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Green bonds for financing renewable energy and energy efficiency in South-East Asia: A review of policies

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GREEN BONDS FOR FINANCING RENEWABLE ENERGY AND ENERGY EFFICIENCY IN SOUTHEAST ASIA: A REVIEW OF POLICIES

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and Yang Liu

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Abstract

Mobilizing private finance for renewable energy and energy efficiency is critical for the Association of Southeast Asian Nations (ASEAN) not only for the reduction of global temperature rise, but also for meeting fast growing energy demand. Two-thirds of green bonds issued in ASEAN countries were used to finance renewable energy and energy efficiency projects. This paper provides a review of green bond issuances and green bond policies in ASEAN countries. Issuance of green bonds in top three green bond issuing countries in ASEAN, i.e., Indonesia, Malaysia, and Singapore, are reviewed in detail. The review of green bond issuance and green bond policies show that green bond policies in ASEAN countries are effective in promoting green bond issuance. However, this does not mean that green bond policies are effective in promoting renewable energy and energy efficiency projects in ASEAN countries. Proceeds of green bonds issued in ASEAN countries can be used for financing projects abroad or refinancing past loans, thus not necessarily promoting green investments in ASEAN countries. This paper provides policy recommendations for promoting renewable energy and energy efficiency financing using green bonds in their countries. To promote renewable energy and energy efficiency, policy makers should consider limiting eligibility criteria in policies supporting green bonds supporting policies, such as green bond grants, to only domestic projects and/or limiting refinancing using green bonds.

Keywords: Green bonds, sustainable finance, green bond grant, green bond standards, ASEAN, sustainable and responsible investment, green sukuk

JEL Classification: Q28, Q42, Q48, Q58, G18

Contents

1.	INTRODUCTION	1
2.	LITERATURE REVIEW	2
2.1	Barriers for Financing Renewable Energy and Energy Efficiency in ASEAN Countries	2
2.2	The Role of Green Bonds in Financing Renewable Energy and Energy Efficiency in ASEAN Countries.....	4
2.3	Barriers for Issuing Green Bonds in ASEAN Countries.....	6
3.	RECENT TRENDS OF GREEN BOND ISSUANCE IN ASEAN COUNTRIES	7
3.1	Green Bond Issuance in ASEAN Countries	7
3.2	Conventional Bond Issuance in ASEAN Countries	9
3.3	Government/Sovereign Green Bond Issuance in ASEAN Countries	10
4.	POLICIES PROMOTING FINANCING OF ENERGY EFFICIENCY USING GREEN BONDS IN ASEAN COUNTRIES.....	12
4.1	Singapore	13
4.2	Malaysia	15
4.3	Indonesia.....	17
5.	DISCUSSION AND POLICY RECOMMENDATIONS	18
6.	CONCLUSION	22
	REFERENCES	23

1. INTRODUCTION

The Inter-Governmental Panel on Climate Change, in their most recent report (IPCC 2018), noted that mobilization of green finance is critical for limiting global warming to 1.5°C, and to prevent disastrous climate change. To fully implement the Paris Agreement, \$1.5 trillion of green finance is required every year until 2030 (UN 2017). Up until now, attracting private investment in green energy in Asia has been a major challenge (Yoshino and Taghizadeh-Hesary 2018). Increasing low-carbon investments to the level required for the 1.5°C pathway mandates a major shift in investment patterns (McCollum et al. 2018). This shift would require government policies to redirect financial resources. One way to attract more investments in low-carbon projects is to promote green bonds (Ng and Tao 2016). While proceeds from generic bonds can be used to fund any legal project, proceeds from green bonds can be used to fund only low-carbon projects, such as those that affect climate change mitigation or adaptation, natural resources, biodiversity conservation, or pollution prevention and control (ICMA 2018a).

At the same time, raising green finance is key to meeting Southeast Asia's surging energy demand, which has been fueled by population growth, economic growth, and increased energy access. A major shift in investment patterns is needed to ignite green finance in the region, which is a growing focus of government policies. Increasingly, new measures supporting green finance are being implemented in Asia such as green bond standards, green bond grant schemes, and sovereign green bonds.

Green bonds have been attracting an increasing degree of interest across Asia and the world, as an alternative source to finance low-carbon investments. The market for green bonds has grown rapidly, from \$3.4 billion in 2012 to \$156 billion in 2017. To raise private finance for low-carbon projects, the European Investment Bank and the World Bank were the first to issue green bonds in 2007 and 2008, respectively. The People's Republic of China, after joining the green bond market in 2015, is now the world's largest issuer of green bonds. The PRC issued \$34 billion and \$31 billion worth of green bonds in 2016 and 2017, respectively.

Using data from Bloomberg terminal (as of July 2019), governments' official websites, and academic literature, this paper reviews issuance of green bonds in the three largest green bond issuing countries in Southeast Asia, i.e., Singapore, Indonesia, and Malaysia, and three government policies which supported them, i.e., green bond framework, bond grant schemes, and sovereign green bonds.

The results show that green bond grant schemes have promoted green bond issuance in Malaysia and Singapore. However, green bond grant schemes did not necessarily lead to decarbonization in these countries because green bonds issued in these countries were often used to finance renewable energy or energy efficiency investments elsewhere. Based on the analyses of green bond grant schemes, policy recommendations on the design of green bond grant schemes are provided. In order to ensure that green bond grant schemes support decarbonization in the country where the bonds have been issued, policy makers need to limit eligibility criteria only to local projects and/or specify refinancing of projects in green bond grant scheme design.

This paper is structured as follows. Section 2 reviews the literature about the barriers to financing renewable energy and energy efficiency, the role of green bonds in financing renewable energy and energy efficiency, and the barriers for issuing green bonds in ASEAN countries. Section 3 describes recent trends in issuance of green bonds in ASEAN countries. Section 4 provides a review of issuance of green bonds and policies

supporting them in Singapore, Malaysia, and Indonesia. Section 5 provides results and discussion. Section 6 concludes.

2. LITERATURE REVIEW

2.1 Barriers for Financing Renewable Energy and Energy Efficiency in ASEAN Countries

Renewable energy and energy efficiency improvement projects in ASEAN countries have faced several barriers that have limited the scope and speed of renewable energy projects in the region (Figures 1–2). Developers continue to face financial, macroeconomic, and regulatory challenges (IRENA 2018).

Figure 1: Energy Efficiency Barriers in ASEAN Countries

Institutional	<ul style="list-style-type: none"> • Lack of effective policy enforcement mechanisms
Financial	<ul style="list-style-type: none"> • High cost of technologies • Lack of funding support
Social	<ul style="list-style-type: none"> • Lack of energy saving awareness
Technical	<ul style="list-style-type: none"> • Insufficient technical experience/knowledge
Policy	<ul style="list-style-type: none"> • Low or subsidized energy prices

Source: Authors' own based on UNEP DTU Partnership and Copenhagen Centre on Energy Efficiency (2015).

Figure 2: Renewable Energy Barriers in ASEAN Countries

Institutional	<ul style="list-style-type: none"> • Unclear legal and regulatory frameworks
Financial	<ul style="list-style-type: none"> • Weak local financial markets • Unfavorable project scale
Social	<ul style="list-style-type: none"> • Lack of clean energy awareness
Technical	<ul style="list-style-type: none"> • Insufficient technical experience/knowledge
Policy	<ul style="list-style-type: none"> • Lack of contract standardization

Source: Author's own based on IRENA (2018).

