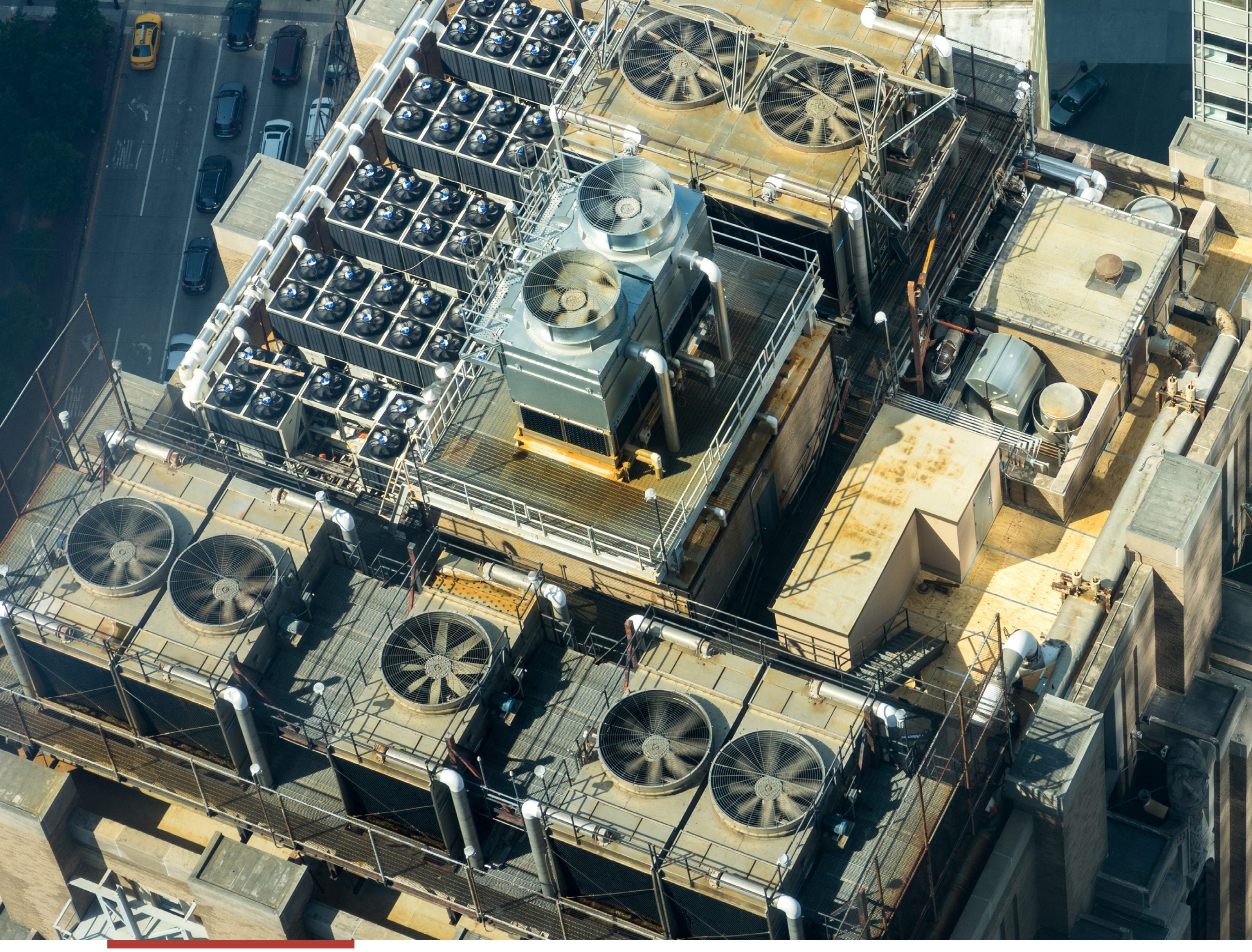

# Exploring viable energy efficiency business models in Indonesia

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CLIMATE POLICY INITIATIVE

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## ABOUT CPI

CPI is an analysis and advisory organization with deep expertise in finance and policy. Our mission is to help governments, businesses, and financial institutions drive economic growth while addressing climate change. CPI has six offices around the world in Brazil, India, Indonesia, Kenya, the United Kingdom, and the United States.

**SECTOR**
Energy

**REGION**
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**KEYWORDS**
Energy efficiency, business model, cooling system

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# EXECUTIVE SUMMARY

Indonesia is the largest economy and energy consumer in Southeast Asia. It accounts for two-fifths of the region's energy consumption, and its overall energy demand is expected to increase by more than 30% between 2020 and 2025.

Indonesia has committed to 29% unconditional emission reduction by 2030. Yet, the country scores high in terms of energy intensity, meaning, the energy consumed for every unit of activity in Indonesia is high and the country is not being efficient with its use of energy.

Energy efficiency offers clear benefits to Indonesia's emission reduction and energy resilience goals, as well as overall support for economic and social development strategic objectives (IEA, 2015). Increasing energy efficiency can also fuel economic recovery through job creation and improved competitiveness in the industrial and commercial sectors. These factors, along with the benefit of reduced energy costs, is particularly valuable during this time as the nation battles the aftereffects of the COVID-19 pandemic.

Despite clear benefits, multiple regulations supporting energy conservation, and large opportunities, energy efficiency business models in Indonesia faces multiple barriers. These barriers threaten the national target of 17% energy savings by 2025 (from the 2015 baseline) and the 2030 emissions reduction target.

Therefore, in this study we aim to:

1. Identify and understand the challenges faced by Energy Service Companies (ESCOs) in Indonesia's developing energy efficiency market
2. Based on market research, suggest improvements to existing energy efficiency business models that are viable and can be scaled up in Indonesia

## KEY FINDINGS

We conducted a market survey among key ESCOs, clients, and lenders to understand where the market stands in terms of regulatory, financial, and awareness towards energy efficiency projects. Our key findings are:

1. **Energy efficiency projects remain unappealing to owners and investors**

Loan officers and risk managers within financial institutions often have no knowledge of energy efficiency technologies and their energy efficiency business models, resulting in perceived high risk on financing aspects. Limited information about the benefits of energy management is the primary reason for the lack of interest by building owners and investors for energy efficiency projects. Owners and facility managers are often unable to access energy consumption benchmarking in buildings and industries, as well as information on impact measurement in energy efficiency projects. This leads to incertitude in risk calculation and investment return.

2. **ESCOs are supposed to play a key role in bridging the gap between clients and investors but are struggling because of perceived risks**

ESCOs are a key part of energy efficiency business models. They design, provide, and maintain systems to ensure energy cost savings can be used to pay back early capital investment. Hence, prioritizing and addressing the concerns of ESCOs are vital to furthering energy efficiency projects in Indonesia.

In our survey, all ESCOs admitted to a lack of confidence from investors and clients in energy saving projects. This is primarily due to the underperformance of Energy Savings which led to a default in payment, resulting in lack of finance to invest. Based on their experience, they identified three key factors that could establish this trust: 1) initial analysis and audit; 2) more communication about energy saving mechanism and performance with the facility owners; 3) and availability of financing.

3. **The financial risk perceived by both clients and investors is the biggest hurdle in developing energy-efficient projects.**

We identified nine perceived risks in the energy efficiency market, listed in Table ES1 below, out of which three stood out in the survey: economic and financial, financial resources, and regulatory. We measured the potential impact of each risk on the market and the likelihood of each of those risks occurring:

**Table ES1:** Perceived risks involved in energy efficiency projects from the project developer's perspective

| Risk | Impact | Likelihood |
|---|---|---|
| Economic and financial | High | Medium |
| Financial resources | High | Medium |
| Behavioral and operational | Medium | Low |
| Awareness and commitment | Medium | Medium |
| Measurement and verification | Medium | Medium |
| Technical solutions and expertise | Medium | Medium |
| Contextual and technology | Medium | Low |
| Regulatory | High | Medium |
| Environment | Medium | Low |

Source: CPI Analysis

4. **The two traditional energy efficiency business models offered by ESCOs—shared savings model and guaranteed savings model—have failed to address the business challenges in Indonesia.**

