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Investment Challenges of Renewable Energy in the Philippines

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Abstract

Accelerating Renewable Energy (RE) investments is crucial for the Philippines to achieve environmental sustainability, energy security, and inclusive economic growth. Despite of the Philippines' vast RE potentials and policy progress, investors face numerous challenges. This study investigates the multifaceted challenges hindering RE investment and development in the Philippines. It proposes strategic solutions to accelerate the country's energy transition from fossil-based to renewable energy sources. Using an exploratory mixed-methods approach, the study surveyed RE investors and developers to collect qualitative data on perceived challenges and key factors influencing investment decisions. This process resulted in the development of the Renewable Energy Acceleration for Sustainability (RE-AcceS) model. Findings reveal that while environmental advocacy is a primary motivator for investment, progress is constrained by significant and interconnected barriers across seven key areas: regulatory, financial, market, human resource, technological, resource, and social acceptance. The research identifies specific issues, such as complex permitting processes, high upfront costs, and grid instability, as major obstacles. The study proposes a comprehensive set of strategies, including streamlining regulations through the full implementation of the Energy Virtual One-Stop Shop (EVOSS), expanding access to green financing and incentives, modernizing grid infrastructure, and integrating RE education into curricula to build a skilled and future-ready workforce. The RE-AcceS model, built on a multi-stakeholder, integrated approach, illustrates how de-risking investments and enhancing enabling systems can simultaneously drive progress. The study concludes that addressing the RE investment challenges is crucial for the Philippines to achieve its goal of a 50% RE share in the energy mix by 2040, ultimately ensuring energy security, environmental resilience, and sustainable economic growth.

Keywords: renewable energy; investment challenges; sustainable development; de-risking investments; environmental advocacy; energy transition

INTRODUCTION

Energy is a fundamental driver of economic growth and development, enabling socio-economic progress in any country. It is considered an essential economic good, and access to affordable, reliable, clean, and sustainable energy is a primary objective of sustainable development. Since the Industrial Revolution, most countries have heavily relied on fossil fuels, such as coal and oil, to power their socio-economic activities. However, the use of these fuels has caused significant environmental harm and has led to global climate change, which is widely considered the biggest threat to humanity and the planet's survival.

The oil crises of 1973 and 1979 exposed the vulnerability of global economies to disruptions in the supply of fossil fuels (Yergin, 1991). These crises prompted governments and researchers worldwide to explore alternatives to oil-based energy and marked the beginning of a shift from fossil-based to renewable energy sources. The recognition of climate change as a pressing global concern in the 1990s further reinforced this realization. The United Nations Conference on Environment and Development (UNCED) in 1992 resulted in the creation of the United Nations Framework Convention on Climate Change (UNFCCC), a multilateral treaty aimed at combating climate change and mitigating global warming through the use of clean and renewable energy.

Subsequent international events, including the 1997 Kyoto Protocol and the 2015 Paris Agreement, solidified the global commitment to address climate change by reducing greenhouse gas emissions and mainstreaming renewable energy to limit global warming to below 2°C. Public awareness was also heightened by the 2006 documentary film "An Inconvenient Truth," featuring former U.S. Vice President Al Gore. The 2008 global financial crisis, intensified by the spike in oil prices, and more recent events such as the COVID-19 pandemic and the 2022 Russia-Ukraine war, further exposed the risks of fossil fuel dependence and accelerated the push for clean energy to achieve energy security and independence.

Globally, massive investments in renewable energy have continued to be implemented. According to BloombergNEF (2024), global investments in the energy transition exceeded USD 2 trillion, reaching a record high. A slowdown was noted in early 2025, which can be attributed to economic, political, and systemic factors. Like many countries, the Philippines has historically relied on imported oil and coal for its energy supply. As a net energy importer, the country is vulnerable to oil supply disruptions, price fluctuations, and geopolitical dynamics. This continued reliance on fossil fuels contributes to climate change, environmental degradation, and pollution, leading to energy security and sustainability issues.

Recognizing these risks, the Philippine Government began seriously exploring clean energy alternatives in 2001 with the passage of the Electric Power Industry Reform Act (EPIRA). This law aimed to restructure the electric power industry, making it more efficient and competitive and laying the groundwork for a renewable energy supply. Capitalizing on this, the Renewable Energy Law (RE Law) was enacted in 2008 to promote the development of indigenous and sustainable sources like biomass, geothermal, solar, hydro, and wind. The RE Law was intended to encourage private sector investment to achieve energy independence, security, and sustainability, and to contribute to the seventeen Sustainable Development Goals (SDGs). The National Renewable Energy Program, launched in 2011, provided a roadmap for implementing the RE Law and included incentives such as Feed-in-Tariffs (FIT), Renewable Portfolio Standards, and the Renewable Energy Market to attract investments.

