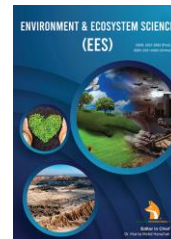




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REVIEW ARTICLE

SECURING AN ALTERNATE POWER SOURCE FOR DHAKA CITY THROUGH RENEWABLE ENERGY GENERATION

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ABSTRACT

This research delves into the critical issue of renewable energy integration as an alternative power source in Dhaka city, a metropolis of over 21 million people grappling with a burgeoning energy demand. Through qualitative interviews involving 40 participants from various sectors, including policymakers, renewable energy experts, energy companies, and community representatives, this study assesses the feasibility, challenges, and potential solutions for transitioning to renewable energy. The research elucidates a varied understanding of renewable energy sources, with solar and wind being the most recognized. Notably, electricity and natural gas dominate as primary energy sources, reflecting the present energy landscape. Conspicuously, coal's absence underscores Bangladesh's energy context. Challenges such as elevated installation costs, infrastructural limitations, and awareness gaps are identified as barriers to widescale adoption. The study advances actionable strategies including regulatory frameworks, financial incentives, and public awareness campaigns. Participants emphasize the pivotal roles of government policy, private sector engagement, and civil society collaboration. Additionally, the study underscores the multi-faceted benefits of renewables, ranging from environmental advantages like reduced carbon emissions to socio-economic gains like job creation. As Dhaka seeks sustainable solutions to its energy conundrum, this research presents a roadmap for policymakers and stakeholders, charting a course towards a greener, more resilient, and energy-secure future.

KEYWORDS

Renewable Energy, Dhaka City, Alternative Power Source, Energy Crisis, Sustainability, Adoption Challenges, Government Policy, Urban Energy Landscape


1. INTRODUCTION

Dhaka, the bustling capital city of Bangladesh, stands as a microcosm of rapid urbanization and economic growth, accommodating an astounding population of over 21 million, thus earning its place among the world's most densely inhabited cities. This growth, coupled with expanding economic activities, has triggered an unprecedented surge in the demand for electricity, outstripping the nation's capacity to produce energy. Consequently, recurrent power outages and load-shedding have emerged as distressing norms, casting shadows over both daily life and business ventures. This energy predicament is not novel to Dhaka; the city has wrestled with energy shortages since the 1990s. Nevertheless, recent years have seen the issue intensify, driven by the mounting thirst for electricity and an energy matrix heavily reliant on fossil fuels. A staggering 85% of Bangladesh's power generation hinges on natural gas, with the remaining energy pie comprising oil, coal, and hydropower. The ecological ramifications of this fossil fuel dependency are far-reaching. Bangladesh's susceptibility to climate change is profound, and the power sector's hefty contribution to greenhouse gas emissions only exacerbates this vulnerability, accounting for a substantial 60% of the nation's total emissions.

The repercussions extend beyond environmental concerns, adversely impacting public health due to heightened air pollution resultant from fossil fuel combustion. The current narrative underscores the urgency of

transitioning to renewable energy sources as a panacea for the power crisis and a salve for carbon emissions. In recent years, Bangladesh has embarked on a promising journey towards integrating renewables into its energy mix. The slice of energy generated from renewable sources grew from a modest 1.4% in 2014 to a heartening 4.6% in 2019. Solar power has propelled this growth, spearheaded by an ambitious governmental program aiming to elevate the share of renewable energy in the energy mix from 5% to 10% by 2021 and to a commendable 20% by 2025. Nonetheless, the potential for renewable energy adoption remains largely untapped, particularly within urban epicenters like Dhaka. The city's labyrinthine populace and spatial constraints pose formidable barriers to conventional energy infrastructure expansion.

Here, the installation of renewable energy solutions, like rooftop solar arrays and compact wind turbines, emerges as a logical, sustainable, and cost-effective remedy. The efficacy of such an approach is vividly evident in international instances, such as Germany's extensive use of rooftop solar panels constituting almost half of its solar energy capacity, or the deployment of small-scale wind turbines in urban pockets of the United States to cater to residential and commercial energy needs. Though Bangladesh is gradually embracing urban renewable energy, the journey is still in its infancy. Challenges, including high installation costs and inadequate awareness about the benefits of renewable energy, act as speed bumps. Furthermore, infrastructural gaps in grid connectivity and energy storage pose impediments to the seamless integration of renewables into

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the existing power grid. The rewards, however, far outweigh the challenges. From diminished carbon emissions and bolstered energy security to burgeoning employment opportunities, the incentives for embracing renewable energy are multifaceted.

