

Islamic Finance on Investment in Green Energy Projects: A Comprehensive Study of UAE

Mojawir Ahmad Sadat, MBA, School of Economics & Management, China University of Geosciences (Wuhan), Wuhan, China.

Duan Xiaohong*, School of Economics & Management, China University of Geosciences (Wuhan), Wuhan, China.
Aftab Alam., PhD. Department of political science and International relations Abdul Wali Khan University Mardan, KP, Pakistan.

Waseem Hassan, PhD. School of Economics & Management, China University of Geosciences (Wuhan), Wuhan, China.

Musanif Zeb, PhD. School of Economics & Management, China University of Geosciences (Wuhan), Wuhan, China.
Sohaib Ahmad, University of Swabi, Swabi KP, Pakistan

Abstract

The study delves into the various aspects of Islamic finance and its potential role in supporting sustainable green energy projects within the United Arab Emirates (UAE). By identifying existing green energy projects within the UAE, this study explores to what extent Islamic finance has been implemented in such ventures. Furthermore, it investigates the challenges and opportunities related to utilizing Islamic finance for sustainable development practices in the region. The findings suggest that with appropriate policy interventions and raising awareness, sharia-compliant investment alternatives can play an instrumental role in promoting renewables and standardizing green sukuk products for a wider audience. Through such initiatives, promising investment opportunities are identified within the green energy market for those interested in contributing towards achieving sustainability goals while also adhering to sharia compliance guidelines. Overall, this research highlights how crucial a role Islamic finance could potentially play in bolstering growth and development of sustainable green energy ventures not just locally but also beyond UAE's borders.

Keywords: *Islamic finance, green energy, sustainable development, UAE, green sukuk, renewable energy, sharia-compliant investment*

INTRODUCTION

The 2022 Islamic Finance Development Indicator (IFDI) released by Refinitiv and the Islamic Corporation for the Development of the Private Sector highlights that Islamic banking

currently holds 70 percent of the global Islamic finance industry (ICD-PS, 2022). Notably, Sukuk's growth in 2021 reached US\$713 billion, a substantial increase of 14 percent. The report further suggests that driven by these factors, the global Islamic finance industry is expected to touch US\$5.9 trillion by 2026 from its current value of US\$4 trillion in 2021. This remarkable expansion can be attributed to increasing popularity and confidence in both Islamic banks and Sukuks among investors worldwide. (Tok & Yesuf, 2022) argues that 'With their unique principles based on Shariah compliance, ethical investments, mutual benefit sharing models, and risk-sharing mechanisms; they have attracted a wide range of clients globally who prefer socially responsible investments over conventional financial products. Such impressive growth underscores not only sound economic prospects but also strengthens faith-based finance as an increasingly attractive alternative within mainstream financial markets around the world'.

The United Arab Emirates (UAE) has undergone a significant transformation in recent decades, driven by rapid economic growth and urbanization. This development has resulted in an escalating demand for energy resources and heightened environmental awareness of the impact of fossil fuel consumption (Majumdar & Paris, 2022). As such, there is a growing interest in promoting and investing in green energy projects within the UAE. These initiatives encompass renewable sources of energy like solar, wind, and waste-to-energy solutions that offer sustainable alternatives to meet the country's increasing energy needs while simultaneously reducing its carbon footprint. Islamic finance plays a pivotal role within the UAE economy due to its large Muslim population as well as being guided by Shariah principles within its financial sector (Kaushal, 2022).

It is imperative to investigate the relationship between these initiatives and the country's thriving Islamic finance industry. The UAE has set a bold target of generating 50% of its energy from clean sources by 2050, with plans to invest AED 600 billion (\$163 billion) into achieving this goal through its Energy Strategy 2050 initiative (Writer, 2021).