Financial barriers to renewable energy investments include factors such as weak local financial markets and unfavorable project scale. Weak local financial markets can act as a barrier because the lack of equity funding from the private sector is a fundamental problem. In the absence of private equity funding, projects are starved of funds and have to rely solely on bank credit. But in countries where there is a lack of bank credit, the high costs of debt and limited length of loan tenure can be issues (IRENA 2018). Unfavorable project scale also impacts renewable energy finance, as the scale of investment in these

projects is usually small and transaction costs are high, which makes these projects particularly undesirable for bankers.

Regulatory challenges that are hinderances in renewable energy projects include unclear legal and regulatory frameworks, including weak feed-in-tariff pricing. Non-bankable public-private agreements are also major barriers (IRENA 2018). In some ASEAN countries, lack of contract standardization is an issue, that is, public-private agreements are negotiated and awarded on a case-by-case basis, leading to a lack of transparency. This process then fails to meet international standards. Macroeconomic barriers such as weak capital markets and high political and commercial risk also affect renewable energy financing, but are more prevalent in the lower Mekong countries such as Cambodia and the Lao People's Democratic Republic (Lao PDR) (IRENA 2018).

Currently, energy efficiency investments are predominantly financed by bank loans, which have proven to be an inadequate supply of funds. Alternative sources of funding for energy efficiency exist in the forms of Energy Performance Contracts (EPC), in which Energy Service Companies (ESCOs) use the profits from projects to repay loans, or green banks, which invest a combination of public and private funds in energy efficiency. Green bonds, a debt instrument created exclusively to raise capital for environmentally friendly activities or businesses, also hold vast potential: the value of green bonds for energy efficiency grew from \$16 billion in 2016 to \$47 billion in 2017 (IEA 2018).

An IEA (2018) report revealed that a majority of energy efficiency investments are self-financed. However, in certain situations, external financing may be necessary to encourage owners to make upgrades to infrastructure to improve energy efficiency (USAID 2018). This financing necessity may occur in three distinct scenarios. The first scenario occurs when owners do not have funds to replace old and inefficient equipment. Second, financing may be necessary during the design and construction of new buildings. And third, some consumers may not be convinced about the cost savings associated with energy efficiency products. Despite the need for increased energy efficiency finance, several barriers exist (USAID 2018).

Barriers to investments in energy efficiency may exist due to limited liquidity or due to a lack of information on the part of the consumers and lenders. Liquidity constraints can act as a market barrier by limiting access to finance for energy efficient investments (Blumstein et al. 1980). Limited liquidity could exist due to two reasons, those being strict collateral requirements and a small size of energy efficiency projects.

A majority of banks have stringent internal credit policies that require the provision of standard collateral like physical assets. Banks do not permit savings from energy efficiency to be used as collateral. This serves as a major barrier in financing energy efficiency initiatives in ASEAN countries. Normally, banks require clients to provide collateral for the project for 80%–120% of the stated project volume, depending on the risk perception of the project. In effect, this implies that energy efficiency equipment purchased using bank loans can be considered as collateral. But without including the savings that accrue from energy efficiency, this figure fails to meet the 80%–120% of project volume threshold (APEC 2017).

Energy efficiency projects are often scattered and small (Taylor et al. 2008) and financial institutions such as banks mention the small size of the energy efficiency projects as one of the prominent barriers to more financing. Although energy efficiency investments tend to be smaller, they offer better returns and provide faster repayment than infrastructure investments. However, the small loan sizes negatively affect lending decisions (USAID 2018). Energy efficiency loans are in fact smaller in size than regular corporate loans. Certain purchasers of equipment may select the less energy-efficient product due to lack of access to credit, leading to an underinvestment in energy efficiency. Even if the rate

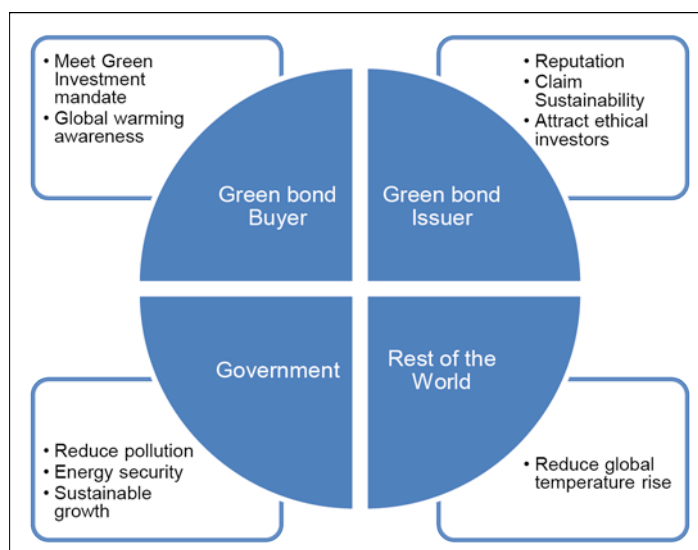
of return for the entire project is high, the larger financial significance of such a small project may be deemed unworthy of attention at a financing institution. And if these small projects cannot be combined into a large project to economize transaction costs, they tend to remain unfinanced and unimplemented (Taylor et al. 2008).

A lack of reliable information and lack of reference points for energy efficiency technologies leads to banks assessing the risk of these projects as too high, which results in higher lending rates. In fact, lenders are often not familiar with how energy efficiency projects can lead to cost savings, which then results in creation of new cash flows and an increased credit capacity (USAID 2018).

2.2 The Role of Green Bonds in Financing Renewable Energy and Energy Efficiency in ASEAN Countries

Unlike other financial instruments, green bonds allow borrowers to promote reputation, claim sustainability, and attract ethical investors (Figure 3).

Figure 3: Benefits of Green Bonds



Source: Authors' own.

Formally defined as a “debt security that is issued to raise capital specifically to support climate-related or environmental projects” (World Bank 2015), the green bond was first issued by multilateral development banks (MDBs) in 2007 and started seeing greater private sector use from 2014, after the Green Bond Principles clarified the standards of eligibility (Cochu et al. 2016). In 2015, in the Paris Green Bonds Statement, over 20 signatories, who together managed a combined \$11.2 trillion, committed themselves to higher investment in green bonds (Climate Bonds Initiative 2015). For firms that wish to finance energy efficiency projects, green bonds provide capital at lower cost and with fewer restrictive covenants than bank loans, and are therefore an appealing source of funding.

The global growth trajectory for green bonds continues to be positive as green bonds exhibit strong performance. Climate Bonds Initiative's (2017a) study found that green bonds outperformed the market in spread tightening within the first 28 calendar days of issuance, indicating a healthy credit profile. With regard to yield, while some studies have found that there is no significant difference between the performance of green bonds and conventional bonds (Östlund 2015, Petrova 2016), other empirical research reveals that there is a slight green premium (Zerbib 2019), although such a premium can be significantly reduced through certification (Hyun, Park, and Shu 2018). Beyond financial considerations, since green bond issuers include the names of their investors in press releases, reputational concerns may also propel demand for green bonds (World Bank 2017).

While global green bond demand booms, the green bond markets of Singapore, the Philippines, Malaysia, and Thailand total only \$549 million, \$200 million, \$58 million, and \$92 million, respectively (Asian Development Bank 2018).