This research endeavor assumes paramount importance due to the burgeoning power crisis plaguing Dhaka, a crisis whose economic and social repercussions are deeply felt. Chronic power shortages have precipitated load-shedding, escalated generator fuel consumption, and engendered disruptions across daily life and business operations. The propulsion of renewable energy sources, particularly solar panels, emerges as a promising antidote capable of alleviating the power crisis whilst curbing carbon emissions. However, the landscape is strewn with obstacles, including a lack of public awareness, prohibitive installation costs, and infrastructure insufficiencies. The study's scope is intrinsically bound to exploring renewable energy generation as an alternative power source specific to Dhaka. This examination involves probing the viability of diverse renewable energy sources—solar, wind, hydro, and biomass—towards abating the city's power crisis and concomitantly curbing greenhouse gas emissions.

The research ambit encompasses a thorough assessment of the challenges and opportunities that accompany renewable energy integration in Dhaka, paving the way for the formulation of astute risk management and mitigation strategies. It's prudent to acknowledge that the study does bear certain limitations: primary data collection hinges largely on online surveys, potentially impacting data accuracy due to representational constraints and response biases. Moreover, this research is confined exclusively to Dhaka, with other districts excluded due to resource constraints, logistical intricacies tied to Ramadan, and unresponsiveness of certain segments. This study assumes a focused role in appraising potential uncertainties inherent in renewable energy assimilation in Dhaka, prescribing strategies to thwart these predicaments. However, it refrains from plunging into the intricate technical aspects of renewable energy generation and system design, as these transcend its scope.

The study's objectives are threefold:

- To substantiate the feasibility of renewable energy adoption as an alternative energy source in Dhaka, Bangladesh.
- To evaluate potential uncertainties and risks intrinsic to the integration of renewable energy in Dhaka, while delineating strategies to mitigate these challenges.
- To conduct a comparative analysis between Dhaka, Bangladesh, and other developing South Asian nations in terms of renewable energy adoption.

In elucidating these dimensions, this research aspires to illuminate a path toward sustainable, resilient, and accessible energy provisioning for Dhaka and beyond.

2. LITERATURE REVIEW

Numerous studies have evaluated the potential of renewable energy sources as an alternate power source in urban areas. Solar energy, in particular, has been identified as a promising renewable energy source due to its abundance and availability in urban areas. Solar energy can be used to generate electricity in urban areas through photovoltaic (PV) panels installed on rooftops, which can also reduce transmission losses and improve the reliability of power supply (Mansouri Kouhestani et al., 2019; Vardimon, 2011). Another study by Goyal and Kaushik highlighted the potential of wind energy in urban areas, specifically in areas with high-rise buildings (Goyal and Kaushik, 2016). The study suggested that vertical axis wind turbines (VAWTs) installed on rooftops of high-rise buildings could generate significant amounts of electricity and reduce the dependence on grid power. The study also noted that VAWTs could reduce the visual impact associated with traditional horizontal axis wind turbines (HAWTs), which require large open spaces. Hydroelectric power has also been evaluated as a potential renewable energy source in urban areas. Micro-hydropower systems can be installed in urban areas to generate electricity from small streams or water sources (Boroomandnia et al., 2022; Quaranta et al., 2022).

The study suggested that micro-hydropower systems could be used to power streetlights, traffic signals, and other public infrastructure, reducing the dependence on grid power and improving the reliability of power supply. Biomass energy has also been studied as a potential renewable energy source in urban areas, particularly in the form of biogas generated from organic waste. Biogas can be generated from organic waste in urban areas through anaerobic digestion (Anyako and Baroutian, 2018). The

study suggested that biogas could be used to generate electricity or as a fuel for cooking, reducing the dependence on fossil fuels and improving the overall sustainability of urban areas. The literature also highlights the challenges and opportunities associated with renewable energy adoption in urban areas. One of the key challenges is the high upfront cost associated with installing renewable energy systems, particularly for low-income households. Financing methods like subsidies and tax incentives might be utilised to promote the adoption of renewable energy systems in urban areas, as suggested by research by (Karytsas and Choropanitis, 2017).

