JIMESE
Journal of Innovation Materials, Energy, and Sustainable Engineering
JIMESE 3(1): 75–90
ISSN 3025-0307

Institute for Advanced Science, Social and Sustainable Future
MORALITY BEFORE KNOWLEDGE

Beyond carbon mechanisms: The role of energy service companies in strengthening energy transition policies and mitigating emissions

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Received Date: June 5, 2025 Revised Date: July 29, 2025 Accepted Date: July 31, 2025

ABSTRACT

Background: The presence of carbon market mechanisms in Indonesia as a government solution to achieve emission reductions has proven to be ineffective. This ineffectiveness confirms that more effective and comprehensive alternatives are needed. In this case, ESCo can be one of the mechanisms that can encourage low-carbon development in Indonesia. **Methods:** This research framework uses a multi-method qualitative approach by combining a narrative literature review and document analysis related to the ESCo model and its effectiveness in reducing emissions. **Findings:** To address the low price of carbon in carbon trading and the prevalence of alleged phantom credits in REDD+ projects, ESCo emerges as a more measurable and stable mechanism. In fact, Indonesia has also launched regulations governing the implementation of ESCo through Ministerial Regulation No. 14 of 2016. However, the lack of social readiness, policy coherence, and suboptimal funding schemes have hampered the implementation of ESCo in Indonesia. Therefore, this paper provides several solutions by examining benchmarks from other relevant countries that can be adopted by the Indonesian government. **Conclusions:** The success of the ESCo scheme is determined not only by its business model but also by the synergy between public communication, policy reform, financing schemes, and public-private collaboration. Thus, ESCo in Indonesia can be a strategic step to ensure more tangible emission reductions in line with the Nationally Determined Contribution targets. By adopting best practices from other countries and mapping domestic implementation barriers, this study offers a comprehensive framework of solutions to optimize ESCo implementation for promoting low-carbon development in Indonesia. **Novelty/Originality of this article:** This article offers originality by presenting a comprehensive framework that integrates international best practices and domestic barrier analysis to optimize the implementation of the ESCo model as a more effective alternative to carbon markets for promoting low-carbon development in Indonesia.

KEYWORDS: carbon trading; emission; energy service company.

1. Introduction

Indonesia demonstrated its serious commitment to tackling climate change by ratifying the Paris Agreement in 2016. This commitment is further strengthened by the National Energy Policy/*Kebijakan Energi Nasional* (KEN) designed by the Indonesian government to achieve a low-carbon contribution target (Nationally Determined Contribution) of 31.89% unconditionally and 43.2% with international support (UNCC, n.d.). This target is quite ambitious considering that Indonesia is among the top ten emitting countries (World Resource Institute, 2021). Nevertheless, Indonesia remains committed to transforming into

Cite This Article:
Sari, V. A., Lioe, J. J., & Sarbana, V. H. R. (2025). Beyond carbon mechanisms: The role of energy service companies in strengthening energy transition policies and mitigating emissions. *Journal of Innovation Materials, Energy, and Sustainable Engineering*, *3*(1), 75-90. https://doi.org/10.61511/jimese.v3i1.2025.2171

a country that contributes to reducing emissions. The Indonesian government's commitment was implemented in the launch of the carbon market on September 26, 2023. The carbon market traded in Indonesia includes two types, namely carbon credit and carbon quota (carbon offset) (Blaufelder et al., 2021). However, in its implementation, the carbon market has encountered a number of serious problems that have resulted in the non-achievement of the original objectives of the carbon market. The fluctuating price of carbon traded in Indonesia's carbon market is one of the factors causing the ineffectiveness of this mechanism, coupled with the issue that traded carbon credits have questionable credibility towards real emission reductions. Recognizing the problems that cause the unpreparedness of Indonesia's carbon market mechanism, an alternative mechanism is needed that can support the achievement of emission reduction targets. One alternative mechanism that can be implemented is the Energy Service Company (ESCo)-based energy efficiency project incentive scheme (Cebekhulu et al., 2024). This scheme is designed as a commercial project that can be utilized by all elements of society to encourage energy consumption savings that have a direct impact on measurable emission reductions.

2. Methods

This study used a multi-method qualitative approach by combining narrative literature review and document analysis as triangulation strategies to strengthen the validity of the findings. Narrative literature review is a systematic, explicit and replicable method that aims to identify, evaluate and synthesize academic literature and professional practices related to ESCo models and their effectiveness in reducing emissions (Randolph, 2009). Qualitative research examines phenomena in natural settings, with the researcher as the primary instrument. Data collection uses triangulation, with analysis conducted inductively, focusing on outcomes that emphasize meaning rather than generalization (Sugiyono, 2017). This study employs a multi-method qualitative design integrating a systematic narrative literature review and focused document analysis to enhance credibility and transparency. The review was conducted through explicit and replicable procedures, focusing on ESCo models, carbon markets, policy failures, and alternatives, applying inclusion–exclusion criteria to identify peer-reviewed studies, policy briefs, technical reports, and practitioner documents (Goldman et al., 2002). Relevant sources were screened for methodological soundness and empirical contribution. Data extraction used a standardized protocol with inductive thematic coding identifying patterns, theoretical constructs, and research gaps. Document analysis examined official and publicly available records such as BEI trading data, regulatory frameworks, national climate and energy reports, program evaluations, and international ESCo cases, critically examined for provenance, temporal relevance, and evidentiary weight. Indonesia Stock Exchange (IDX) indicators such as transaction volumes and prices were used only to contextualize qualitative findings, not for quantitative analysis. Cross-referencing literature and documents offered comparative insights across jurisdictions and models, identifying institutional, market, and sectoral drivers behind ESCo effectiveness and carbon market shortcomings. To ensure trustworthiness, the research team maintained an audit trail, practiced reflexivity, and conducted peer debriefing to resolve coding discrepancies. Recognizing limitations of secondary qualitative approaches, findings are cautiously presented yet remain policy-relevant. Ethical considerations included rigorous citation, copyright compliance, and transparent disclosure. Results are presented narratively, supported by tables and excerpts to clarify findings for academic and policy audiences, offering a foundation for future primary data validation.

