Islamic Green Finance

Islamic green finance is a growing field that combines Islamic investment principles with environmental responsibility. This book explores the potential of this concept to address climate change and promote sustainable development.

It examines various aspects of Islamic green finance, including Shari'ah-compliant financial instruments for renewable energy projects, green businesses, and environmental risk mitigation. It also explores the role of Islamic financial institutions and government policies in influencing green initiatives. Additionally, the book discusses the positive impact Islamic green finance can have on social development and assesses the role of technology in facilitating green transactions, discussing emerging trends in blockchain, crowdfunding, and artificial intelligence. The book emphasizes the need for robust impact measurement frameworks and sustainability reporting standards for Islamic green finance projects, evaluating existing frameworks and methodologies, and identifying best practices for measuring and reporting the environmental and social impact of green finance initiatives. It analyzes successful case studies and identifies key challenges and opportunities for government policies to foster the growth of Islamic green finance. It also highlights key areas for further research and examines the potential of Islamic green finance to contribute to achieving the Sustainable Development Goals (SDGs). Further, it showcases real-world examples of successful Islamic green finance initiatives from diverse regions. These case studies provide valuable insights into practical implementation and scalability.

The book raises awareness of Islamic green finance, stimulates innovation in this area, informs policymaking, and empowers investors to make ethical and sustainable investment decisions, and as such, targets a wide audience including academics, researchers, financial professionals, policymakers, and individual investors.

Edib Smolo is an Associate Professor and former Chair of the Finance Department and Director of the Master of Science in Finance programme at Effat University, Jeddah, Saudi Arabia.

Muhammad Omer Rafique is an Assistant Professor of Islamic Finance and Management Sciences at SZABIST University.

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Islamic Green Finance

Towards Ethical and Environmentally Responsible Investing

Edited by Edib Smolo and Muhammad Omer Rafique

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To the resilient people of Palestine—whose enduring strength, courage, and hope in the face of adversity continue to inspire the world. May this work stand as a small tribute to your unwavering spirit and your pursuit of justice, dignity, and peace.

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10 Green *Sukuk*[*]

Leveraging Islamic Finance for Ecological Sustainability

Mohammad Mahbubi Ali, Aam Slamet Rusydiana, Aisyah As-Salafiyah, and Shahino Mah Abdullah

Introduction

In recent years, there has been an increasing interest in socially responsible investing (SRI) among Muslim and non-Muslim investors, driven by a growing awareness of the ethical and social implications of investment decisions. This growing interest in ethical finance has also been felt by financial institutions (Alkadi, 2024). An example is the introduction of the Principles for Responsible Banking in November 2018 by 28 leading global banks, under the United Nations Environment Programme – Finance Initiative (UNEP FI) (United Nations Environment Programme, 2018). This initiative has the potential to reform the current capitalist banking system into a more sustainable and responsible one, while also helping banks make positive contributions to society and the environment. In addition, green finance has been recognized by governments, the United Nations, and the G20 as a means to finance global policy change (G20, 2021). Environmental sustainability is a key objective of SRI, with green bonds and green *sukuk* emerging as well-known instruments in this area in the global market. Many green bonds and green *sukuk* have been issued worldwide to finance environmentally friendly sustainable projects (Suriani et al., 2024). For example, on 27 July 2017, the Securities Commission (SC) announced the launch of Malaysia's first green *sukuk* under the Sustainable and Responsible Investment (SRI) *sukuk* framework (Ali, 2018).

Based on the above background, this study discusses the concept and practice of green *sukuk* as a financing instrument to promote ecological sustainability (Supriyadi et al., 2023).

Following this introduction, this study is structured as follows: Part 2 discusses the emergence of green bonds and green *sukuk* in the global market. Part 3 provides an Islamic perspective on green *sukuk*, emphasizing its alignment with Shari'ah principles. Part 4 outlines the various types and structures of green *sukuk*, including the Murabahah, Istisna', and *Wakalah* models. Part 5 discusses the prospects and challenges of green *sukuk*, more specifically on its growth potential and limitations. Finally, the conclusion section summarizes

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the research findings and provides policy recommendations to advance green *sukuk* in supporting ecological sustainability.

Green Bond and *Sukuk*: Emerging Markets

Green bonds are fixed income instruments issued with the aim of raising capital to finance climate and environmental projects or activities. They are structured in a similar way to standard bonds but focus on promoting sustainability through projects that benefit the environment. They are made more attractive than standard bonds by being accompanied by tax incentives including tax credits and tax exemptions. The term "green bonds" is often used in conjunction with another term, namely "climate bonds". While both have the same objective as blue bonds, namely addressing carbon emissions and reducing the impact of climate change, they cannot be completely equated with blue bonds which specifically focus on supporting sustainability projects that protect marine ecosystems. On the other hand, blue bonds are a subset of green bonds, but while all blue bonds are a subset of green bonds, not all green bonds qualify as blue bonds. The status of green bonds is usually verified by a third-party organization, such as the Climate Bonds Standard Board. The International Capital Market Association (ICMA) is a self-regulatory and trade organization serving the international primary and secondary capital markets. The guidelines were developed to provide broadly clear guidance on sustainable financial instruments, which has been accepted globally (Pirgaip & Arslan-Ayaydin, 2024). The guidelines cover a range of principles, including the Green Bond Principles (GBP), Social Bond Principles (SBP), Sustainability Bond Guidelines (SBG), and Sustainability-Linked Bond Principles (SLBP), all of which have become key frameworks for issuing sustainable bonds. Many countries refer to the GBP when developing their national green bond guidelines or standards. The Green Bond Principles (GBP) support increased transparency and disclosure of issuers' sustainability strategies and commitments. The guidelines further aim to promote integrity in the development of the Green Bond market by clarifying the Green Bond issuance process (ICMA Group, 2017). The GBP also provide issuers with guidance on the essential components of a credible Green Bond issuance and also help investors obtain the information they need to assess the environmental impact of their Green Bond investments, while assisting underwriters in ensuring that required disclosures are met (Billah, Amar, et al., 2023). The GBP places great emphasis on transparency, accuracy and integrity in the information disclosed by issuers to stakeholders. The GBP outlines four core components, namely: (1) use of proceeds, (2) project selection and evaluation process, (3) management of proceeds, and (4) reporting.