Renewable energy sources, such as solar and wind, present another difficulty because of their intermittent nature. Metropolitan areas might benefit from the usage of energy storage technologies like batteries to deal with the intermittent nature of renewable energy sources (Tan et al., 2021). Findings from the research revealed that energy storage devices might be utilised to store and later utilise the surplus energy produced during times of strong solar or wind energy production. Awareness and education regarding the advantages and possibilities of renewable energy sources is lacking, which is a key hurdle for the adoption of renewable energy in developing nations. The lack of public knowledge and education regarding the benefits of renewable energy sources is a major barrier to their adoption in Pakistan (Solangi et al., 2021). According to the results, public education and awareness initiatives may boost renewable energy adoption. The high cost of installation is another major obstacle for renewable energy initiatives in underdeveloped nations.

One of the main obstacles to the development of renewable energy projects in India is the large initial investment required (Majid and others, 2020). The research found that using novel finance methods like community ownership and crowd-funding might help bring down the price of renewable energy projects. Adoption of renewable energy sources is hindered in poor nations in part because of inadequate infrastructure. A key barrier to the widespread use of renewable energy sources in Bangladesh (Hasan and Emon, 2023; Khan et al., 2019): a lack of appropriate infrastructure and grid connection. The report recommended that, along with the expansion of renewable energy projects, grid infrastructure should be upgraded to provide consistent and efficient electricity delivery. Adopting renewable energy sources in poor nations is complicated by regulatory hurdles. One of the main obstacles to the implementation of renewable energy projects in India is the lack of supporting regulatory frameworks and regulations (Zebra et al., 2021).

According to the findings, establishing legal and policy frameworks that encourage the use of renewable energy sources would be beneficial. The advantages of adopting renewable energy sources in underdeveloped nations have been shown to outweigh the difficulties. Carbon emissions, energy security, and employment opportunities are all boosted by the use of renewable energy. Switching to renewable energy in Senegal might cut carbon emissions, improve energy security, and generate new jobs (Nsafon et al., 2023). According to the findings, developing nations might benefit from adopting renewable energy sources. The use of renewable energy in Pakistan has been shown to have positive effects on the country's economy, energy security, and carbon emissions (Rehman et al., 2019). The research found that if the right policies and regulatory frameworks were developed, renewable energy usage in Pakistan might be boosted. Several obstacles, such as a lack of knowledge, high installation costs, limited infrastructure, and regulatory impediments, impede the adoption of renewable energy sources in developing nations.

Reduced carbon emissions, increased energy security, and new employment opportunities are just some of the advantages of adopting renewable energy. Developing nations may speed up their transition to renewable energy by creating enabling laws and regulatory frameworks and using creative finance methods. The literature review on renewable energy generation and its potential as an alternate power source in urban areas highlights the relevance of the study's objectives and research questions. The review emphasizes the need for alternative sources of energy to meet the growing demand for electricity while reducing carbon emissions. It also suggests that solar energy is the most viable and abundant renewable energy source in urban areas and can provide a sustainable and cost-effective solution to the power crisis. Furthermore, the literature review identifies the challenges faced in the implementation of renewable energy sources in developing countries, which are relevant to Dhaka. These challenges include lack of awareness, high installation costs, inadequate infrastructure, and regulatory barriers.

The review also highlights the benefits of renewable energy adoption, such as reduced carbon emissions, improved energy security, and job creation, which are relevant to Dhaka's socio-economic context. Therefore, the literature review provides a foundation for the study's objectives and research questions, which seek to evaluate the potential of renewable

energy generation as an alternative power source in Dhaka city while identifying the challenges and opportunities associated with its adoption. The review also helps to guide the methodology and analysis of the research by identifying relevant research gaps and highlighting the key findings and insights from existing studies. Overall, the literature review is essential in establishing the study's relevance, significance, and contribution to the existing literature on renewable energy adoption in developing countries.

3. MATERIALS AND METHOD

In order to investigate the viability of renewable energy as an alternative power solution for Dhaka city, this study harnessed a qualitative research design. This approach facilitated a comprehensive exploration of the subject by conducting semi-structured interviews with a diverse array of key stakeholders. These stakeholders included policymakers, renowned experts in renewable energy, representatives from energy companies, and members of the local community. Through purposive sampling, participants were thoughtfully selected based on their expertise and direct involvement in Dhaka's renewable energy landscape, resulting in a sample size of 40. Data collection was executed through a combination of in-person and online interviews, flexibly catering to participant preferences. The interviews were conducted with careful consideration, ensuring comprehensive and accurate documentation of responses. The primary objective of these interviews was threefold: first, to gauge the current state of renewable energy adoption in Dhaka; second, to unravel the manifold possibilities and challenges interwoven with renewable energy integration; and third, to elucidate the methodologies employed in managing and mitigating the associated risks.