3. Results and Discussion

3.1 Carbon market failure in Indonesia

In order to realize its commitment to emission reduction, Indonesia has implemented several solutions to the emissions generated by fossil energy projects. This is reflected

through the National Energy Policy which is regulated in the Minister of Environment and Forestry Regulation No. 7 of 2023 concerning Forestry Sector Carbon Trading Procedures. The mechanisms that have been implemented by the Government of Indonesia to mitigate carbon emissions are carbon trading and carbon offset. The carbon trading scheme was formalized by the Indonesian government in September 2023 through the Indonesia Stock Exchange (IDX). The following is an attachment of carbon trading data at the beginning of 2024.

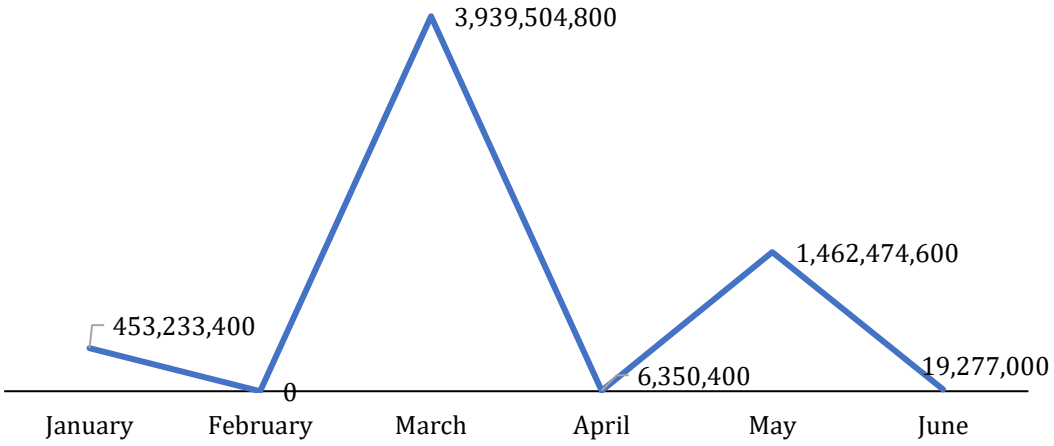

Fig. 1. Carbon trading value from January to June 2024

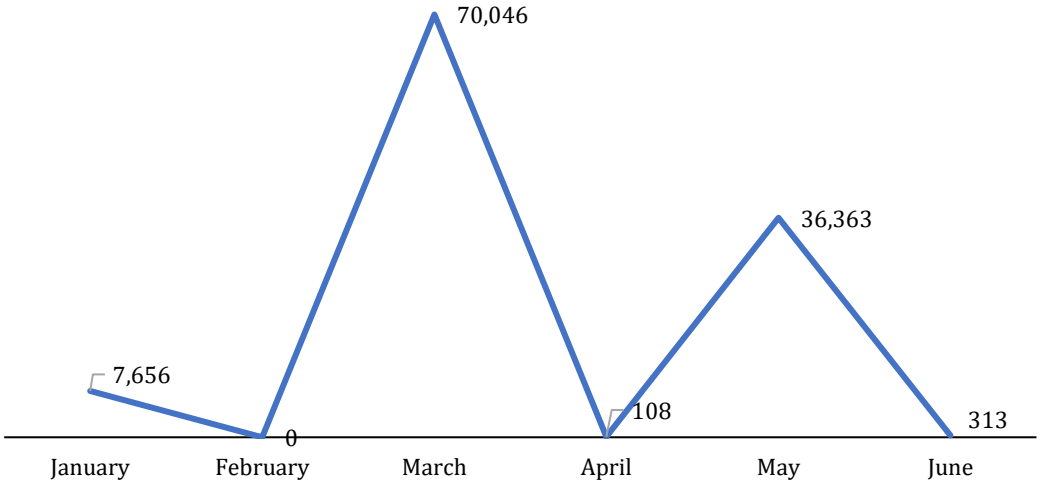

Fig. 2. Carbon trading value from January to June 2024

It should be noted that the determination of the price of carbon in circulation is the result of the price discovery process based on the many interactions of demand and supply in carbon trading. Based on Figure 4), it is known that the frequency of carbon trading from January to June 2024 shows a fluctuating pattern. Meanwhile, the volume (Figure 1) and value of carbon trading (Figure 2) also experienced inconsistent changes from January to June. However, the total number of participants (Figure 3) has grown since February. This reflects an increased interest in carbon trading despite instability in the frequency, volume and value of transactions.