The recommendations to improve transparency are twofold: (1) issuers should explain how their Green Bond Framework aligns with the four core components and (2) issuers are encouraged to appoint an external review provider to verify the alignment of their Green Bonds with the GBP core features (ICMA

Group, 2021). In the ASEAN region, a platform of capital market regulators, the ASEAN Capital Markets Forum (ACMF), has developed the ASEAN Green Bond Standards (ASEAN GBS) to promote sustainable growth and facilitate regional market integration. These standards, which are based on the ICMA GBP, in addition to aligning with the four core components of the GBP, also introduce additional features, namely (1) eligible issuers, (2) ineligible projects, (3) continuous access to information, (4) encouraging more frequent reporting, and (5) external review (ASEAN Capital Markets Forum, 2021). Initially, the idea of green bonds began to take shape when the European Investment Bank issued a EUR 600 million climate-aware bond in 2007, focusing on renewable energy and energy efficiency (European Investment Bank, 2021). Then in 2008, the World Bank followed suit by issuing a USD 440 million green bond to support a climate-focused programme for Scandinavian pension funds (World Bank, 2017). Then in 2013, the African Development Bank issued a USD 500 million green bond to finance climate change solutions in Africa (African Development Bank Group, 2013). As of June 2015, the World Bank had issued more than 100 green bonds, worth USD 8.5 billion. In fact, in the second quarter of 2017 alone, green bonds were issued worth more than USD 30 billion. Since then, green bond issuance has continued to experience exponential growth, with total green bond issuance reaching USD 130 billion in the second quarter of 2017.

In 2015, Bloomberg then launched the Global Green Bond Index and included several sectors in green projects such as green buildings, sustainable transportation, energy efficiency, sustainable air, air pollution climate adaptation, and sustainable forestry/agriculture (Mehta, 2020).

Furthermore, the concept of green *sukuk* originated in 2012 when the Climate Bonds Initiative (CBI), in collaboration with the Clean Energy Business Council of the Middle East and North Africa (MENA) and the Gulf Bond and Association based in Dubai, formed the green *sukuk* Working Group to promote *sukuk* that align with low-carbon criteria (Climate Bonds Initiative, 2021). In 2014, Malaysia's Securities Commission enhanced its *sukuk* guidelines, incorporating additional features for the issuance of Sustainable and Responsible Investment (SRI) *sukuk*. The updated guidelines clarify that the proceeds from SRI *sukuk* can be used not only to enhance societal well-being and address specific social issues but also to support projects aimed at environmental preservation, natural resource conservation, energy efficiency, renewable energy development, and the reduction of greenhouse gas emissions (Zain & Sori, 2020).

Under SC SRI *Sukuk* Framework, the eligible SRI projects are categorized into three main areas: waqf, social, and green projects. Waqf projects focus on the development of waqf assets, while social projects include initiatives such as affordable housing, essential infrastructure, employment generation, access to essential services, food security, and socioeconomic development. Green projects eligible for SRI funding are diverse and include renewable energy, energy efficiency, green buildings, clean transportation, pollution prevention, climate

change adaptation, sustainable water and wastewater management, circular economy products, natural resource management, and conservation of terrestrial and aquatic environments (The Securities Commission Malaysia, 2019).

The core components of the SRI *Sukuk* Framework align closely with those of the Green Bond Principles (GBP) by the International Capital Market Association (ICMA) and the ASEAN Green Bond Standards (ASEAN GBS). These components include the use of proceeds, the process for project evaluation and selection, management of proceeds, and reporting. Notably, the eligible SRI projects listed in this framework align with the United Nations' Sustainable Development Goals (SDGs), as shown in Table 10.1.

The SDGs consist of 17 interconnected global objectives aimed at addressing urgent challenges and fostering prosperity while safeguarding the planet. These goals are: Goal 1, No Poverty; Goal 2, Zero Hunger; Goal 3, Good Health and Well-Being; Goal 4, Quality Education; Goal 5, Gender Equality; Goal 6, Clean Water and Sanitation; Goal 7, Affordable and Clean Energy; Goal 8, Decent Work and Economic Growth; Goal 9, Industry, Innovation, and Infrastructure; Goal 10, Reduced Inequality; Goal 11, Sustainable Cities and Communities; Goal 12, Responsible Consumption and Production; Goal 13, Climate Action; Goal 14, Life Below Water; Goal 15, Life on Land; Goal 16, Peace, Justice, and Strong Institutions; and Goal 17, Partnerships to Achieve the Goals. These objectives provide a roadmap for achieving a more sustainable and equitable future, addressing global challenges such as poverty, inequality, climate change, environmental degradation, and promoting peace and justice.

The concept of green *sukuk* was first realized in July 2017, when Tadau Energy Sdn Bhd, a Malaysian firm specializing in renewable energy and sustainable technology investments, issued the world's inaugural Green SRI *Sukuk*, valued at up to RM 250 million. This *sukuk* was intended to finance the construction of large-scale solar photovoltaic power plants in Kudat, Sabah.

In October 2017, Quantum Solar Park (Semenanjung) Sdn Bhd followed suit, issuing one of the largest Green SRI *Sukuk* globally, valued at up to RM 1 billion, to fund the construction of three large-scale solar photovoltaic plants in Kedah, Melaka, and Terengganu (Ali, 2018).

Later in December 2017, PNB Merdeka Ventures Sdn Bhd, a subsidiary of Permodalan Nasional Berhad, issued an unrated Green SRI *Sukuk* through a *sukuk* programme of up to RM 2 billion, aimed at financing the construction of the 83-storey Merdeka PNB118 Tower.