Despite these efforts and the growing demand for sustainable energy, the share of renewable energy in the country's energy mix remains low. A significant gap persists between the government's energy transition targets and the actual deployment of renewable energy projects. RE investors face numerous challenges, including regulatory processes, project financing, market stability, and social acceptability. This study aims to investigate these investment challenges, propose practical strategies to overcome them, and identify enablers that will boost investor confidence. Ultimately, more RE investments and deployed projects are vital for accelerating the energy transition, achieving energy security, and promoting inclusive, sustainable development in the Philippines.

Various literature highlights the critical drivers of RE investments. In her 2014 research, Gyanendra Singh Sisodia presented a macroeconomic modeling framework for RE investments, focusing on solar and wind energy. Her framework identified three key factors that directly impact investment decisions: geographical factors, technical factors, and government regulations. The deployment of RE investments is also influenced by high upfront capital costs, investment risks, the long-term viability of technology, long periods for return on investment, and uncertainty about public acceptance. These factors directly affect the risk and return profiles for RE investors. Other literature suggests that technological efficacy, RE regulations, climate policies, market conditions, and a country's economic situation also influence investor behavior.

Building on this, Kilinc-Ata and Domatovno (2022) put forward a conceptual model of structural and behavioral factors that influence

RE investor decisions in countries belonging to the Organisation for Economic Co-operation and Development (OECD) and the BRICS nations (Brazil, Russia, India, China, and South Africa). Their model proposes that RE investment decisions are influenced by a country's expenditures on Research and Development (R&D) for renewable technologies, clear and suitable long-term RE and climate change policies, power and energy consumption, and the overall economic situation. This model serves as a foundation for understanding the macro-level factors that shape the investment landscape.

Building on the work of Kilinc-Ata and Domatovno, this study's conceptual framework was developed to specifically investigate the multifaceted hurdles affecting RE investment decisions in the Philippines. The framework identifies six core categories of investment challenges that act as independent variables directly impacting RE investments:

1. Regulatory Uncertainty
2. Technological/Infrastructure Limitation
3. Market Uncertainty
4. Access to Financing
5. Social Acceptance
6. Resource/Geographical Constraints

The identification and resolution of these challenges are crucial for formulating effective investment strategies and ensuring that projects are implemented efficiently to contribute to the country's energy transition and sustainable development goals. The framework also identifies institutional support and technical competency as moderating variables that can cushion the adverse effects of these challenges on the deployment of RE investments. These factors collectively influence the technical and financial viability, as well as the bankability and sustainability, of RE projects in the country.

Based on the conceptual framework and a thorough analysis of the RE investment landscape, the study developed the Renewable Energy Acceleration for Sustainability (RE-AcceS) model. This model is a strategic, results-based roadmap for policymakers, regulators, investors, and other stakeholders. It addresses key investment challenges by integrating strategic enabling solutions and investor motivations into a cohesive and actionable framework. The model is cyclical, indicating that continuous improvement is necessary for sustained growth in the RE sector.

The RE-AcceS model is founded on the key insight that while a strong advocacy for sustainable development is the primary driver for investment, its acceleration is critically hampered by a series of interconnected barriers. Progress, therefore, depends on a multi-stakeholder, integrated approach that de-risks investments and enhances enabling systems simultaneously. The model consists of a foundation and three core pillars, all driving towards the ultimate goal of energy security, environmental resilience, and inclusive, sustainable development for the Philippines.

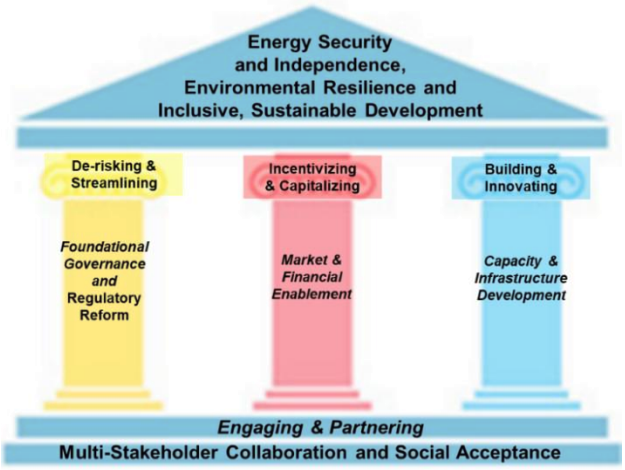

Figure 1
The Renewable Energy Acceleration for Sustainability (RE-AcceS) Model

Model Foundation. Multi-Stakeholder Collaboration and Social Acceptance. This foundation is the bedrock of the model, acknowledging that the success and sustainability of RE projects depend on the acceptance and support of various stakeholders, particularly local government units and host communities. The model recognizes that investors' motivations are often rooted in a commitment to sustainability and