The small size of Southeast Asian national green bond markets may pose an obstacle to accruing sufficient demand. Since the minimum bond value for investment by institutional investors is approximately \$230 million (Cochu et al. 2016), large investors are precluded from entering the green bond markets in this region. Indonesia has begun to combat this problem by issuing a green *sukuk* (Islamic bond) worth \$1.25 billion (International Capital Market Association 2018b). Since green loans tend to be low amounts individually, states may consider adopting securitization mechanisms to aggregate green loans into higher-value assets, deriving guidance from developments in green Asset-Backed Securities (ABS) in the United States (US), Canadian, Australian, and EU markets (Climate Bonds Initiative 2018).

For covered green bonds backed by their issuers, a reason accounting for the insipid demand within Southeast Asian green bond markets may be the low credit ratings of sovereign bonds. Considering that the issuers of such bonds tend to be governments (Climate Bonds Initiative 2017b), the demand for green bonds relies on the credit ratings of governments. Sovereign bonds issued by the Philippines and Thailand have been deemed moderately risky at Moody's credit ratings Baa2 and Baa1, respectively (Rating: Moody's Philippines Credit Rating 2018, 2018; Rating: Moody's Thailand Credit Rating 2018, 2018). This may translate to a persistent gloomy outlook on green bonds in these countries as well.

However, positive externalities may accrue to the Southeast Asian green bond markets with growth in such markets elsewhere. Knowledge on the risk associated with green bonds is likely to transcend geographical boundaries and diffuse into Southeast Asia. China Railway Corporation is the world's largest issuer of green bonds (Climate Bonds Initiative 2017a). Considering that the PRC is heavily invested in Southeast Asia and is in sufficiently close proximity to the region that ideas, information and expertise are frequently exchanged, the demand for green bonds in Southeast Asia may be positively influenced by the growth of the Chinese green bond market.

ASEAN member states have recently established a codified and uniform set of criteria for bonds to be considered green (ASEAN CMF 2017), signaling a new focus on this energy investment tool. This is a step in the right direction. As green bonds are set to become an integral part of energy efficiency financing, Southeast Asian states must promote the growth of local green bond markets to facilitate investment in a sustainable future.

According to ICMA's Green Bond Principles, proceeds from green bonds can be used to fund projects that contribute to environmental sustainability, such as renewable energy, energy efficiency, pollution prevention/control, clean transportation, climate change adaptation, and green buildings. Green bond proceeds can be used to fund energy efficiency improvements in new and refurbished buildings, energy storage, district heating, smart grids, appliances, and products. Green buildings include energy efficiency improvements to meet regional, national, or internationally recognized standards or certifications.

Despite there being a great variety of projects eligible to use green bonds' proceeds, most of green bonds' proceeds are used to fund renewable energy, energy efficiency, and green buildings.

2.3 Barriers for Issuing Green Bonds in ASEAN Countries

Green finance is still at an early stage in ASEAN countries and it faces several critical challenges. These challenges exist both for issuers of green bonds and investors. Two distinct challenges that have been found in the literature for issuers include limited credit absorption capacity and costs of meeting green bond requirements. Challenges for investors include a limited investment pipeline, lack of data and analytical ability, and a lack of green bond indices, listings, and ratings.

Small and medium-sized enterprises are devoid of access to the process of issuing green bonds due to their small size and limited credit absorption ability (Chang 2019). Green bonds are therefore a way of raising finance for bigger entities. This acts as a barrier for expanding the green bond market. While bigger markets, such as the PRC, can sustain a market for green bonds due to the sheer number of big entities soliciting green finance, a lack of domestic market due to unavailability of appropriate projects in countries such as Singapore acts as a major impediment in universalizing green bonds (Chang 2019).

Third-party assurance providers, such as specialized research agencies, are responsible for verifying the "green bond" status and monitoring the use of bond proceeds by issuers. However, potential users are not aware of how to complete the third-party review process. The high costs of obtaining a third-party opinion, which could range from \$10,000–\$100,000, is also a hinderance for small issuers. Although Singapore and Malaysia have established grants to cover the costs of external review, these costs still exist in other ASEAN countries. In addition, issuers have also voiced concerns about the high costs of disclosure requirements (UNEP 2016).

A major challenge for issuing green bonds for investors in ASEAN countries is that the green investment pipeline of commercially viable projects is limited. According to industry experts, currently only 45% of renewable energy projects in Southeast Asia are bankable without the support of the public sector (Koh 2017). Marsh and McLennan have estimated that 60% of all infrastructure projects in Asian emerging markets are not "bankable", unless there is non-commercial financing from the public sector. The paucity of green investments in a country means that it is hard to have a portfolio of commercially viable green assets. Due to these assets being in multiple countries, currency risk can make the investment more expensive.

There is also a lack of comparable disclosure from companies that makes it difficult for financial decision makers to assess project risk and for companies to raise green finance (DBS 2017). Comprehension of financial implications of environmental variables is still at a nascent stage. In several financial institutions, the understanding of green investment market and credit risk is relatively low. This hampers effective risk

management and can lead to a misallocation of capital to risky projects. This would then limit the availability of green finance (DBS 2017a).

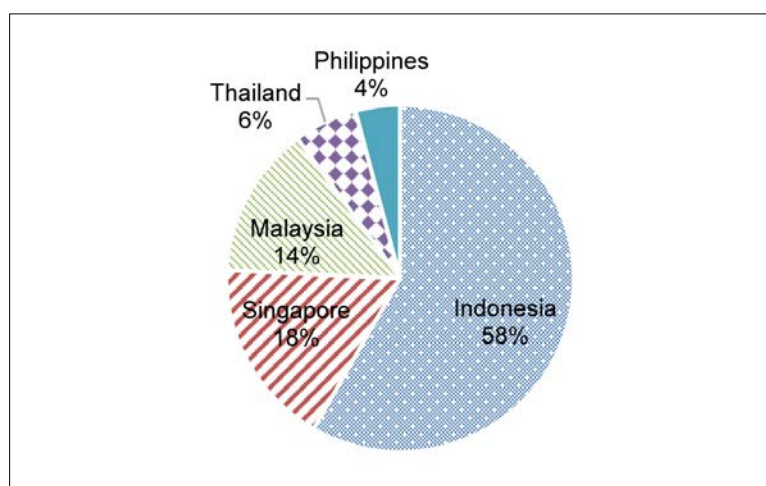
Green bond listing criteria that are implemented by stock exchanges can guide bond investors to securities that meet their investment preferences. This would result in an increased flow of funds, thereby reducing funding costs for issuers of green bonds. Green bond indices also help investors match their preferences to specific green securities and can have similar benefits. Green bond ratings incorporate environmental information into bond ratings and help the market in aligning green bonds with international standards. However, a very small number of green bond listings, indices, and ratings are available that promote green products and policies (UNEP 2016).

3. RECENT TRENDS OF GREEN BOND ISSUANCE IN ASEAN COUNTRIES

3.1 Green Bond Issuance in ASEAN Countries

This section presents the trends of issuance of green bonds in ASEAN countries, and compares them across ASEAN countries and with the trends of global issuance of green bonds. Five out of ten ASEAN countries have issued green bonds, i.e., Indonesia, Thailand, Malaysia, Singapore, and the Philippines (according to Bloomberg terminal as of June 2019). From 2018 Indonesia joined Singapore and Malaysia in issuing green bonds. In 2019 Philippines and Thailand started to issue green bonds. The issuance of green bonds in ASEAN countries was pioneered by Malaysia and Singapore. Although Indonesia started to issue green bonds a year later than Singapore and Malaysia, Indonesia became the largest issuer of green bonds (58%) in ASEAN countries (as of June 2019), followed by Singapore (18%) and Malaysia (14%) (Figure 4).