In January 2018, Sinar Kamiri Sdn Bhd, a subsidiary of Mudajaya Group Berhad, issued a Green SRI *Sukuk* of up to RM 245 million to fund the development of a 49 MW solar photovoltaic facility in Sungai Siput, Perak.

In March 2018, Indonesia, with support from the World Bank, issued the world's first sovereign *sukuk*, amounting to USD 1.25 billion, as part of a USD 3 billion issuance. This *sukuk*, based on a *wakalah* bil istitsmar (investment agency) structure, was secured by state-owned assets, including land and buildings (51%), as well as project assets under construction or planned for development (49%). This issuance complied with Indonesia's Green Bond and Green

Table 10.1 Eligible SRI Project That Aligned with SDGs

Eligible SRI Projects	*Sustainable Development Goals*																
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*	*11*	*12*	*13*	*14*	*15*	*16*	*17*
GREEN																	
Renewable energy			*				*	*	*		*	*	*				
Energy efficiency			*				*	*	*		*	*	*				
Pollution prevention and control			*								*	*					
Environmentally sustainable management of living natural resources and land use		*				*					*	*		*	*		
Terrestrial and aquatic biodiversity conservation		*				*					*	*		*	*		
Clean transportation											*						
Sustainable water and wastewater management							*				*	*					
Climate change adaptation	*	*											*				
Eco-efficient and/or circular economy adapted products, production technologies and processes									*		*	*					
Green buildings which meet regional, national or internationally recognized standards or certifications											*						
SOCIAL																	
Affordable basic infrastructure		*	*			*	*		*		*						
Access to essential services	*	*	*	*	*			*	*	*							
Affordable housing	*										*						
Employment generation including the potential effect of SME financing and microfinance								*	*								
Food security		*										*					
Socioeconomic advancement and empowerment	*	*		*	*			*		*	*			*			
WAQF																	
Development of Waqf properties or assets	*		*	*			*	*	*	*	*						

* Eligible project that aligned with the SDG.

Sukuk Framework, developed in accordance with the GBP and aligned with the ASEAN GBS (Faisal et al., 2023).

In April 2018, UiTM Solar Power Sdn Bhd made history by issuing a Green SRI *Sukuk* worth up to RM 240 million to finance the development and operation of a 50 MW utility solar power plant in Gambang, Pahang. This marked the first time a higher education institution globally issued a Green SRI *Sukuk*.

By 2020, Malaysia had celebrated the third anniversary of the first green *sukuk* issuance, solidifying its role as a pioneer in the integration of green and Islamic finance. As of that year, Malaysia held the largest number of green *sukuk* issuances, although Indonesia had raised the most funds through green *sukuk*, according to its Green Bond and Green *Sukuk* Framework (Bin-Armia & Riana, 2023). By July 2020, a total of USD 6.1 billion had been raised through 12 unique green *sukuk* issuances from countries such as Indonesia, Malaysia, the United Arab Emirates, and one multilateral development bank. A significant majority, 65%, of these green *sukuk* were issued in USD, followed by Euro-denominated *sukuk* (18%), Ringgit-denominated *sukuk* (16%), and Rupiah-denominated *sukuk* (1%).

The ASEAN Capital Market Forum (ACMF) has also listed the *sukuk* issuers in this region. Surprisingly, many of the green *sukuk* issuers in the list are not limited from Muslim majority countries like Indonesia and Malaysia. The other green *sukuk* issuers in the ASEAN region can be seen from Singapore (nine times), Thailand (13 times), and the Philippines (16 times). Unfortunately, the list did not include even a single issuer from Indonesia since ACMF released the first list in 2017 until 15 September 2021 (ASEAN Capital Markets Forum, 2021), the latest one. This shows that the ACMF's list of ASEAN *sukuk* issuers needs to be revised, instead of just adding new issuers but keeping the previously unlisted issuers uncounted. Table 10.2 showed the green *sukuk* project in Malaysia as listed 20 times by ACMF, however, the organization did not list all the projects including some of those that have been mentioned above. The table also contains "sustainability *sukuk*" projects issued in Malaysia since it covers a wider scope of projects, in which the issuer of this "sustainability *sukuk*" also include the green project in their issued *sukuk*.

Based on Table 10.2, PNB Merdeka Ventures Sdn Bhd was the first green *sukuk* issuer in ASEAN according to the ACMF record. But it missed to include Tadau Energy and Quantum Solar Park projects that had issued their *sukuk* on renewable energy projects to build hydropower and solar energy facilities (The World Bank, 2020) even before PNB issued its *sukuk* for green building development. PNB had issued its *sukuk* multiple times from 29 December 2017, followed on 28 June 2019, 27 December 2019, and latest was on 25 June 2021 to raise RM 2 billion for its green building project. Then, Segi Astana Sdn Bhd issued its *sukuk* on 8 January 2018 for a green building that was worth RM 415 million.

Even though the first two green *sukuk* are based on green building projects from PNB Merdeka and Segi Astana Sdn Bhd according to the ACMF list, most green *sukuk* projects are based on green energy as the following eight

Table 10.2 List of *Sukuk* Issuers in Malaysia as Recorded by ASEAN Capital Market Forum

