available at: <https://www.energytransitionpartnership.org/resource/diagnostic-analyses-report-of-energy-efficiency-development-in-indonesia/>

⁵² Asian Development Bank. (2023) Regional: Accelerating the Clean Energy Transition in Southeast Asia. Available at: <https://www.adb.org/projects/55124-001/main>

⁵³ Letschert, V., McNeil, M. Energy efficiency could help avoid the need to build up to 50 power plants in Indonesia. Available at: <https://theconversation.com/energy-efficiency-could-help-avoid-the-need-to-build-up-to-50-power-plants-in-indonesia-136426>

⁵⁴ Business Indonesia & EIBN. n.d. Energy Efficiency in Industry. Available at: https://business-indonesia.org/energy_efficiency_in_industry

In addition, reduction of GHG still requires more EE measures, and depending on the industry, the energy requirement is very different. The key industries were food (5.4 Mtoe), paper (3.3 Mtoe), metal (9.4 Mtoe), cement (10.4 Mtoe), fertiliser (4.9 Mtoe) and ceramics (1.4%), responsible for 34.8 Mtoe alone in 2018. That corresponds to more than four-fifths of the total energy consumption in the industry. With a growth scenario of 5%, significant increases would be expected by 2050.

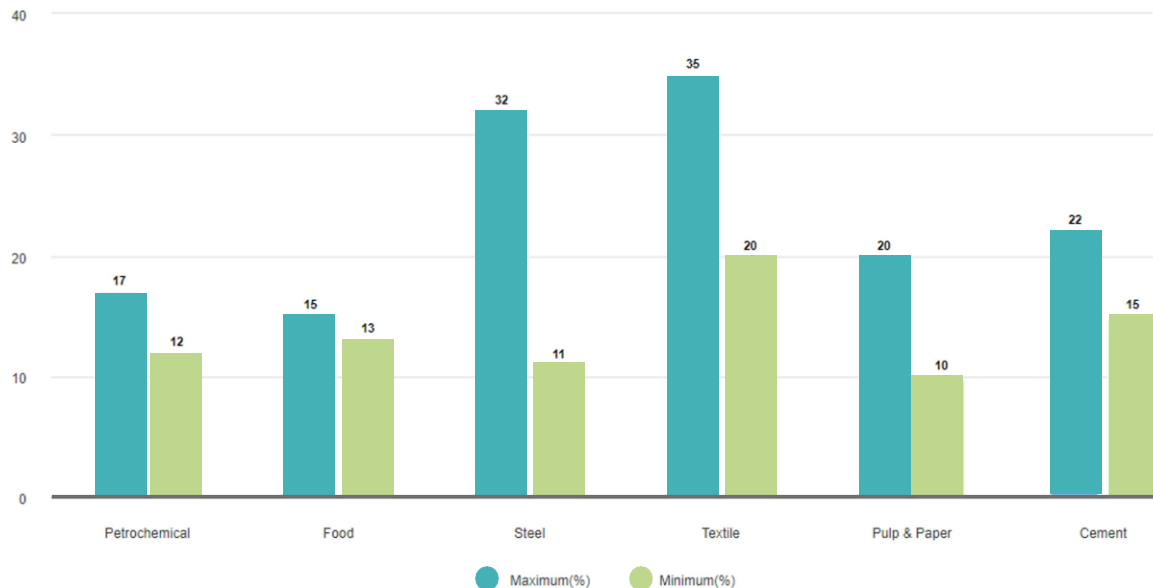


Figure 7.4 Energy-Saving Potential in Indonesia's Industry⁵⁵

Many Indonesian companies are not very aware of the energy efficiency sector. Energy-saving measures are perceived as an environmental measure, not a means of reducing costs. Indonesian companies are often initially sceptical about new technologies, especially when these technologies are not yet widely used by other Indonesian companies.

The Gol's KEN and RUEN targets are to save a cumulative 11,300 PJ (petajoules) of source energy by 2025 in the BaU scenario.⁵⁶ If these targets are achieved, Gol 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 Gol's commitment to fulfil its National Determined Contribution (NDC) under the Paris Agreement, in which the Government commits to an emission reduction of 29% by 2030 (IEA, 2019). It also clearly demonstrates the direct potential of EE implementation to significantly reduce Indonesia's GHG emissions in the long term.^{57,58}

⁵⁵ Ibid.

⁵⁶ MEMR's Press release No. 018.Pers/04/SJI/2021.

⁵⁷ Energy Transition Partnership. (2022) Diagnostic Review and Analysis of Energy Policy Development in Indonesia. Available at: <https://www.energytransitionpartnership.org/resource/diagnostic-analyses-report-of-energy-efficiency-development-in-indonesia/>

⁵⁸ ADB 2023: Accelerating the Clean Energy Transition in Southeast Asia.