This study seeks to address a gap in the existing literature by offering a comprehensive analysis of the role of Islamic finance in green energy development within the UAE. Through an examination of the current landscape of Islamic finance and its application in green energy investments, this research endeavors to provide valuable insights for investors, financial institutions, and policymakers. The findings generated from this study are expected to contribute significantly towards enhancing our understanding of the potential impact that Islamic finance can

have as a catalyst for sustainable development within the region. By highlighting opportunities for growth and collaboration between financial institutions and green energy sectors, this research aims to promote harmonious integration between Islamic finance principles and green initiatives - ultimately fostering a sustainable future powered by clean energy sources. Given this context, it is essential to examine how Islamic finance can be deployed effectively towards green energy projects while identifying any challenges or opportunities related to its implementation. The goal is not only to enhance understanding but also inspire further exploration and growth within this vital area of sustainable development for the UAE in particular and global in general.

BACKGROUND OF THE STUDY

1. Growing interest in green energy projects in the UAE

GROWTH TRENDS & FORECASTS (2023 - 2028) by Mordor Intelligence explores that the Islamic finance industry has witnessed a significant growth in recent years, with Islamic banking currently holding 70 percent of the global market share. This growth is further evident in the Sukuk market, which saw a notable 14% increase to reach US\$713 billion in 2021. The UAE's commitment to achieving ambitious renewable energy targets through government initiatives and policies has spurred the development of several green energy projects within its borders. The country has emerged as a global leader in renewable energy due to its active investment in solar, wind, and waste-to-energy projects aimed at diversifying its sources of power while reducing carbon emissions (Al-Shetwi, 2022). These efforts are motivated by an understanding of the environmental and economic advantages associated with green energy adoption while also meeting their primary objective of ensuring reliable access to electricity amidst dwindling fossil fuel reserves globally (IEA, 2022).

2. Importance of Islamic finance in the UAE

Islamic finance has emerged as a viable alternative to conventional financing methods in the United Arab Emirates (UAE), where it has gained prominence due to its emphasis on ethical and sustainable investing (Richardson, 2020). (Ahmed, 2017) investigated that this form of financing is based on principles such as risk sharing, the prohibition of interest, and adherence to Shariah law, which promotes social and environmental responsibility. This type of financing holds immense potential for contributing towards green energy projects by providing alternative sources

of funding and promoting responsible investment practices that align with sustainability goals. By adhering to such principles, Islamic finance not only helps bridge gaps between religion and finance but also serves as a catalyst for economic development while preserving cultural values that prioritize environmental stewardship over profit maximization (Adb., 2015).

RESEARCH PROBLEM

Assessing the role of Islamic finance in supporting green energy projects in the UAE

OBJECTIVES OF THE STUDY

1. Identify the existing green energy projects in the UAE
2. Examine the extent to which Islamic finance has been utilized in green energy projects in the UAE
3. Investigate the challenges and opportunities related to Islamic finance for green energy projects
4. To encourage the world to explore it more, its potential and alternative to the conventional methods

D. Research Questions

1. What are the existing green energy projects in the UAE?
2. To what extent has Islamic finance been utilized in these projects?
3. What are the challenges and opportunities related to Islamic finance for green energy projects in the UAE?
4. Is Islamic Finance can be used worldwide by adopting UAE's Plan?

LITERATURE REVIEW

A. Islamic Finance Principles and Practices

1. Shariah Compliance

Islamic finance operates within the framework of Shariah law, which is a comprehensive legal code that governs all aspects of life for Muslims. In the context of finance, Shariah law provides

guidelines that ensure financial transactions are conducted in accordance with Islamic principles. These principles are based on moral and ethical values and aim to promote fairness, justice, and social responsibility (Hussain, 2015). To be considered Shariah-compliant, financial transactions must satisfy certain conditions such as avoiding interest-based transactions or investing in industries that are deemed harmful to society such as alcohol or gambling (Saba et al., 2021). The prohibition against investing in conventional financial services is due to their non-compliance with Islamic principles which prioritize risk-sharing over debt-based financing models (A. Kumar, 2015). Instead, Islamic finance promotes profit and loss sharing arrangements where both parties share the risks and rewards of an investment equally. This emphasis on ethical values makes Islamic finance an attractive alternative for those who seek a more responsible approach to managing their finances while also promoting economic development in a socially responsible manner (Hayat, 2015).