No.	*Name of Issuer*	*Project Type*	*Amount Issued*	*First Issued*	*Sukuk type*
1	PNB Merdeka Ventures Sdn Bhd	Green building	USD 451 M	29/12/2017	Green
2	Segi Astana Sdn Bhd	Green building	USD 93 M	08/01/2018	Green
3	UiTM Solar Power Sdn Bhd	Renewable Energy	USD 54 M	27/04/2018	Green
4	Pasukhas Green Assets Sdn Bhd	Renewable energy	USD 45 M	28/02/2019	Green
5	Telekosang Hydro One Sdn Bhd	Renewable Energy	USD 106 M	06/02/2019	Green
6	Telekosang Hydro One Sdn Bhd	Renewable Energy	USD 27 M	06/02/2019	Green
7	CIMB Bank Berhad	Multiple	USD 680 M	09/10/2019	Sustainability
8	Edra Solar Sdn Bhd	Renewable energy and agriculture	USD 55 M	11/10/2019	Sustainability
9	Leader Energy Sdn Bhd	Renewable Energy	USD 58 M	16/07/2020	Green
10	Solar Management (Seremban) Sdn Bhd	Renewable Energy	USD 58 M	21/10/2020	Green
11	Cagamas Berhad	Affordable housing	USD 22 M	26/10/2020	Sustainability
12	Cagamas Berhad	Renewable energy & Sustainability	USD 22 M	27/10/2020	Sustainability
13	Sime Darby Property Berhad	Affordable housing	USD 33 M	03/12/2020	Sustainability
14	Malaysia Wakala *Sukuk* Berhad	Multiple	USD 1,300 M	28/04/2021	Sustainability
15	reNIKOLA Solar Sdn Bhd	Renewable Energy	USD 88 M	11/05/2021	Green
16	SME Development Bank Berhad	Green and social projects	USD 112 M	02/08/2021	Sustainability
17	Agroto Business (M) Sdn Bhd	Management & food security	USD 67 M	05/08/2021	Sustainability
18	Cagamas Berhad	Affordable housing	USD 45 M	05/08/2021	Sustainability
19	Cagamas Berhad	Renewable energy & Sustainability	USD 22 M	05/08/2021	Sustainability
20	Hanwha Q Cells Malaysia Sdn Bhd	Renewable Energy	USD 33 M	01/09/2021	Green
Total			USD 3,371 M		

projects were on the development of green energy facilities. On 27 April 2018, UiTM Power Sdn Bhd introduced their *sukuk* renewable energy projects. The company was set up to develop and operate a 25 MW solar power plant in Pasir Gudang, Johor (Aziz, 2020). Then, in February 2019, Pasukhas Green Assets Sdn Bhd, and Telekosang Hydro One Sdn Bhd had issued their green *sukuk* worth RM 200 million and 590 million, respectively. Pasukhas Green Assets Sdn Bhd expanded its scope beyond renewable energy projects to include initiatives focused on environmental preservation, natural resource conservation, and the reduction of greenhouse gas emissions.

Malaysian companies had issued the highest *sukuk* in 2019 as some of the *sukuk* were also listed in foreign exchange. On 9 October 2019, CIMB Bank Berhad had issued the highest "sustainability *sukuk*" since the first *sukuk* was issued in the country that was worth USD 680 million and the *sukuk* is listed in Taipei Exchange, Singapore Exchange, and Bursa Malaysia (as exempt regime). The projects aim to enhance access to essential services, promote gender equality, and support sustainable water and wastewater management. They also focus on providing affordable basic infrastructure, advancing renewable energy, improving energy efficiency, generating employment (e.g., through SME financing and microfinance), promoting clean transportation, developing green buildings, and providing affordable housing. Additionally, these initiatives address climate change adaptation, pollution prevention and control, the conservation of terrestrial and aquatic biodiversity, and the environmentally sustainable management of living natural resources and land use. In the same month, Edra Solar Sdn Bhd issued a "sustainability *sukuk*" valued at RM 245 million to finance its renewable energy and socio-agricultural projects.

In 2020, an increasing number of "sustainability *sukuk*" were observed after Leader Energy Sdn Bhd and Solar Management (Seremban) Sdn Bhd issued their green *sukuk* in June and October 2020 that worth RM 260 million each. Cagamas Berhad had issued its sustainability *sukuk* twice on 26 and 27 October 2020 that worth RM 100 million each was used for the acquisition of eligible Islamic financing to support affordable housing, as well as for the purchase of qualified loans related to small- and medium-sized enterprises (SMEs), renewable energy, and sustainable water and wastewater management. By the end of 2020, Sime Darby Property Berhad issued a sustainability *sukuk* valued at RM 150 million, aimed at advancing affordable housing, promoting terrestrial and aquatic biodiversity conservation, enhancing energy efficiency, addressing climate action, and fostering socio-economic development and empowerment.

On 28 April 2021, the Malaysian government, through Malaysia Wakala *Sukuk* Berhad, issued its largest and first-ever sovereign international sustainability *sukuk*, valued at USD 1.3 billion. This issuance comprised USD 800 million in ten-year trust certificates (RM 3.3 billion) and USD 500 million in 30-year trust certificates (Kana, 2021). This *sukuk* issuance surpassed the previous record set by the CIMB *sukuk* in 2019. The *sukuk* was listed on the Hong Kong Stock Exchange, Labuan International Financial Exchange, and Bursa Malaysia Securities Berhad (under the Exempt Regime). According to Moody's Investor Service, this issuance positioned Malaysia as a global leader in *sukuk*

issuance within the Islamic financial market for the year (Adilla, 2021). The proceeds from this *sukuk* will support a range of projects focused on improving access to quality healthcare, education, and training, enhancing affordable basic infrastructure, generating employment through SME financing and microfinance, advancing socioeconomic development and empowerment, promoting clean transportation, and fostering the sustainable management of natural resources, renewable energy, and green buildings.

As mentioned above, "sustainability *sukuk*" covers a wider scope of projects and it has made the number of green *sukuk* issuance seems to reduce onward. Many issuers have incorporated a range of green projects in their sustainability *sukuk*, focusing on areas such as renewable energy, energy efficiency, green building initiatives, clean transportation, and the sustainable management of natural resources.

But since their *sukuk* contain mix types of projects that fall under social-related projects, the *sukuk* have been categorized as sustainability *sukuk*. The first pure green *sukuk* in 2021 was issued by reNIKOLA Solar Sdn Bhd to support a renewable energy project that worth RM 390 million. Numbers of sustainable *sukuk* have been issued afterwards until the latest pure green *sukuk* has been issued by Hanhwa Q Cells Malaysia Sdn Bhd in September 2021 that worth RM 150 million. Interestingly, Hanwha Q Cells that was the manufacturer for solar panels in Solar Management (Seremban) Sdn Bhd SRI project back in 2020, is now taking the same measure by issuing green *sukuk* in September 2021 and making it the latest green *sukuk* issuer as of this chapter is prepared.