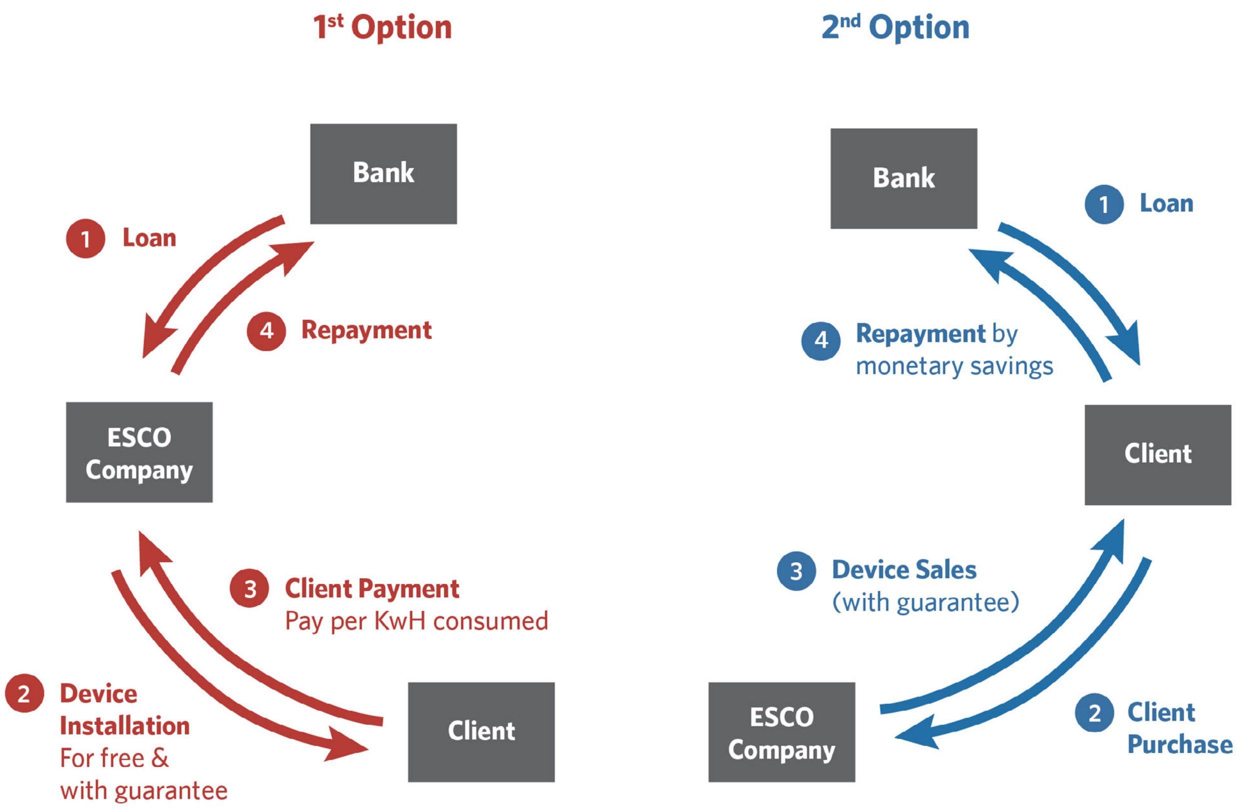
The **shared savings model** is primarily recommended for developing economies, where clients are usually small and face difficulties in accessing finance from banks. But a common problem across developing economies, including Indonesia is that ESCOs are also usually small and face the same difficulties in accessing finance from banks, thus the shared savings model remains unsuccessful.

The **guaranteed savings model** puts the ESCO client in a risky position because they assume the debt risk from the bank. Clients' lack of trust in ESCOs' capacity and capabilities hampers this business model from being functional in Indonesia. Further, the **typical contractual agreements** for energy efficiency businesses in Indonesia still do not fully address certain key issues. These issues include the potential disagreements in energy-saving measurements, the opaqueness of the resulting monetary savings, and the lack of financial guarantees in a non-performing situation. Updating standard contractual agreements to address these issues would improve trust between clients and banks.

## BUSINESS MODELS

Business models must be improved to accelerate energy efficiency development. We recommend tailored versions of three existing business models that 1) can address the risks identified in Table ES1 including economic and financial risks, and financial resource risks, 2) are being implemented and can be scaled up in Indonesia, but 3) require additional support from Ministry of Energy and Mineral Resources (MEMR) and Financial Services Authority (OJK) to address regulatory risk.

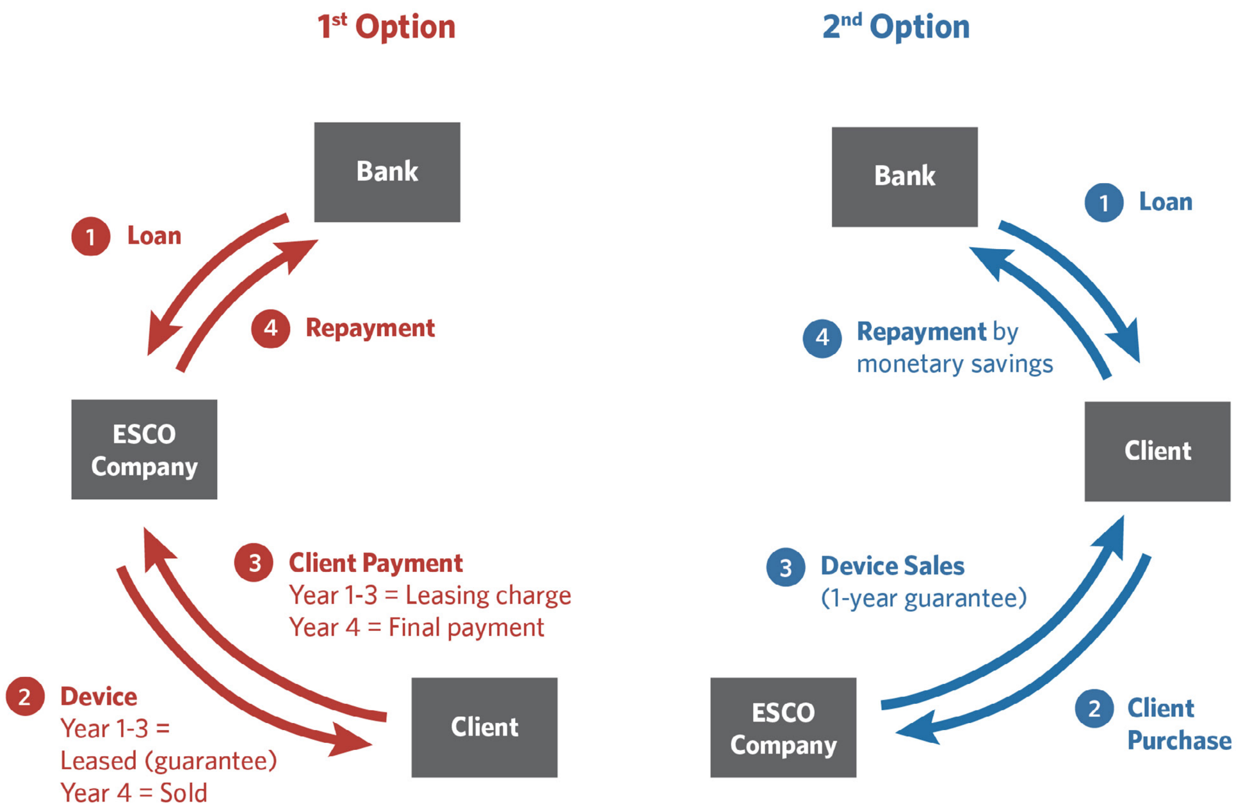
1. **Service or device business model**




Source: CPI Analysis

This model is expected to lower the perceived high investment cost for clients, because it offers flexibility and multiple options that suit their investment preferences, i.e., the subscription service or the purchase option. Further, because ESCO helps install the equipment in both options, the clients face no construction risks. Even in the second option where the client opts for purchasing the device only and are responsible for repaying the bank's loan, the ESCO would still provide technical guarantee that the device would deliver the promised energy savings or the required output. Thus, it minimizes unknown factors in the detailed risk and return calculation for both the client and the ESCO.

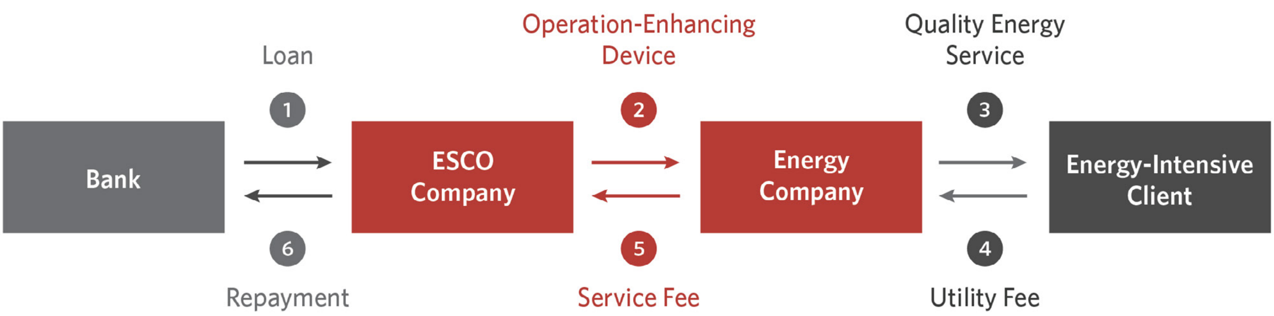
2. **Leasing and purchase business model**




Source: CPI Analysis

The bank's payment default risk is low because the ESCO, as the borrower, will be fully paid by the clients who either buy the device immediately (with single big payment in the beginning) or continuously pay small amounts within four years (after which the device's ownership is transferred to client). Additionally, the client, as the borrower, will be backed by ESCO's guarantee, which is another factor that lowers the risk. This guarantee minimizes the perceived high investment cost from the client's perspective.

3. **Quality energy service business model**




Source: CPI Analysis

Under this model, the client does not install the device and is protected from risks that arise from construction costs. The bank is also relatively safe from the risk of payment defaults. First, this model is applicable to a particular business arrangement, in which the energy-providing company would only have deals with certain types of clients (energy-intensive companies – usually big players with a reliable financial background). Second, the collateral in this model is the escrow account that the ESCO has in the bank, to which the energy-providing company pays the fee for the service provided by the ESCO.

Although improved business models and contractual agreements offer several advantages to manage challenges in the energy efficiency business, they cannot address regulatory risk, a topic outside the scope of this report. Indonesia needs stable and reliable regulations to grow and support its energy efficiency business landscape.

Other important issues that this study does not include, but must be addressed and need further analysis to accelerate energy efficiency business in Indonesia, include:

1. Bank loan interest reduction
2. Implementation of incentives or disincentives measures, and
3. Market expansion through wider mandatory energy efficiency enforcement or market based mechanism, such as energy savings credits trading.

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# 1. INTRODUCTION AND OVERVIEW

Indonesia faces growing power demand. Due to this demand, Indonesia is shifting from being an oil exporter to an oil importer, leading the government to acknowledge this future concern, and issue its presidential decree (PP) no.5/2006. This was later detailed in the national energy policy (Kebijakan Energi Nasional or KEN) and its blueprint of national energy management 2005 – 2025. Energy conservation and efficiency were clearly indicated as one of the pillars of Indonesia's energy policy to respond to the looming energy supply problem.

