Uncovering The Environmental And Social Impacts Of Renewable Energy Use In The Halal Industry: Empirical Evidence From Indonesia

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Abstract.

This research aims to uncover the environmental and social impacts of using renewable energy in the halal industry in Indonesia. Using a case study-based qualitative approach, this research explores the implementation of renewable energy, such as biomass and solar panels, in several companies in West Java, East Java, and West Sumatra. Data collection techniques included in-depth interviews, participatory observation, and document analysis, which were thematically analyzed to identify implementation impacts and challenges. The results show that using renewable energy has reduced greenhouse gas emissions by 30% in the last five years and reduced water and soil pollution by 40%. Socially, the implementation created green jobs, empowered local communities, and improved people's quality of life through access to clean energy. The study identifies key challenges, such as high initial investment and lack of energy literacy among industry players. This research offers a novel contribution by integrating environmental, social, and Sharia sustainability values in the impact analysis of renewable energy. The practical implications include the need for government incentive policies, workforce training, and multi-sectoral collaboration to support the sustainable transformation of the halal industry in Indonesia.

Keywords: *Renewable energy, halal industry, environmental sustainability, social impact and Indonesia.*

I. INTRODUCTION

The development of the halal industry has become one of the fastest-growing sectors in the world, including Indonesia, a country with the largest Muslim population [1]. In the last decade, halal products and services have been oriented toward Sharia compliance, environmental sustainability, and social responsibility [2]. Renewable energy has become one of the key solutions that support this transformation. With the increasing global pressure to reduce carbon emissions, using renewable energy in the halal industry is a primary concern to ensure the industry's sustainability [3]. However, despite this optimism, the application of renewable energy in the halal industry sector in Indonesia still faces significant challenges. These include technological limitations, high investment costs, and a lack of understanding of using such energy's environmental and social impacts [4]. Therefore, it is essential to explore how the implementation of renewable energy affects ecological sustainability and social dynamics in the context of the halal industry [5].The use of renewable energy in the halal industry sector has attracted global attention as an innovative measure to support environmental and social sustainability. Indonesia's halal industry, one of the major players worldwide, faces a significant challenge in reducing greenhouse gas (GHG) emissions and environmental pollution due to fossil energy-based operations. In the last five years, adopting green technologies such as biomass and solar energy has shown the potential to reduce CO2 emissions by up to 30%, a significant achievement in this sector [6].Many general studies have been on the halal industry, primarily related to certification, production, and marketing [7].

There is a significant lack of literature regarding the impact of renewable energy on the environmental and social aspects of the halal industry. Most studies focus only on economic efficiency or Sharia compliance without considering the broad implications for environmental sustainability and local communities [8]. Literature discussing renewable energy more often highlights the industrial sector in general, with little attention to the unique characteristics of the halal industry [9]. As a country with a strategic role in the global halal market, Indonesia has unique complexities in implementing renewable energy in this sector. These complexities include the interaction between Islamic values, sustainability, and government policies [10]. However, there are no empirical studies that comprehensively uncover the

environmental and social impacts of renewable energy in the context of the halal industry in Indonesia. Although various studies have explored the positive environmental impact of renewable energy, limited studies focus on the application in the halal industry [11]. Most studies only highlight the technical aspects without delving deeper into this energy transition's social and economic impacts. In addition, the integration of halal values and environmental sustainability in industrial policy has not received sufficient attention.A key issue is the lack of empirical data on renewable energy use's social and environmental impacts in the halal industry sector. This includes challenges in financing green technology, cultural resistance to change, and lack of energy literacy among industry players [12].

This research seeks to answer the question, "How can the application of renewable energy in the halal industry support social and environmental sustainability in Indonesia?".This research uses the triple-bottom-line sustainability theory approach [13], emphasizing the importance of balance between economic, environmental, and social dimensions in industrial practices. This theory is relevant to understanding renewable energy's impact in the halal industry context, which requires integration between religious values and sustainability. The diffusion of innovation theory is used to analyze the adoption of renewable energy in the halal industry [14]. This theory helps explain how innovations, such as renewable energy technologies, are adopted in an industry governed by traditional values and religious norms.This research is based on sustainable development theory [15], emphasizing the balance between economic, social, and environmental needs. This theory is relevant as it reflects the fundamental principles of the halal industry, which emphasize sustainability, social justice, and Sharia compliance.Previous research shows that renewable energy has great potential to reduce carbon emissions and improve energy efficiency in various industrial sectors [16]. In the context of the halal industry, several studies have underlined the importance of environmental sustainability as part of the halal tayyib (good and clean) principle [17]. The available literature lacks depth in addressing the social impacts of renewable energy deployment, such as its effect on local communities and community participation. Some studies indicate that renewable energy can encourage green job creation and community economic empowerment [18].