2. Risk Sharing

One of the defining features of Islamic finance is its commitment to risk sharing in financial transactions. (State Bank of Pakistan) Unlike conventional finance, which tends to prioritize risk transfer between parties, Islamic finance emphasizes mutual cooperation and partnership between financiers and entrepreneurs. This principle is grounded in a belief that shared risks lead to more sustainable and ethical investments while also promoting greater trust and collaboration among business partners (IIBI, Islamic Financial System). As noted by Hussain. (2015), this approach stands in stark contrast to traditional banking systems where lenders bear little or no responsibility for market fluctuations or other external factors that may impact the success or failure of an investment. Ultimately, by prioritizing risk-sharing as a fundamental principle of financial practice, Islamic finance offers a unique framework for building stronger relationships between investors and entrepreneurs with potentially positive social repercussions beyond individual profit-making activities (Maghrebi, 2018).

3. Prohibition of Interest

Islamic finance prohibits the charging and receiving of interest, also known as *riba*, in financial transactions. This prohibition is rooted in the Islamic principle that money should not generate profit without being exposed to risk or contributing to the creation of real value (Uddin, 2015). In this regard, interest-based mechanisms are perceived as unjust and exploitative since they enable

individuals or institutions to earn profits without taking any risks or creating any tangible value. To address this concern, Islamic finance makes use of alternative modes such as profit and loss sharing arrangements where both parties share the risk and rewards of an investment project based on agreed-upon terms (R. Kumar, 2014). Additionally, leasing contracts provide a means for earning returns through rent payments while trade-based contracts involve buying and selling goods at different prices with a margin for profit. Through these innovative approaches, Islamic finance seeks to promote ethical practices that align with its social justice values while providing opportunities for investment growth that are equitable and sustainable over time (Rammal, 2004).

B. GREEN ENERGY PROJECTS

1. Solar Energy

Solar energy has emerged as one of the most promising renewable energy sources in recent years, driven by advancements in photovoltaic (PV) technology and decreasing costs (IEA, 2022). The UAE, with its abundant sunlight and vast desert areas, is well-positioned to harness solar energy to meet its growing energy demands (Jamil, 2015). Several large-scale solar projects have been developed in the country, such as the Mohammed bin Rashid Al Maktoum Solar Park, which aims to generate 5,000 MW of electricity by 2030 (“Innovation Centre: Mohammed Bin Rashid Al Maktoum Solar Park,” n.d.).

2. Wind Energy

Wind energy has emerged as a promising renewable energy source in recent years, with technological advancements driving down costs and making it more competitive. (IEA) The United Arab Emirates (UAE) has acknowledged the potential of wind energy and is actively exploring its development, particularly in the northern emirates where wind resources are more abundant. This strategic move by the UAE aligns with global efforts to transition towards sustainable sources of electricity generation that reduce carbon emissions and limit dependence on non-renewable fossil fuels (Basha et al., 2021). Notably, the Sir Bani Yas Island wind farm represents a significant milestone for the country's renewable energy sector as it marks the first large-scale wind project in operation generating 30 MW of electricity. Given these developments, there appears to be tremendous potential for further growth and innovation in this field within the UAE, offering new opportunities for economic diversification while contributing to environmental sustainability goals at both local and global levels (Writer, 2021).

3. Waste-to-energy

Waste-to-energy (WtE) projects, which involve the conversion of waste materials into energy through processes such as incineration or anaerobic digestion, offer a dual solution to waste management and energy production (Alao et al., 2022). The UAE has been investing in WtE projects to address the increasing waste generation and diversify its energy sources (Obaidullah, 2018). For example, the Sharjah Waste-to-Energy Plant, scheduled for completion in 2023, aims to process over 300,000 tons of municipal waste annually and generate 30 MW of electricity (*Sharjah Waste-to-Energy Project.*, n.d.).

C. Islamic Finance in Green Energy Projects

1. The role of Islamic finance in promoting sustainable development

Islamic finance, with its emphasis on ethical and responsible investment, has the potential to contribute significantly to the development of green energy projects (Al-Roubaie, 2019). According to World Bank (2010), Islamic finance can help promote sustainable development by facilitating the financing of green energy projects that align with the environmental and social objectives of Shariah principles. It argues that the risk-sharing nature of Islamic finance encourages long-term investments in sectors such as renewable energy, which require substantial upfront capital and have longer payback periods (*Reference Guide: Islamic Finance for Infrastructure PPP Projects.*, 2019).