The following year, the government released its law no.30/2007, which mandates the implementation of specific energy conservation measures. These are specified within the government regulation no.70/2009 on energy conservation. Later, PP no.79/2014 on national energy policy (KEN) was issued, revoking PP no.5/2006. Under the new policy, the Ministry of Energy and Mineral Resources (MEMR) set new targets to reduce energy consumption, final energy intensity, and energy elasticity with a horizon up to 2025.

In line with the government's increasing focus on energy efficiency, the technical ministries have implemented several policies in different energy sub-sectors that have implications for energy conservation measures.

These include:

- The preparation of energy intensity standards (green industry standards) by the Ministry of Industry
- Regulation of the Ministry of Energy and Mineral Resources (MEMR) no.14/2012 on energy management
- Presidential regulation no.55/2018, which stipulates energy diversification in the transportation sector through the transportation master plan for Jakarta, Bogor, Depok, Tangerang, and Bekasi
- Establishment of eco-building standards through the regulation of the Ministry of Public Works and Public Housing (PUPR) no.92/PRT/M/2015 regarding the implementation of energy-efficient house designs

From the private sector's point of view, energy service companies (ESCO) have become a global business vehicle and model for efficient energy provision. They can help energy users, companies, industries, and commercial sectors improve equipment efficiency. ESCOs were implemented quite successfully to promote energy efficiency in many developed countries, such as the USA, Canada, and Japan. Many developing economies, including Indonesia, still face several barriers in implementing ESCOs on a large scale. However, there are successful cases like India's EESL model which is a public sector funded "super ESCO" with a wide mandate and better access to capital. Itis able to take risks that normal private ESCOs could not.

To successfully deploy and operate ESCOs in developing economies like Indonesia, it is crucial to study and understand the opportunities and challenges facing current energy efficiency programs. This study aims to understand and verify the challenges that ESCOs face in Indonesia's developing energy efficiency market, and identify improved energy efficiency business models that are viable to be scaled up in Indonesia. This was achieved by surveying key stakeholders and identifying regulatory, financial, and awareness factors to help decision makers. The key findings of this research indicate that strong policy regulation and financial incentives coupled with sizeable investment opportunities for energy efficiency projects can improve the development of ESCOs in Indonesia.

## 1.1 OBJECTIVE AND METHODOLOGY OF STUDY

This study identifies the main challenges that hinder the development of energy efficiency projects and explores potential financial solutions that can be deployed on a large scale in Indonesia. It is based on existing risks and barriers that encumber the energy efficiency market, which will be summarized in the next chapter.

In terms of methodology, Climate Policy Initiative (CPI) conducted a literature review to identify theoretical arguments on the risks and challenges faced by the energy efficiency business in both global and national contexts. This served as the basis to assess the domestic market. CPI distributed questionnaires and interviewed several project developers regarding energy efficiency projects in Indonesia to gain a deeper insight into the current situation. Questions asked of project developers covered topics, such as:

- Business development approach and business structure
- Investment appetite from the client in terms of project size and categorization of the client
- Factors that significantly determined the quality and success of past projects
- Ease of accessing available sources of funding to finance past energy efficiency projects
- Project sizing
- Measurement and verification processes
- Main business barriers and drivers

The project developers were also asked about perceived risks (further described in Section 2), the importance of these risks, and the likelihood of their occurrence during the project lifecycle. This part of the questionnaire and interview were used to map the most frequent risks that hinder the development of energy efficiency projects in Indonesia. It also helped identify solutions, particularly financial ones, that could be used to mitigate risks and make energy efficiency projects more attractive to both big energy users and financial institutions.

## 1.2 OVERVIEW OF ENERGY EFFICIENCY POLICIES AND TARGETS

In Indonesia, law no.30/2007 is the overarching law that regulates energy. It introduced the concept of energy conservation as a systematic, planned, and integrated effort to conserve domestic energy resources and improve the efficiency of energy resource utilization. The mandate aims to carry out energy conservation at all stages of the supply chain, including the sectors of energy distribution, production, distribution, consumption, and energy technology and conservation measures.

Government regulation (PP) no.70/2009 on energy conservation is the next most important provision. The PP is aligned with the provisions of the national energy policy or KEN (initially released in 2007) to support systematic energy conservation.

In particular, PP no.70/2009 addresses the responsibility of the federal government, regional governments, entrepreneurs, and communities in implementing energy conservation measures. These measures include the entire cycle of energy management from both supply and demand sides, the use of standards and labeling, incentives and disincentives, and monitoring, reporting, and evaluation.

In 2014, the government released the new KEN under PP no.79/2014. This regulation aims to direct national energy management to achieve energy independence, and national energy security to support national sustainable development.

The regulation was later expanded to include more specific targets within the national energy plan (RUEN), which was issued in 2015. In the context of energy efficiency, RUEN offers several indicators of success related to energy efficiency efforts in Indonesia.

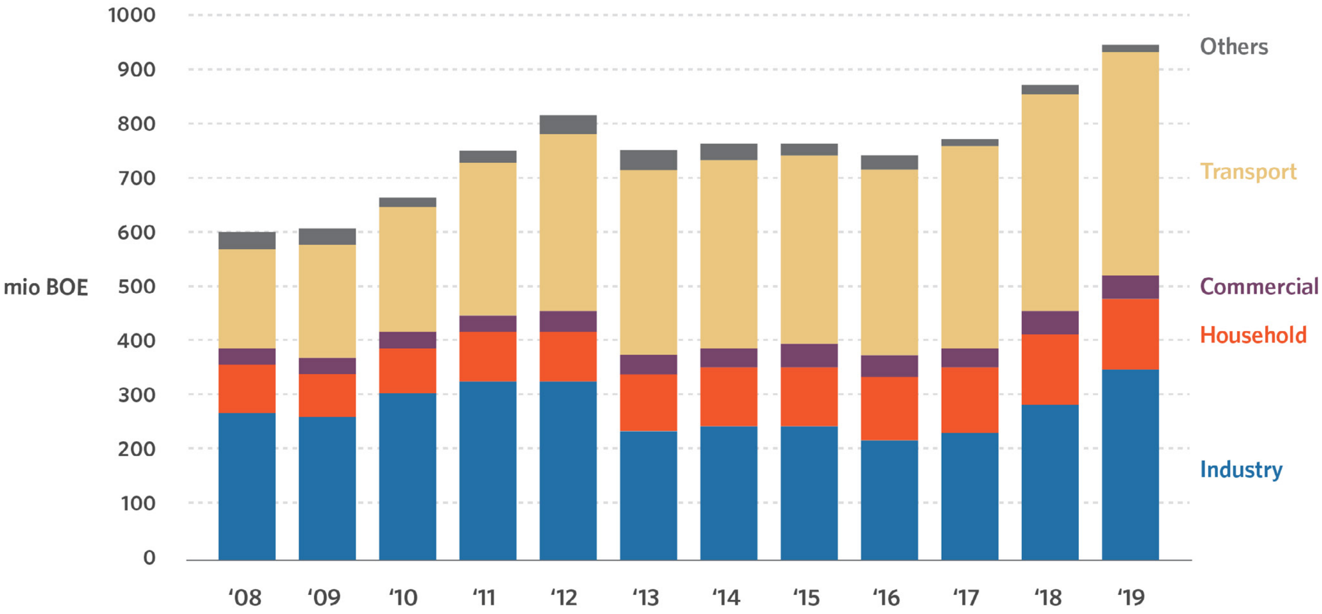
These include:

1. Average annual energy intensity reduction of 1% from 2015 onwards
2. Energy elasticity <1 in 2025 in compliance with economic growth
3. Energy consumption reduction of 17% compared with BAU in 2015

With the energy consumption baseline number at 1,101 barrels of oil equivalent (BOE) in 2015, these three targets equal 368 BOE of energy saving in 2025, assuming the economic growth rate at 8% (or total energy consumption in 2025 at 2,166 BOE). It can equal 227 BOE if the economic growth rate is assumed to be 5.4%, or total energy consumption amounts to 2,016 BOE in 2025.

Data from the Ministry of Energy and Mineral Resources (MEMR) in 2020 shows a recent surge in national energy consumption. Sector-wise, industry used to be the main driver of energy consumption in the country. However, since 2012, the transport sector has taken the lead, with a steady growth rate up to last year, at a range of 5.3-5.9% annual growth.