7.3.3 Step 1: where implementation can be done without regulatory action

The following suggested steps and actions can be done relatively quickly as no regulations and law changes are needed. The list can be amended but shows which directions actions should be considered

Table 7.2 Summary of Step 1 Based on Sector, Action Points, and Expected Outcome

Sector	Action Points	Expected Outcome
Government Institutions, e.g. ESDM	Increase the visibility of EE on the government-related web pages and keep them up to date (many websites are outdated, no longer existing, or EE is not even mentioned)	EE is better recognised as an important factor for the government's Energy Transition and GHG reduction efforts
	Increase the importance and reach of PROPER (Program Penilaian Peringkat Kinerja Perusahaan dalam Pengelolaan Lingkungan)	An extended PROPER process can be a valuable tool for implementing and building awareness for EE in the industrial sector
ESCO association, APKENINDO	The current ESCO association, APKENINDO, has been dormant for nearly 10 years and needs to be reorganised with competent staff to become a platform for discussing and developing EEPs and ESCO policy in Indonesia. The support needed should also include establishing 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	The ESCO association can play a crucial 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' portfolios under the ESCO scheme. This intervention should be able to be implemented with relative ease since it does not require any government intervention or support
Strengthen other associations related to Energy Efficiency.	Organisations such as MASKEEI, Green Building Council, and others will play a more prominent role in the practical implementation of EE promotions, programs, and initiatives. Updating and improving their websites and energy-saving topics also increased their presence on social media	Associations and Certification Companies can play a vital role in bringing relevant stakeholders together; the primary focus should be to link manufacturers and users of EE equipment. Young people are particularly concerned about the environment and must be reached and engaged via sustainable social media campaigns
Retrofitting of Government buildings with ESCO companies	Use for the retrofitting and renovation of ESCO structures to build a qualified ESCO pool of companies	ESCOs can build a track record and reference projects for other users in the public and private sectors (e.g. hospitals and schools)
Industry	Create a best practice website with examples and references from different industries, also naming manufacturers, the equipment, service providers and suppliers of EE equipment	Corporations like to follow successful examples within their industry. A public "register" with savings examples from successfully implemented projects can speed up the implementation of technologies and provide reference projects (voluntarily, perhaps linked with PROPER)
	Consider to establish also for equipment used in industrial processes, minimum energy performance standards (MEPS)	Increase awareness and trust for equipment which saves energy in industrial applications, e.g. automation and control technology, lighting, air conditioning and refrigeration technology, motors, and heat management
Consumer	On 20 September 2022, the Indonesian government established three ministerial decisions stipulating the minimum energy performance standards (MEPS) and energy efficiency labels for refrigerators, ACs, fans, and rice cookers. On 3 October 2022, the Ministry of Energy and Mineral Resources of Indonesia notified WTO/TBT of draft decrees on the Minimum Energy Performance Standard (MEPS) for blenders, drinking water dispensers, electric stoves, washing machines, smoothing iron, television, electric motor and water pump. The list of such appliances has to be amended faster	The more appliances that carry the EE label, the more awareness consumers will have Given that ACs run often day and night, the focus has to be on the ever-increasing number of ACs in the country and using an environmentally friendly refrigerant There needs to be a website where consumers can calculate how much money they can save during the appliance's lifetime in relation to the higher investment cost. The label also has to be explained, and the cost savings for the consumer must be clearly visualised
Banking	Special Credit Card promotions to finance on attractive terms EE appliances which carry the highest MEPS standard	Consumers will consider buying a more efficient household appliance if they get more attractive financing terms than buying a less energy-efficient product
	Specifically, State-Owned Banks should cooperate with manufacturers and ESCO companies to promote the usage of ESCO financing schemes An example can be the UOB U-Energy product, Asia's first integrated financing platform for energy efficiency projects. U-Energy is designed to simplify the switch to energy-efficient appliances and fittings in residential and business premises	If there is an established cooperation and process which includes EE manufacturers, ESCOs and bank's potential users will have more trust in the potential energy savings than 'only' relying on the promises of a manufacturer/supplier

7.3.4 Step 2: where regulatory changes are required

In the second step, the following actions can be considered. The list is to be amended/changed and discussed with the major stakeholders to be effective and achieve the desired outcome.