Upon data collection, a meticulous process of transcription was followed, rendering the collected narratives into verbatim records. Subsequently, a thematic analysis was undertaken, scrutinizing the transcripts for recurrent patterns and overarching themes. This analytical phase involved systematically identifying common threads within the data, thereby refining them into cohesive and insightful findings. Resolute adherence to ethical tenets was a cornerstone of this research endeavor. Before any interviews were conducted, participants were comprehensively briefed about the study's objectives, ensuring they were well-informed prior to their involvement. The ethical principles of informed consent, confidentiality, and anonymity were stringently upheld throughout the study. Participants' autonomy to withdraw from the study at any point was unequivocally respected, reinforcing their voluntary participation. Confidentiality was upheld through stringent data management practices, as only the designated research team had access to the amassed information. Participant identities were diligently safeguarded through the allocation of pseudonyms, further fortifying their privacy.

This study employed a rigorous qualitative research design to dissect the potential of renewable energy as a feasible alternative power solution for Dhaka city. By engaging a diverse range of stakeholders and meticulously abiding by ethical guidelines, the study endeavors to furnish a comprehensive understanding of the opportunities and challenges presented by renewable energy integration in this urban landscape.

4. RESULTS AND FINDINGS

The aim of this study was to explore the potential of renewable energy as an alternative source of power in Dhaka city, identify the challenges and opportunities associated with the adoption of renewable energy, and propose strategies for risk management and mitigation. A total of 40 participants from various backgrounds participated in the study, providing qualitative responses to a questionnaire.

4.1 Understanding of renewable energy sources

Most of the participants had a basic understanding of renewable energy sources, with the majority identifying solar and wind as the most common types of renewable energy. Some participants also mentioned hydropower and biomass. A few participants had a limited understanding of renewable energy sources, with one participant stating, "I have heard the term renewable energy, but I am not sure what it means." Renewable energy is a rapidly growing sector of the global economy, and it is crucial to understand the public's understanding and perception of it. In this study, the understanding of renewable energy sources among participants in Dhaka city was explored. The results indicate that the majority of participants had a basic understanding of renewable energy sources, with solar and wind being the most commonly identified types. Hydropower and biomass were also mentioned by some participants.

The participants' basic understanding of renewable energy sources is not

surprising given the recent push for renewable energy adoption in Bangladesh. The government has set a target of generating 10% of the country's electricity from renewable sources by 2021 and has taken steps to promote renewable energy adoption, including incentives for renewable energy projects and the establishment of a regulatory framework to promote renewable energy. It is concerning that a few participants had a limited understanding of renewable energy sources. This highlights the need for public education and awareness campaigns to increase understanding and promote renewable energy adoption. This is especially important given the potential of renewable energy to provide sustainable and cost-effective solutions to the power crisis in Dhaka city.

It is essential to note that the understanding of renewable energy sources is not limited to the general public but also includes policymakers, investors, and other stakeholders. The development and implementation of effective policies and programs to promote renewable energy adoption require a clear understanding of renewable energy sources' potential, limitations, and challenges. The results of this study suggest that while there is a basic understanding of renewable energy sources among the participants in Dhaka city, there is still room for improvement. It is essential to continue educating the public and other stakeholders about renewable energy sources to promote their adoption and realize their full potential as a sustainable and cost-effective solution to the power crisis.

4.2 Main sources of energy used in households or workplaces

In terms of the reasons for the dominance of electricity as the main energy source, participants highlighted its availability and convenience, with most households and workplaces being connected to the national grid. The use of natural gas was also common, with many participants noting its affordability and the government subsidies that make it accessible for most households and businesses. However, some participants expressed concerns about the reliability of the power supply and the high cost of electricity during peak hours. Oil was mentioned as a backup option, particularly for heating and cooking purposes. Participants noted that oil is more expensive than natural gas but is still preferred in certain situations, such as during power outages when electricity and gas supplies are disrupted. Interestingly, none of the participants mentioned the use of coal as a primary energy source, despite its prevalence in other parts of the world. This may be due to the fact that Bangladesh does not have significant coal reserves and relies primarily on imports. The findings suggest that the use of electricity and natural gas are the dominant sources of energy in households and workplaces in Dhaka city, with oil as a backup option. The use of renewable energy sources such as solar, wind, and biomass was not commonly mentioned, highlighting the need for increased awareness and promotion of these sources in the city.