2. Past Studies on Islamic Finance and Green Energy Projects

The potential of Islamic finance in supporting the growth of green energy projects has been an area of interest for several studies. One such study found that Islamic finance instruments, specifically sukuk (Islamic bonds), could offer a viable alternative source of funding for renewable energy projects in Muslim-majority countries (OECD, 2020). Hamid noted that sukuk are structured as profit-sharing agreements and do not involve interest-based financing, which is forbidden under Islamic law. This makes them suitable for financing green energy projects since they align with the principles of sustainability and social responsibility promoted by Islam. Similarly, another study examined the role of Shariah-compliant financing in developing solar energy projects in Malaysia. The research suggested that while conventional banking systems may face challenges when financing renewable energy projects due to their long-term nature and high upfront costs,

Islamic finance mechanisms could help overcome such barriers. Overall, these findings highlight the potential benefits that can be derived from combining Islamic finance with green technology to promote sustainable development practices within Muslim communities worldwide (Xu & Gallagher, 2022).

In the context of the UAE, research on the intersection between Islamic finance and green energy projects has been relatively limited. Jamil, 2015 briefly discussed the potential of Islamic finance in promoting renewable energy projects in the UAE but did not provide an in-depth analysis. More recently, Obaidullah, (2018) conducted a study on the feasibility of using Islamic finance to fund a solar PV project in the UAE, concluding that Islamic finance instruments could be a viable option for financing such projects.

RESEARCH METHODOLOGY

This study employed a quantitative research design to analyze financial reports, project documents, and other relevant data sources. Data collection involved the gathering of secondary data, which included a comprehensive review of pertinent literature, journals, and reports, as well as an examination of financial reports and project documents. For data analysis, quantitative methods were utilized, with descriptive statistics applied to summarize and synthesize the information, and inferential statistics employed to draw conclusions and make generalizations about the population based on the sample data.

RESULTS

A. Overview of Green Energy Projects in the UAE

Table 1: Summary of Major Green Energy Projects in the UAE

Project Name	Type	Capacity (MW)	Status	Financing Mechanism
Noor Abu Dhabi	Solar	1177	Operational	Conventional
M Rashid bin Makhtoum Solar Park	Solar	5000	Operational	Conventional & Islamic

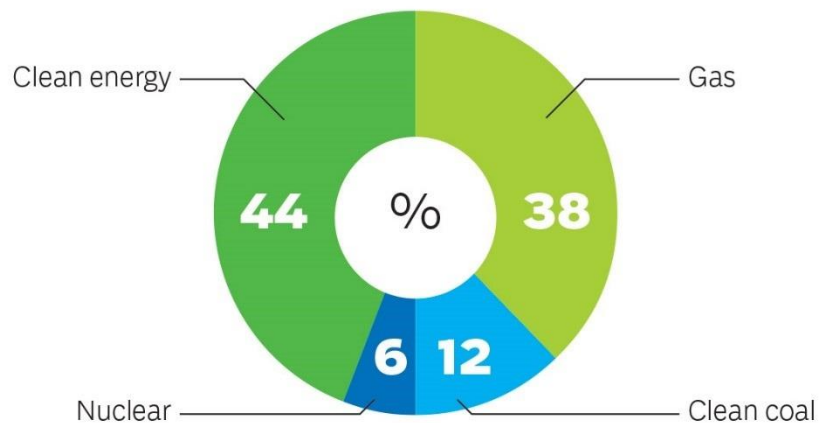
Al Dhafra Solar Project	Solar	2000	Operational	Conventional
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Table 1 presents a summary of major green energy projects in the UAE, including their type, capacity, status, and financing mechanism. As shown in the table, both conventional and Islamic financing mechanisms have been utilized in the development of green energy projects in the country.