Table 7.3 Summary of Step 2 Based on Sector, Action Points, and Expected Outcome

Sector	Action Points	Expected Outcome
Procurement Guidelines	Government Agencies must NOT use the 'lowest upfront cost' procurement method but the most energy-efficient equipment and consider the Lifetime Cost model	The larger market for EE equipment and appliances, building a track record for reference purposes, focuses on EE and not the upfront cost
New buildings	Mandatory building codes for all kinds of new buildings	New buildings will be more energy-efficient
Appliances	Phase out of old, less efficient appliances, e.g. old chillers	Immediate reduction in energy usage and energy efficiency
Government Building retrofits	Energy-saving measures have top priority when buildings are being retrofitted	It will increase the usage of state-of-the-art EE technologies and make them more widely available and known
Building operation	Energy management is mandatory in all public and commercial buildings, and the energy managers have received sufficient training to make energy renovation business cases and to implement suggested energy-saving measures	It will increase the pool of energy managers, which will spill over to other sectors
Enforcement of Regulatory EE Mandates	There must be consequences and sanctions if non-compliance with existing regulations exists	Targets can be met as there will be high compliance with existing regulations
EE Education	Development of revised SKKNI (National Personnel Competence Standard) for energy managers and energy auditors for Energy Efficiency, which is linked to the Development of syllabus and curriculum for Energy Management	Sufficient trained staff to implement and monitor the EE regulations
EE Finance De-Risking Products:	Establish an Energy Savings Insurance (ESI) and Partial Credit Risk Guarantee (PCG) product	It is overcoming the huge collateral and confidence barriers of financing EEPs by LFI, facility owners, ESCOs, and other EEP developers

7.4 Suggested stages for the implementation of energy efficiency activities⁵⁹

Besides the recently introduced Carbon Trading in Indonesia, the government could consider teaming up and developing schemes with international companies and organisations on EE Carbon Offset and EE Certificates schemes. These must be used in conjunction with direct carbon reduction measures to directly reduce emissions and avoid them. Internationally, they are in an early development stage but worth exploring further in the Indonesian context.

7.4.1 Carbon Offsets

The government of Indonesia has stipulated Presidential Regulation No. 98 of 2021 on the Implementation of Carbon Economic Value for Achieving Nationally Determined Contribution Targets and Controlling Greenhouse Gas Emissions in National Development (Perpres NEK). This regulation stipulated the Economic Value of Carbon (NEK) as the value of each unit of greenhouse gas emissions resulting from human activities and economic activities. The stipulation of Perpres NEK is also relevant with private companies particularly the industrial sector, considering that private companies typically offer Carbon Offsets. The top energy-efficiency offset companies support third-party verified projects involving, for example, clean cookstoves, waste co-generation, and water filtration. Energy-efficiency carbon offsets upgrade traditional systems to those requiring less energy to perform the same tasks. These offsets avoid carbon emissions immediately, bolster energy security, and are relatively cost-effective. However, they can lack additionality, standardisation, and monitoring.

⁵⁹ Smoot, G. n.d. Energy-Efficiency Carbon Offsets Explained: All you Need to Know. Available at: <https://impactful.ninja/energy-efficiency-offsets-explained/>

Energy-efficiency carbon offsets are a specific type of carbon offset that upgrades conventional systems into ones that use less energy to perform the same task, generating environmental benefits in the process. Energy-efficiency carbon offsets are efficient because they avoid carbon emissions immediately, promote energy decentralisation, and are relatively cost-effective. However, they can also lack standardisation and monitoring.

If emissions are only offset and not reduced from the source, this could lead to greenwashing, when the consumer is deceived into thinking they are offsetting their emissions, but in reality, they are not.

Table 7.4 Pros and Cons of Carbon Offsets

Pros and Cons of Carbon Offsets	Reasons
7 pros of energy-efficiency carbon offsets	<ul style="list-style-type: none"> • Energy-efficiency offsets avoid CO2 emissions immediately • Energy-efficiency offsets improve air quality • Energy-efficiency offsets help reduce deforestation • Energy-efficiency offsets bolster energy security • Energy-efficiency offsets promote energy decentralisation • Energy-efficiency offsets are relatively cost-effective • Energy-efficiency offsets allow us to reduce carbon emissions in ways we would not be able to accomplish individually
3 cons of energy-efficiency carbon offsets	<ul style="list-style-type: none"> • Energy-efficiency offsets can lack additionally • Energy-efficiency offsets can lack standardisation and monitoring • Energy-efficiency offsets do not reduce your own carbon emissions, which can lead to greenwashing
Examples of energy-efficiency projects	<ul style="list-style-type: none"> • Energy-efficient solutions for disadvantaged households • Energy-efficient buildings require less energy to heat and cool • Energy-efficient facilities use less energy to manufacture goods • Energy-efficient transportation reduces fuel usage
EE offset “only” in combination with carbon reduction	Energy-efficiency offsets must be used in conjunction with direct carbon reduction measures to directly reduce emissions and avoid them

There are several steps that can be implemented in Indonesia for carbon trading to be applicable for EE: (1) Developing carbon trading roadmap for the industrial sector; (2) Developing clear procedures for carbon economic value in the industry sector; (3) clarity on carbon certificates; (4) developing clear market infrastructure and procedures on carbon economic value including an integrated information system and alignment of carbon trading procedures in the industrial sector with the SRN PPI system under the Ministry of Environment and Forestry.