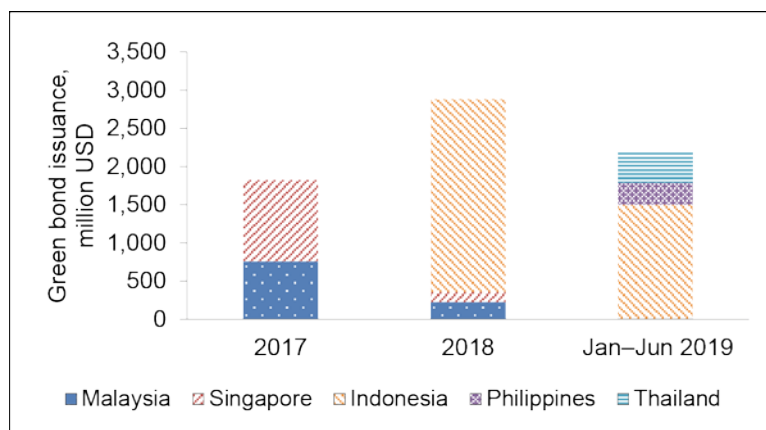
Figure 4: Issuance of Green Bonds in ASEAN Countries (as of June 2019)



Source: Authors' own based on data from Bloomberg terminal.

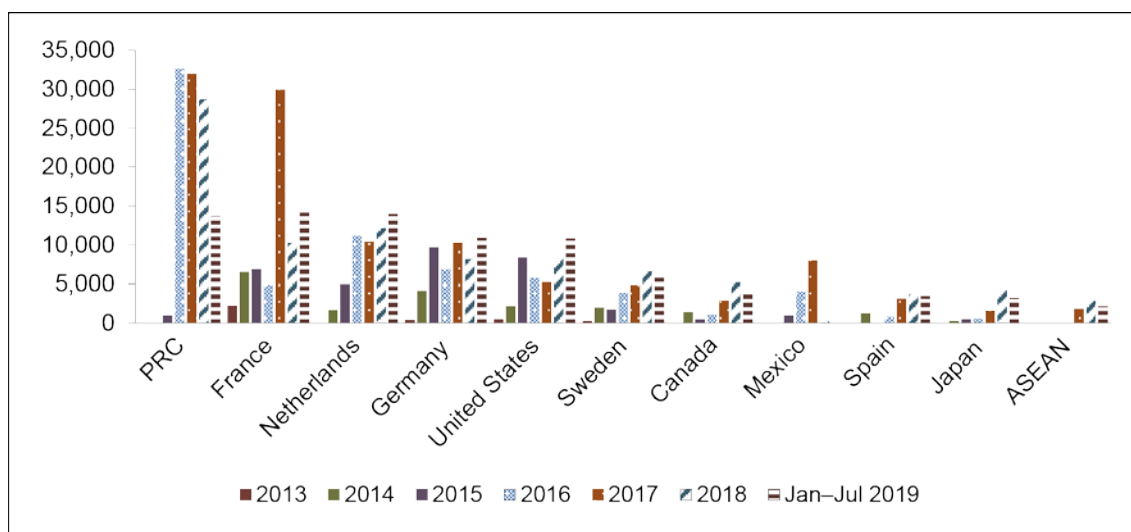
The issuance of green bonds in ASEAN countries is growing, as is the number of countries issuing green bonds (Figure 5). Nevertheless, ASEAN countries are not among the global top 10 largest issuers of green bonds (Figure 6). ASEAN countries issue significantly fewer green bonds than the global top five issuers, i.e., the PRC, France, Germany, the US, and the Netherlands. ASEAN countries are less experienced in issuing green bonds than the top global issuers. ASEAN countries have issued green bonds only since 2017, while many top global issuers started a few years earlier, in 2014–2015.

Figure 5: Green Bond Issuance in ASEAN Countries



Source: Authors' own based on data from Bloomberg terminal.

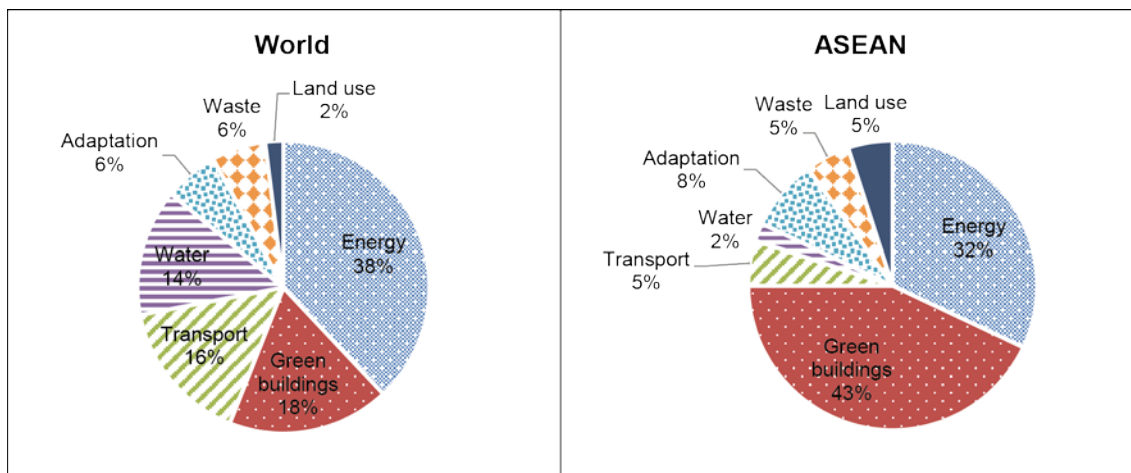
Figure 6: Green Bond Issuance by Top 10 Issuing Countries in the World and ASEAN Countries



Source: Authors' own based on data from Bloomberg terminal.

Globally, most green bond proceeds are used for energy (38%), which includes renewable energy and energy efficiency improvements (Figure 7). However, in ASEAN countries, most green bond proceeds are used for green buildings (43%). Use of green bond proceeds for green buildings is driven by two ASEAN countries: Singapore and Malaysia. One-third of green bond proceeds were used for energy, mainly geothermal and solar, in ASEAN countries. This is driven by three ASEAN countries: Indonesia, Thailand, and the Philippines.