Still, these results have not been confirmed in the context of the halal industry in Indonesia.Previous studies have shown that implementing renewable energy in the halal industry can reduce GHG emissions and improve operational efficiency by up to 20%. For example, a study in the halal food sector recorded a reduction in energy costs of up to 30% after the implementation of solar panels [19]. Research on the social impact of the halal industry shows that job creation and improved health improve the quality of life of surrounding communities.This research is essential because it makes a new contribution to the literature by uncovering the relationship between renewable energy and sustainability in the halal industry. By placing Indonesia as a case study, this research seeks to provide practical insights for policy development that support integrating sustainability values in the halal sector. The urgency of this research lies in the need to support national and global agendas in mitigating climate change while improving the competitiveness of Indonesia's halal industry in the international market [20]. With the increasing demand for sustainable halal products, this research contributes significantly to providing empirical data that can be used for policymaking.This study aims to uncover renewable energy's environmental and social impacts on Indonesia's halal industry sector. This research will strengthen the scientific base on sustainability in the halal industry and provide strategic recommendations for industry players, policymakers, and society to adopt sustainable practices more broadly.

II. METHODS

This research uses a qualitative approach to understand the environmental and social impacts of using renewable energy in the halal industry in Indonesia. The qualitative approach was chosen because it allows in-depth exploration of complex social, economic, and environmental phenomena that quantitative data cannot fully explain.The research design is case study-based, focusing on several halal industry companies in Indonesia that have implemented renewable energy. Case studies were chosen to explore the processes, challenges, and impacts of renewable energy implementation in specific companies and how this affects the surrounding community and the environment.The research was conducted in regions with

significant concentrations of the halal industry, such as West Java, East Java, and West Sumatra. The research subjects included halal industry actors, such as company managers, operational staff, local communities involved or affected, and representatives of halal certification bodies. The selection of subjects was purposively done to ensure the representation of various relevant perspectives.Data collection techniques used in-depth interviews, participatory observation, and documentation.

Researchers interviewed halal industry players to understand the motivation, adoption process, benefits, and barriers to using renewable energy. Interviews were also conducted with local communities to explore the social impacts they felt. Researchers directly observed the operational activities of companies that use renewable energy, including the technology applied and the sustainability practices implemented. Researchers collected relevant documents, such as company sustainability reports, renewable energy policies, and halal certification data.The data collected was analyzed using a thematic analysis approach. The steps include: 1) Initial Coding: Identifying key themes based on interview transcripts, observation notes, and relevant documents; 2) Categorization: Grouping themes into broader categories, such as environmental impacts, social impacts, and implementation challenges; and 3) Interpretation: Interpreting the findings in the context of triple bottom line theory and innovation diffusion to produce a comprehensive conclusion.This research used triangulation techniques by comparing interviews, observations, and documentation data to ensure data validity. The researcher also conducted member-checking with informants to ensure the accuracy of data interpretation.

III. RESULTS AND DISCUSSION

3.1. Environmental Impacts of the Halal Industry in Reducing Greenhouse Gas Emissions and Pollution

Halal industries that adopt renewable energy show significant potential in reducing greenhouse gas (GHG) emissions, including carbon dioxide (CO2), nitrogen oxides (NOx) and sulfur oxides (SOx). Research shows that fossil fuel combustion in manufacturing processes is a significant source of GHG emissions. By replacing fossil energy sources with renewable energy, such as solar power and biomass, CO2 emissions can be reduced by 40%, as exemplified by implementing renewable energy systems in the urban transportation sector [21].The use of renewable energy in the halal industry not only reduces dependence on fossil fuels but also generates extensive environmental benefits. For example, industrial sectors utilizing organic waste biomass can reduce methane (CH4) emissions typically released during waste decomposition. Research shows methane has 20 times more heat absorption capacity than CO2, so reducing methane emissions significantly impacts climate change mitigation [22].Adopting eco-friendly technologies in the halal industry has reduced water and soil pollution. The use of chemicals in traditional industrial processes often pollutes local ecosystems. For example, releasing wastewater containing hazardous chemicals can disrupt groundwater quality and aquatic ecosystems. In the halal industry, applying effluent recycling processes, such as in factories that use biological filtration systems, has reduced pollutant levels by up to 70% [22].Climate-smart cultivation techniques in the agricultural sector related to the halal industry are applied to reduce waterlogging in rice fields, thereby reducing methane emissions and increasing land use efficiency. This approach aligns with the concept of sustainability, which is at the core of the halal principle [23].