advocacy, rather than solely on profits. It highlights that local stakeholders can "make or break a project". Social challenges, such as a lack of community acceptance and distrust, are identified as significant barriers. To address this, early and continuous stakeholder engagement and transparent Information, Education, and Communication (IEC) campaigns are proposed as foundational activities to build trust and social buy-in.

Pillar 1: Foundational Governance and Regulatory Reform. This pillar directly tackles regulatory inefficiencies, which were identified as the most significant challenge in the study. The model calls for streamlining permitting through the full implementation of the Energy Virtual One-Stop Shop (EVOSS) and creating stable and consistent policies. This pillar focuses on creating a predictable, efficient, and transparent regulatory environment.

Pillar 2: Market and Financial Enablement. This pillar addresses challenges in the financial and market regime of the RE sector, such as high upfront costs, high interest rates, and market uncertainties, which are determinants of project viability and profitability. Key actions include creating green financial mechanisms, ensuring fair and stable tariffs through initiatives like the Green Energy Auction Program (GEAP), and enhancing the confidence of lending institutions. A stable market framework and robust financial landscape can improve investor confidence and ensure the financial viability of RE projects.

Pillar 3: Capacity and Infrastructure Development. This pillar confronts technological, human resource, and physical infrastructure gaps in the development and deployment of RE investments. Key actions include prioritizing the modernization and expansion of the grid to accommodate RE, developing a skilled workforce by integrating RE courses into higher education, and fostering innovation through R&D and technology transfer. This pillar ensures the country has the physical and intellectual capacity to support a scaled-up RE sector.

The Ultimate Goal: Energy Security and Independence, Environmental Resilience, and Inclusive, Sustainable Development. The model culminates in the overarching national objectives that the energy transition is meant to achieve. The successful implementation of the three pillars, supported by a strong foundation, is intended to directly contribute to these particular goals.

LITERATURE REVIEW

Energy and Economic Development. Energy is a crucial factor in economic development, driving everything from industrialization and urbanization to production and consumption. Access to affordable and reliable energy is a basic input for all economic activities. As countries develop, their demand for energy increases. The World Bank's Energy Overview from June 6, 2023, states that energy is at the center of development and will continue to be vital for the economic growth of emerging and developing nations. Therefore, expanding access to sustainable energy is essential for inclusive development and for achieving Sustainable Development Goal (SDG) No. 7. This shows that energy has a direct and fundamental link to a country's economic growth.

Call for Sustainable Development. Today's world faces pressing issues like food, energy, and financial crises, as well as irreversible environmental damage from climate change, pollution, and unsustainable resource use. To move toward a more sustainable world and ensure humanity's survival, it is necessary to take action now. Over the past decade, many countries have adopted measures to balance nature and economic activities to achieve sustainable development. The 1987 Report of the World Commission on Environment defines sustainable development as meeting the needs of the present without compromising the ability of future generations to meet their own needs. In simple terms, it's a development that does not cause environmental harm and requires the integration of three interdependent pillars: economic development, social development, and environmental protection.

In 2015, the United Nations adopted the 17 Sustainable Development Goals (SDGs) to address these global concerns. The primary goal of the SDGs is to create a more sustainable and equitable world. They focus on areas like climate action, clean energy, sustainable cities, economic growth, and education. SDG-7, which calls for affordable and clean energy, highlights the need for countries to reduce the carbon intensity of energy while making it accessible and affordable for all. The targets for achieving SDG-7 by 2030 include:

1. Ensuring universal access to affordable, reliable, and modern energy services.
2. Substantially increasing the share of renewable energy (RE) in the global energy mix.
3. Doubling the global rate of improvement in energy efficiency.
4. Enhancing international cooperation to facilitate access to clean energy technology and promote investment in clean energy infrastructure.
5. Expanding infrastructure and upgrading technology to supply modern and sustainable energy services to all developing countries.