Among the sustainable *sukuk* issued between those two pure green *sukuk* are from Small Medium Enterprise (SME) Development Bank Malaysia Berhad, Agroto Business (M) Sdn Bhd, and Cagamas Berhad. SME Development Berhad had issued RM 500 million sustainability *sukuk* to support green and social projects, including initiatives in renewable energy, clean transportation, green building, energy efficiency, sustainable water and wastewater management, waste and pollution control, as well as affordable basic infrastructure, access to essential services (healthcare, education, and vocational training), socioeconomic development and empowerment, and the mitigation of socioeconomic impacts from pandemic outbreaks (Hariz et al., 2023; Naeem et al., 2023). Agroto Business (M) Sdn Bhd issued a RM 200 million sustainability *sukuk* focusing on the environmentally sustainable management of natural resources, land use, and food security. Cagamas Berhad continued its approach from 2020 by issuing sustainability *sukuk* twice on 5 October 2021, totalling RM 300 million. These *sukuk* were intended for purchasing eligible loans for affordable housing and acquiring eligible Islamic financing for affordable housing, respectively.

Islamic Perspective on Green *Sukuk*

While Islam advocates environmental preservation as part of the *maqasid al-Shari'ah*, there remain critical debates regarding its implementation within Islamic finance compared to mainstream sustainable finance. For example, the

notion of sustainable Islamic finance being a subset of Islamic finance is challenged by scholars who argue for sustainability as an inherent principle of all Islamic financial transactions.

Islam strongly advocates for the concept of green financing, aligning with its teachings on environmental conservation and preservation. The Qur'an and the Hadith underscore the significance of safeguarding nature, with Islam instructing humanity, as God's vicegerents, to care for the environment and avoid actions that harm it. This aligns with the fundamental objectives of Shari'ah (*maqasid al-Shari'ah*), which aim to promote public welfare (*maslahah*) and prevent harm and destruction (*mafsadah*). These objectives are typically categorized under five key areas: the protection of life, the preservation of religion, the safeguarding of human intellect, the protection of family, and the defence of lawfully owned property. Notably, Al-Qardhawi also recognized environmental conservation as an additional critical objective of Shari'ah, placing it on par with the aforementioned goals (Ali, 2018).

Sukuk refers to certificates of equal value that represent undivided shares in the ownership of tangible assets, usufruct, services, or specific project assets and investment activities (AAOIFI, 2015). Furthermore, green *sukuk* is a specialized form of *sukuk* structured to comply with Shari'ah principles, with a focus on financing renewable energy and environmental projects. The proceeds from green *sukuk* are allocated towards environmental preservation, natural resource conservation, energy efficiency, the promotion of renewable technologies, and the reduction of greenhouse gas emissions (Climate Bond Initiative, 2021). The structuring of green *sukuk* involves several key Shari'ah principles, which include: (1) utilizing specific Shari'ah contracts such as *Mudharabah*, *Musharakah*, *Murabahah*, *Salam*, *Istisna'*, and *Ijarah*; (2) ensuring the structure is free from Shari'ah prohibitions like *riba*, *gharar*, and *maysir*; (3) guaranteeing that the underlying assets and core business activities are Shari'ah-compliant; (4) directing the proceeds towards financing environment-friendly projects; (5) ensuring the investment returns adhere to Shari'ah principles and contracts; (6) granting the ownership right for *sukuk* holders to the underlying assets and their cash flows; and (7) clearly outlining the parties' rights and obligations in a transparent manner.

Types and Structures of Green *Sukuk*

This section describes the different types and structures of green *sukuk* that demonstrate their adaptability to different financing needs and their alignment with Shari'ah principles. Green *sukuk* can be structured using a variety of Shari'ah contracts, each of which offers specific mechanisms to support environmentally sustainable projects. Among the most common structures are the *Murabahah*, *Istisna'*, and *Wakalah* models. The *Murabahah* model is typically implemented through a commodity *Murabahah* arrangement that facilitates financing through disclosure of acquisition costs and markups to the buyer. This structure has been used for renewable energy projects, such as the Quantum

Solar Park *sukuk* issuance in Malaysia. This has demonstrated its effectiveness in financing large-scale solar initiatives. The *Istisna'* model involves certificates being issued for manufacturing or construction projects, allowing the *sukuk* holder to own the resulting asset. An example is the Tadau Energy Green SRI *Sukuk*, which finances solar photovoltaic power plants in Malaysia through a combination of Istisna' and Ijarah contracts. The *Wakalah* model is also widely used, where a trustee manages the investment on behalf of the *sukuk* holder. For example, the Sinar Kamiri *sukuk* in Malaysia that uses the *Wakalah* structure to develop solar photovoltaic facilities. This *sukuk* demonstrates the flexibility of this model for green financing.

Thus, by integrating this structure, green *sukuk* is aligned with Islamic principles and sustainability goals, making it possible to become a financing solution for ecological preservation.

Murabahah Model

Murabahah is derived from the Arabic term *ribh*, which means "profit" or "gain". In technical terms, *murabahah* refers to a sale transaction in which the cost of acquiring an asset, along with the agreed-upon markup, is disclosed to the purchaser (Bank Negara Malaysia, 2013). Thus, the main distinctive feature of a *murabahah* contract is that disclosure of the acquisition cost and markup to the buyer. Nevertheless, the *murabahah* contract underlying green *sukuk* in the market is structured based on commodity *murabahah* via *tawarruq* arrangement. Under commodity *murabahah*, the investor (*sukuk* holders) appoints a facility agent (FA) to purchases a specified commodity from a registered commodity *murabahah* trading platform. Acting as an agent, FA purchases a commodity from trader A on a spot basis. Subsequently, FA sells the commodity to the company issuing the *sukuk* on *murabahah* basis for the selling price which is equivalent to the *sukuk* proceeds and its margin. The company issuing *sukuk* to represent the *sukuk* holders' entitlement for deferred payment. Successively, the company sells the commodity on sport basis to trader B with the price equivalent to the *sukuk* proceeds. On a periodical basis, the company makes a regular payment to *sukuk* holders (Figure 10.1).