**Figure 1.1** Annual energy consumption by sector[1]

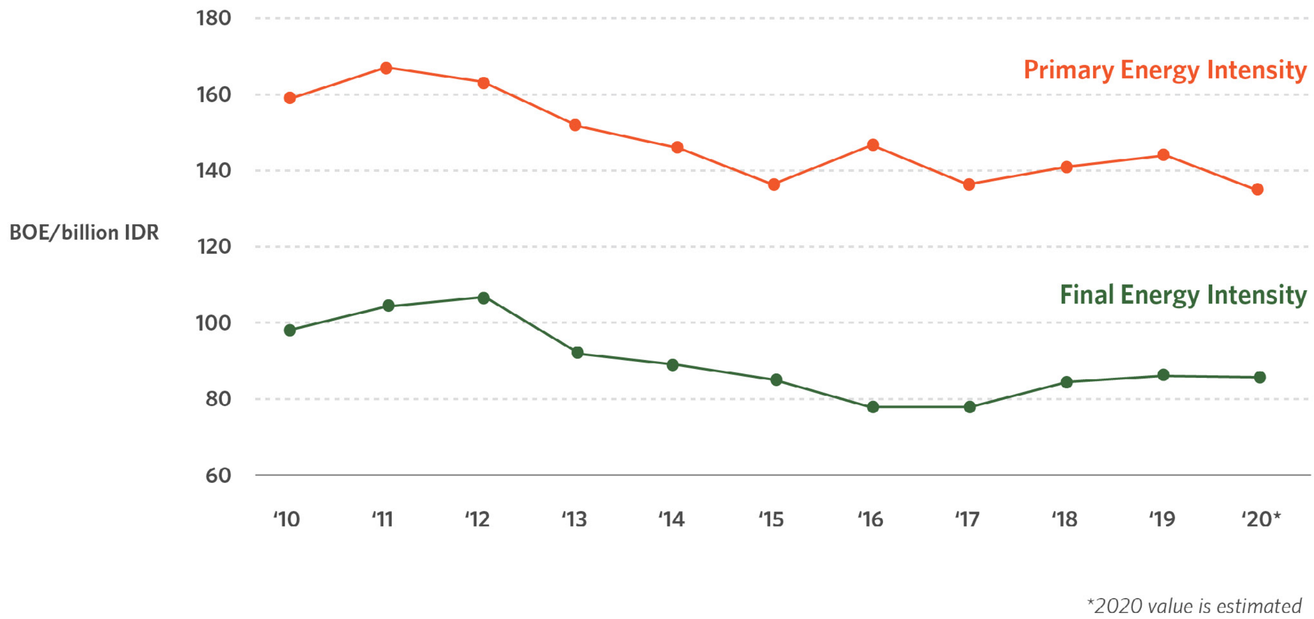



Source: Handbook of Energy and Economic Statistics of Indonesia 2019, MEMR

The graph illustrates the extreme volatility of Indonesia's energy intensity. A study of the determinants of energy intensity in Indonesia by Kartiasih et al. (2012), concluded that energy intensity at the national level is influenced by economic activity. Meanwhile, a follow-up study by Azaliah et al. (2020), showed that the ups and downs in energy intensity in Indonesia have a positive correlation with the ratio of income from the industrial sector to GRDP, trade openness, and FDI per capita. Based on the results of this study, it can be concluded that Indonesia is actively engaged in the industrial sector so that an increase in output from the industrial sector can encourage an increase in energy intensity. The study also shows that encouraging increased energy use efficiency in the industrial sector, by improving industrial technology, can encourage efficient reductions in energy intensity in Indonesia.

1 The value does not include biomass consumption. Others include the agriculture, construction and mining sectors.

**Figure 1.2** Annual national energy intensity of Indonesia




Source: CPI Analysis

This finding is in line with the latest work from the Directorate of Energy Conservation of MEMR, which has mapped the energy efficiency potential from five users on the demand side. The data was collected from an energy audit conducted by MEMR in 2011-2018 on 422 industries and 225 buildings, energy management reports, DANIDA study in 2017, and BPPT outlook in 2018. In addition, the MEMR has also identified energy efficient generation from the supply side with a total energy saving potential of 14.7 SBM in 2025, assuming an energy-saving rate of 0.5-2% of BAU.

**Table 1.1** Energy efficiency potential in the five energy consumption sectors

| Indicator | Industry | Commerce | Household | Transport | Total |
|---|---|---|---|---|---|
| Average energy consumption | 310 MBOE | 42 MBOE | 149 MBOE | 309 MBOE | 811 MBOE |
| Energy consumption 2018 | 334 MBOE | 43 MBOE | 151 MBOE | 391 MBOE | 920 MBOE |
| Energy saving potential | 5-26% | 12.5-16.5% | 0.3-26.3% | 3.2-18.9% | |
| Projected energy consumption in 2025 | 441.8 MBOE | 81.43 MBOE | 201.42 MBOE | 492.74 MBOE | |
| Energy savings target in 2025 | 83.1 MBOE | 13.8 MBOE | 53.1 MBOE | 76.9 MBOE | 227 MBOE |

Source: CPI Analysis

Based on the projection in Table 1.1, industry has the biggest energy saving potential to achieve the energy efficiency target stipulated by the RUEN. In the context of energy efficiency services in Indonesia, this is in line with the target market where energy service companies already have extensive experience with industrial and commercial clients. Other sectors, such as transportation also have significant energy-saving potential.

# 2. A REVIEW OF THE RISKS AND CHALLENGES IN THE INDONESIAN ENERGY EFFICIENCY MARKET

## 2.1 THEORETICAL BACKGROUND ON RISKS AND BARRIERS TO THE ENERGY EFFICIENCY MARKET

The first objective of this study is to identify the existing risks, barriers, and challenges in developing the energy efficiency business and projects in Indonesia. The study began with an academic literature review, which was conducted through a systematic search of related studies and papers available in bibliographic databases. This was based on keywords, such as energy efficiency investment, energy efficiency financing, energy efficiency risk, energy efficiency market, and variants thereof. The review also attempted to examine publications from non-academic or non-governmental institutions that were published domestically and regionally, without excluding studies from specific countries or regions.

The main studies that provide an in-depth summary of the risks and challenges in the energy efficiency market, and contribute input to this study include:

- Energy Efficiency Financing: A review of risks and uncertainties (Hill, 2019)
- Technical skills, disinterest, and non-functional regulation: Energy efficiency barriers viewed in an ecosystem of energy service companies (Kangas, et al. 2017).

There are multiple ways to categorize risks in energy efficiency investment. Risks can be grouped into project intrinsic or controllable risks, and extrinsic or uncontrollable risks. Other studies classify risks as either quantifiable, for instance, financial, or non-quantifiable factors like regulatory risks. This report leverages the classification criteria used in the reference as this is simple to understand.

The findings from the literature review on due to this demand investment risks were then further summarized into a category table that can be presented to and reconfirmed by ESCOs and project developers. This section will discuss real examples of how this type of risk can manifest itself in energy efficiency projects.

### ECONOMIC AND FINANCIAL RISKS

Energy efficiency projects are usually small in volume and require complex financing structures.  They need relatively small investments, which limit possible profits and necessitate a certain level of aggregation to appeal to financing institutions. Even if the energy efficiency projects are not so small in terms of energy savings, the contribution to overall cost reduction for an industrial operation is usually not significant enough for the CFO and others to make this a priority.

A multitude of actors are involved in energy efficiency projects. However, in developing and emerging economies where markets are new, trust has not developed between the different stakeholders. Investors often lost interest in energy efficiency in developing countries after they recognized the need for large capacity building to convince potential customers to enter contractual arrangements (APEC Energy Working Group, 2017).

The existence of information barriers, in the sense that information related to factors that affect the feasibility of energy efficiency projects, such as component costs or foreign currency exchange, is limited and imperfect. This is also due to asymmetric information where actors in the energy efficiency business may want to keep their information private to maintain their competitive edge. This leads to imperfect cost information, where ESCOs believe that there is a lack of knowledge regarding the real costs and benefits of energy efficiency improvements. They may also consider that the cost information may not reflect the real cost calculations. Also, they may not be in line with the projected payback periods and return on capital investment, which may lead to project payment default.

**Associated risks in this category:** Cost increases, interest rates, volatile foreign currency exchange, payment default.

## FINANCIAL RESOURCE RISKS

Risks involved with energy efficiency projects are perceived to be high as they generate ‘income’ from ‘invisible’ resource savings. The asset cannot be refinanced through the sale of its products (energy efficiency savings), and for financial institutions, this is a problem under conventional investment strategies. Often, domestic ESCOs have weak balance sheets and lack the collateral required by banks. Therefore, the internal lending credit policies of banks are usuallystrict towards ESCOs and seem reluctant to fund traditional energy efficiency projects.

Banks tend to lend only to existing customers, which makes it difficult for new customers, such as ESCOs to get access to funding (APEC Energy Working Group, 2017). In addition, due to this lack of confidence in the performance of energy efficiency projects , facility owners are often unwilling to borrow a loan for energy efficiency projects. For the same reason, ESCOs also find it difficult to convince their clients to act as a guarantor when accessing an energy efficiency loan.

Limited capital availability also pits energy efficiency investments against other investment priorities, and therefore, many firms face high hurdles for energy efficiency investments. In many developing countries, including Indonesia, the cost of capital for domestic enterprises to invest in energy efficiency improvement technologies may reach 30-40%, and the situation is even more difficult for small and medium enterprises (SMEs).

**Associated risks in this category:** Perceived complex investments and uncertain calculations of risk and return due to unpredictability of energy savings performance limit the supply of affordable capital, and the demand for such investments.

## BEHAVIORAL AND OPERATIONAL RISKS

Behavioral and operational risks can manifest in the form of unexpected consumption patterns, faulty operation or improper maintenance of equipment, and negative utility from time-consuming maintenance or usage. The causes are often attributed to systematic behavioral biases or energy-related behavior patterns.

The so-called rebound effect is often discussed in the context of energy efficiency investment. The concept posits that increases in energy efficiency can lead to lower energy costs for energy services and potentially a substantial increase in demand for such services, which would, in turn, result in lower-than-expected savings. This means that net savings are not realized at the level envisioned ex-ante as increased energy use offsets the actual energy savings.

A number of prominent studies on specific behavioral factors that influence energy consumption originate in behavioral economics or psychology. These studies identify and analyze energy-related behavior patterns to predict energy user consumption, notably for households. Some energy use patterns were observed in such studies, where one group behaved quite differently from others. These patterns highlight the risk of uncertainty from different groups of households in terms of energy consumption and equipment use.

**Associated risks in this category:** Behavioral biases, rebound effect, faulty operation, and unexpected consumption patterns.