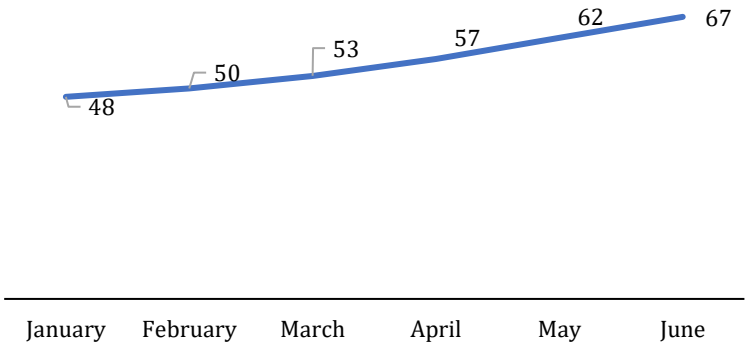

Fig. 3. Carbon trading participants from January to June 2024

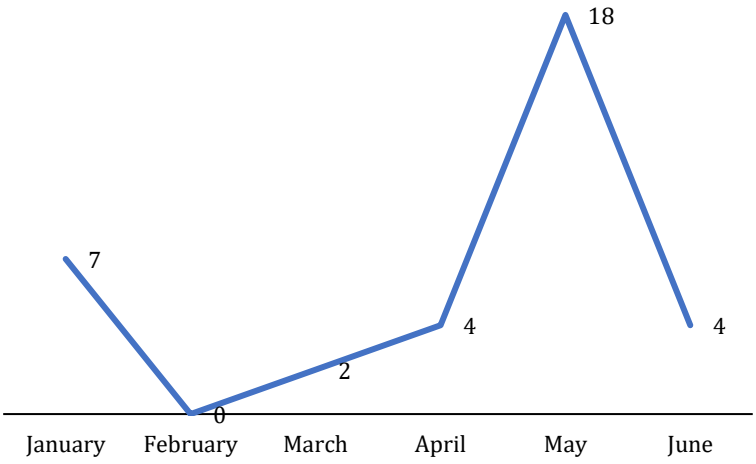

Fig. 4. Frequency of carbon trading from January to June 2024

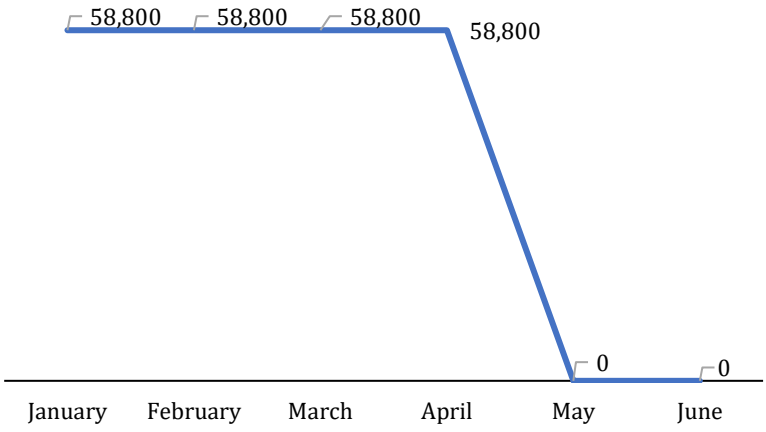

Fig. 5. Closing price per ton of CO_2 in carbon trading from January to June 2024 (Katadata, 2022)

For comparison, carbon trading in the European Union, which is regulated through the European Union Emissions Trading System (EU ETS), has shown stable market conditions. Based on EU ETS auction data issued by the European Commission, on June 3, 2024 the auction volume reached 3,099,500 tCO_2e with a carbon trading value of EUR 233,547,325

(European Commission, 2024). The total number of participants in the EU ETS was 27 bidders, which is less than the total number of participants in Indonesia. However, the trading frequency of 108 times shows the high intensity of demand and supply in carbon trading. These data reflect the high liquidity and strong market stability in the EU region, something that is still not realized in carbon trading in Indonesia.

On the other hand, it is worth highlighting that the carbon price (either carbon quota or carbon credit) has not increased since January at IDR 58,800.00 or EUR 3.61 per ton of CO_2 (Figure 5 due to inconstant carbon trading transactions and volume. The unavailability of carbon price information in May and June means that the current carbon price in Indonesia cannot be determined. When compared to the global carbon price under the EU ETS, which is EUR 75.35 per ton of CO_2, the carbon price in Indonesia is still very low (European Commission, 2024). Market studies also suggest that a carbon price that could be applied in Indonesia could only reach EUR 15.40 per ton of CO_2. The low carbon price is due to the lack of trading activities and market infrastructure that has not been optimally developed (Hidranto, 2023). The implementation of carbon trading in Indonesia has also not been able to harmonize economic, social and environmental interests because it is still dominated by economic interests as a developing country (Amalia & Emala, 2022; Sihotang, 2025). In addition, the implementation still faces structural barriers such as weak monitoring systems, regulatory unpreparedness, and lack of community involvement. Therefore, the low carbon price and suboptimal implementation of carbon trading are the main reasons why the mechanism has not been effective in solving the carbon emission problem (Tsai, 2020).