Figure 7: Use of Green Bond Proceeds in the World (left) and in ASEAN Countries (right) (as of November 2018)

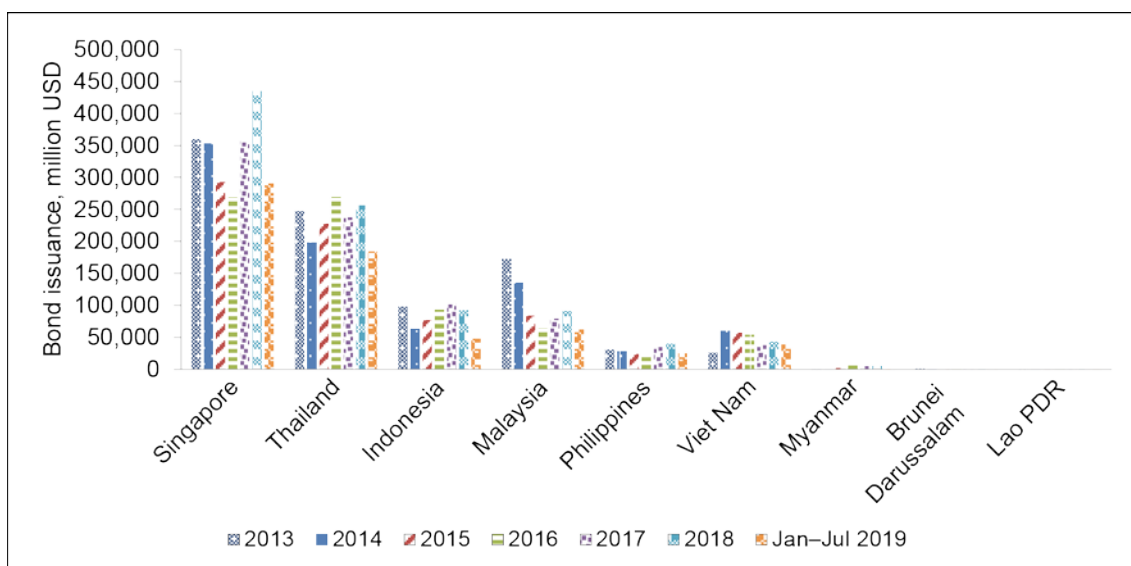


Source: Authors' own based on data from Frandon-Martinez and Filkova (2018).

3.2 Conventional Bond Issuance in ASEAN Countries

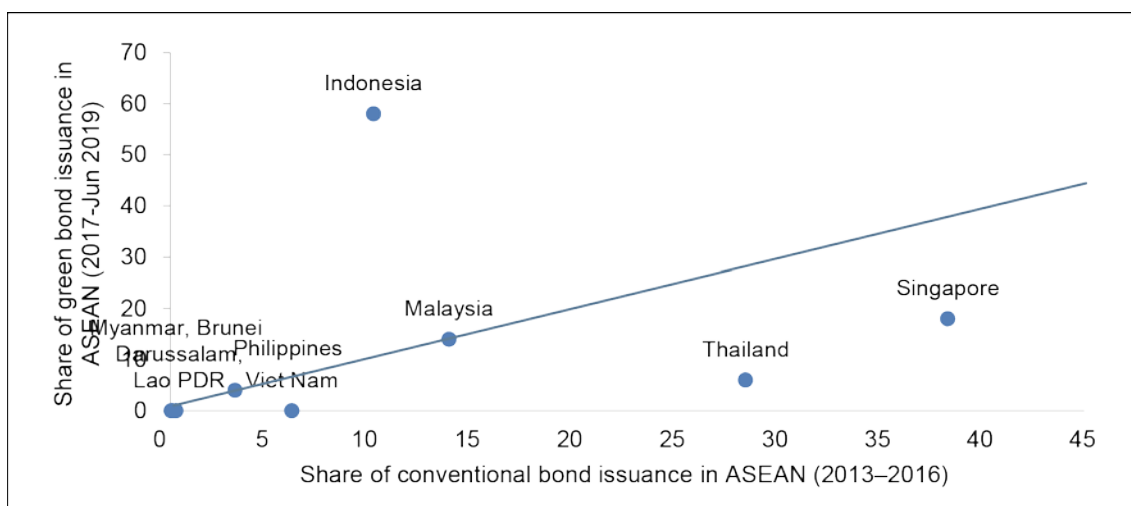
Although Singapore and Thailand are the most experienced issuers of conventional bonds in ASEAN countries (Figure 8), they issued fewer green bonds than Indonesia (Figure 4). Figure 8 demonstrates share of issuance of conventional and green bonds in ASEAN countries. Issuance of green bonds by countries located on the 45° line (Malaysia, Myanmar, Brunei Darussalam, the Lao PDR, and Cambodia) can be explained by experience (or lack of experience) in issuing conventional bonds. Issuance of green bonds by countries located under the 45° line (Indonesia) or below (Thailand, Singapore, and Viet Nam) cannot be explained by experience in issuance of conventional bonds. Although Indonesia is less experienced in issuance of conventional bonds, it is the largest issuer of green bonds in ASEAN countries. While Singapore and Thailand are the largest issuers of conventional bonds, they have issued fewer green bonds than Indonesia.

Figure 8: Issuance of Conventional Bonds in ASEAN Countries



Source: Authors' own based on data from Bloomberg terminal.

Figure 9: Issuance of Conventional and Green Bonds in ASEAN Countries (%)

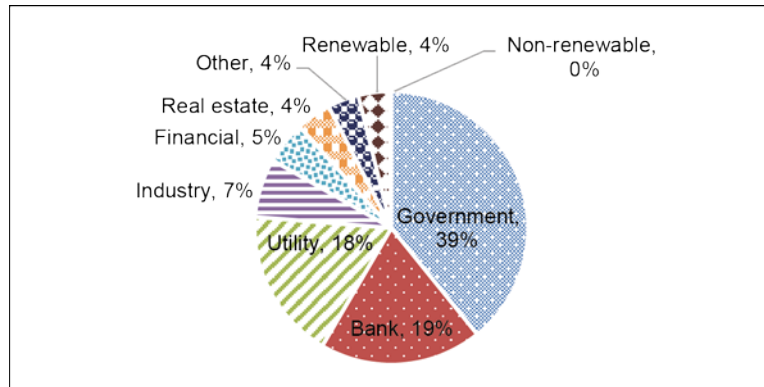


Source: Authors' own based on data from Bloomberg terminal.

3.3 Government/Sovereign Green Bond Issuance in ASEAN Countries

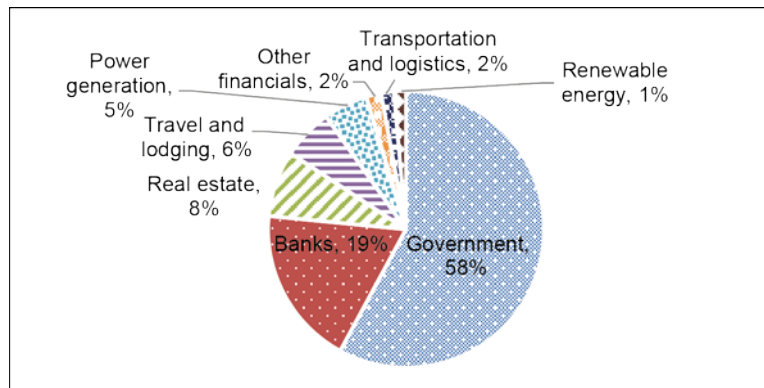
The issuance of green bonds is dominated by the government and financial sector and underrepresented by power generation and renewable energy sectors, both in the world (Figure 10) as well as in ASEAN countries (Figure 11). However, the share of government green bonds in ASEAN countries (58%) is higher than globally (39%). Energy sectors such as power generation (utility) and renewable energy have a small share in green bond issuance globally (18% and 4%, respectively). However, in ASEAN countries, shares of these two sectors are even smaller (5% and 1%, respectively).