An example of a green *sukuk* structured using commodity *murabahah* through a *tawarruq* arrangement is the Solar *Sukuk* Programme issued by Quantum Solar Park (Semenanjung) Sdn Bhd. This *sukuk* was used to finance the development of three large-scale solar photovoltaic power plants in Gurun (Kedah), Merchang (Terengganu), and Jasin (Melaka), Malaysia. The issuance, which was considered the world's largest green *sukuk* at the time, amounted to RM 1 billion, offering profit rates between 4.81% and 6.16%. The project is expected to generate and supply approximately 282,000 MW of electricity annually to Malaysia's national utility provider, Tenaga Nasional, over a period of 21 years.

Another example of a green *sukuk* structured using commodity *murabahah* through a *tawarruq* arrangement is the Green Building *Sukuk* issued by PNB Merdeka Ventures Sdn Bhd in December 2017. This *sukuk* was issued to

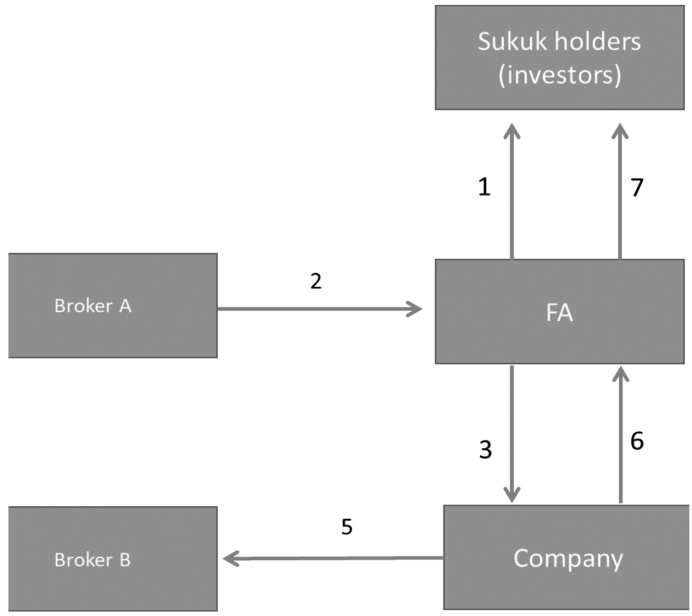

Figure 10.1 Commodity Murabahah Model.

Source: Authors' own.

finance the construction of an 83-storey office tower, which is part of the Merdeka PNB118 complex. It is recognized under both Malaysia's SRI *Sukuk* Framework and the ASEAN Green Bond Standards (GBS).

Istisna' Model

Sukuk Istisna' are certificates of equal value issued to raise funds for the production of environmentally friendly products, with ownership of the products resting with the certificate holders. In this arrangement, the issuer (typically the manufacturer or supplier) is responsible for producing the goods, while the subscribers are the buyers of the intended products. The funds raised through the issuance of these certificates cover the production costs. The certificate holders have ownership rights over the product and are entitled to either the sale price of the certificates or the sale price of the products sold, based on a parallel *Istisna'* agreement, if applicable.

The world's first green *sukuk* was structured using the *Istisna'* concept, combined with *ijarah* and *ijarah mawsufah fi al-dzimmah*. On 27 July 2017, the Securities Commission of Malaysia announced the issuance of this pioneering green *sukuk* under its Sustainable and Responsible Investment (SRI) *sukuk* framework. Issued by Tadau Energy Sdn Bhd, a Malaysian-based firm specializing in renewable energy and sustainable technologies, the RM250 million

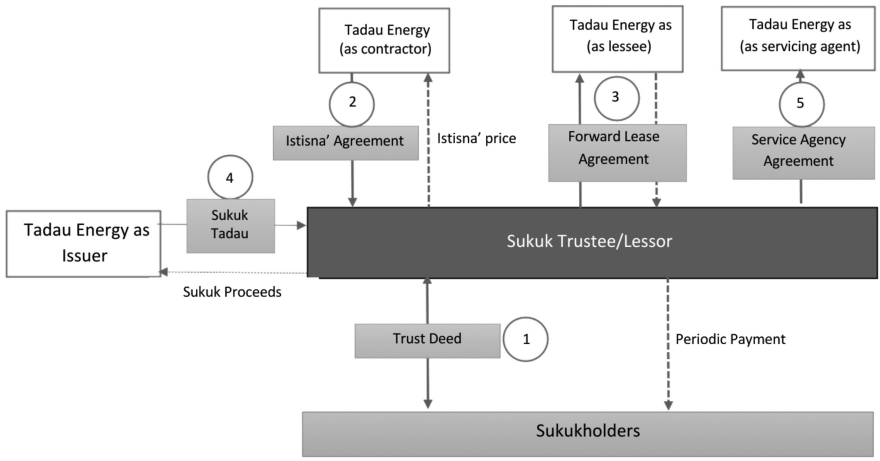

Figure 10.2 At the inception and the construction of assets.

Source: Guidance Note on Issuance of Green, Social and Sustainability Sukuk in Labuan International Business and Financial Centre.

Green SRI *Sukuk* Tadau was designed to finance the development of large-scale solar photovoltaic power plants in Kudat, Sabah. The *sukuk*, with a tenure ranging from two to 16 years, was structured based on the Shari'ah principles of *Istisna'* (manufacturing sale) and *ijarah* (leasing). This significant achievement was made possible through a collaborative effort involving the Securities Commission, Bank Negara Malaysia, and the World Bank Group to promote the growth of green financing and encourage investor participation in SRI *sukuk*. The following Figure 10.2 and corresponding Figure 10.3 illustrates the structure of Green SRI *Sukuk* Istisna' – Tadau Energy Sdn Bhd.