In addition to carbon trading, another carbon market mechanism, carbon offset, has also been implemented in Indonesia through the REDD+ (Reducing Emissions from Deforestation and Forest Degradation) project. The implementation of this REDD+ project is voluntary, where major global companies such as Shell, Volkswagen, EasyJet, and Grab, can choose to fund this project as a form of emission reduction contribution. However, this carbon offset mechanism has been criticized for alleged phantom credits, which are carbon credits that do not represent real emission reductions. Two studies published by the University of Cambridge show that 94% of carbon credits generated from rainforest projects certified by Verra, the world's largest carbon credit verification standards management organization, have no real impact on emission reductions. This is due to the use of methods based on exaggerated calculations of projected deforestation, leading to fictitious claims of threatened deforestation. The study also revealed that most of the carbon credits issued are invalid because they do not represent real emission reductions on the ground. These findings raise serious concerns about the credibility of the global carbon market and emphasize the need to transition to an emissions mitigation mechanism based on real and verifiable results.

3.2 Policy alternatives through energy efficiency projects

The reliance on carbon prices and political quotas coupled with the threat of phantom credits for projects offered in the market means that the carbon market has not been effective in addressing the challenge of reducing emissions. This condition is reinforced by a study proposed by the Center for Strategic and International Studies (Siagian, 2023), which states that the ineffectiveness of the carbon market in Indonesia includes two fundamental aspects, namely the low carbon price and the weak selection mechanism for projects that are allowed to sell carbon credits. Many projects that do not actually result in actual emission reductions still gain access to the market, including conservation projects that only prevent deforestation without absolute emission reductions. This contributes to the accumulation of phantom credits and undermines the integrity of the national carbon market. Therefore, there is a need for a more measurable scheme that does not rely on carbon prices in combating emission rates. One scheme that can be used is energy efficiency projects through the Energy Service Companies (ESCo) scheme (Jaffe & Stavins, 2004).

The ESCo model was first born in North America in the late 1980s as a response to the energy crisis following the oil price shocks of the 1970s. ESCo's presence as a private party was able to provide energy efficiency that was a burden to the company. ESCo is a corporate model that focuses on improving energy efficiency and reducing customer facility loads through the development, installation and financing of performance-based projects. ESCo's work includes energy supply and management services, financing, consulting and technical engineering assistance such as equipment supply, installation and operation and maintenance which includes monitoring, measurement and verification of energy savings (Buchner et al., 2023; U.S. Department of Energy, 2024).

ESCo's general business model is divided into 2 types, namely Shared savings (SSM) and Guaranteed savings (GSM). The application of these two ESCo business models varies from country to country, depending on each country's capabilities and policies. In the shared savings model, the ESCo acts as the full initiator of the funding and implementation of energy efficiency projects. The ESCo borrows funds from a financial institution to purchase and install energy-efficient devices at the client's facility, then conducts Measurement & Verification to calculate the difference in energy consumption before and after installation. The net savings value is divided according to a ratio agreed between the client and the ESCo, where the ESCo's portion is prioritized to repay the loan, and the client continues to pay energy bills as usual without upfront investment (Sorrell, 2004). This model is designed to reduce the initial significant investment burden for the client because during the contract the client continues to pay the same energy bills as before but some of the money goes to the ESCo which amounts to a certain percentage of the savings. At the end of the contract the client pays a lower energy bill, in other words the client incurs no investment costs (Hartzmark & Shue, 2022). If the actual savings are lower than projected, there are two adjustment mechanisms, the ESCo can request an extension of the contract period until it can settle the debt repayment with the same portion (Sarkar & Sundararajan, 2020; World Bank, 2016) or clawback, which is a reduction in the ESCo's share of the revenue by the client according to the terms of the contract (Figure 6). In contrast, in the Guaranteed savings model, the client is fully responsible for the energy efficiency project either through internal funding or loans from financial institutions. Meanwhile, the ESCo acts as a technical service provider as well as a guarantor of the agreed energy savings achievements. If there is a discrepancy between the agreed savings and the actual situation, the ESCo is responsible for returning the difference in the form of financial compensation. However, the guaranteed savings concept puts the client at risk because the client is fully responsible for the risk of loans to financial institutions that directly affect cash flow, therefore the guaranteed savings scheme requires clients with good credit conditions. This model is more commonly used in developed countries such as Figure 6.