## AWARENESS AND COMMITMENT RISKS

Loan officers and risk managers within financial institutions often have no knowledge of energy efficiency technologies, their performance, and contracting. Financiers are also often unable to access energy consumption benchmarking in building and industry, and the know-how on impact measurement of energy efficiency projects. In emerging countries, where energy efficiency technology is new and mainly imported, knowledge and information are limited and often out of date (APEC Energy Working Group, 2017). In Indonesia, there were a couple of capacity building workshops for financial institutions, but there were no significant changes in the project pipeline.

On the other side, project developers and ESCOs often have inadequate capacity to develop financially attractive project proposals, coupled with low awareness of financing options. Project developers also often lack the skills and knowledge needed to convince the CEOs of property companies that energy efficiency investments are an important business area.

In addition, company decision-makers often choose to overlook the lengthy due diligence process for energy efficiency projects if they are not clear winners, and tend to prioritize other corporate projects. This leads to the fundamental question of what improvements can ensure a bigger appetite from potential clients for energy efficiency development. A commitment to energy efficiency can be enforced by appropriate regulation. However, energy efficiency often finds itself at the bottom of the barrel in terms of supporting policies with respect to construction and energy production.

**Associated risks in this category:** Lack of knowledge of energy efficiency, skepticism, and misunderstanding of benefits, conflicting priorities, and a lack of motivation across businesses obstruct potential demand. The lack of a convincing business case for cheap energy and absent regulation are other factors.

## MEASUREMENT AND VERIFICATION RISKS

As the return on investment from any energy efficiency project will likely arise from energy savings, financial institutions and investors require an accurate assessment of the achieved savings. Therefore, cost effective measurement and verification (M&V) is essential to achieve long-term energy savings. However, the potential risks can manifest in the form of poor data quality, inconsistency of data collection, level of verifiability, and modeling errors. In a real-life scenario, energy savings are not measured. They are computed between the adjusted baseline energy use and actual energy use (Meyers and Kromer, 2008). The two types of energy use are the result of power measurements over time, which may be subject to instrument error due to harmonics from faulty parts. Modeling errors and sampling errors can also play a role when reporting energy savings, which can lead to either over-reporting or under-reporting.

The International Performance Measurement and Verification Protocol (IPMVP) is often referred to as a guideline to mitigate M&V risks. Other possible mitigation solutions include improved model validation and smart metering. However, the development of infrastructure and a suitable process to conduct rigorous M&V takes time and needs the active participation of many stakeholders.

**Associated risks in this category:** Poor data quality, inconsistent measurement, and modeling errors.

## TECHNICAL SOLUTIONS AND EXPERTISE RISKS

Multiple actors can cause, and become affected by, the lack of technical skills that hinder energy efficiency improvements. These actors include the core businesses themselves (ESCOs and technology suppliers), extended ecosystem actors (builders and developers, building owners, building managers, planners and architects, and planning bodies), and governmental agencies in the broader business ecosystem.

The lack of technical skills in public bodies and governmental agencies may imply that requirements and standards are not always up to date with the latest technology. Building managers, building inspectors and architects may have limited information about energy management. Therefore, despite good technology, the resulting energy efficiency improvements may be negligible and impact the building users, and their energy costs (Kangas, et al. 2017).

On the other hand, ESCOs can also have limited technical skills, such as knowledge of new technologies, which has an impact on their customers and suppliers.

In many parts of the world, ESCOs have observed that officials, policymakers, construction companies, and building owners do not value their professional skills and knowledge. In addition, the rapidly changing policy landscape has also led to questions about the legitimacy of ESCOs. As the demand for energy efficiency solutions increases rapidly when a new policy is implemented, it attracts companies that lack the required market skills. This tendency downgrades the legitimacy of ESCOs. The asymmetric information regarding energy efficiency measures among the actors involved also lowers trust towards ESCOs and construction companies. This leads to clients feeling a sense of being taken advantage of because of their limited knowledge of energy efficiency technology.

**Associated risks in this category:** Insufficient technical capacity, lack of commonality on best practices, and standardization of procedures and technologies.

## CONTEXT AND TECHNOLOGY RISKS

Contextual and technology risks involve unpredictable negative externalities or uncertainties related to the technical specifications of the project. Contextual risks can be defined as insufficient information about the facility, installation delays, and extreme weather conditions or changes. Insufficient information about the facility i.e., a house, apartment building or factory, is perhaps the most obvious risk related to energy efficiency installations. While a full audit and project assessment prior to the launch of a project would limit such risks, acquiring complete and accurate data about a building is often difficult. Similarly, the removal of existing equipment and the installation of new equipment, which is typically done during specific working hours, leads to delays. The environmental risks include uncertainties about the adaptability of the installed technology to changing climate conditions.

Associated risks in this category: Poor project design, installation delays, insufficient information regarding the facility, poor equipment design, and poor performance.

## REGULATORY RISKS

Regulatory risks are associated with negative effects that arise from changes in government policies. These risks can take the form of political obstruction, conflicting guidelines, and lack of policy coordination (Langlois-Bertrand et al., 2015). Examples of these include energy rating standards adjustments, building code revisions, stricter climate change mitigation policies, highly subsidized energy pricing, reduction or cancellation of energy efficiency grants, and subsidies or other public funding programs. Other risks include the failure to implement supportive policies for energy services or the energy efficiency market, changing regulations on financial markets, and economic, regional and industrial development policies.

The most prevalent obstacle tends to be non-functional regulations, which are ineffective in practice, due to either poor design or implementation. Many policies are prepared in a hurry, and public bodies and other actors are not prepared for new policies when they begin to be implemented. Some policies were viewed as 'too technology specific', and, thus, restrictive to the actors. Many policies regulate how energy efficiency improvements should be performed, which alter energy efficiency outcomes. Further, certain standards and requirements were viewed as obstacles rather than drivers, as they promote energy efficiency only in principle, but not in practice. This caused energy efficiency projects to become cost-inefficient (Kangas, et al, 2017).

**Associated risks in this category:** Changes in grants or subsidy programs, unfavorable financial regulations, conflicting guidelines, and regulatory changes in the financial market.

## ENVIRONMENTAL RISKS

Environmental risks arise from externalities around the project that may impact the effectiveness of an energy efficiency project. This includes not only the environment per se but also the cultural and social factors that are prevalent in the project location.

The Indonesian working culture tends to be reluctant to change the business-as-usual work practices and modes of operation that are considered to 'work perfectly'. Energy efficiency projects can involve changes to work habits that can be perceived as troublesome and create more work, and this can disincline people towards energy efficiency. This is besides the fact that the energy efficiency ecosystem also works in separated silos, where the policymakers and practitioners are not on the same page in terms of energy efficiency technology deployment.

On the other hand, the same issue may also plague ESCOs, who are sometimes pointed out as actors, who are reluctant to develop new business models to increase their market share. Within developing markets like Indonesia, finding a market and funding can be quite problematic, and ESCOs must be creative about finding new market niches and financing where energy efficiency can flourish.

Social factors may also hinder the development of energy efficiency, as large players and the technology involved come mainly from developed nations with minimal to non-existent participation from local workers. The presence of local experts is, therefore critical, and capacity building for local workers is crucial to the success of energy efficiency projects in the country.

**Associated risks in this category:** Cultural reluctance to change, social resistance, and an uncertain market for growth.

## 2.2 SURVEY OF ENERGY EFFICIENCY PROJECT DEVELOPERS

Between January to February 2020, CPI conducted surveys of ten companies domiciled in Jakarta and Bandung. The survey intended to collect empirical data from business actors in the field of energy efficiency and understand the project developers' perspectives concerning financing needs to develop energy efficiency projects. The survey took place in two phases: distribution of questionnaire and follow-up interview.

Based on the results of the survey, we categorized projects undertaken by developers based on investment size: small investments ranging from IDR 2-10 billion; medium investments ranging from IDR 10-100 billion; and large investments for projects bigger than IDR 100 billion.

Small investments tend to be directly funded by clients through bank loans and equity. The initial costs of medium and large investments can be borne by both the project developer through bank loans, and the client through equity. The largest clients for energy efficiency come from the industrial sector, which falls under the large investment group. Small investments are normally applicable to projects related to building, retail, hospitality industry, and state-owned premises.

The survey found that all project developers admitted to a lack of trust from both small and large investors against energy efficiency projects in general. This origins from the doubt whether the project can actually achieve the expected level of energy saving to be economically feasible. From their experience, the project developers identified three most important determinants of quality in energy efficiency projects that must be prioritized to establish trust from the client's perspective.. These factors are initial analysis or audit, intensive communication with the facility owner, and availability of financing. Among these three, they acknowledged that access to financing was difficult and identified it as the most urgent component necessary to improve energy efficiency market implementation. After financing, we need to prioritize measurement and initial auditing, respectively.

The survey also asked respondents about the main barriers to energy efficiency businesses based on the activities of the last twelve months. The project developers were given a list of risks based on the theoretical background and were asked to assess the impact and likelihood of these risks from the perspective of their businesses. The findings regarding these perceived risks are summarized in Table 2.1.

**Table 2.1** Summary of Project Developer Responses on Risk Impact and Likelihood

| Risk | Impact | Likelihood |
|---|---|---|
| Economic and financial | High | Medium |
| Financial resources | High | Medium |
| Behavioral and operational | Medium | Low |
| Awareness and commitment | Medium | Medium |
| Measurement and verification | Medium | Medium |
| Technical solutions and expertise | Medium | Medium |
| Contextual and technology | Medium | Low |
| Regulatory | High | Medium |
| Environment | Medium | Low |

Source: CPI Analysis

The project developers agreed that the perceived financial risk, from both the client's and lender's perspectives, is the biggest hurdle to developing energy efficiency projects. The risks that were most often mentioned on the survey include:

- The incertitude within the calculations of risk and return
- The possibility of cost increases
- The risk of payment default

These result from the lack of access to energy efficiency financing. In addition, project developers also stated that the lack of regulatory support from the government, and the lack of awareness regarding the complex concept of energy efficiency were the biggest non-financial barriers in the energy efficiency market.