Figure 10: Global Issuers of Green Bonds by Sector



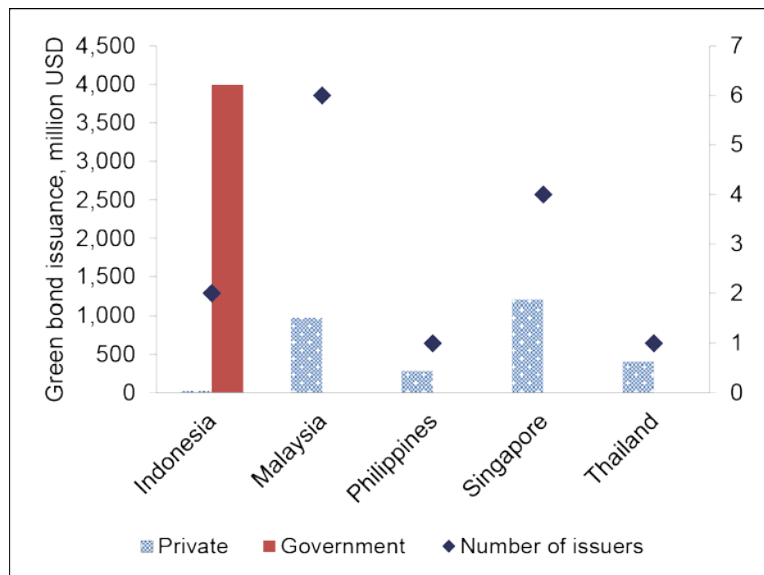
Source: Authors' own based on data from Bloomberg terminal.

Figure 11: Issuers of Green Bonds by Sector in ASEAN



Source: Authors' own based on data from Bloomberg terminal.

Figure 12: Government and Private Issuance of Green Bonds in ASEAN Countries (2017-Jun 2019)

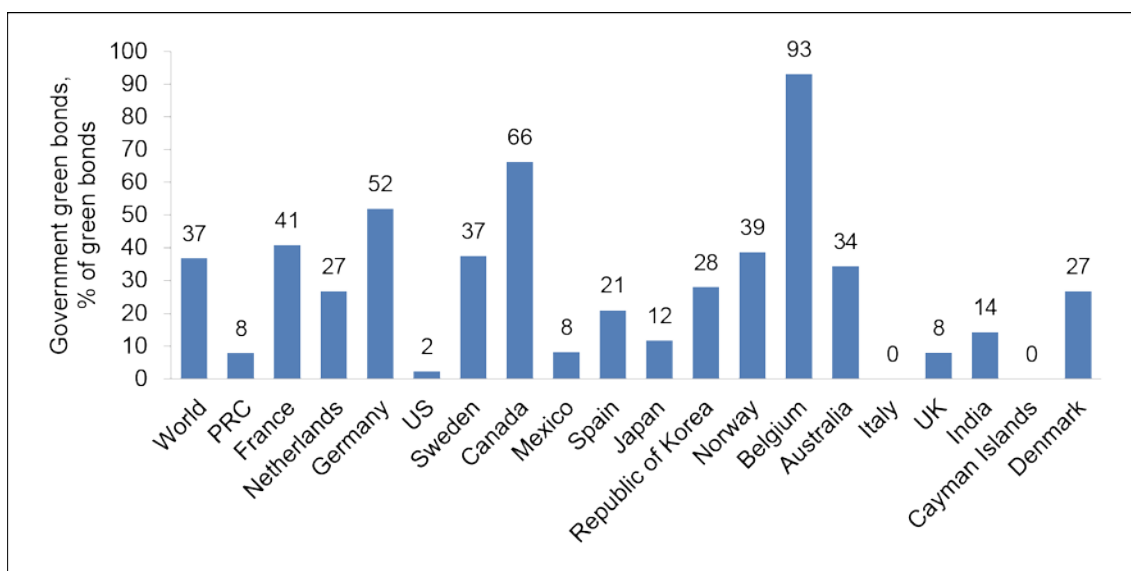


Source: Authors' own based on data from Bloomberg terminal.

A large share of government green bonds in ASEAN countries are driven by Indonesia (Figure 12). 99% of green bonds issued in Indonesia are issued by government, while in other ASEAN countries, bonds were issued by the private sector.

A large portion of government green bond issuance is not unique to ASEAN countries. Globally many countries have a high proportion of government green bonds (Figure 13). Thirty seven percent of all green bonds in the world are issued by governments (as of June 2019).

Figure 13: Share of Government Green Bonds in Total Issuance of Green Bonds in the World and in the Top 20 Issuing Countries (as of June 2019)
(%)



Note: countries are sorted by the issuance of green bonds in descending order from left to right.

Source: Authors' own based on data from Bloomberg terminal.

4. POLICIES PROMOTING FINANCING OF ENERGY EFFICIENCY USING GREEN BONDS IN ASEAN COUNTRIES

This section reviews issuance of green bonds and national policies supporting them in the top three green bond issuing countries in the ASEAN region, i.e., Singapore, Malaysia, and Indonesia. In this paper we include green bonds issued in Singapore, Malaysia, and Indonesia that are listed on the Singapore Stock Exchange (SGX), Kuala Lumpur Stock Exchange and Indonesia Stock Exchange (respectively), regardless the country of the issuer.

4.1 Singapore

The Singapore government made clear its intentions and political commitment to reduce greenhouse gas emissions with the introduction of carbon tax in 2019 and the following targets (UNFCCC 2015):

- emissions intensity reduction by 36% from 2005 levels by 2030;
- emissions peak around 65 MtCO₂e by 2030;
- 1 gigawatt-peak (GWp) of solar power beyond 2020;
- 80% of buildings in Singapore to be green by 2030.

The central bank of Singapore, Monetary Authority of Singapore (MAS), implemented a 3-year Green Bond Grant Scheme (GBGS) in 2017, which was later modified into a Sustainable Bond Grant Scheme (SBGS). GBGS, announced in March 2017,¹ reduces the cost of issuance of green bonds by covering the cost of external review, which is a mandatory requirement for labeling bonds as “green”. This external review is not required for generic bonds. GBGS is a great incentive for green bond issuance as the cost of external review is one of the key barriers at the early stage of green bond issuance (Kidney 2017). GBGS covers the entire reviewing cost up to S\$0.1 million (\$0.07 million) and is only available until May 2020. Similar green bond subsidies to cover the cost of external review are provided in Hong Kong, China (since June 2018)² up to HK\$0.8 million (\$0.1 million), Japan up to JPY50 million (\$0.5 million), and Malaysia 90% up to RM0.3 million (\$0.07 million).

MAS decided against introducing national green bond standards similar to what was done in the EU, India, and the PRC, among other countries, and has instead acknowledged international green bond standards like International Capital Market Association’s (ICMA) Green Bond Principles (GBP), Climate Bond Initiative’s Climate Bond Standards and ASEAN Capital Market Forum’s (ACMF) ASEAN Green Bonds Standards (ASEAN GBS). GBGS accepting existing international standards makes Singapore an attractive destination for not only Singaporean issuers, but also for international issuers to list their bonds on the SGX.