The Philippines' Energy Transition Towards Sustainable Energy. Following the objectives of SDG #7, countries are focusing on transitioning from non-renewable, fossil-based energy systems to renewable energy sources. The Philippines' energy transition is outlined in the Philippine Energy Plan (PEP) from 2023 to 2050. This plan serves as a guide for the country's energy transformation, with a strategic direction to facilitate access to affordable energy, secure a reliable supply, and transition to clean, sustainable resources. The goal is to increase the share of renewable energy in the power mix from 22.3% in 2023 to 35% by 2030, 50% by 2040, and over 50% by 2050.

To achieve these goals, the Philippine government, through the Department of Energy (2025a), is intensifying efforts to fully electrify households, particularly in rural areas. This is expected to stimulate economic activity and alleviate poverty. The government is also encouraging energy investors to adhere to standards and timelines for their projects and has directed the transmission network operator to build a smart and green grid system to accommodate the influx of RE capacity.

In 2024, the Philippines saw a record-breaking 794.34 MW of new renewable energy capacity, surpassing the combined total of the previous three years. This achievement placed the Philippines second in BloombergNEF's 2024 Climatescope report for emerging markets for renewable energy investments. The Philippines has significant untapped potential for renewable energy, including:

1. Geothermal: 981 MW untapped potential.
2. Solar: 31,301 MW potential (with only 1,443 MW installed).
3. Wind: 89,357 MW potential (with only 443 MW developed).
4. Hydropower: 12,742 MW potential (with only 1,190 MW harnessed).

To address challenges such as permitting delays, limited financing, and grid interconnection issues, the government is committed to creating a better business environment. This includes easing foreign ownership limits, providing preferential dispatch for RE resources, and creating a policy framework for other RE sources.

METHODS

Design. This study adopted an exploratory mixed research method to investigate the complex and dynamic nature of RE investments. This approach was chosen to examine the experiences of investors and critically analyze the underlying challenges that hinder the advancement of sustainable energy development. To achieve this, an online survey was administered to a targeted group of RE investors and project developers. The survey included open-ended questions to gather qualitative data on perceived challenges and key factors influencing investment decisions, which were then used to contextualize and validate the quantitative findings. The quantitative data measured the level of

agreement with the independent variables within the conceptual framework.

Population, Sample Size, and Technique. As of February 28, 2025, the Department of Energy (2025b) had issued 1,338 Renewable Energy Service Contracts (RESC) for commercial use, with solar, wind, and hydropower projects accounting for 93% of these, or 1,240 contracts. These contracts were awarded to approximately 478 RE project developers/investors, with Electric Cooperatives and government agencies excluded from the population. The target population for this study was focused on RE project developers and investors with five or more RESCs, including RE conglomerates and prime movers in the sector, totaling 54 at the time of the research. A purposive sampling technique was employed to select a sample of 48 out of the 54 total population, with a tolerable error of 5% and a confidence level of 95%. The samples were chosen based on their availability, willingness to participate, expertise, and direct involvement in RE project development. All 48 samples completed the online survey within the prescribed data collection period.

Research Instrument and Data Analysis. The primary data collection instrument was an online questionnaire with five major sections: the profile of the respondents, an assessment of investment challenges, a section on strategies and solutions, a section on motivation, outlook, and overall attitude, and a final section on key enabling factors and barriers. This structured approach ensured the collection of comprehensive and targeted data directly responsive to the study's research questions. The questionnaire also included open-ended questions, allowing respondents to elaborate on their experiences and perspectives. This enabled the collection of qualitative data on perceived challenges, proposed strategies, and investor motivations and attitudes. To complement this, secondary data from existing plans, programs, and policy documents were reviewed to enrich the study's literature foundation and provide broader context. The data analysis for qualitative responses was conducted using thematic and content analysis to identify common themes, views, and patterns. For quantitative data, a 7-point Likert scale was used, where each level of agreement was assigned a numerical value. The weighted mean for each challenge was computed to provide an average score, and visual tools such as tables and bar charts were used to present the results clearly.

RESULTS

This section presents the findings from the survey, analyzing and interpreting the responses from RE investors and developers. The results show a high degree of similarity in respondents' opinions regarding the challenges faced in the Philippine RE sector.