4.3 Adoption of renewable energy sources

Some participants expressed interest in renewable energy sources, particularly solar panels, due to their potential to reduce electricity bills and provide a sustainable source of energy. One participant mentioned, "I am interested in installing solar panels because it will save money in the long run and it is good for the environment." Participants who had not considered adopting renewable energy sources cited the lack of awareness and knowledge about the benefits of renewable energy as a reason. One participant mentioned, "I haven't really thought about it. I don't know much about renewable energy." The findings suggest that there is limited adoption of renewable energy sources in Dhaka city, with high installation costs and lack of awareness being the main deterrents. However, there is potential interest in renewable energy sources among some participants, particularly solar panels, due to their potential to save money and provide a sustainable source of energy. Increasing awareness and education about the benefits of renewable energy sources may encourage more households and workplaces to consider adopting them in the future.

4.4 Sustainability and cost-effectiveness of renewable energy sources

Participants also noted that renewable energy sources could help reduce dependence on fossil fuels, which are finite and subject to price fluctuations in the global market. This would help ensure energy security and reduce the vulnerability of the city to power outages. However, some participants expressed concerns about the initial high costs of installation and maintenance of renewable energy systems, which may deter many households and businesses from adopting them. One participant mentioned, "Renewable energy sources are still expensive to install and maintain, which is a major barrier to their adoption." Despite these concerns, the findings suggest that the majority of participants believe renewable energy sources can be a sustainable and cost-effective solution to the power crisis in Dhaka city. Increased government and private sector

investment in renewable energy infrastructure and technology, as well as greater public awareness and education about the benefits of renewable energy sources, could help accelerate their adoption and pave the way towards a more sustainable energy future for the city.

4.5 Challenges associated with the adoption of renewable energy sources

Participants noted that while the cost of renewable energy equipment, such as solar panels and wind turbines, has decreased in recent years, the initial investment required to install them is still high. This can be a significant barrier for households and businesses, particularly those with limited financial resources. Additionally, the lack of financing options and incentives for renewable energy projects can further deter investment in this sector. Participants also mentioned that inadequate infrastructure, such as the limited availability of grid-connected solar energy systems, can make it difficult for households and businesses to adopt renewable energy sources. The lack of awareness about the benefits of renewable energy sources was also cited as a major challenge, as many people may not be aware of the potential savings and environmental benefits associated with using renewable energy.

Participants highlighted the limited availability of renewable energy equipment, such as solar panels and wind turbines, as another challenge associated with the adoption of renewable energy sources in Dhaka city. This can make it difficult for households and businesses to obtain the necessary equipment to implement renewable energy systems. The findings suggest that there are several challenges associated with the adoption of renewable energy sources in Dhaka city, including high installation costs, inadequate infrastructure, lack of awareness, and limited availability of renewable energy equipment. Addressing these challenges through increased government and private sector investment in renewable energy infrastructure and technology, as well as greater public awareness and education about the benefits of renewable energy sources, could help accelerate their adoption in the city.

4.6 Strategies to overcome challenges associated with renewable energy adoption

Participants suggested that a regulatory framework to promote renewable energy adoption could help to address some of the challenges associated with the adoption of renewable energy sources in Dhaka city. Such a framework could include policies and regulations that incentivize the adoption of renewable energy sources and promote the development of renewable energy infrastructure. Participants also emphasized the importance of financial incentives for renewable energy adoption, such as tax credits, rebates, and subsidies, to help offset the high installation costs associated with renewable energy systems. Additionally, participants suggested the establishment of financing mechanisms to support the installation of renewable energy systems, such as low-interest loans and financing partnerships between the government and private sector. Participants suggested that public awareness campaigns could help to increase awareness about the benefits of renewable energy sources and promote their adoption in Dhaka city. Such campaigns could be targeted at households and businesses and could include information about the potential cost savings, environmental benefits, and other advantages of renewable energy sources.

4.7 Importance of diversifying energy mix and shifting towards renewable energy sources

The majority of participants believed that it was important for Bangladesh to diversify its energy mix and shift towards renewable energy sources. The main reasons cited were environmental benefits, reduced dependence on fossil fuels, and energy security. One participant stated, "We need to reduce our dependence on fossil fuels, which are not only harmful to the environment but also contribute to the power crisis."