7.4.2 Energy Efficiency Certificates (EECs)⁶⁰

Energy Efficiency Certificates (EECs), or “white tags,” are a tradable environmental commodity representing an MWh of energy consumption reduced through an energy efficiency activity. Although far less common than RPS compliance RECs, they also serve a compliance function in select US states and other countries with government-mandated energy savings quotas. These mandates are placed on electricity distribution utilities.

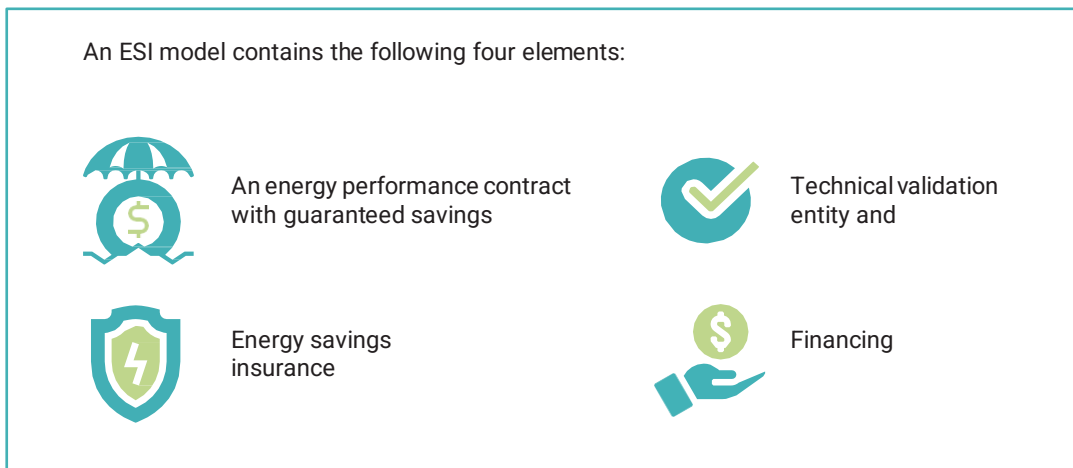
In theory, EECs are analogous to carbon offset credits. However, they are denoted in units of energy reductions rather than emission reductions. To be counted as an emission reduction, an EEC project would need to satisfy the same quality criteria (e.g. additionality and accurate quantification) and assurance processes as a carbon offset project.

EECs are denoted in terms of MWh of energy savings. Therefore, they would have to be converted to metric tons of GHG emission reductions by analysing the marginal impact of the underlying energy efficiency project on electricity generation emissions. Given the immaturity of the market for EECs and the lack of standardisation methods for these certificates, there is limited information about this

⁶⁰ Carbon Offset Guide. n.d. Energy Efficiency Certificates. Available at: <https://www.offsetguide.org/understanding-carbon-offsets/other-instruments-for-claiming-emission-reductions/energy-efficiency-certificates/>