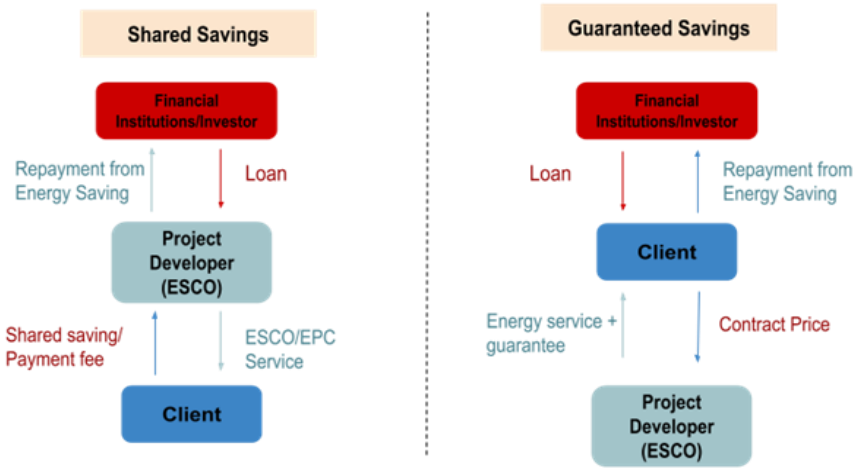

Fig. 6. ESCo project model adapted from climate climate policy initiative: exploring viable energy efficiency in Indonesia
(Climate Policy Initiative, 2021)

3.3 ESCo advantages

Since its introduction until now, the ESCo model has been widely used in various countries around the world, many countries choose to implement ESCo in addition to reducing emission rates and efficiency but also as a form of technology transfer and investment in the sustainable sector. ESCo is considered more stable because savings can be verified and contracted from the beginning, while the carbon market based on the previous discussion is still influenced by price fluctuations that cause the transaction value to be unstable so that verification of savings in suppressing emission rates becomes uncertain. Many countries that adopt the ESCo model have succeeded in reducing energy consumption which has a direct impact on emission rates, including countries in Europe such as Germany (Berlin), ESCo-based energy saving partnerships on average achieve energy cost savings of up to 26%. In addition, the UK (London), through ESCo's public program "RE:FIT" involving 660 buildings, recorded savings of around 32,000 tons of CO_2/ year and a pilot phase of 42 buildings reached 7,000 tons of CO_2 which is equivalent to 28% reduction in energy consumption (C40 Cities, n.d.). In the United States, the ESCo industry has a long history of strong quantitative data. The DOE's 2023 report also noted that under the Energy Savings Performance Contract (ESPC) program, ESCo contractors on average met or exceeded their guaranteed savings, indicating high savings realization. China has become the largest ESCo market with a total project investment of USD 19.2 billion and accounts for 59% of the global ESCo market. Through this project, China has reduced emissions by 103 million tons per year and created a green transition market with a growing number of ESCo companies (International Energy Agency, 2018; Siagian, 2022). Furthermore, in terms of developing countries, namely India, although the ESCo market is relatively new, this model has succeeded in avoiding 95,000 tons of CO_2 emissions per year through a credit guarantee fund (PRSF/Poverty Reduction Support Facility) from the World Bank that supports 28 ESCo projects in India. Verification with the ESCo scheme is considered more real because it relies on the savings generated in contrast to carbon market mechanisms that use cap & trade schemes and REDD + projects that have the potential to generate phantom credits.

Another advantage of ESCo's scheme as described in the guaranteed or shared savings models is the fact that ESCo bears the success of the savings delivered through its services. ESCo transfers all technical and performance risks to the service provider. In an EPC (Energy Performance Contracting) contract, the ESCo guarantees the volume of energy savings measured through standardized M&V (Measurement & Verification) protocols so that if the savings target is not achieved, ESCo will be fully responsible for returning the difference in the form of compensation. This is different from the carbon market mechanism where the carbon quota buyers only conduct credit transactions and then still bear the responsibility for the realization of emission reductions on the ground. On the other hand, under the (shared savings) scheme, the client is exempted from significant initial financing, in contrast to the carbon market mechanism where the buyer must provide substantial funds for the acquisition of emission quotas.

3.4 Implementation of the ESCo model in various countries and its challenges

This section will highlight the implementation of ESCo in many developed and developing countries. In the US, there is a professional association for ESCo, the National Association of Energy Service Companies (NAESCo), which serves to encourage the adoption of ESCo and provide up-to-date data and analysis on its development in the United States. The most common funding models used by ESCo companies include guaranteed savings contracts and design-build or fee-for-service schemes. Through these mechanisms, business entities can access external sources of financing at competitive interest rates. In Japan, the ESCo model is dominated by the Shared savings contract scheme, with about 90% of projects using this approach. Many ESCo initiatives in the Sakura country have relatively long payback periods and generally involve large-scale projects as well as institutional

customers. Moreover, the Japanese government is actively developing and strengthening the standards and regulatory framework to support the growth of the ESCo industry. In South Korea, ESCo implementation has shown a high degree of success thanks to the implementation of a multiyear procurement strategy as well as institutional reforms to remove operational barriers. The government has also introduced fiscal incentives in the form of long-duration tax credits with low interest rates to support the implementation of ESCo projects.