Regulatory Challenges. The most significant regulatory challenge identified by respondents was the sheer number of permits and approvals required for RE projects, with a weighted mean of 6.35. This was confirmed by 64% of respondents who answered the open-ended question, stating it was the "topmost deterrent" in project development. This aligns with a USAID survey that found policy and regulatory barriers, specifically the many required approvals, were the most significant reasons for delays in RE development. The second major hurdle was the multiple permitting requirements, with a weighted mean of 6.14, reflecting a strong agreement from respondents. Bureaucratic permitting procedures and regulatory uncertainties also presented significant challenges, both garnering a weighted average of 5.92. Qualitative responses elaborated that this is caused by a lack of alignment and coordination between local and national government units. Other regulatory challenges identified include high permitting costs, inconsistent policy frameworks, excessive red tape, graft and corruption, and insufficient support and incentives. These inefficiencies lead to project delays, cost escalations, and a general sense of unpredictability, which significantly raises investment risks and discourages long-term capital commitments. These findings support Gyanendra Singh Sisodia's (2014) assertion that

government regulations are a key factor directly impacting RE investment decisions, especially for solar and wind energy. The high weighted means across all these factors highlight the need for comprehensive regulatory reform.

Financial Challenges. In the category of financial challenges, high upfront costs were viewed as the most significant barrier, with the highest weighted mean of 5.9. This was followed by high interest rates, which had a weighted mean of 5.42. In the open-ended responses, 20% of respondents identified these two factors as major financial barriers because they increase investors' risk exposure. The study's findings align with a 2023 USAID report which also found that limited access to project financing is a moderate concern. Although local banks are liquid, their lending appetite for renewables is constrained by their limited experience and knowledge of financing such projects. Other financial challenges cited include unrealistic guarantees and securities, a lack of support from insurance providers, and uncertainty on investment returns. The risk of default received the lowest weighted mean of 4.87, suggesting it is a perceived challenge but less severe than the others.

Market Challenges. Regarding market obstacles, price variability garnered the highest weighted mean score of 5.65, followed closely by a low off-take tariff at 5.63. These results indicate that respondents consider these the most significant market concerns. The low off-take tariff, especially when combined with unstable tariff adjustment mechanisms, is a deterrent to RE investments, a finding consistent with Roesad K. (2017). Price and market competition with conventional energy were also viewed as major challenges, with weighted mean scores of 5.48 and 5.37, respectively. The current energy market is still dominated by conventional fuels, and long-term power supply agreements for these fuels can hinder a rapid shift to renewables. Market availability is also a challenge, likely stemming from unclear government policies or delays in implementing market mechanisms like the Feed-in-Tariff (FIT) and Green Energy Auction (GEA). The minimal disagreement across all market challenges underscores that these issues are widely seen as significant barriers to the growth of the RE sector.

Human Resource Challenges. Respondents indicated moderate agreement that human resource challenges are a concern in the RE sector. The shortage of a skilled workforce stood out with the highest weighted mean of 4.99. The next highest weighted means were for low compensation packages (4.92) and a high turnover rate (4.88), suggesting a strong correlation between these factors in this industry. Limited R&D skills, with a weighted mean of 4.83, were also seen as a significant challenge, as R&D is considered the "backbone of innovation and progress" in the sector. Without a strong R&D focus and skilled workforce, the industry could stagnate and fail to compete with established energy sources. Insufficient expertise in regulatory compliance and a lack of technical competence and experience also affirm findings by USAID (2023) that these are key barriers to rapid project development, particularly for newer technologies like solar and wind.

Technological Challenges. High capital costs, grid integration and stability issues, and the availability of access roads and logistics infrastructure were identified as the most significant technological barriers, with weighted means of 5.92, 5.84, and 5.66, respectively. Qualitative responses corroborated that these factors substantially impede project development. The prominence of grid integration issues is consistent with USAID's (2023) finding that grid connection is the foremost project development barrier. This is particularly pronounced in the Philippines, where optimal RE resource areas are often in remote locations that lack grid infrastructure. This forces project developers to assume the financial burden of establishing grid connections, adding to the already substantial capital costs. Furthermore, the lack of local technology content (5.44), design risks (5.31), and lengthy and costly technical studies (5.21) were also widely recognized as considerable challenges. The reliance on imported technology and the scarcity of domestically

developed components are significant impediments. These factors can prolong the gestation period of RE projects, especially for hydropower, increasing overall complexity and cost. Finally, limited local technical expertise, the dominance of Chinese suppliers, and high maintenance costs add to the multifaceted nature of the challenges, validating Gyanendra Singh Sisodia's (2014) finding that technical factors directly impact RE investment decisions.