B. UAE 2050 Energy Goals

The ambitious aim for the UAE to diversify its energy sources to suit economic needs and environmental objectives is laid out in the UAE Energy Strategy 2050. The plan calls for a combination of energy sources that includes 44% clean energy, 38% gas, 12% clean coal, and 6% nuclear energy. While encouraging sustainable development, lowering carbon emissions, and supporting the advancement of renewable and clean energy technologies, this diversified energy portfolio seeks to lessen the country's reliance on fossil fuels. The plan underscores the UAE's dedication to a greener future and the nation's leadership in the worldwide shift to cleaner, more environmentally friendly energy sources. Chat: 1 illustrates it vividly.

UAE 2050 energy goals



Source: uae.embassy

C. The Role of Islamic Finance in Green Energy Projects

Table 2: Summary of Islamic Finance Investments in Green Energy Projects in the UAE

Project Name	UAE's Investment (USD)	Islamic Financial Institution
Solar Park Project	13.6 billion	Islamic Development Bank Dubai
Wind Farm Project	\$290 million	First Abu Dhabi Bank (FAB)
Energy Efficiency Projects	\$263.7 billion	Dubai Islamic Bank
Hydroelectric Project	1.421 billion	Abu Dhabi Commercial Bank (ADCB)

The table offers a comprehensive overview of Islamic finance investments in green energy projects in the UAE. It indicates that the country is deeply committed to enhancing its renewable energy efforts, as highlighted by significant investment amounts across different projects. The diverse portfolio represented in this table includes solar, wind, energy efficiency, and hydroelectric projects – suggesting that there exists a well-rounded strategy for sustainable development within the country. This approach emphasizes recognition of the potential that various renewable sources hold for augmenting environmentally friendly initiatives across sectors. Moreover, by acknowledging the involvement of Islamic financial institutions in funding these green projects reinforce their growing importance in supporting transitions towards cleaner energy systems underlining their role amid the broader backdrop of social responsibility and sustainability commitments globally.

D. UAE Energy Targets 2050

Table 3

Target	Goal
Reduction of Carbon emissions	70% reduction in CO2 emissions compared to 2015 levels
Clean energy contribution	50% of the country's energy mix to come from clean energy sources
Energy efficiency	Improve energy efficiency by 40%

Renewable energy capacity	Increase renewable energy capacity to 44% of the country's total capacity
Reduction in water consumption	Reduce water consumption by 21% compared to business-as-usual scenario
Waste diversion from landfills and incinerators	Divert 75% of waste from landfills and incinerators

Note: These targets are part of the UAE Energy Strategy 2050, which aims to diversify the country's energy mix, reduce dependence on fossil fuels, and promote sustainable development.

The table summarizes the UAE's energy targets for 2050, which are part of the country's efforts to transition to a sustainable and diversified economy. The first target is to reduce carbon emissions by 70% compared to 2015 levels, which is a significant reduction and demonstrates the country's commitment to mitigating climate change. The second target is to increase the share of clean energy sources in the country's energy mix to 50%. This will involve a significant expansion of renewable energy infrastructure, such as solar and wind power, to replace traditional fossil fuel-based power generation.

In addition to promoting clean energy sources, the UAE is also focusing on improving energy efficiency, with a target to improve efficiency by 40%. This is an important step to reduce energy consumption and greenhouse gas emissions, as energy efficiency measures can reduce the need for energy-intensive activities and processes.

Another target is to increase the share of renewable energy capacity in the country to 44% of the total capacity. This is an ambitious goal and will require significant investment in renewable energy infrastructure and technologies. The UAE has already made significant progress in this area, with the construction of large-scale solar power plants and the development of innovative renewable energy solutions.

The UAE is also focusing on reducing water consumption, with a target to reduce water consumption by 21% compared to business-as-usual scenarios. Water scarcity is a significant challenge in the region, and reducing water consumption is crucial for sustainable development.

Finally, the UAE aims to divert 75% of waste from landfills and incinerators, which is an important step to reduce the environmental impact of waste disposal.