In developing countries, financing for ESCo and energy efficiency projects remains a major challenge. Therefore, governments are working with international institutions as well as ESCo associations to design financing mechanisms that facilitate financial institutions to support ESCo business models. Various incentives and financing schemes such as the provision of low interest rates, credit guarantees, as well as the provision of revolving funds are being developed to expand ESCo adoption. In China, the establishment of ESCo associations and the provision of credit guarantee mechanisms have been key in establishing the ESCo market ecosystem (Baek & Bhamra, 2022). A key driver for this growth is the emission reduction potential of the industrial and commercial sectors. In the initial phase, ESCo implementation started through pilot projects with the predominant use of guaranteed savings contracts. While industrial projects still account for 67% of the market share, the number of ESCo initiatives in the building sector is also increasing, with a focus on providing energy efficiency. Recently, some companies have started to purchase energy directly from utilities and then deliver it to end consumers with set efficiency targets. Thailand has successfully implemented ESCo despite not having a specialized association, thanks to attractive financial incentives for businesses. The ESCo market in the country is facilitated by small and medium-sized enterprises, the industrial sector, and the building/commercial sector.

Table 1. Implementation ESCo in developed country

Country	ESCo Model	Main Sector	Support	Barriers
USA	GSM	Public & Private sectors such as integrated building and industrial sectors	legislative support at both the federal and state levels, facilitated by the Public Utilities Commission. Through the REEP Program as a key incentive for ESCo businesses.	Inconsistent rules regarding how to include non-energy benefits in project cost-benefit calculations have led to low interest among ESCos in retrofitting small facilities.
Japan	SSM	Industry & Public sectors	Escalation of standards and regulations applied in public facilities	Funding for small to medium-sized projects is less attractive.
Austria	SSM	Public sectors buildings	Determination of certification and accreditation standards and environmentally friendly labels with third parties, namely energy consultants.	high transaction costs, relatively small project scale, high risk perception, and a lack of pilot projects to use as references.
Germany	SSM	All energy efficiency sector	National and European regulations supports	The regulatory framework, particularly Renewable Energy Law No. 7, places EPC companies at a disadvantage in terms of asset ownership and operational rights.
UK	SSM & GSM	Public sector buildings & Industry	Climate conservation policy support and financial incentives	high transaction costs and lack of standardization

The Energy Conservation Promotion Fund (ENCON Fund) provides capital and technical assistance, low-interest credits, and revolving funds to spur the energy efficiency market. In addition, the ESCo Fund provides capital and technical support for ESCo projects and building renovation initiatives. In India, ESCo first emerged in the form of small projects such as street lighting upgrades, hotel efficiency, and industrial operations optimization. Energy Efficiency Services Limited (EESL) is the only public ESCo that leads most of the activity in this market. Most projects are funded through debt acquired by clients using traditional collateralized loan schemes. However, lack of technical skills, low level of public awareness, limited funding, as well as inadequate regulatory policies remain significant constraints. Meanwhile, in the Philippines, the most effective application of ESCo is seen in the streetlight overhaul project facilitated by the Development Bank of the Philippines as an industry benchmark. However, there are still obstacles in the form of a lack of understanding of the ESCo business model among domestic actors. The following table provides examples of ESCo implementation in each developing and developed country.

Table 2. Implementation ESCo in developing country

Country	ESCo Model	Main Sector	Support	Barriers
China	SSM	Buildings & Industry	China Energy Conservation Service Industry Association Support	Awareness of energy savings potential and Insufficient capacity in the ESCo sector also Difficulty accessing financing
India	SSM	Buildings & Industry	ESCo business promotion through Federation of Indian Chambers of Commerce and Industry	Traditional collateral-based financing system, making it difficult to assess and finance energy savings, low trust in ESCo
Thailand	SSM & GSM	Buildings & Industry	Thailand State-Owned Enterprises support in promoting ESCos projects. and support of the Energy Conservation Promotion Fund (ENCON Fund)	-
Philippines	SSM	Street Lighting	Funding support by the National Bank of the Philippines	Lack of ESCo Business Concept
Brazil	SSM	Electricity Conservation Program (PROCEL)	Loan guarantee fund	Lack of energy efficiency marketing

Based on the data, it can be concluded that in many countries, the majority use the shared savings model (SSM), which indicates the state's intervention with the private sector in the development of ESCo projects with loan guarantees either in the form of private credit such as India and China or public loan credit as applied by Thailand and the Philippines. In addition, the importance of pilot projects in public facilities or government buildings in promoting ESCo as well as gaining the trust of financial institutions in terms of capital. Furthermore, it is also necessary to improve institutional weaknesses through the establishment of a specialized forum, such as the ESCo Association as implemented by the United States. The formation of this association is important as a first step in introducing energy efficiency as well as acting as a catalyst in the development of ESCo practices, especially for developing countries that are just starting the implementation of ESCo. In addition, the formation of this association can also attract investment funding from world

financial institutions such as the World Bank or the International Monetary Fund, such as Brazil and India, which have the support of the World Bank.