Renewable Energy Resource Challenges. Land-use conflicts were by far the most critical challenge in this category, with an exceptionally high weighted mean of 6.27. This strong level of agreement (40% "Completely Agree" and 44% "Strongly Agree") highlights land-use conflicts as a major impediment. The complexity arises because optimal RE resources, particularly hydropower sites, are often on indigenous lands, complicating the acquisition of possessory rights. Navigating negotiations with local communities significantly impacts project implementation, a finding that aligns with USAID's 2023 report. This issue also underscores the competition between land for food security and land for energy generation. Other primary concerns with strong agreement include energy storage costs (5.56) and site-specific resource constraints (5.51). Site-specific constraints are particularly significant for hydropower, which is highly dependent on localized factors like natural river flow and terrain. The accessibility of resources also received a weighted mean of 5.44. These findings corroborate Gyanendra's (2014) assertion that geographical factors are a key hurdle for RE investments. The intermittency and variability of solar and wind energy (5.22) are widely acknowledged as major challenges to ensuring reliability and maintaining grid stability. Finally, the impact on biodiversity (5.12) and the general variability of resources (5.07) indicate moderate but growing concerns among respondents.

Social Acceptance Challenges. Social acceptance is a fundamental prerequisite for successful RE projects, especially at the local community level. The most significant social hurdle was the lack of understanding and misconceptions about RE, with the highest weighted mean of 5.50. This indicates a strong consensus that public incomprehension is a substantial barrier to project acceptance. A lack of social acceptance and a perceived lack of transparency were tied, both with a weighted mean of 5.18. These findings align with Wustenhagen, Wolsink, and Burer (2007), who identified social acceptance as a constraining factor, particularly for wind farms due to their visual impact. The "Not in My Backyard" (NIMBY) attitude (4.89), distrust in project developers (4.55), and a lack of community consultation (4.54) are also widely recognized as significant obstacles. Other issues, such as the potential impact on cultural heritage (4.40), noise pollution (4.1), and perceived health risks (3.78), were considered less significant by the respondents.

Proposed Strategies and Solutions. The study also gathered and analyzed recommendations from respondents for overcoming these challenges. The strong consensus across various solution areas indicates that stakeholders have a clear vision for an enabling environment for the RE sector.

Addressing Regulatory Challenges. Respondents showed overwhelming support for streamlining permitting processes (weighted mean = 6.38) and the full implementation of the Energy Virtual One-Stop Shop (EVOSS) (weighted mean = 6.34). These interventions, which respondents believe are urgently needed, aim to simplify and expedite permitting, thereby encouraging greater participation from investors. There was also strong agreement on the necessity of seamless coordination among government agencies (6.0) to address administrative hurdles and enhance efficiency. Furthermore, respondents agreed on the need for new laws and policies (5.76) and for amending existing ones (5.74) to create a more stable and supportive legislative framework.

Addressing Financial Challenges. The highest level of support was for Green Bonds and other financing mechanisms (6.19), followed by the coordination of financial institutions and RE regulatory agencies (6.17). The provision of

special interest rates for RE also received significant support (6.12). These findings suggest a strong belief that developing new financial instruments and enhancing collaboration between financial and regulatory bodies are vital. The provision of tax incentives and grants (6.05) and improving the appreciation of RE among lending institutions (5.96) also garnered strong agreement. The results suggest a multifaceted approach that includes both direct financial support and systemic improvements in the financial ecosystem's understanding of the RE sector.

Addressing Technological Challenges. Improving grid and transmission infrastructure was the top priority, with a weighted mean of 6.18, underscoring the critical need for robust infrastructure to effectively integrate RE and ensure system stability. An open market policy for RE technology (6.05) and industry-academe collaboration for R&D (5.99) were also strongly supported. This reflects the belief that fostering innovation and knowledge exchange is crucial for the sector. Other strategies, such as global cooperation for knowledge sharing (5.89) and energy storage integration (5.87), also garnered strong support, highlighting the need for continuous learning and the integration of complementary technologies.

Addressing Market Challenges. All four identified interventions received strong support, with weighted means above 6.0. The increase in Renewable Portfolio Standards (RPS) was the most strongly supported (6.26), as respondents believe it will enhance market transparency and stability. The annual Green Energy Auction (GEA) (6.22) and the implementation of available market mechanisms (6.20) also received substantial support. The high level of support for fair tariffs (6.15) and the GEA strategies collectively highlights the importance of equitable pricing structures and consistent action plans in fostering an investor-friendly market.