4.8 Role of government in promoting the adoption of renewable energy sources

Participants believed that the government could play a significant role in promoting the adoption of renewable energy sources in Dhaka city. The most commonly suggested measures were the establishment of favorable policies and regulations, incentives for renewable energy adoption, and the allocation of funds for renewable energy projects. Participants also emphasized the need for the government to prioritize renewable energy in its energy policy.

4.9 Contribution of private sector and civil society organizations

Participants believed that the private sector and civil society organizations

could play a significant role in promoting the adoption of renewable energy sources in Dhaka city. The most commonly suggested measures were the establishment of partnerships between the private sector and government, public awareness campaigns, and the provision of financing for renewable energy projects.

4.10 Potential benefits of adopting renewable energy sources

Reduced carbon emissions were the most commonly cited potential benefit of adopting renewable energy sources in Dhaka city. Renewable energy sources such as solar, wind, and hydro power generate electricity with little to no greenhouse gas emissions, helping to reduce the city's carbon footprint and mitigate the impacts of climate change. Improved energy security was also mentioned as a potential benefit, as renewable energy sources are typically distributed and decentralized, meaning they are less vulnerable to disruptions in the energy supply chain. This can help to ensure a more reliable and resilient energy system for the city. Job creation was another potential benefit of adopting renewable energy sources in Dhaka city, as the installation and maintenance of renewable energy systems can create jobs in the local economy. Participants also mentioned the potential for reduced energy costs and increased access to electricity in rural areas, which could improve the standard of living for many people in the region. The findings suggest that adopting renewable energy sources in Dhaka city could have significant environmental, economic, and social benefits. By reducing the city's carbon footprint, improving energy security, creating jobs, and increasing access to electricity, renewable energy sources have the potential to promote sustainable and equitable development in the region.

5. DISCUSSION

The discussion delves comprehensively into the intricate nuances revealed by this study's findings, providing an insightful exploration of the context, challenges, and possibilities surrounding the integration of renewable energy sources within Dhaka city. The diverse range of participants' understanding of renewable energy underscores the critical need for widespread awareness campaigns to bridge existing knowledge gaps. The prevalence of electricity and natural gas as predominant energy sources within households and workplaces reflects the current energy landscape while also exposing the city's dependence on conventional fossil fuels. Notably, the absence of coal as a dominant source aligns with Bangladesh's resource constraints and signals the importance of exploring alternative and sustainable energy options. The formidable challenges of high upfront costs, insufficient infrastructure, and limited awareness act as deterrents to broader adoption but also offer strategic focal points for intervention.

The proposed strategies, including financial incentives and awareness initiatives, offer promising pathways to overcome these barriers and stimulate adoption. Participants' unanimous recognition of the government's pivotal role in shaping policies and regulations underscores the need for an enabling environment that fosters innovation and supports investment in renewable energy sources. The role of the private sector and civil society in partnership with the government amplifies the potential for transformative change through joint efforts, while highlighting the significance of public engagement in driving adoption. The broader benefits of reduced carbon emissions, enhanced energy security, job creation, and better living standards stand as pivotal arguments for accelerating the transition towards renewables. By outlining actionable recommendations for policymakers, this study lays a solid foundation for policy formulation, strategic implementation, and stakeholder engagement, ultimately setting Dhaka city on a path towards a more sustainable and resilient energy future.

6. CONCLUSION

In the face of Dhaka city's pressing energy crisis and the imperative of sustainable development, this study has provided a comprehensive exploration of the potential, challenges, and strategies pertaining to the integration of renewable energy sources. The study's findings underscore the urgency of diversifying the city's energy landscape and transitioning towards cleaner and more sustainable options. The diverse participants' varied understanding of renewable energy emphasizes the need for enhanced public awareness initiatives to drive adoption. Dominant energy sources such as electricity and natural gas, coupled with the absence of coal, reveal the current energy mix and underscore the need for innovative solutions. While the hurdles of high installation costs, inadequate infrastructure, and limited awareness pose challenges, the study offers strategic interventions, including financial incentives and awareness campaigns, as catalysts for overcoming these barriers. The prominent role of the government, the collaborative potential of the private sector and civil society, and the wider benefits of reduced carbon emissions, enhanced

energy security, job creation, and improved living standards collectively pave the way for a sustainable energy transition. With these insights, this study provides a roadmap for policymakers, stakeholders, and citizens to collaboratively navigate the path towards a greener and more resilient energy future for Dhaka city. The imperative of sustainability, economic viability, and environmental responsibility converge in the call to expedite the adoption of renewable energy sources, setting Dhaka on a trajectory towards a more sustainable and secure energy landscape.

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