3.5 Opportunities in Indonesia

Seeing neighboring countries such as Thailand and the Philippines that have adopted the ESCo concept, the Indonesian government has also launched regulations governing the implementation of ESCo through Ministerial Regulation No. 14 of 2016, which outlines the provision of energy conservation support services, including ESCo. Under this regulation, ESCo requires a Letter of Acceptance from the government to operate its business. ESCo may also collaborate with financial institutions to arrange financing. According to the Ministry of Energy and Mineral Resources, Indonesia has significant opportunities to invest in energy efficiency, including ESCo. This regulation is also aligned with the National Energy Policy as reflected in Government Regulation No. 79 of 2014, which mandates Indonesia to reduce energy intensity by at least 1% annually and target an energy elasticity rate below 1 (ESDM, 2014). Energy efficiency policies are one of the most influential factors, accounting for (0.084). In 2023, the Indonesian government also launched a regulation that justified the legal establishment of ESCo through PP No. 33 of 2023. After the issuance of this regulation in 2024, 12 ESCo companies were actively registered with the Ministry of Energy and Mineral Resources , with the main sectors being street lighting and manufacturing (ESDM, 2024). This situation reflects one of the government's supports in developing ESCo, namely through the issuance of clear regulations governing energy service performance contracts.

However, regulatory support alone is not enough, as many countries that have implemented ESCo have experienced difficulties in obtaining financing from financial institutions. This is because ESCo projects are high-value investment projects, leading many financial institutions to remain skeptical about the success of ESCo projects. As a result, many companies struggle to obtain low-interest loans. Additionally, the lack of consumer motivation to conserve energy also contributes to the challenges faced by the ESCo market. This situation is further compounded by Indonesia's government policies, which still provide significant incentives for energy use, making the ESCo policy contradictory.

3.6 Policies and funding schemes that can be adopted to realize ESCo opportunities in Indonesia

To realize the opportunities and overcome the difficulties faced by Indonesia in implementing ESCos, the Indonesian government must formulate appropriate policy support strategies and funding schemes. Such collaborative support can help improve the competitiveness of renewable energy projects, especially those involving high initial costs or capital, attract investor interest, and accelerate the shift from non-renewable to renewable energy sources (Adi, 2024; IESR, 2023, 2024, IISD, 2022). A study using the SWOT-AHP model demonstrates that appropriate policies and financial incentives can improve energy efficiency in Indonesia (Nurcahyanto et al., 2020). However, the effectiveness of all policy support and financing schemes depends heavily on social readiness in the community, so interventions should not be implemented in a piecemeal manner.

Social readiness must be a primary prerequisite before ESCo regulations and financing schemes are implemented by the Indonesian government. Without public awareness and understanding, various energy transition programs such as ESCo will struggle to operate optimally (Jazuli et al., 2024). Poor public communication will further exacerbate public ignorance about saving energy and switching to renewable energy. Without sufficient understanding and awareness, the public will doubt the effectiveness of this energy source as a solution for their daily electricity needs or consider it an additional financial or technical burden. In this case, the Indonesian government can adopt three crucial steps to achieve a just transition, namely utilizing local knowledge, transparent information

disclosure, and diverse representation (Jenkins et al., 2016). The government can implement educational campaigns on the reliability and benefits of renewable energy, as well as technical training and pilot projects that demonstrate the tangible benefits of ESCo implementation. Projects such as street light retrofits in the Philippines, city light improvements, hotel energy efficiency upgrades, and industrial operations management in India can serve as examples of ESCo pilot projects in Indonesia. Similar projects can be applied in Indonesia across various sectors, from public facilities, industry, to office buildings, by adapting to local conditions, targets, and the national energy efficiency development level through collaboration with universities, industry, private sector, and government. As public awareness and understanding of ESCos increase, there will be a shift in lifestyle toward renewable energy, while also enhancing banks' and financial institutions' confidence in the potential of the ESCo market in Indonesia, thereby opening up more opportunities for funding and investment.

Once public awareness and understanding are sufficient, the government can formulate policies that are more focused on the implementation of ESCos in Indonesia. These policies should include a review of energy development priorities, including the restructuring of regulations related to energy efficiency. This is because without appropriate and consistent regulatory support, the awareness and understanding that has been built up among the public will not be able to be realized.

However, the reality is that Indonesia still faces challenges in the form of a lack of regulatory coherence that supports ESCos. This lack of coherence results in poor coordination and alignment between environmental commitments, which can hinder the implementation of effective solutions for sustainable development and increase the risk of policy priority conflicts (Coscieme et al., 2021). On one hand, the government is committed to energy transition, but on the other hand, non-renewable energy sources, such as coal, still dominate the national energy mix, particularly for domestic electricity needs. Data shows that 67% of power plants in Indonesia still use coal as fuel for domestic electricity needs (Sinaga, 2024). This dominance is also reflected in the composition of Indonesia's primary energy mix in 2024, where coal accounts for 40.37%, followed by oil at 28.82%, natural gas at 16.17%, and renewable energy at only 14.65%, far from the target of 19.49% in 2024. This lack of coherence is further reinforced by fiscal spending policies on energy subsidies (electricity and fuel) reaching 210.6 trillion rupiah, equivalent to 1.65% of GDP. This percentage remains quite high compared to other countries leading the way in decarbonization, such as Sweden, which allocates only 0.3% of its GDP to fiscal subsidies for energy. Ideally, countries serious about reducing emissions should target energy subsidies below 0.5% of GDP or even close to zero (International Monetary Fund, 2023). This demonstrates that Indonesia has not yet fully been able to break free and remains heavily dependent on coal as an energy source, complicating the implementation of ESCo.