7.5 Development of an Energy Savings Insurance (ESI) Model for Indonesia⁶¹

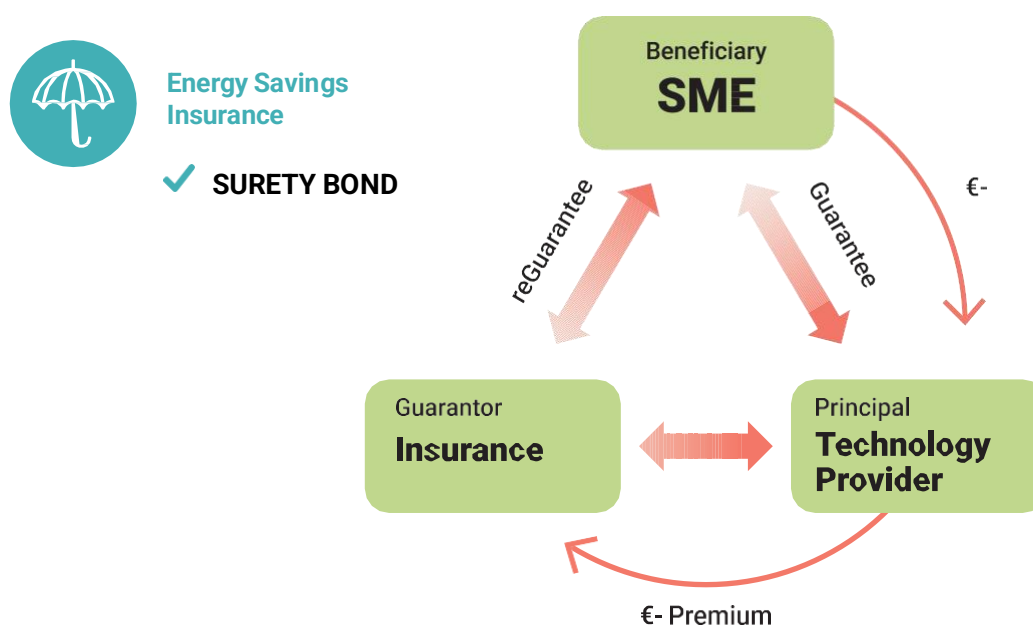
The Energy Savings Insurance (ESI) model was first developed by the Inter-American Development Bank (IDB) in 2014, with the support of the Basel Agency for Sustainable Energy (BASE), as a mechanism to build investor confidence and improve access to low-cost finance for energy efficiency projects. Originally designed to be implemented in Latin America, the ESI model has been implemented in Colombia and El Salvador and is partially implemented or underway in several other countries in the region. It was developed with financial support from international donors such as the Danish Energy Agency (DEA), the Clean Technology Fund (CTF), and the Green Climate Fund (GCF). It is now being replicated in numerous countries worldwide, and countries such as India, Indonesia, the Philippines, and Vietnam have expressed interest in the model. The ESI model is designed to reduce perceived risk and make energy efficiency investments more attractive.



How it works: ⁶²

Insurance policy on not achieved energy savings, and when Provider cannot fulfil commitments. Guarantee the guarantee

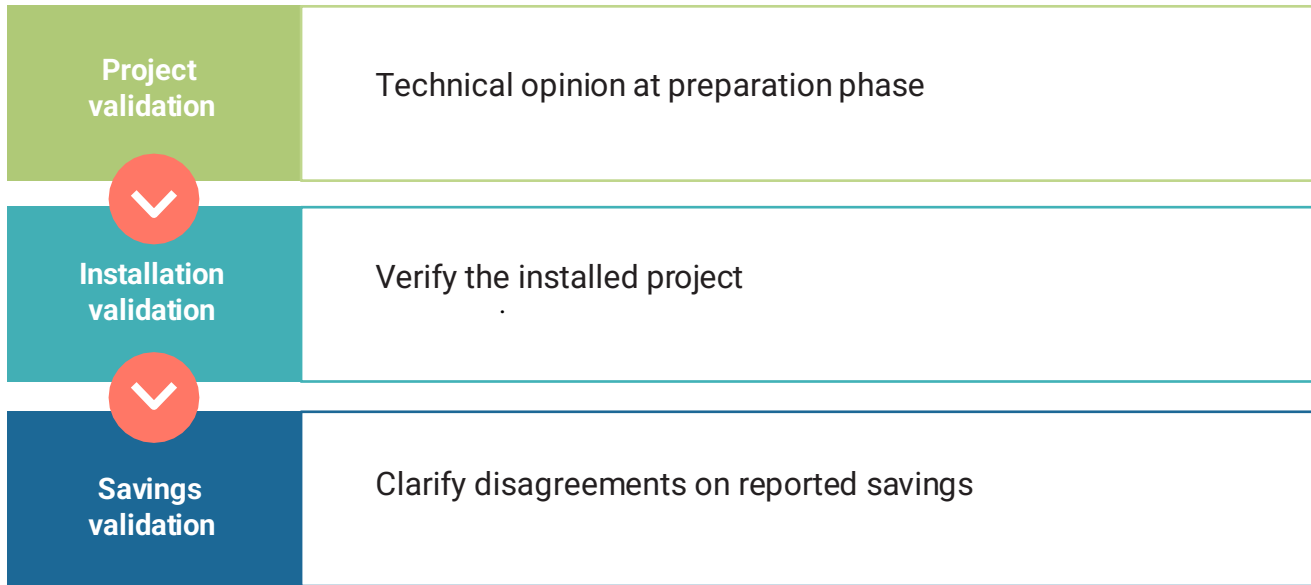
Energy Savings Insurance:



⁶¹ BASE. n.d. Unlocking Investments in Energy Efficiency in Europe. Available at: <https://energy-base.org/projects/energy-savings-insurance-europe/>