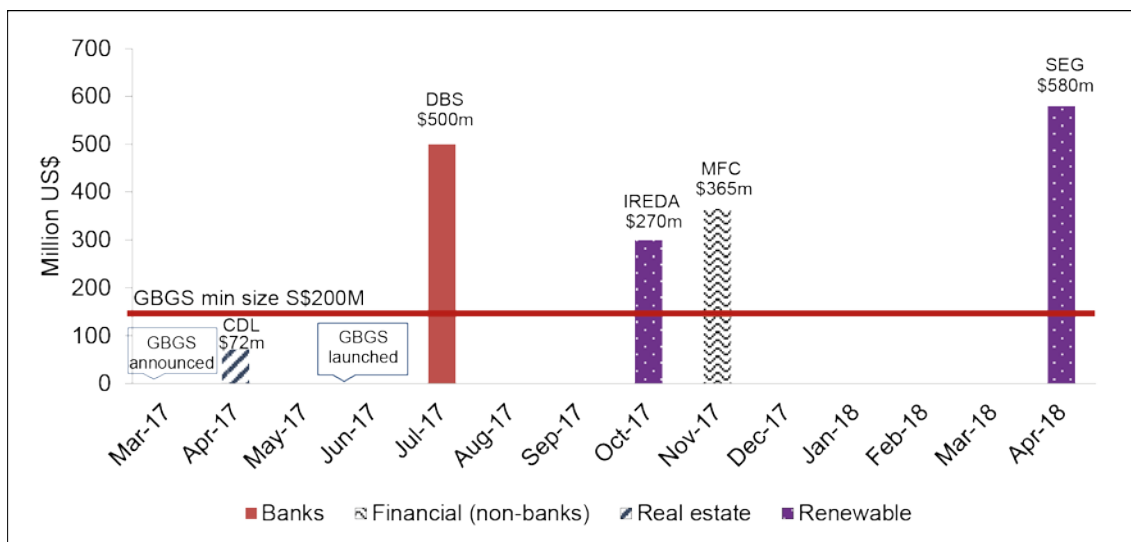
Green bonds were issued in Singapore by City Developments Limited (CDL), DBS Bank, Indian Renewable Energy Development Agency (IREDA), Manulife Financial Corporation, and Star Energy Geothermal Limited in 2017–2018 (Figure 14). Singapore’s GBGS attracted the first-time issuers of green bonds. Interestingly, even green bonds which did not qualify for the GBGS, such as the one issued by CDL, with a bond price of less than S\$200 million and tenure below three years, were issued in Singapore (Figure 14 and Table 1).

Proceedings of green bonds issued in Singapore were used to finance low-carbon projects not only in Singapore, but also in other countries in Asia and North America.

¹ <http://www.mas.gov.sg/News-and-Publications/Speeches-and-Monetary-Policy-Statements/Speeches/2017/Keynote-Address-at-the-Investment-Management-Association-of-Singapores-20th-Anniversary-Conference.aspx>.

² <https://www.info.gov.hk/gia/general/201806/15/P2018061500373.htm>.

Figure 14: Issuance of Green Bonds in Singapore



CDL = City Developments Limited (Singapore), DBS = DBS bank (Singapore’s local bank), IREDA = Indian Renewable Energy Development Agency, MFC = Manulife Financial Corporation (Singapore), SEGL = Star Energy Geothermal Limited, GBGS = Green Bond Grant Scheme.

Source: Authors’ own based on data from Bloomberg terminal.

Table 1: Qualification Criteria for Green Bond Grant Scheme

Criteria	Qualification	CDL	DBS	IREDA	Manulife	SEGL
Sector	Any	Real estate	Bank	Government	Life insurance	Energy
Issuance, place	SG	SG	SG	SG	SG	SG
Listing, place	SGX	SGX	SGX	SGX	SGX	SGX
Principal, mln	S\$200	S\$100	\$500	INR19.5M (\$300, S\$405)	S\$500 (\$368.8)	\$580
Tenure, years	≥3	2	5	5	12	15
ICMA GBP	Any	✓	✓		✓	✓
CBI CBS		✓		✓		✓
ASEAN GBS						✓
Company location	Any	SG	Singapore	IN	SG HQ in Canada	ID
Coupon	Any	1.98% due in 2019	Quarterly coupon of 3-month US\$ LIBOR + 0.62%	Annual coupon of 7.125%.	3% for 7 years, 0.832% 5 - year SG\$ swap rate after.	semi-annual coupon of 6.75%
Currency	Any	US\$	US\$	INR	SG\$	US\$
Project	Green	Green building	Green building	Renewable energy	Renewable energy	Renewable energy
Project location	Any	SG	SG	IN	Canada and US	ID
Refinancing	Allowed	Yes	Yes	No	No	Yes

SG = Singapore, SGX = Singaporean stock exchange, LIBOR = London Interbank Offered Rate, MM = billion, M = million, INR = Indian rupee, In = India, ID = Indonesia, SG\$ = Singapore dollar, CDL = City Developments Limited, DBS = DBS bank, IREDA = Indian Renewable Energy Development Agency, MFC = Manulife Financial Corporation, SEGL = Star Energy Geothermal Limited, GBGS = Green Bond Grant Scheme, CBI CBS = Climate Bond Initiative’s Climate Bond Standard, ICMA GBP = International Capital Market Association’s Green Bond Principles, ASEAN GBS = ASEAN Capital Markets Forum’s ASEAN Green Bond Standards.

Note: Highlighted in gray are those not meeting the GBGS requirements.

Source: Authors’ own based on data from Bloomberg terminal.

4.2 Malaysia

The Malaysian government made clear its intentions and political commitment to reduce greenhouse gas emissions by setting the following targets:

- reduction of greenhouse gas emissions by 45% by 2030 in relation to their 2005 GDP. This target was set with 35% on unconditional and 10% on conditional basis upon receipt of climate finance funding, capacity building and technology transfers from developed countries;
- reduction of carbon intensity by 40% by 2020;
- reduction of 13.113 million tons CO₂ emissions for year 2020;
- reduction of additional 62 million–89 million cars between 2020–2030 through the launch of the Mass Rapid Transit system.

The Securities Commission Malaysia launched the Sustainable and Responsible Investment (SRI) Sukuk Framework in August 2014 to facilitate the financing of SRI Initiatives. Eligible projects include those relating to natural resources, renewable energy and energy efficiency, community and economic development and waqf³ properties and assets (Securities Commission Malaysia 2014, 2017). Multiple incentives have been instituted to attract green issuers, including tax deductions on the issuance costs of SRI sukuk, a grant scheme to offset independent expert review costs incurred by issuers, and tax exemptions for recipients under the Green SRI Sukuk Scheme from year of assessment 2018 to 2020.

The Green Bond Grant implemented by the Malaysian Government from July 2017 assists the issuers of the green Sustainable and Responsible Investment Sukuk. The grant partially covers the costs of offering the financial instrument, like for the cost of external review. Capital Markets Malaysia, a part of the Securities Commission Malaysia, administers the SRI Sukuk Grant Scheme. Under this scheme, institutions that issue green bonds to finance environmentally sustainable projects compliant with the SRI Sukuk Framework can claim 90% of the costs of independent review up to a maximum of MYR300,000 (\$77,536) per bond issuance (Table 2). Subsidizing the initial issuance costs levels the playing field between non-green bond issuers and green bond issuers. The grant can be availed by both foreign and domestic issuers, regardless of currency, provided it is issued in Malaysia. These grants are also tax-exempt, provided applications are received before December 2020.

The SRI Sukuk grant launched in July 2017 attracted a number of SRI Sukuk issuers (Figure 15). Although the SRI Sukuk grant is open for both foreign and domestic issuers, SRI Sukuk grant has attracted domestic issuers. This could be due to a requirement to follow Malaysia's SRI Sukuk Framework and a lack of internationally recognized standards and guidelines for Islamic green bonds.

³ "Islamic endowment – a voluntary and irrevocable endowment of Shariah-compliant assets for Shariah-compliant purposes" (Securities Commission Malaysia 2014, 2017).