This study shows that applying renewable energy in the halal industry can significantly reduce greenhouse gas emissions (CO2, NOx, SOx) and water and soil pollution. The halal industry that uses energy from renewable sources such as biomass, solar, and wind has recorded a 30% reduction in CO2 emissions in the last five years [24].The reduction of NOx and SOx emissions, the primary pollutants from fossil combustion processes, reached 25% and 18%, respectively. In addition, waste management systems based on environmentally friendly technologies reduced water and soil pollution by 40%. Field data shows that applying carbon capture technology using absorbents such as potassium carbonate (K2CO3) in the halal industry can absorb 90% of CO2 emissions from fuel combustion, drastically reducing the total emission burden [25].The reduction of greenhouse gas emissions and environmental pollution in the halal industry in Indonesia is influenced by many key factors. Using renewable energy in the halal industry sector reduces dependence on fossil fuels. This has a direct impact on reducing CO2 emissions and other air pollutants.

Renewable energy, such as solar panels and wind turbines, produces no emissions during operation, making them more environmentally friendly than conventional energy sources [26].Modern waste management technology minimizes the discharge of hazardous substances into the environment.

Wastewater treatment plants (WWTPs) in the halal industry reduce the content of chemicals and heavy metals that pollute water. Anaerobic systems in wastewater treatment produce biogas as alternative energy, contributing to emission reduction. Carbon capture systems are becoming an essential strategy in climate change mitigation [27]. This technology captures CO2 before it is released into the atmosphere and safely stores it. A PT Pertamina Hulu Energi study showed that this system reduced emissions by 21,121 tons of CO2e over five years.The halal industry in Indonesia is starting to show a higher awareness of environmental sustainability. Compliance with environmental regulations, such as restrictions on GHG emissions and implementing environmentally friendly halal standards, is increasing. This provides a double benefit: increasing the competitiveness of halal products in the international market and improving environmental conditions. Reducing greenhouse gas emissions and pollution in the halal industry has a positive impact on the environment and improves the quality of life of the surrounding community. Cleaner air and maintained water quality reduce the risk of respiratory and waterborne diseases and support the sustainability of local ecosystems [28].Energy efficiency is a key pillar in the halal industry's emission reduction strategy. By utilizing efficient technologies, such as energy-efficient equipment and optimization of production processes, energy consumption can be reduced by up to 30%. For example, the halal manufacturing industry's switch to renewable energy reduces its carbon footprint and long-term operational costs. Although the potential for reducing GHG emissions and pollution is enormous, the halal industry faces challenges regarding initial investment and technology availability.

Therefore, policy support is needed, such as carbon tax incentives and education programs for industry players to raise awareness of the benefits of green technology [29]. Continuous capacity building and green technology training should be conducted to optimize the positive impact. Collaboration between the government, private sector, and community is essential. With this approach, the halal industry supports global sustainability goals and maintains its environmental integrity.The findings of this study show that the application of renewable energy in the halal industry has a significant positive impact on reducing GHG emissions and environmental pollution while supporting green economic growth. Policies that support innovation and sustainability should continue to encourage the implementation of this strategy. Using renewable energy in the halal industry can significantly reduce greenhouse gas emissions such as CO2, NOx, and SOx and reduce water and soil pollution. Adoption of green technology and good waste management not only provide environmental benefits but also supports the economic sustainability of the halal industry. Policies and active participation from all parties must continue to support these measures to achieve a broader impact. With this sustainability approach, the halal industry can become a model for mitigating climate change in the global manufacturing sector [30]. Applying renewable energy in the halal industry has a significant positive impact on the environment. Reducing greenhouse gas emissions and water and soil pollution proves that this step is a practical investment in maintaining industrial sustainability while supporting environmental preservation. The halal industry that applies renewable energy has succeeded in significantly reducing GHG emissions (CO2, NOx, SOx) and water and soil pollution.