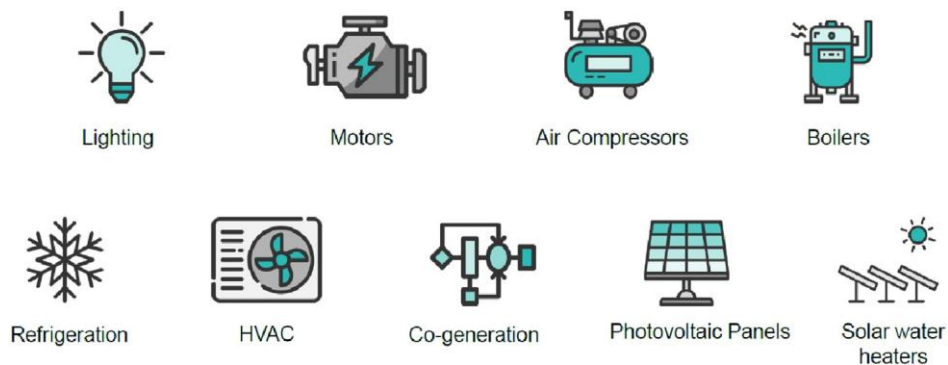
⁶² ESI Europe. (2020) The Energy Savings Insurance Model. Available at: <https://cinea.ec.europa.eu/system/files/2021-04/5.3.deriskInvestmentStandardsInsuranceEsiEurope.pdf>

Technical Validation through a validation agent:



It works best with pre-selected technologies, for example:

Pre-selected technologies



Key lessons learned across the different country cases include:

- The importance of strategic partnerships among organisations to help create demand for ESI
- Existing contracts and methodologies have to be adapted to the national context to efficiently develop tools.
- Training of different ESI participants is needed to develop the market capacity.
- Online MIS will improve the efficiency of administrative procedures.
- Active involvement of the executing agency and insurance company is needed to create a market for ESI.
- Local insurance regulation can restrict market development or impact the type of insurance products provided.
- Data availability and accuracy are key to promoting comprehensive insurance packages.
- The development of technology lists can help customers access financing for energy efficiency projects and reduce due diligence and transaction costs for financial institutions.
- Using concessional funds and grants is especially important in emerging and developing economies with higher financing costs.

Main Challenges for the success of such a program:

- All stakeholders have to be involved so that trust in the market can be fostered.
- Engage Associations and other stakeholders.
- Providers try to avoid liability.
- Big effort raising awareness SMEs.
- Communicating success.

How this can work with the support of a National Development Bank and Multilaterals are shown in Figure 7.5