In a standard *sukuk* issuance process, the *sukuk* trustee enters into a Trust Deed agreement with the *sukuk* holders, acting as their representative and safeguarding their interests. The trustee subsequently enters into an *Istisna'* contract with Tadau Energy, commissioning the construction of power plants according to predefined specifications, with the funds raised from the *sukuk* proceeds used to finance the agreed *Istisna'* price. On behalf of the *sukuk* holders, the trustee enters into a forward lease (*ijarah mawsufah fi dzimmah*) agreement with Tadau Energy, leasing the asset under construction. The SRI *sukuk* are then issued by Tadau Energy to reflect the *sukuk* holders' rights, interests, and entitlements, including the transfer of the assets upon completion.

Tadau Energy Sdn Bhd is designated as the servicing agent for the duration of the lease. Upon the completion of the project, Tadau Energy informs the *Sukuk* Trustee of the asset's completion and delivery in accordance with the terms of the *Istisna'* agreement. As the lessee, Tadau Energy pays periodic lease rentals to the *Sukuk* Trustee, who distributes these payments as Periodic Distribution Amounts to the *sukuk* holders. In the event of a declared Dissolution Event,

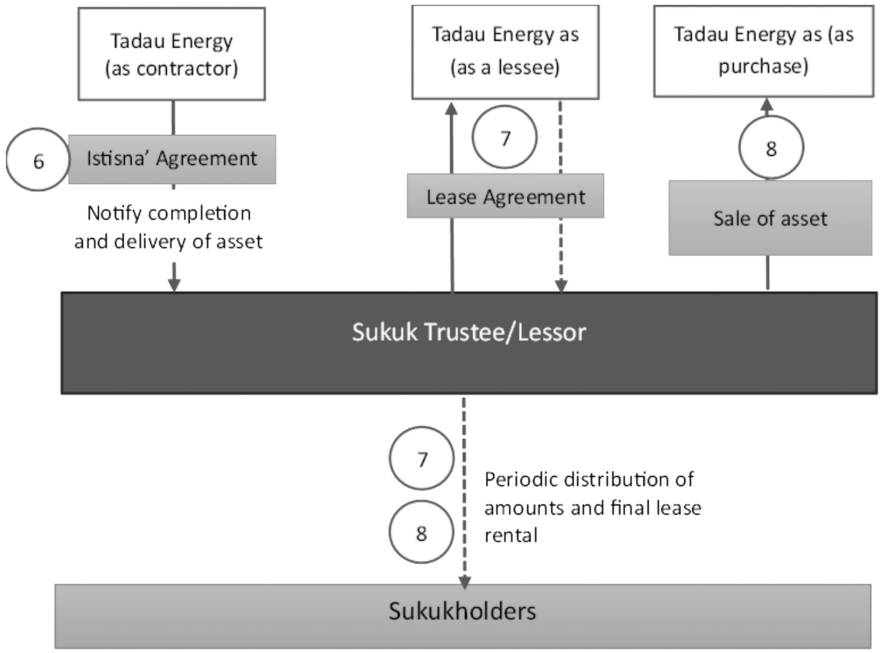

Figure 10.3 Post-completion of the asset and at maturity of *sukuk*.

Source: Guidance Note on Issuance of Green, Social and Sustainability Sukuk in Labuan International Business and Financial Centre.

Tadau Energy, as the purchaser, agrees to a Purchase Undertaking at the designated Exercise Price, acquiring the proportionate undivided ownership of the relevant asset through a sale agreement.

Wakalah *Model*

According to AAOIFI, *sukuk wakalah bi al-istithmar* refers to certificates representing a project or specific activity carried out under the *wakalah* principle, where a representative (*wakil*) is appointed to manage the project on behalf of the *sukuk* holders (AAOIFI, 2015).

Wakalah sukuk are trust certificates issued by an entity to raise capital for the acquisition or investment in Shari'ah-compliant assets, goods, or services. These *sukuk* grant the holders ownership or equity participation in the underlying assets, goods, or services. The management of these acquisitions or investments is entrusted to an agent (*wakil*), who oversees them on behalf of both the issuer and the *sukuk* holders.

A practical example of a *wakalah*-based green *sukuk* is the Green *Sukuk* issued by Sinar Kamiri Sdn Bhd, an indirect subsidiary of Mudajaya Group

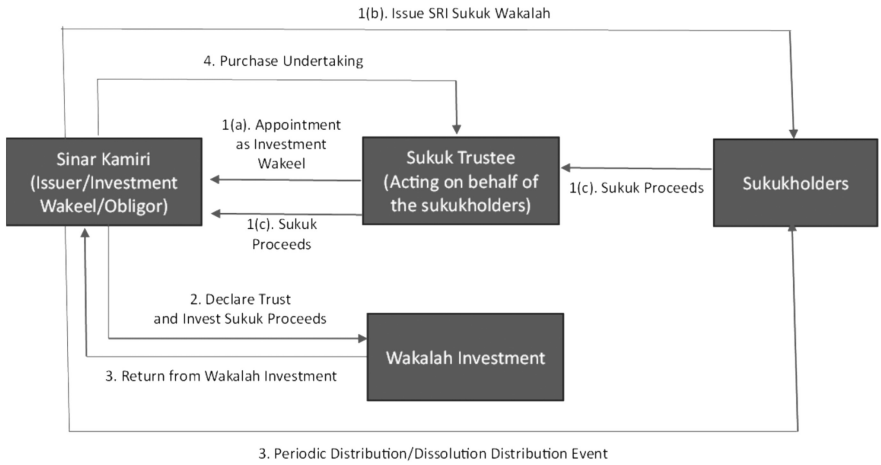

Figure 10.4 Green SRI *Sukuk* Sinar Kamiri – *Wakalah* Structure.
Source: Owais & Mustafa, 2018.

Berhad. In January 2018, the company issued RM 245 million in *sukuk* to finance the development of a 49 MW solar photovoltaic facility in Sungai Siput, Perak. The structure works as in Figure 10.4.