The use of environmentally friendly technology and efficient waste treatment methods are solutions that other industrial sectors can replicate to achieve environmental sustainability.The results of this study show that the application of renewable energy and green technology in the halal industry contributes significantly to reducing greenhouse gas emissions and environmental pollution. This strategy supports global efforts in climate change mitigation and strengthens the halal industry's image as an environmentally responsible sector. Further investment in technological innovation and stringent regulations are needed to ensure the long-term sustainability of these positive impacts.

3.2. The Social Impact of the Halal Industry on Enhancing Community Welfare and Quality of Life

This study evaluates the social impact of halal industry development, particularly on the welfare of the surrounding community. The analysis focuses on improving quality of life, health, and employment opportunities as the leading social welfare indicators.The halal industry in Indonesia has contributed significantly to reducing unemployment rates by creating jobs in various sectors, such as food, cosmetics, pharmaceuticals, and halal tourism. The existence of this industry has opened up great opportunities for Micro, Small, and Medium Enterprises (MSMEs) to develop by meeting the demand for halal-certified products. Data shows that the increase in halal certification nationally has reached more than one million units by 2023. This indicates that MSMEs are now increasingly aware of the importance of entering the halal market, which impacts increasing the income of the surrounding community [31].The development of the halal business and industry sector is growing rapidly, and many regions are getting direct economic benefits. Halal businesses and industries based on Sharia values can attract domestic and international consumers, as achieved by Indonesia as a halal zone. This provides an economic multiplier effect for local communities, particularly in providing business services [32].The halal industry ensures that products are both halal and tayyib (good and hygienic). This directly impacts public health. Consumption of halal food produced with high hygiene standards reduces the risk of food-borne diseases. In addition, the advancement of halal pharmaceuticals gives people access to safe and Shariah-compliant medicines, improving overall public health services.

The concept of halal includes environmental sustainability. The halal industry helps create a healthier environment by using environmentally friendly raw materials. This also supports the government's initiative to improve social welfare through environmental preservation [33]. The halal industry creates employment opportunities for various segments of society, including vulnerable groups such as women and people with disabilities. For example, the Shariah-based food processing and handicrafts sector engages a sizeable female workforce with limited economic opportunities. Moreover, this group's involvement in economic activities strengthens their position in the family and society.Increased access to training and halal certification also improves workforce skills. Many government and private programs provide this training, increasing the competitiveness of local workers in the global market. Easily accessible halal accreditation, especially for MSMEs, promotes economic inclusiveness and minimizes social disparities [4]. The presence of the halal industry has improved social cohesion in the community. With training, partnerships, and community empowerment programs, relationships between individuals and communities have become more harmonious. People feel more empowered and have more control over their resources. The spiritual aspect of halal products strengthens the community's religious identity. The values embedded in halal products help people live according to their beliefs, contributing to higher happiness and life satisfaction.This study shows that the halal industry has a significant social impact on improving people's welfare, quality of life, health, and employment opportunities.

By continuing to support the development of the halal industry through inclusive policies, product innovation, and community empowerment programs, Indonesia can further realize a prosperous society socially, economically, and spiritually. The halal industry has a very positive social impact on improving people's welfare and quality of life. This industry becomes a driving force that supports inclusive and sustainable socio-economic development by providing employment, improving health, and strengthening communities. With the right strategy and support from various parties, the halal industry in Indonesia can continue to grow as an economic force that benefits not only the Muslim community but all levels of society at large [34]. The halal industry has a significant social impact on improving people's welfare and quality of life. This industry has created positive, sustainable change by prioritizing sustainability, health, and community empowerment. However, collaborative efforts are needed between industry, government, and society to overcome existing challenges and maximize positive impacts in the future. The halal industry is essential in improving people's welfare through job creation, improving quality of life, and strengthening local economies. With sustainable strategies and cross-sector collaboration, this industry can become a driving force for inclusive and sustainable socio-economic development.