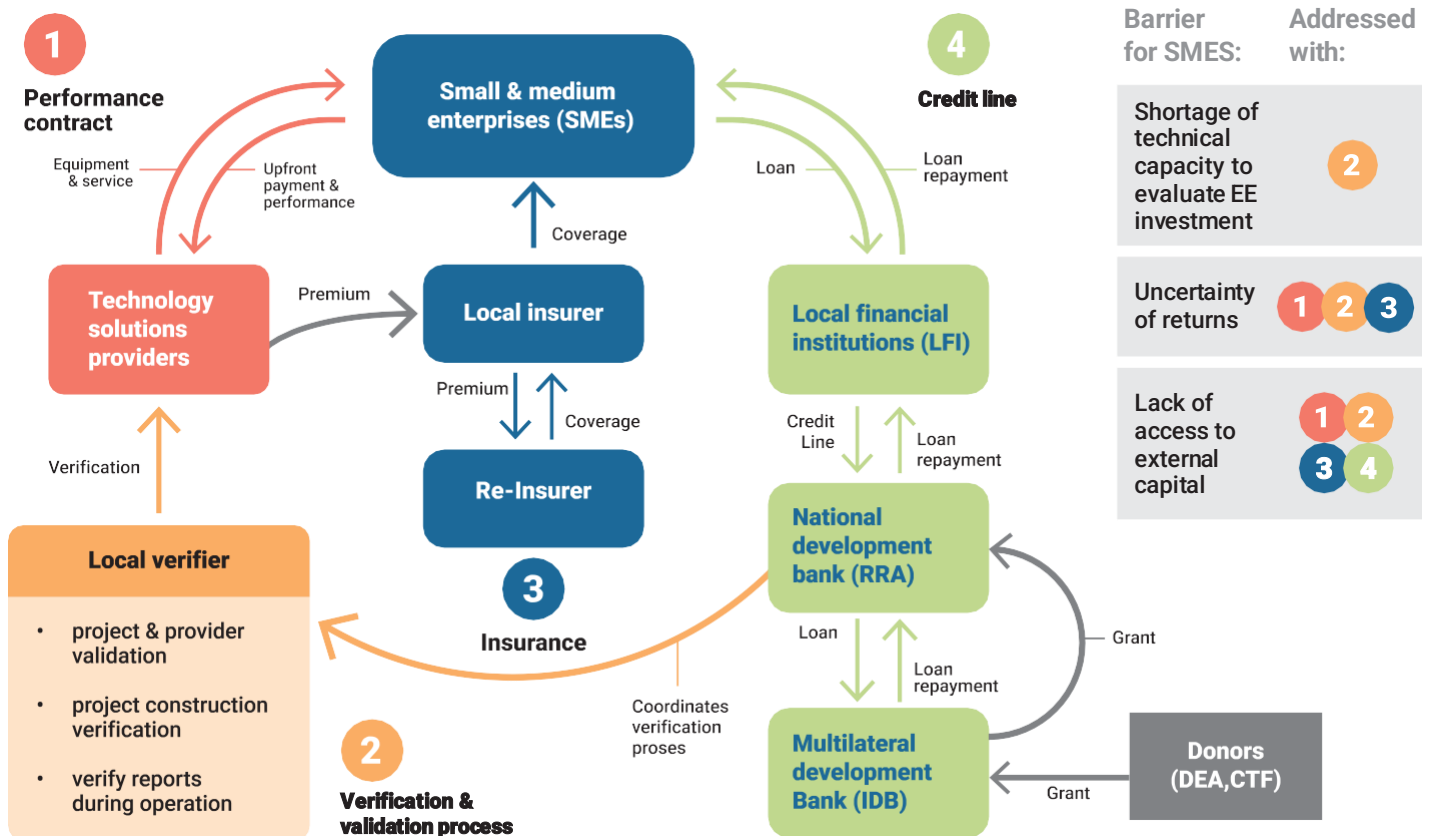


Figure 7.5 Main Components of an Energy-savings Insurance Instrument (chart originally created by the Climate Finance Lab)⁶³

In Indonesia, the Energy Savings Insurance (ESI) scheme is currently being co-developed by OECD CEFIM, where in 2024 currently the development is in the need assessment phase where the OECD will garner inputs and recommendations from experts and stakeholders. In its development, this need assessment aims to review the needs and readiness of Indonesia in implementing the ESI scheme. One of the recommendations given in implementing the ESI scheme in energy efficiency projects, reflecting on international good practices, is how to connect good international funding such as donors in providing grants through multilateral development banks as a seed fund for the scheme. Currently, challenges of implementing ESI in Indonesia involve the necessity for the availability of standardised contracts, technical validation, the insurance product, as well as concessional credit lines.

⁶³ Global Innovation Lab for Climate Finance. (n.d.) Energy Savings Insurance. Retrieved from <https://www.climatefinancelab.org/project/insurance-for-energy-savings/>

Table 7.5 Stakeholders’s Role in ESI Model ⁶⁴

ESI Stakeholders	Description of Stakeholder Role
The implementing institution	A facilitator (most likely a multilateral development bank) uses donor funds or its own funds to support an implementer (most likely a local development bank or EE institution) to define and drive an EE financing program. The implementer uses these funds to specify and assess an EE market, convene and coordinate key players (notably private banks), and put in place the financial (investment capital, guarantees, and insurance) elements required to implement the program
SMEs	The implementer also uses these funds to put in place the technical (contracting, qualification, validation and verification methodologies and documents) elements required to implement the program. SMEs are engaged at the stage of contracting and qualification
Energy service providers (ESCOs)	The estimated energy savings associated with technology are determined based on the technical analysis performed by the program’s third-party local verifier, whose work is coordinated by the ESCO
Insurance companies (local insurers and re-insurers)	Identify or establish a verification entity and the procedures aligned with the implementing institution. Establish operational procedures for the contract insurance mechanism
Banks	Conduct a market study of the potential for undertaking energy efficiency projects. Align the instrument with the other financial products
The verifier	Estimated energy savings associated with technology are determined based on technical analysis performed by the program’s third-party local verifier, whose work is coordinated by the ESCO. They validate the project’s design, projected energy savings, and monitoring and verification (M&V) scheme according to a technology-specific methodology and notify the national development bank

⁶⁴ GIZ. (2020) Innovative Energy Efficiency Instruments for the MENA Region. Available at: <https://www.giz.de/en/downloads/giz2020-en-innovative-energy-efficiency-instruments.pdf>

Annex I

Internal barriers for EE Investments (EEI)

Lack of budget funding, access to capital, and other priorities are typically the crucial barriers to EE investments. However, internal economics, behavioural barriers, and lack of time are also important barriers. An in-house energy management program is perhaps the most essential tool or method by which a company can tackle barriers to EEI.

Barriers before the investment:

- | | |
|---------------------------------------------------------------------------|--------------------------------------------------|
| 1. Lack of Management Awareness | 5. Management resistance to change |
| 2. Complex Decision Chain | 6. Inadequate management capacity |
| 3. Conflicts of interest within the organisation | 7. Insufficient Integration of Energy Objectives |
| 4. Energy manager or people in charge of energy management lack influence | |

Lack of management awareness, complex decision chains, and conflicts of interest within the organisation are often the most important barriers.