# 3. EXPLORING EXISTING ENERGY EFFICIENCY BUSINESS MODELS

To start with, it is important to understand that not all businesses that invested in energy efficiency in the world relied on ESCO. Their journeys generally started with an energy audit (OJK, 2015).

The simplest audit, which is called a walk-through or preliminary audit, involves short interviews with the facility personnel, brief reviews of the facility's utility bill and operating metrics, and a short facility tour. The goal is to identify easy energy saving activities with minimal or no cost and offer a relatively quick return on investment.

The second audit, which is an energy survey and analysis, requires more comprehensive surveys, with lengthy and direct inspections, to establish a detailed understanding of the facility. This exercise aims to list all potential energy saving activities, along with their operational impact, if implemented.

The highest form of audit is called an investment grade audit (IGA). Building on the previous audits, the IGA seeks to understand the costs and benefits of the identified energy saving activities in monetary terms (OJK, 2015). This enables businesses to prioritize the actions that need to be taken and justify the reasons for them. This is vital because energy saving activities often compete with the need to simultaneously perform other non-energy saving activities within the budget allocated by the company. Depending on the audit level, an audit may be performed with or without the help of an ESCO. If the audit is conducted by the ESCO, the company is not obliged to continue with implementing the energy saving project through the ESCO.

The company management will determine how to implement an energy saving project after an audit, to understand the energy profile and how it can be minimized. This decision is based on the project's complexity, and whether it would need a guarantee from an external party (OJK, 2015). Small projects are usually simple and do not require a guarantee. Such projects are usually implemented internally by the company.

On the other hand, bigger projects tend to be complex, and the company often needs a guarantee that the implementation will be successful. In such situations, the company or client may seek help from the ESCO, which can provide the client with human and technological support, and a guarantee.

## 3.1 SHARED SAVINGS BUSINESS MODEL

ESCOs can help their clients save energy through the two business models (Figure 3.1) that are present in Indonesia.

The first is the shared savings model where the ESCO borrows money from a bank and uses the loan to buy and install energy efficient devices at the client's facility. The installation can offer the client some energy savings that lead to monetary savings. The client will then share some of the monetary savings with the ESCO as payment for the device installation. The ESCO will use this revenue to repay the bank loan.

In case the energy savings and the consequent monetary savings are less than the expected amount, the parties will settle it based on the stipulation in each contract. They usually follow two common practices.

1. The ESCO can ask the client to extend the contract until it can fully repay the bank (Hofer et al. 2016), with the same share proportion. Under this practice, the client does not punish the ESCO due to its underperformance.
2. The client may claw back a percentage of the fees paid to the ESCO (SEAI, 2013). In other words, the ESCO's share becomes smaller if the device underperforms. Even worse, in a small number of cases, the ESCO gets no share at all if the energy savings fall below the promised threshold (Pantazaras, 2013).

In the shared savings model, the client does not incur any additional costs. During the contract, the client pays the same energy bills as earlier, but some of that money goes to the ESCO, which amounts to a certain percentage of the savings. After the contract, the client pays even lower energy bills. In other words, the client incurs no investment costs.

Different countries have variants of this model. In Turkey, Mexico, and Armenia, the ESCO receives 60-70% of the total payment immediately after device installation, based on the measurements taken during the commissioning. The remaining 30-40% of the total payment is paid six to twelve months later, with the shared savings, depending upon the device's actual performance. The total payment here refers to the theoretical revenue that the ESCO should get under the contract period (Hofer et al, 2016).

Further, in the US, typically 85% of the savings will go to the ESCO company, and that percentage either stays the same or gradually declines as the contract nears expiration (Energy Office of Hawaii State, 2013). After the contract between the ESCO company and the client expires, the client has the right to retain 100% of all monetary savings.

Meanwhile, in Canada, the shared savings model has two variants. In the first model, the ESCO receives 100% of all energy savings until its costs and profits are achieved. After this, the contract ends, and the client keeps all the savings from that point onwards. In the second model, the ESCO receives the percentage mentioned in the contract. However, if the actual energy saving is less than expected, the contract can be extended until the ESCO company recovers all its costs (Hofer et al, 2016).

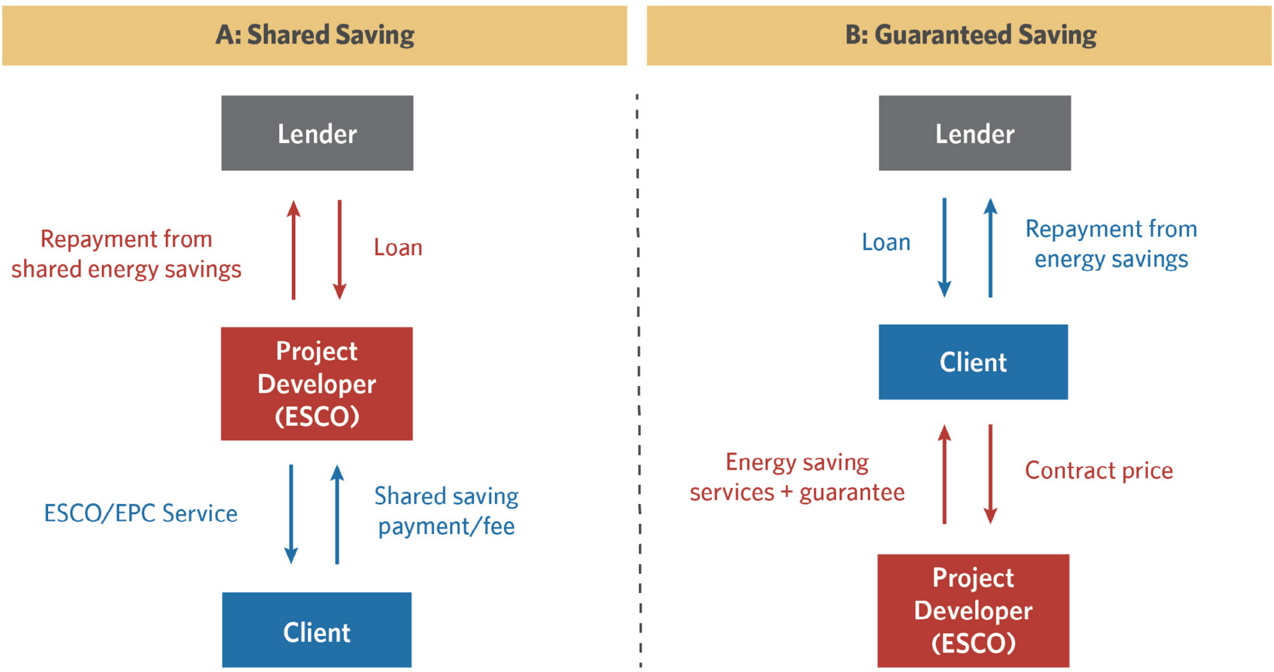
In Mexico and Armenia, the ESCO finances, designs, and implements the project, and the client pays a fixed nominal amount per year, instead of a fixed percentage, until the ESCO recovers its investment. This fixed nominal amount payment is agreed upon depending on the baseline energy costs, with agreed adjustment factors.

In South Africa, the ESCO industry relies only on certain standard products that have a good market reputation for reliable energy savings. These products are agreed upon in advance. Therefore, the clients face minimal uncertainty concerning the device's performance from the beginning. The clients then pay the ESCO a predetermined nominal amount after installation (Hofer et al, 2016).

According to the European Energy Efficiency Platform (2020), the shared savings model puts the ESCO in a risky position for two reasons. First, the ESCO assumes the debt risk from the bank. Second, the ESCO's revenue is dependent on an unpredictable utility price that is set by the government, and this price decides the monetary benefits that are gained from the energy savings. Therefore, the shared savings model may be a poor one for small ESCOs. Small clients benefit from this model, as they are protected from direct responsibility to the bank.

Some believe that the shared savings model, where the ESCO is liable to pay the bank, maybe better suited to developing countries where clients are small and face difficulties accessing finance. However, ESCO companies in developing countries are also usually small and face the same difficulty in accessing finance. This chicken-and-egg dilemma, where neither side wants to take the lead due to similar financial difficulties, may persist in developing countries if their governments never step in.

**Figure 3.1** Two types of energy efficiency business model:(A) Shared Savings and (B) Guaranteed Savings




Source: CPI Analysis

## 3.2 GUARANTEED SAVINGS BUSINESS MODEL

Under the guaranteed savings model, the client borrows money from a bank to buy and install the energy efficient device from an ESCO. In this case also, 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.

According to the European Energy Efficiency Platform (2020), the guaranteed savings model puts the client in a risky position because they assume the debt risk from the bank. As such, the debt will be reflected on its balance sheet. This requires the client to be creditworthy by the bank's standards. Meanwhile, 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.

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. On the other hand, the guaranteed savings model offers a financial guarantee from the ESCO to the client and ensures that the client is able to repay the loan.

However, neither model can manage the threat from the utility price increase, which can pose a risk to both the ESCO and the client. In essence, energy efficiency measures like this aim to lower the energy price risk but cannot eliminate it.

## 3.3 THREE IMPROVED BUSINESS MODELS IN INDONESIA

The three most significant risks that hinder energy efficiency businesses are economic and financial risks, financial resource risk, and regulatory risk. The above two business models do not address these risks due to the challenges identified in previous sections.  So, in this section, we recommend three improved energy efficiency business models to alleviate these risks. They are developed by modifying the existing two and drawing inspiration from the successful business models in other sectors. In the first category of economic and financial risks, the main factors that stand out are cost increase and payment defaults. The reason for this is the lack of a financial guarantee in a non-performing situation.