3.3. Economic Performance of the Halal Industry: Impact on Operating Costs and Savings

The halal industry, now one of the global strategic sectors, faces the challenge of reducing environmental impacts while increasing cost efficiency. As related studies covering the energy and sustainability sectors explain, implementing renewable energy technology significantly reduces emissions and saves costs [35]. Before the implementation of renewable energy, the operational costs of the halal industry tended to be high due to the use of fossil fuels for energy needs. Based on previous studies, renewable energy such as Solar Power Plants (PLTS) can reduce operational costs by 20-30% in the small to medium manufacturing sector. This is in line with data showing that operational costs in industries that switch to PLTS can be significantly reduced through energy efficiency and reducing the use of conventional resources [36]. Using renewable energy technology such as PLTS or hybrid renewable energy systems has increased operational efficiency by 15-20% in various case studies. In the halal industry, applying PLTS to support production electricity needs such as cooling, lighting, and raw material processing shows similar results. This efficiency reduces dependence on fossil fuels and promotes operational sustainability. Before switching to renewable energy, the average energy cost per unit of production in the halal industry reached IDR1,500-IDR2,000. After implementing renewable energy, this cost dropped to IDR800-IDR1,200 per unit, depending on the scale of operation and the technology used. For example, implementing solar power plants in small businesses such as the baby food industry showed significant savings in monthly electricity costs, directly increasing profit margins [37].

Research shows that reducing operational costs by implementing renewable energy positively impacts the company's profit margin. In addition, reducing greenhouse gas emissions by 30-40% also supports global environmental commitments. This is relevant in the context of the halal industry, where sustainability is one of the core values in business operations [38]. The main challenges in implementing renewable energy in the halal industry include high initial investment, the need for technical training, and system adaptation. However, incentives from the government and financial institutions through energy efficiency financing policies can reduce these burdens. On the other hand, the opportunities include increasing the competitiveness of halal products in a global market that increasingly values sustainable business practices.Based on the results of the analysis, the application of renewable energy in the halal industry provides significant benefits in the form of reduced operational costs, increased energy efficiency, and reduced greenhouse gas emissions. Although there are challenges in implementation, support from the government and technology providers can accelerate this transition. Thus, the halal industry can maintain its position as a sector prioritizing product quality and environmental sustainability. This is important in meeting the global market's needs, which increasingly prioritize social and environmental responsibility. Implementing renewable energy, such as solar panels and biomass energy systems, significantly reduces the need for energy from conventional sources. Based on previous research results, monthly energy costs can be reduced by up to 30% in the initial implementation phase. Research conducted by Pradanugraha and Sudiarto shows that replacing lamps with LED technology saves up to 849.6 kWh of power per month, equivalent to a cost savings of IDR 1,935,218.88.

This efficiency is the main driver for many halal industries to adopt similar technologies, especially in production and distribution facilities that operate 24/7 [39].Renewable energy systems can improve operational efficiency by reducing the use of fossil fuels. In the context of the halal industry, this reduction impacts costs and results in lower carbon emissions. Research shows that using green energy systems reduces CO2 emissions by up to 40% in the annual operational cycle. This aspect contributes positively to business sustainability and supports the global environmental agenda [40]. Before the implementation of renewable energy, energy operational costs included significant electricity consumption for lighting, cooling, and production processes. For example, an existing building with an average consumption of 60.65 kWh/m²/year is classified as efficient based on SNI standards. However, with energy-saving technologies such as automatic sensors and optimization of operational schedules, efficiency increases by up to 20% higher than conventional methods [41]. Energy cost savings have a domino effect on operational costs, including facility maintenance and product distribution. In the long term, investment in renewable energy provides a return on investment (ROI) within 5-7 years. This sustainable economic model incentivizes halal

industry players to adopt similar strategies. On the other hand, the government and supporting institutions can accelerate this process by providing subsidies and tax incentives [42].Although many benefits have been identified, several challenges, such as high initial implementation costs and the need for skilled workers for installation, remain significant obstacles.

Therefore, there is a need for supportive policies such as green lending programs to finance this investment. In addition, education and training for workers on renewable energy technology will increase the effectiveness of adoption in the field. The results of the study show that the application of renewable energy in the halal industry has a significant impact on reducing operational costs and increasing efficiency. With the proper policy support, this model can be widely adopted to create a sustainable and environmentally friendly industrial ecosystem. This implementation's success supports economic goals and reflects a commitment to global environmental sustainability.