Barriers before the investment:

The result of EE investments does sometimes not have the desired effect on reducing the energy end-use rate. Factors like (1) new technologies are not adequate or compatible at the site; (2) lack of know-how in the integration of new and existing technology; and (3) lack of skilled technical staff for new technology implementation have resulted in sometimes underperformance of the energy-efficient technologies. In the process of energy-efficient technology adoption, the organisation's structure plays an important role.

Annex II

ESCO companies active in Indonesia

It is difficult to identify ESCO companies in Indonesia as the association has been inactive for many years, and there is no public register of registered ESCO companies. Selectively, the following companies in Table II.1 have been identified, acknowledging that the list is non-exhaustive.

Table II.1 ESCO Companies Active in Indonesia (non-exhaustive)

Selected ESCO Companies in Indonesia as an example	Services provided
<p>PT INDESCO INDUSTRIAL SERVICES (INDESCO)</p>	<p>PT INDESCO INDUSTRIAL SERVICES (INDESCO) is a Jakarta-based Indonesian Energy Services Company (ESCO) that develops and implements (engineer, procure and construct) energy efficiency, renewable energy and other energy-saving technologies in industrial process and power generation plants throughout Indonesia, https://indesco.id/company</p>
<p>PT Energy Management Indonesia (commonly abbreviated as EMI) is a subsidiary of PLN.</p>	<p>Amongst others: The scope of services and business competencies possessed by PT EMI include:</p> <p>Energy and Environmental Assessment</p> <ul style="list-style-type: none"> • Energy Audit <ul style="list-style-type: none"> - Audit walkthrough - Audit details * - Investment grade audit • Environmental Audit <ul style="list-style-type: none"> - Environmental audit for PROPER Ministry of the Environment * • Energy Management System <ul style="list-style-type: none"> - IT-based Energy Management System - Building Automation System (BAS) - Implementation of ISO 50001:2011 - ISO 50001:2011 Certification • Survey • Eligibility Test <ul style="list-style-type: none"> - Medium voltage generator - High voltage generator <p>Training and Education:</p> <ul style="list-style-type: none"> • Energy conservation and energy audit training (basic) • Energy auditor certification • Clean water conservation training • Energy audit training - lighting systems • Energy audit training - cooling systems • Environmentally friendly energy education

BECIS	BECIS, benefiting from highly aligned shareholders, Berkeley Energy, FMO, Siemens, and Norfund-KLP, is firmly committed to sustainability by delivering Energy as a Service for its customers. BECIS distributed energy solutions can lower energy costs, reduce energy consumption, or both, resulting in lower operating costs for its customers. BECIS invests and operates distributed energy solutions requiring no capital from their customers, allowing them to focus on their core operations
PT Enertec Mitra Solusi	EMS is focusing on energy service, energy efficiency and renewable energy. Enertec started as an Energy Services Company, focusing on retrofitting existing buildings and public facilities for energy efficiency solutions
Schneider EcoStruxure Power & EcoStruxure Building (partner of UOB U-Energy program) ⁶⁵	Schneider brings together an integrated building management system that delivers the actionable insights needed to better manage and optimise assets, increase reliability, improve energy efficiency, and meet cybersecurity needs. It securely connects hardware, software, analytics and services through a digital IP backbone on an open and innovative platform
SES (partner of UOB U-Energy program)	SES is Indonesia's leading energy efficiency firm, having completed over 200 projects
G-Energy (partner of UOB U-Energy program)	G-Energy assists clients in saving energy by optimising their ME system, helping clients obtain Green Building Certification and providing a Control system to maintain and monitor the performance
BBP (partner of UOB U-Energy program)	BBP enables businesses to achieve their carbon neutrality and sustainability goals. BBP has enabled multiple blue-chip and Fortune 500 companies to achieve up to 40% of energy and cost savings using patented HVAC optimisation technologies, the Internet of Things (IoT), proprietary software algorithms, and machine learning. Energy savings solutions delivered by BBP are implemented on customers' sites with fail-safe methods. Cost savings across all sites are audited by third-party auditors like TUV and DNV. All investment costs associated with implementing and delivering energy savings solutions are typically borne by BBP

⁶⁵ United Overseas Bank. (2023) Business. Available at: <https://www.uobgroup.com/u-energy/indonesia-en/business.page>

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Contact person

Deni Gumilang | ✉ Deni.gumilang@giz.de
Agus P. Tampubolon | ✉ agus@iesr.or.id

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