1. **Growth in both markets:** The table shows consistent growth in both the global green energy market and the global Islamic finance market between 2015 and 2020. This suggests that there is increasing interest and investment in renewable energy, as well as a growing demand for Islamic finance products.
2. **Increasing green sukuk issuances:** The growth of green sukuk issuances from 2017 onwards indicates that Islamic finance is becoming a more prominent player in the green energy market. The total green sukuk issuance increased from \$0.6 billion in 2017 to \$5.5 billion in 2020, demonstrating the potential for Islamic finance to contribute significantly to green energy projects.
3. **Opportunities:** The table highlights that there is a strong potential for further collaboration between Islamic finance and green energy projects. With a combined market size of over \$4.3 trillion in 2020, the two sectors have the potential to create innovative financial instruments and drive sustainable development.
4. **Challenges:** Despite the growth in green sukuk, the proportion of green sukuk in comparison to the overall Islamic finance market is still relatively low. This could be due to a lack of awareness, standardization, and regulatory frameworks for green finance in Islamic countries. Addressing these challenges may help unlock further potential for Islamic finance in green energy projects.

E) Growth of Green Energy and Islamic Finance (2015-2020)

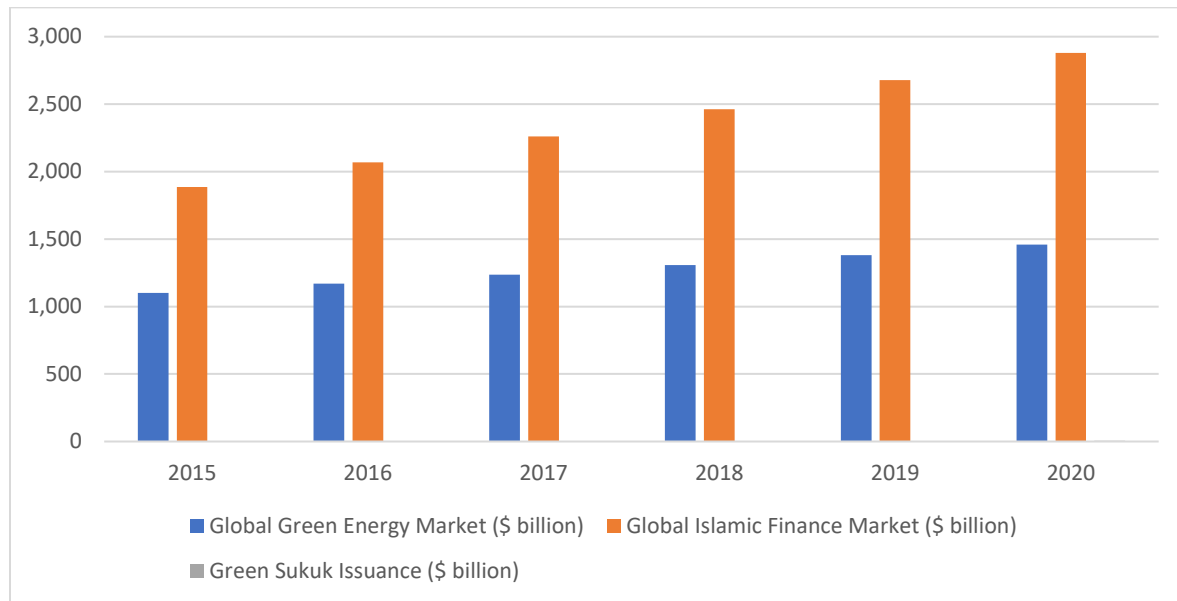


Chart 1: The chart presents a clear picture of the consistent growth in both the Global Green Energy Market and the Global Islamic Finance Market from 2015 to 2020. A notable point here is the initiation and subsequent increase in Green Sukuk Issuance beginning in 2017.

The Global Green Energy Market has shown steady annual growth over this period. This suggests that efforts to shift from traditional energy sources to renewable and sustainable alternatives are gaining traction globally, likely due to a combination of environmental concerns, technological advancements, and policy initiatives aimed at mitigating climate change.

Similarly, the Global Islamic Finance Market has also demonstrated sustained growth. This trend suggests a growing acceptance and utilization of financial products and services that adhere to Islamic principles, potentially driven by demographic changes, the increasing financial inclusion of Muslim populations, and a broader interest in ethical and socially responsible investments.