MTrustee Berhad, serving as the *Sukuk* Trustee, designates Sinar Kamiri Sdn Bhd as the Investment Wakeel under the *Wakalah* Agreement to manage the investment of *Sukuk* proceeds on behalf of the *Sukuk* holders. As the issuer, Sinar Kamiri Sdn Bhd issues the Green SRI *Sukuk Wakalah*, and the *Sukuk* holders subscribe by contributing to the *Sukuk* proceeds. The Green SRI *Sukuk Wakalah* grants the *Sukuk* holders an undivided and proportionate beneficial interest in the Trust Assets, which include the *Sukuk* proceeds, *Wakalah* Investments, and all associated rights, titles, interests, entitlements, and benefits as outlined in the Transaction Documents. The *Sukuk* proceeds, paid through the *Sukuk* Trustee, are directed to the Investment Wakeel, who holds a trust over both the proceeds and the returns generated. In its role as the Obligor, Sinar Kamiri Sdn Bhd will acquire the *sukuk* holders' undivided and proportionate beneficial interests in the solar photovoltaic energy facility by entering into a sale agreement with the *Sukuk* Trustee at the agreed exercise price.

Prospects and Challenges of Green *Sukuk*

Green *sukuk* have the potential to renew sustainable finance by addressing global environmental challenges and linking them to Islamic finance principles. However, realizing this potential requires efforts to overcome several obstacles and navigate future directions. Green *sukuk* face several challenges, particularly in emerging markets. These challenges include the lack of a standardized green taxonomy and the limited availability of bottom-up data for valuation, which

hinders accurate valuation and aggregation of green assets (Supriyadi et al., 2023). In addition, green *sukuk* issuance often involves higher compliance costs due to additional requirements for certification, reporting, and third-party monitoring (Rahman et al., 2024). The nascent secondary market for green *sukuk* also further limits liquidity, making green *sukuk* less attractive to institutional investors who prioritize market efficiency (Pirgaip & Arslan-Ayaydin, 2024). Another challenge is aligning green *sukuk* with credible green standards and ensuring that proceeds are directed to impactful projects. There are also methodological gaps in measuring environmental impacts and the absence of a standardized classification system, especially in countries with limited resources to implement evaluation frameworks (Billah et al., 2023; Ghaemi Asl et al., 2024). However, on the other hand, to support the potential of green *sukuk*, governments and regulatory bodies should prioritize the development of green finance taxonomies and harmonize standards to facilitate wider adoption. Initiatives such as Malaysia's Green Technology Financing Scheme to become a global hub for Sustainable and Responsible Investment (SRI) can be a model to emulate (Ali et al., 2024). Although green *sukuk* issuance is focused on renewable energy, its scope includes sectors such as agriculture, construction, and manufacturing that face significant climate transition risks that can amplify its impact (Bin-Armia & Riana, 2023; Shalhoob, 2023). Integration of hybrid financial models by combining conventional green bonds and Islamic *sukuk* can attract more investors and increase market resilience. Advances in deep learning models for market risk mitigation can also support this evolution (Ghaemi Asl et al., 2024). Building a robust secondary market for green *sukuk* is essential to increase its liquidity and attractiveness to institutional investors through incentives, such as tax breaks or subsidies for green *sukuk* transactions, and through collaboration with international financial institutions (Billah & Adnan, 2024). Raising investor and issuer awareness of the benefits of green *sukuk* is essential. Education and capacity-building programmes can help empower stakeholders to better understand and implement sustainable financial instruments (Alkadi, 2024). Aligning green *sukuk* with frameworks such as the United Nations Sustainable Development Goals (SDGs) and the Paris Agreement commitments can also enhance its credibility and attract global investors (Faisal et al., 2023). Green *sukuk*, therefore, represents a transformative opportunity to leverage Islamic finance for ecological sustainability. Addressing these challenges can be done by implementing measures such as improving the regulatory framework, encouraging sectoral diversification, and encouraging global alignment, green *sukuk* can develop into a major financial instrument, driving economic growth and environmental preservation (Suriani et al., 2024).

Conclusion

Green *sukuk* is a potential financing model for sustainable infrastructure development and serves to bridge the gap between conventional and Islamic finance. In recent years, green *sukuk* issuance has also expanded beyond

Muslim-majority ASEAN countries, such as Malaysia and Indonesia. The number of green *sukuk* issuers continues to grow in other countries, including the Philippines, Thailand, and Singapore. Currently, green *sukuk* is issued and listed in non-Muslim-majority countries, such as the Philippines and Singapore. This shows its positive acceptance and implementation so that many countries can follow these steps to support green *sukuk* for the development of economic and environmental projects. Sustainable investors and *sukuk* investors need to strive to align their investments with certain ethical principles. Green *sukuk* financing, especially for environmentally friendly sustainable infrastructure projects such as renewable energy initiatives, is quite attractive to *sukuk* investors and conventional investors who are focused on the environment because by its structure, *sukuk* is tied to a pool of specified assets, making it suitable for financing projects that meet both financial and sustainability objectives. In fact, most of the sustainable *sukuk* issued in ASEAN also include green projects that are usually supported by green *sukuk* instruments. Projects involving sustainable and green activities are often categorized as "sustainable *sukuk*" rather than "green *sukuk*". This is because green projects contribute significantly to reducing carbon emissions, mitigating global warming, and addressing climate issues.

To further enhance the role of green *sukuk*, the government should provide tax incentives or subsidies for green *sukuk* issuance, develop a green taxonomy and standardized reporting framework. In addition, efforts that can be made include the establishment of a strong secondary market, capacity-building programmes and public awareness campaigns, and aligning green *sukuk* initiatives with global sustainability goals to increase the attractiveness of international investors.

Ultimately, green *sukuk* plays an important role in environmental conservation and supporting sustainability. This *sukuk* contributes to nature conservation, so its contribution to sustainable development needs to be prioritized and strengthened.

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