In the second category of financial resource risks, the key issues are the perceived high investment costs and the prohibitive calculation of risk and return. Generally, the problem arises from disputes regarding the energy saving measurement and the opaqueness of the resultant monetary savings.

Under the third category of regulatory risks, the ever-changing nature of regulation, including energy pricing, hinders investment confidence.

These uncertainties create a lack of trust in energy efficiency investment.

### 3.3.1 SERVICE OR DEVICE BUSINESS MODEL

Large buildings usually use energy to control their air temperature. Air temperature is usually centrally managed and is not controlled by individual heaters or air conditioners in different rooms.

In many cases, accurate metrics to assess the captive power plant's performance are not easily available. On the other hand, air temperature information is easily available. The building operator understands when it is necessary to lower or increase the plant's output while assuming that energy consumption will follow a similar pattern.

However, they have no means to directly read how much energy they have used to produce and distribute the conditioned air, let alone understand whether their energy consumption can still be significantly minimized without loss of output. In tropical Indonesia, this model is adopted primarily in chiller plants.

The building operator, who is the client, has two options (Figure 3.2).

In the first option, the client allows the ESCO to install a set of devices for free. This set of devices (consisting of sensor or data logger, variable speed drive components, etc.) helps the plant to operate more efficiently. These devices also enable the client to regulate their electricity consumption easily. This arrangement creates trust as the ESCO will provide a performance guarantee. The client pays the ESCO a fixed nominal amount for every kWh of electricity that the building consumes. Therefore, the client pays the ESCO only for the service.

In situations where the device delivers as promised but the client does not pay at all or pays late, it is important to establish requirements to protect the ESCO.

1. The client pays the ESCO a refundable deposit when they make the contract, which may be returned after the contract expires, with some conditions.
2. The client needs to regularly maintain the original deposit.
3. The ESCO has the right to uninstall the device if the deposit is not made within a specified timeframe.

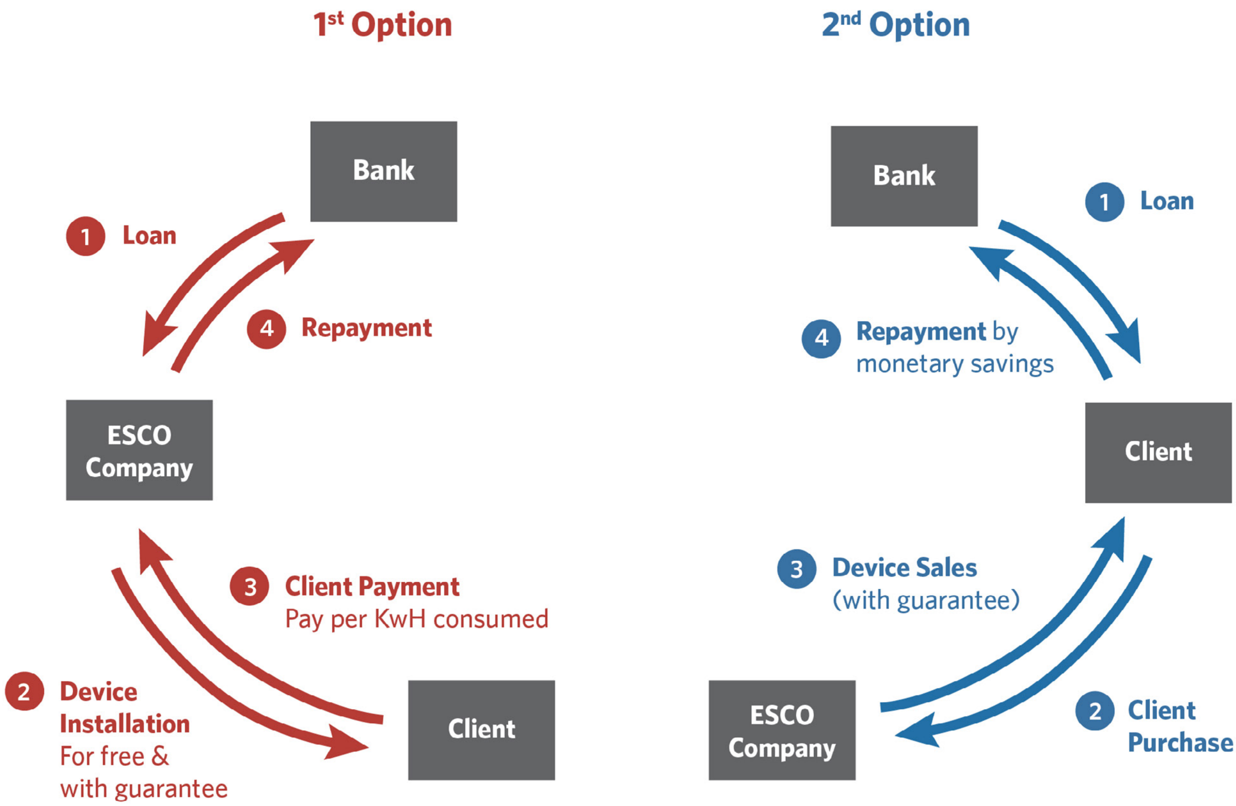
The deposit ensures that the ESCO can repay the bank loan when the client delays payment if the ESCO is the borrower. The entire deposit may also be used to repay part of the loan when the client does not pay at all for a considerable amount of time.

In the second option, the client buys the device from the ESCO and pays it to install the device on the client's premises. The client is required to pay a small fee every month to maintain the device. These costs are applicable to only one device.

The client can decide how many devices they need to achieve the desired energy savings. The client will then use these energy savings to repay its loan.

The ESCO will offer the client a technical guarantee on the minimum energy savings that the device would enable, or on the energy output that the plant would deliver.  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.

**Figure 3.2** Service or device business model




Source: CPI Analysis

This model is expected to reduce the perceived high investment cost for the client and offers options that suit their investment preferences.

In addition, because the ESCO will install the device in either option under this model, the client does not take on this responsibility and faces no construction cost risks. The contract minimizes unknown factors in the detailed risk and returns calculation for both sides, as it stipulates the fee per kWh in the first option or cost per device installation in the second option. If a bank lends to any party, this certainty reduces the likelihood of payment default. However, this model cannot eliminate regulatory risk as it is beyond the control of both the ESCO and the clients.

## 3.3.2 LEASING AND PURCHASE BUSINESS MODEL

The leasing and purchase business model offer two options (Figure 3.3).

In the first option, the ESCO company borrows money from the bank to procure the energy saving device, which may be either self-built or bought from the original manufacturer. The ESCO will lease this device to the client for three years, with a guarantee. Convinced by the guarantee, the client will then pay a leasing charge to the ESCO for this period. In the fourth year, the client will have to buy the device with the final payment. It can be said that this first option resembles the concept in which the client buys the device under multiple years with installment scheme. The ESCO will use the leasing revenue and the final payment to repay the bank loan.

As in the case of the service or device business model, the client is required to first make a deposit. This protects the ESCO in the event of late or no payment even if the device delivers as promised.

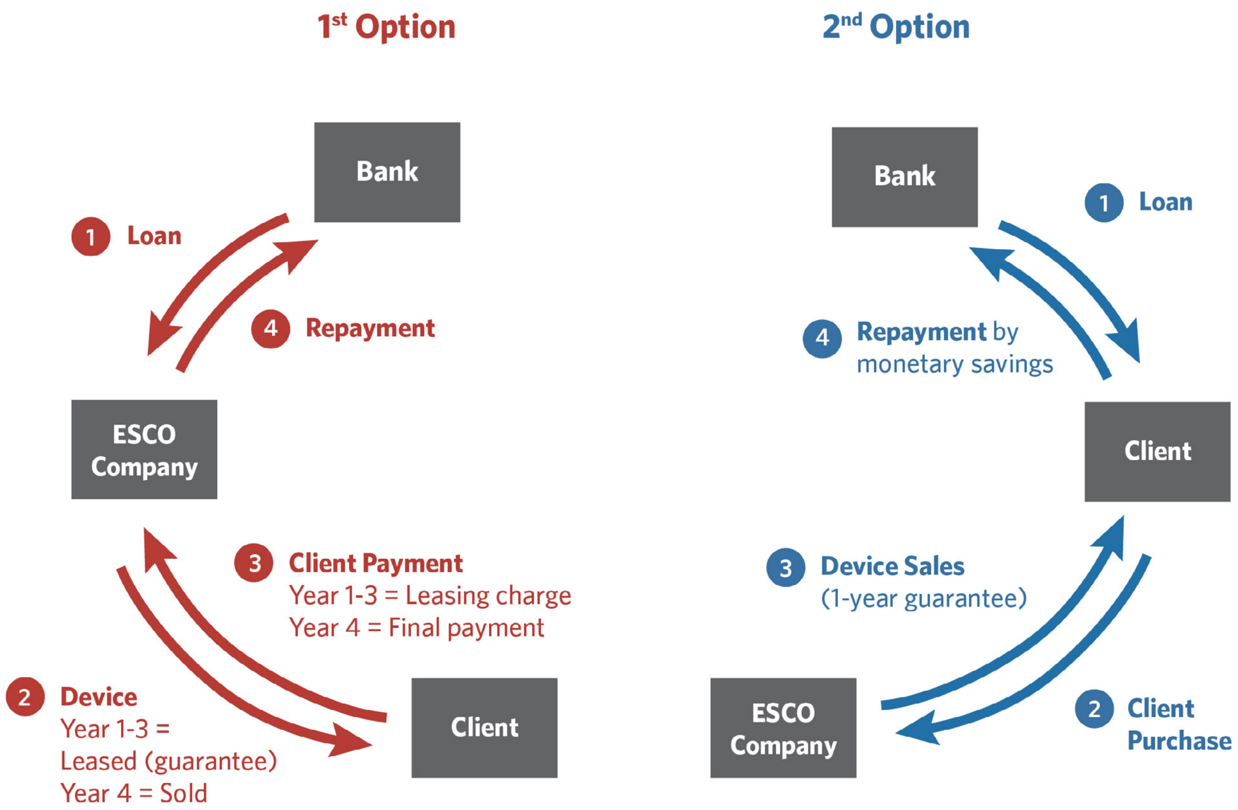
In some countries like Turkey, China, India, and Vietnam, the leasing charge is generally not fixed. It is contingent on energy cost savings, which are verified by measurements at commissioning (Hofer et al, 2016).