Addressing Human Resource Challenges. Integrating RE courses into college education emerged as the most impactful intervention (6.21), with 44% in complete agreement. This underscores a widespread belief that embedding RE topics in education is essential for developing a skilled workforce. Industry-academe collaboration (6.02) and attractive compensation packages (6.01) also received strong support. Workforce development through training (6.00) was seen as critical but slightly less impactful than the top three interventions, yet still essential for continuous learning and closing skill gaps.

Addressing Social Challenges. Stakeholder engagement and education received the highest level of support (6.33), highlighting the belief that inclusive and informed involvement is essential for building public trust and securing project acceptance. The conduct of Information, Education, and Communication (IEC) campaigns also garnered strong agreement (6.22), underscoring the value of transparent communication in correcting misconceptions and fostering community buy-in.

Overcoming RE Investment Risks. Implementing robust risk management systems received the highest weighted mean (6.29) and was viewed as the most crucial intervention. Thorough due diligence followed closely (6.22), underscoring its vital role in informed decision-making. Partnering with experienced developers also received a very strong weighted mean of 6.21, reflecting the value of expertise, regulatory know-how, and efficient project management that such partnerships can bring. Investing in multiple projects and hybrid systems received strong agreement (6.04), reflecting a belief in the effectiveness of diversified strategies for optimizing returns and promoting resilience.

Motivation, Outlook, and Overall Attitude towards Renewable Energy. The study also explored respondents' motivations, preferences, and overall attitudes toward RE. The strongest motivators for RE investment were environmental impact (6.40) and advocacy (6.33). This indicates a value-driven approach where sustainability and ethics are central to investment decisions. Profitability ranked third (6.05), reinforcing that financial returns remain a crucial factor but are secondary to ethical considerations. The least influential motivator

was market trends (4.98), suggesting that investors are guided by long-term impact rather than short-term popularity.

The most favored RE technologies were solar integrated with battery energy storage (6.17), run-of-river hydro (6.05), and onshore wind (5.90). Solar with storage was valued for its ability to mitigate intermittency and its quick return on investment. Biomass was the least preferred energy source (4.92), likely due to concerns about feedstock sustainability, land use, or emissions.

Respondents consistently identified solar-based technologies, particularly those paired with battery storage, as having the highest growth potential (6.01). Rooftop solar and onshore wind shared the second-highest potential (5.76) due to their maturity and cost-effectiveness. Other technologies like pumped-storage hydro, impounding hydro, and biomass received less optimistic perceptions.

Overall, respondents held a very strong belief in the global importance of RE for sustainability (6.46). They viewed the current investment climate in the Philippines as generally positive (5.58) and perceived a healthy level of market competition (5.46). However, confidence in the government's 2040 RE target was more reserved (5.24), and there was less conviction that current laws and policies are sufficient to boost investments (4.86).

DISCUSSION

This study investigated the investment challenges faced by RE investors and developers in the Philippines. The findings revealed a strong consensus on several key challenges across seven categories: regulatory, financial, market, human resource, technological, resource, and social. The most cited regulatory barriers were the excessive number of permits and approvals and bureaucratic procedures. Financial challenges centered on high upfront costs and limited access to financing (Sisodia, 2014; USAID, 2023). In the market, price variability and low off-take tariffs were the most significant barriers (Roesad, 2017). Human resource challenges included a shortage of skilled workers, low compensation, and limited R&D skills (USAID, 2023). High capital costs, grid integration issues, and land-use conflicts were identified as critical technological and resource barriers. Finally, a lack of public understanding and social acceptance were the major social concerns affecting project implementation at the grassroots level.

The study also gathered a broad range of proposed solutions and strategies to address these challenges. Key recommendations include streamlining regulatory processes through the full implementation of the EVOSS, expanding access to green financing and offering special interest rates and tax incentives, and improving grid infrastructure and fostering industry-academe R&D. Other vital solutions involve increasing the Renewable Portfolio Standards (RPS) and implementing annual Green Energy Auctions (GEA), integrating RE education into college curricula, and implementing stakeholder engagement and comprehensive IEC campaigns to build community trust. To mitigate investment risks, the study recommends implementing robust risk management systems, thorough due diligence, and partnerships with experienced developers.

Accelerating RE investments is crucial for the Philippines to achieve environmental sustainability, energy security, and inclusive economic growth. Despite the country's vast RE potential and policy progress, RE investors continue to face multi-faceted investment challenges that hinder project development and implementation. The study reveals a strong consensus among stakeholders on these barriers, which span regulatory, financial, market, human resource, technological, and social concerns. Addressing these interconnected barriers is essential to unlock the full potential of the RE sector.