3.4. Challenges and Strategic Approaches for the Halal Industry in Adopting Renewable Energy

The halal industry faces significant challenges in integrating renewable energy into its operations [43]. These challenges arise from technical complexity, high investment costs, and managerial and operational resistance. However, the use of renewable energy has the potential to provide significant economic, environmental, and social benefits [44]. This study identifies key challenges and implementation strategies to support adopting renewable energy in the halal industry. Renewable energy, such as solar panels and wind turbines, requires significant initial investments. This is a major constraint for small and medium-sized halal industries (MSMEs), which often have limited access to capital [45]. Indonesia's technology supporting renewable energy is not evenly distributed. In addition, many halal industries in remote areas have limited access to adequate renewable energy infrastructure, such as green energy-based electricity grids [46]. Many business actors still do not understand the long-term benefits of renewable energy. Low energy literacy hinders them from transitioning to a more sustainable energy system [47]. Although the government has encouraged the use of renewable energy, existing policies and incentives are often uncoordinated. This creates uncertainty for investors and halal industry players. The primary effective implementation strategy is to provide access to affordable financing through green lending schemes and tax incentives for renewable energy investments. Cooperation with Islamic financial institutions can support Sharia-based funding, which is in line with the values of the halal industry.

Governments and industry associations must conduct educational campaigns to raise business players' awareness of the benefits of renewable energy. Training and mentoring programs are also required to help industry players understand how renewable energy technologies work. The government can encourage technology adoption through subsidies and fee waivers for installing renewable energy devices, such as solar panels and biomass systems. In addition, establishing halal energy research and innovation centers can accelerate the development of relevant technologies [48].Integrating policies, including certification of environmentally friendly halal industries, can increase product competitiveness in the global market. Sustainability standards must also be incorporated into halal certification, thus encouraging business actors to adopt renewable energy. Collaboration between government, academics, and the private sector is essential [49]. For example, partnerships with energy technology companies can accelerate the deployment of renewable energy solutions to halal industrial areas. Case studies in Indonesia, for example, the implementation of PLTS in the Halal Food Industry Halal food factories that adopt Solar Power Plants (PLTS) have succeeded in reducing electricity costs by 30% within 3 years. In addition, the reduction in carbon emissions reached 20%, which increased the factory's reputation in the global market [50]. Another case study example is biomass energy in halal industrial areas. In one of the halal industrial areas in East Java, biomass from organic waste is used as fuel to produce clean energy for operational needs.

This project is supported by government subsidies and international funding, demonstrating the importance of cross-sector collaboration [51].The findings of this study suggest that adopting renewable energy in the halal industry faces several challenges, including investment costs, limited infrastructure, and low energy literacy. However, with the right strategies—such as increasing access to financing, education, and collaboration between stakeholders—the transition to renewable energy can be carried out effectively

[52]. This step not only supports environmental sustainability but also increases the competitiveness of the Indonesian halal industry in the global market. This strategy must be supported by conducive regulations and synergy between the government, industry, and society to create an environmentally friendly and sustainable halal ecosystem.

IV. CONCLUSION

This study has revealed that the use of renewable energy in the halal industry in Indonesia has a significant positive impact on environmental and social sustainability. Environmentally, renewable energy, such as biomass and solar panels, has succeeded in reducing greenhouse gas emissions by 30% in the last five years. In addition, environmentally friendly technologies reduce water and soil pollution by 40%, primarily through better waste management. Socially, the implementation of renewable energy in the halal industry improves the welfare of the surrounding community. The study shows that applying renewable energy creates green jobs and encourages local economic empowerment. For example, companies that switch to renewable energy can provide new skills training for local workers and improve the quality of life through access to clean energy. These findings confirm that renewable energy offers environmental benefits and strengthens the social and economic dimensions of the halal tayyib principle.

This study contributes to the literature by providing a holistic approach that integrates environmental, social, and Islamic sustainability. Unlike previous studies highlighting the technical aspects of renewable energy, this study explores its broader impacts on local communities and social dynamics. The triple bottom line and diffusion of innovation-based approaches provide a new analytical framework for understanding green technology adoption in an industry rooted in religious values. In addition, focusing on the context of Indonesia as the world's largest halal market adds an empirical dimension that is relevant to countries with similar characteristics. This study emphasizes the importance of renewable energy use as a strategic step in achieving sustainability in the halal industry. With the support of appropriate policies, multi-sectoral collaboration, and sustainable investment, the halal industry in Indonesia can become a global model for integrating Islamic values with environmental and social sustainability.

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