In the second option, the client borrows money from the bank to purchase an energy saving device from the ESCO. The client takes the responsibility of repaying the loan with the generated energy savings and receives guaranteed support (in monetary term) for a year from the ESCO.

The ESCO offers this monetary guarantee to convince the client that the savings will be sufficient to repay the loan within a year. The monetary guarantee will be given to the client either when the actual monetary savings are less than the promised amount (due to sub-standard technical performance), or if the device is damaged and is not repaired by the ESCO.

Under either option, the client eventually buys the device. The difference is that the client will buy it at a higher total cost with the first option because they can purchase it (with a sort of installment) over a longer time frame.

**Figure 3.3** Leasing and purchase business model




Source: CPI Analysis

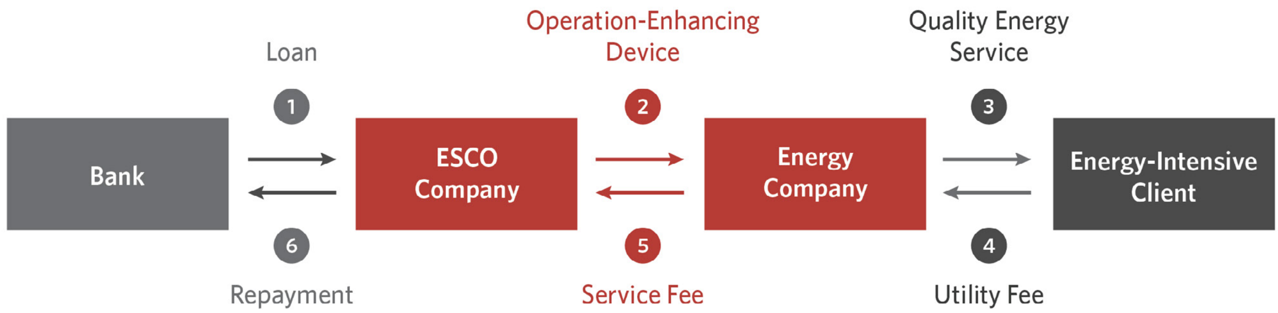
This model minimizes the risk of payment default for the bank. Firstly, this is because the ESCO, as the borrower, will be paid in full by the client who buys the device immediately or after four years with a sort of installment scheme. Secondly, the client as the borrower is backed by ESCO's monetary guarantee. Under the second option, the ESCO's monetary guarantee reduces uncertainty in the risk and return calculation, which makes the calculation seem less prohibitive than before from the client's perspective. It also shows a more optimistic view of the perceived high investment costs. Under the first option, the ESCO takes up the responsibility to install the device so that the client is not liable to face the construction cost risk. However, this model cannot eliminate regulatory risk, which is beyond the control of both the ESCO and the clients.

### 3.3.3 QUALITY ENERGY SERVICE BUSINESS MODEL

Under the third model (Figure 3.4), which is the quality energy service business model, the ESCO uses the bank's loan to manufacture different devices that are designed to perfect the operation of the utility company itself. In other words, the ESCO meets the utility company and has no direct contact with the end clients. The utility company uses these devices to enhance the quality of its offering to the client. Later, the client pays a premium fee for these enhanced services, and the utility company uses this payment to repay the ESCO.

The ESCO uses this payment to repay the bank loan later.

**Figure 3.4** Quality energy service business model




Source: CPI Analysis

These devices may be electricity stabilizers, UPS (uninterruptible power supply) or energy storage. Electricity stabilizers ensure a stable power supply to the ESCO's clients. The UPS makes it possible to quickly dispatch an alternative power supply to the clients during a blackout. Energy storage devices help the company store the electricity generated from its intermittent renewable power plants and offer unfluctuating and renewably sourced electricity to green energy conscious clients.

Clients who need enhanced power services are usually large energy-intensive companies, such as oil refineries, industrial manufacturers, or even data centers. They are usually willing to pay a premium fee for enhanced services.

In the third model, the client does not install the device and is not exposed to the construction cost risks. The bank is also relatively safe from payment default risks for two reasons. First, this third model is applicable to a particular business arrangement, in which the energy-providing company would only have deals with certain types of clients (big energy-intensive companies with a reliable financial background). These energy-intensive clients require and are willing to pay for consistent and quality services. That is why the energy-providing company would only deliver quality energy to these segmented clients in the first place. Second, the collateral in this model is the escrow account that the ESCO has with the bank, to which the energy-providing company pays the fee for the service provided by the ESCO. This way, banks have an option to deduct money (from the ESCO's escrow account) that is needed to cover the unpaid loan.

In addition, from the energy company's perspective, the perceived investment cost may be lower because quality services are outsourced to the ESCO. From the ESCO's perspective, the venture poses minimal payment risks because the energy company makes the payment. In the case of Indonesia, the company is the monopolistic giant state-owned company PLN. This means that the risk calculation is not as prohibitive as it might be otherwise. Once again, this practice does not have the ability to eliminate regulatory risks, as it is beyond the control of both the ESCO and the clients.

### 3.3.4 RECAP OF BUSINESS MODELS VS RISKS

All three models must include a stipulation that grants tripartite access to the saved energy monthly data, i.e., for the ESCO, the client, and the lender. This must be available on a single data platform, which should also indicate the estimated saved electricity costs. The data should be accurate but as non-technical as possible. This transparency will boost both financial predictability and trust in this investment, especially for the lender. Banks are usually reluctant to finance small energy efficiency projects because they require significant due diligence regarding effort and cost to understand the nature of these small projects' energy consumption. Data transparency can minimize this need.

To recap, Table 1 summarizes the three models and how they compare with the risks mentioned in subchapter 2.2. In general, the regulatory risk cannot be eliminated through any of these models.

**Table 3.1** Business models vs risks

| Risk | Does the model alleviate the risk? | | |
|---|---|---|---|
| | Service-or-device | Leasing-and-purchase | Quality energy service |
| Construction cost increase | Yes | Yes | Yes |
| Payment default | Yes | Yes | Yes |
| Perceived high investment cost | Yes | Yes | Yes |
| Prohibitive risk/return calculation | Yes | Yes | Yes |
| Changing regulation | No | No | No |

Source: CPI Analysis

Additionally, in Indonesia, any practice that is based on the shared savings model is uncommon, as it requires the ESCO company to withdraw the bank loan. Most ESCO's in Indonesia are usually small and lack the ability to convince the banks to give them loans. On the other hand, most clients that engage in energy efficiency contracts in Indonesia are large green-conscious companies, and they possess the ability to convince the banks. Therefore, the guaranteed savings practice is more prevalent.

Hofer et al. (2016) proposes the use of simpler business models to stimulate enough demand and promote the ESCO industry in developing countries that have low experience with energy efficiency projects. Simpler models also offer a clear financial trajectory for the ESCO's themselves.

Simple models may also aim to:

1. Reduce the ESCO's perceived risk
2. Enhance the ESCO's repayment ability for short-term loans
3. Remove the continuous need for long-term energy measurements
4. Democratize opportunities for smaller enterprises to take on the role of the ESCO and/or clients
5. Protect the rights of the client to pay based on the device's actual performance at the same time

# 4. CONCLUSION

Energy efficiency initiatives can offer multiple co-benefits for Indonesia. They can play a key role in enabling a sustainable and clean energy future, promoting energy savings, fueling economic recovery through job creation, and improving competitiveness in the industrial and commercial sectors. Although there are significant opportunities for energy efficiency gains in Indonesia, several challenges must be overcome to develop energy efficiency business models in the country.

Clients and lenders perceive significant financial risks in developing energy efficiency projects, which is the largest hurdle. Their incertitude with risk and return calculations is the most-cited risk. In addition, the lack of awareness regarding the concept of energy efficiency and the lack of regulatory support from the government are other major barriers that obstruct the development of the energy efficiency market.

The two most common energy efficiency business models offered by energy services companies (ESCOs), shared and guaranteed savings, have failed to address business challenges in Indonesia. Therefore, improved business models need to be explored to accelerate energy efficiency development.

This study found three business models that currently exist and are viable to be scaled up in Indonesia. These are:

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

Although these three improved business models promise several advantages to manage challenges, they cannot eliminate regulatory risks. Strong and reliable regulation is necessary to grow and support the energy efficiency business in Indonesia.

Three urgent support measures need to be addressed. They are:

1. Bank loan interest reduction
2. Implementation of incentives or disincentives measures.
3. Market expansion through wider mandatory energy efficiency enforcement

Addressed together, an improved regulatory environment, market education and the ambitious pursuit of the more innovative business models discussed in this paper could significantly expand Indonesia's energy efficiency business sector, helping the country achieve its 2025 energy savings and 2030 emissions reductions goals, as well as longer-term energy resilience.

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