Given this dependence, a strategic step that the Indonesian government can take is to reform policies that support the use of fossil fuels into renewable energy policies that support the implementation of ESCos. One policy that can be implemented is to gradually remove fossil fuel subsidies, taking into account global oil prices and household electricity capacity so that subsidy recipients are more targeted (OECD, 2021). The removal of energy, electricity, and fuel subsidies will make prices more expensive and encourage the public, including industry players, to rethink their energy consumption behavior. At the same time, this policy will also create greater fiscal space for the government to allocate budgets for renewable energy development, including supporting the implementation of ESCo-based energy efficiency projects (Halimatussadiah et al., 2023).

In order for ESCos to operate sustainably, these policy reforms must be balanced with adequate financial support. The government needs to play a role in ensuring that these energy efficiency projects receive sufficient financing and confidence from banks in granting credit. Banks generally view energy-saving projects as a sector with a high risk of default, mainly due to the lack of clear physical collateral and dependence on future energy savings projections. This results in high interest rates or even financing rejection for ESCo companies, especially small ones. To address this, the government needs to shift fiscal

incentives into a credit guarantee scheme for ESCo projects. Under this scheme, the government provides credit guarantees to ESCos, making it easier for them to obtain financing from banks. These guarantees reduce the risk for banks as lenders because they provide assurance that part or all of the loan will be repaid if the ESCo fails to meet its obligations. Such a scheme has been implemented by South Korea through the Korea Credit Guarantee Fund (KODIT) since 1976. KODIT provides credit guarantees for companies, especially SMEs (small and medium-sized enterprises), and supports innovative or risky projects, including in green sectors such as renewable energy and energy efficiency.

The support provided includes guarantees for investment, infrastructure installation, and equipment for renewable energy power plant installations. This scheme uses a partial guarantee system with a ratio ranging from 70% to 85%, depending on the borrower's credit rating and the duration of service use. For priority projects supporting government policies, the guarantee ratio can reach 90-100% for such priority projects. The guarantee fee ranges from 0.5% to 3% per year, determined based on the borrower's risk profile. South Korea's success in implementing the credit guarantee scheme through KODIT demonstrates that targeted fiscal support can create a conducive environment for energy efficiency projects, including ESCos. Indonesia can adapt a similar approach with some adjustments, so that ESCos are no longer hindered in accessing bank financing, especially for Micro, Small, And Medium Enterprises/*Usaha Mikro, Kecil, dan Menengah* (UMKM).

4. Conclusions

The failure of the carbon market in Indonesia shows that relying solely on the carbon market is like placing your hopes on a kite string during a storm—it may appear to be moving, but it can easily break. Low and stagnant carbon prices indicate that carbon trading implementation has not been able to harmonize economic, social, and environmental interests in Indonesia. Not to mention, weak supervision, regulatory unpreparedness, and lack of involvement further prove that carbon trading in Indonesia has not been effective in addressing carbon emissions. In addition to carbon trading, Indonesia also implements carbon offsets through REDD+ (Reducing Emissions from Deforestation and Forest Degradation) projects. Similar to carbon trading, the implementation of REDD+ has also been criticized for alleged phantom credits, which have raised serious concerns about the integrity and credibility of this project. The ineffectiveness of carbon trading and carbon offsets in Indonesia indicates the need for alternative schemes that are more measurable, tangible, and verifiable in reducing emission rates. One scheme that can be used is an energy efficiency project through the Energy Service Companies (ESCo) scheme.

ESCo focuses on improving energy efficiency and reducing customer facility loads through the development, installation, and financing of performance-based projects. ESCo will be fully responsible if the promised savings are not achieved, by refunding the difference in the form of compensation to service users. Various practices in developed and developing countries show that ESCo are capable of providing measurable, verified, and sustainable energy savings because the savings have been contracted from the outset, thus proving effective in reducing energy consumption and emissions. Like other countries, Indonesia also has the same opportunity to implement ESCo. The Indonesian government has even launched various regulations related to the implementation of ESCo, and there were 12 active ESCO companies registered with the Ministry of Energy and Mineral Resources in 2024. However, the success of this scheme is not only determined by regulations and business models, but also by social readiness, consistent policies, and adequate financing. The government plays a crucial role through public education campaigns, pilot project development, the gradual elimination of fossil fuel subsidies, the provision of credit guarantee schemes, the allocation of fiscal spending for green projects, and the strengthening of collaboration between the public and private sectors. By building synergy between public communication, policy reform, financing schemes, and public-private collaboration, ESCo in Indonesia is not just another alternative to the carbon market,

but a strategic step to ensure more tangible emissions reductions while promoting national energy independence in achieving Nationally Determined Contribution targets.

Acknowledgement
The authors would like to express their sincere gratitude to all parties who contributed to the completion of this research.

Author Contribution
All authors collaboratively developed the research framework and contributed to data collection and analysis. Each author participated in interpreting the findings and refining the manuscript. All authors approved the final version of the article for submission.

Funding
This research received no external funding.

Ethical Review Board Statement
Not available.

Informed Consent Statement
Not available.

Data Availability Statement
Not available.

Conflicts of Interest
The authors declare no conflict of interest.

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