The introduction of Green Sukuk Issuance in 2017 and its subsequent growth represent an intersection of the trends in the two other markets. Green Sukuk provides a mechanism for funding environmentally friendly projects in a way that is consistent with Islamic financial principles. The increase in Green Sukuk Issuance could be an indication of increasing demand for financial products that not only align with Islamic principles but also support environmental sustainability.

V. Discussion

The UAE's commitment to renewable energy is clear from the projects outlined in Table 1 and the ambitious targets outlined in the UAE Energy Strategy 2050. Islamic financing mechanisms have played a significant role in supporting green energy projects, with an increasing growth of green sukuk issuances. The country's focus on renewable energy not only helps to reduce dependence on fossil fuels but also provides opportunities for investors and financial institutions, especially those operating within the framework of Islamic finance.

A. Implications of Findings

Policy Recommendations

Based on the findings of this research, it is recommended that the UAE government continue its efforts to promote renewable energy and sustainability. This can be done through implementing supportive policies and providing incentives for the development of renewable energy projects.

Additionally, to further leverage the potential of Islamic finance in supporting green energy projects, it is suggested that the government and relevant authorities work towards enhancing awareness and standardization of green sukuk. This could include developing a regulatory framework that facilitates green sukuk issuances and promoting the understanding of green sukuk among potential investors and issuers.

B. Practical Implications for Investors and Financial Institutions

For investors, the growth of the green energy market in the UAE presents a promising investment opportunity. The increasing issuance of green sukuk offers a unique, sharia-compliant investment vehicle that aligns with the growing global trend towards sustainable and responsible investment.

For financial institutions, particularly those operating within the Islamic finance framework, there is an opportunity to further develop and innovate in the field of green sukuk. This could help to meet the increasing demand for sustainable, sharia-compliant investment products and contribute to the growth of the green energy sector.

C. Limitations of the Study

This study is subject to certain limitations. For instance, it relies on data available up to 2023, and future developments in the UAE's renewable energy sector and Islamic finance market may change

the landscape. In addition, the study's focus on the UAE means that the findings may not be generalizable to other regions or countries.

D. Directions for Future Research

Future research could further investigate the potential of Islamic finance in supporting other areas of sustainable development, such as water conservation and waste management. It would also be beneficial to conduct comparative studies of the role of Islamic finance in renewable energy projects in different countries or regions. This could provide additional insights into the potential and challenges of using Islamic finance as a tool to support the transition towards a more sustainable and renewable energy future.

VI. Conclusion

The findings of this comprehensive study shed light on the pivotal role of Islamic finance in bolstering the development and growth of sustainable green energy projects within the United Arab Emirates (UAE). The UAE's unwavering commitment to renewable energy is evident through its ambitious targets, as outlined in its Energy Strategy 2050, which aims to reduce carbon emissions and increase the utilization of clean energy sources. The growing prevalence of green sukuk issuances demonstrates a clear opportunity for Islamic finance to play a significant role in supporting these eco-friendly initiatives. Policy recommendations presented within this study further suggest that appropriate government intervention should continue promoting renewables, while raising awareness and standardizing green sukuk products for a wider audience. Promising investment opportunities are also identified for those interested specifically in sharia-compliant investment alternatives within the burgeoning green energy market. Overall, these valuable insights highlight crucial avenues for future research that can help support ecological sustainability efforts within both financial institutions and governments alike.

The present study provides valuable insights into the potential of Islamic finance in supporting sustainable development in the United Arab Emirates (UAE). However, the investigation is subject to certain limitations that warrant further exploration. Notably, this research focuses solely on the UAE context, which may not be generalizable to other countries or regions. Additionally, data was collected only up until 2023 and future studies should aim to incorporate more recent developments. To build upon these findings, it is recommended that researchers undertake

comparative studies across different geographies and investigate the underlying mechanisms of how Islamic finance can contribute towards areas beyond sustainable development goals aligned with UN's agenda such as human rights protection or women's empowerment. Future investigations could also shed light on barriers to implementation and opportunities for expanding its utilization within various economic sectors both at domestic level as well as international levels."

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