Achieving this requires a holistic and integrated approach that combines regulatory reform, innovative financing mechanisms, technological advancement, market restructuring, workforce

development, public engagement, and comprehensive risk management strategies. The study outlines several key enablers to improve investor confidence, including streamlining permitting processes through the full implementation of the EVOSS, expanding access to green financing and offering investment incentives, and enhancing market access by increasing RPS and implementing annual green energy auctions. It also emphasizes the importance of modernizing grid infrastructure, developing a skilled workforce through education and collaboration, fostering strong stakeholder and community engagement, and strengthening internal capacities for due diligence and risk management.

To fully realize its goal of achieving a 50% RE share in the power mix by 2040, the Philippines must cultivate a robust, transparent, and investor-friendly environment. With investor interest increasingly driven by environmental advocacy, a cohesive and collaborative national strategy is imperative to address these barriers and position the country as a regional leader in clean energy. Through decisive action, the public and private sectors can collaborate to transform renewable energy into a powerful engine of sustainable and resilient growth for all Filipinos.

Proposed Strategic Interventions. Based on the study's findings, the following strategic interventions are proposed to fully harness the potential of RE investments and meet the national goal of a 50% RE share by 2040:

Streamline Regulatory Processes and Improve Governance. Enhance and fully implement the Energy Virtual One-Stop-Shop (EVOSS) to reduce permitting timelines, minimize administrative red tape, and provide a more efficient and transparent project approval process for RE investors.

Strengthen Policy and Institutional Frameworks. Amend outdated provisions of the Electric Power Industry Reform Act (EPIRA) and the Renewable Energy Act (RE Law) to align with current energy market dynamics and the country's RE transition goals. Develop long-term, consistent, and enforceable RE policies to provide strategic clarity and regulatory certainty for investors.

Expand Access to Financing and Investment Incentives. Expand the availability and diversity of green financing instruments, including green bonds, preferential interest rates for RE, and tax incentives, to improve project bankability and de-risk investments. Strengthen and broaden existing fiscal incentives, such as extending tax holidays, enhancing duty exemptions for imported equipment, and institutionalizing VAT zero-rating, to significantly improve project viability and boost investor returns to at least 12%. Enhance the appreciation of lending institutions through improved coordination between regulatory agencies and local banks to increase local lending to RE projects.

Promote a Competitive and Transparent RE Market. Implement and enhance the Green Energy Auction Program (GEAP) to encourage price discovery, drive down generation costs, and attract a broader pool of investors. The GEAP should be fair, transparent, and predictable, with clear timelines and technology-specific auction windows. Strengthen offtake arrangements by implementing fair tariffs, increasing Renewable Portfolio Standards, and optimizing current offtake mechanisms to create a stable and competitive RE market.

Improve Grid Infrastructure and Technology Integration. Prioritize investments in grid modernization, expansion, and interconnection, focusing on smart-grid technologies and digital infrastructure. These upgrades are critical to enhancing grid flexibility and resilience, particularly in managing the variability of RE. Support energy storage solutions and distributed energy systems, especially for remote and off-grid communities, to address intermittency. Strengthen international cooperation for technology transfer and capacity building to reduce dependence on imported technologies and cultivate a homegrown RE innovation ecosystem.

Develop a Skilled and Competitive RE Workforce. Integrate RE-focused curricula into higher education and vocational training to build a future-ready talent pool. Encourage stronger academe-industry collaboration to align skills development with market demands. Expand access to professional development and certification programs, while offering competitive compensation and career advancement pathways, to attract, retain, and empower a skilled and motivated RE workforce.

Increase Public Awareness and Strengthen Community Engagement. Implement a sustained and inclusive nationwide Information, Education, and Communication (IEC) campaign to raise public awareness about the benefits of RE, address misconceptions, and build community trust. Ensure early engagement with local communities and stakeholders during project planning to foster a participative approach that will address concerns and mitigate opposition, such as "Not in My Backyard" (NIMBY) sentiments.

Mitigate Investment Risks. Implement comprehensive due diligence and risk mitigation tools, such as political risk insurance, sovereign project guarantees, and stable return mechanisms, to shield investors from potential uncertainties and ensure long-term project viability. Encourage strategic joint ventures and partnerships between experienced foreign developers and local companies to facilitate technical expertise and knowledge sharing.

These interventions, if effectively implemented, will address the challenges facing RE investments and transform the Philippine RE landscape into a more attractive, stable, and scalable sector. This will drive the country towards a sustainable, inclusive, and climate-resilient energy future.

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