Table 2: Qualification Criteria for SRI Sukuk Grant Scheme

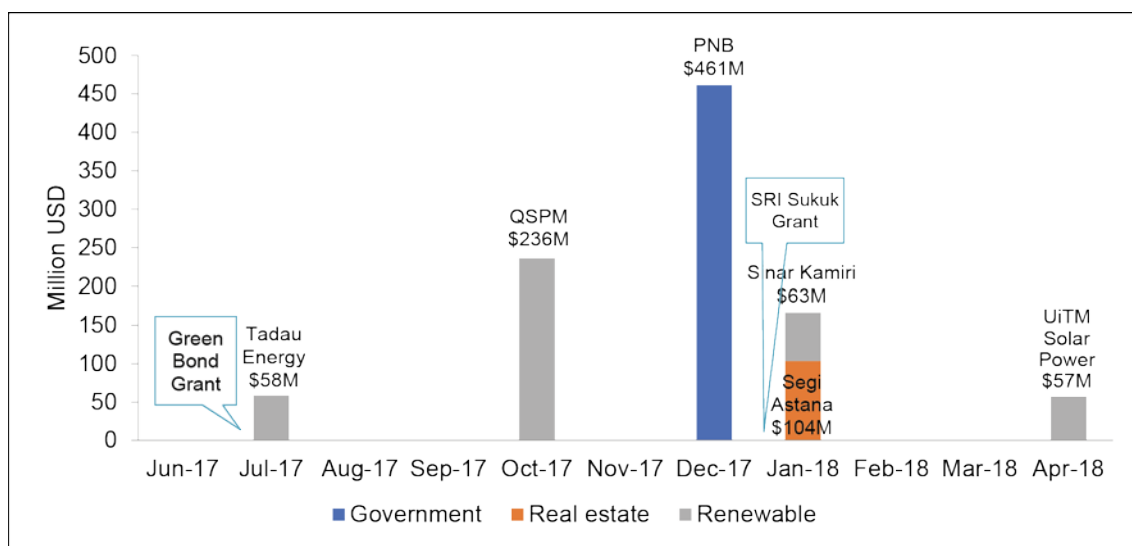
Criteria	Qualification	Mudajaya Group Bhd (Sinar Kamiri)	Segi Astana Sdn Bhd	Permodalan National Bhd	Quantum Solar Park Malaysia Sdn Bhd	Tadau Energy	UiTM Solar Power Sdn Bhd
Sector	Any	Renewable energy	Real estate	Government	Renewable energy	Renewable Energy	Renewable energy
Company location	Any	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia
Issuing, place	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia
Listing, place	KLSE	KLSE	KLSE	KLSE	KLSE	KLSE	KLSE
SRI Sukuk Framework	Compulsory	✓	No ⁴	✓	✓	✓	✓
Principal, USD million	NA	63	104	461	236	58	57
Refinancing	Allowed	No	Yes	No	No	No	No
Project	SRI projects ^a	Renewable (solar)	Green building	Green building	Renewable (Solar)	Renewable (solar)	Renewable (solar)
Project location	NA	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia	Malaysia

NA = not available, KLSE = Kuala Lumpur Stock Exchange.

^aEligible SRI projects refer to projects that aim to—(a) preserve and protect the environment and natural resources; (b) conserve the use of energy; (c) promote the use of renewable energy; (d) reduce greenhouse gas emission; or (e) improve the quality of life for the society” (Securities Commission Malaysia 2017, p. 66).

Source: Authors’ own based on data from Bloomberg terminal.

Figure 15: Issuance of Green Bonds listed on Kuala Lumpur Stock Exchange (Malaysia)



GBG = Malaysia’s Green Bond Grant, QSPM = Quantum Solar Park Malaysia, PNB = Permodalan National Berhad, UiTM = UiTM Solar Power Sdn Bhd.

Source: Authors’ own using data from Bloomberg terminal.

⁴ Own corporate green bond framework.

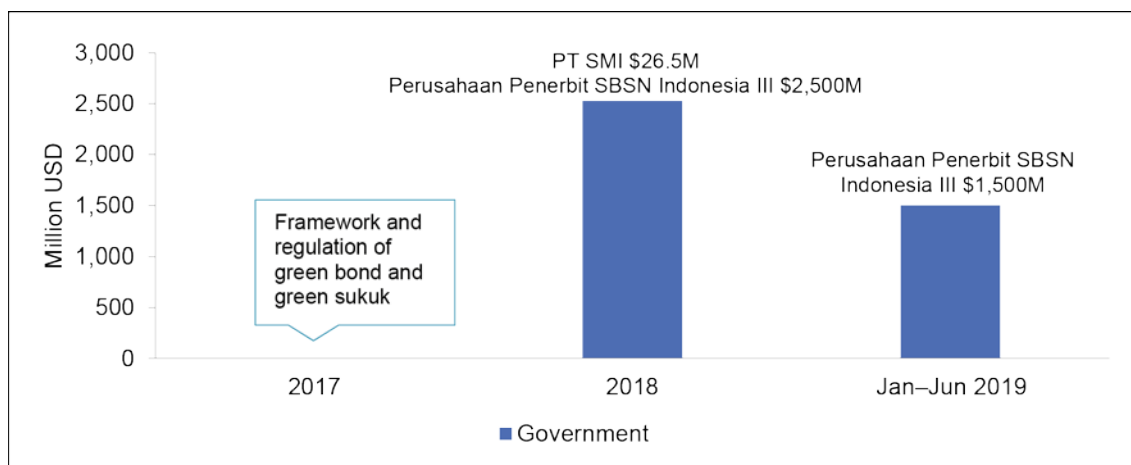
4.3 Indonesia

The Indonesian government made clear its intentions and political commitment to reduce greenhouse gas emissions with the following targets (IRENA 2017):

- 29% reduction in greenhouse gas emissions by 2030 compared to a business-as-usual scenario;
- renewables provide 23% of total primary energy supply by 2025, and 31% by 2050;
- 6,400 MW of solar and 1,800 MW of wind by 2025.

In 2017, the Government of Indonesia set its own national framework and regulation for green bond issuance, as well as the national Green Bond and Green Sukuk Framework (Figure 16). According to these frameworks, the proceeds of green sukuk or green bonds will be used only to finance and/or re-finance “Eligible Green Projects”. Projects should either be related to renewable energy, energy efficiency, resilience to climate change or disaster risk reduction, sustainable transport, waste to energy and waste management, sustainable management of natural resources, green buildings, green tourism, and sustainable agriculture. Eligible green projects do not include those relating to new fossil-fuel-based electric power generation capacity, large scale hydro plants, or nuclear and nuclear-related assets. The Republic of Indonesia, represented by the National Development Planning Agency and the Ministry of Finance, will review and approve projects, budget allocation, and subsidies to be included in the State Budget. In 2015, the Republic of Indonesia had introduced a system for “tagging” of ministry budgets with support of the UNDP to identify expenditures on projects that help meet Indonesia’s climate action objectives. The proceeds of each green bond or green sukuk can be used for financing and/or refinancing eligible green projects (Table 3). The ministry of finance in the Republic of Indonesia will also prepare a green bond and green sukuk report that briefly describes the projects to which green bond and green sukuk proceeds have been allocated, the amount of proceeds allocated and an estimation of beneficial impact arising from the implementation of the Eligible Green Projects. Indonesia will also engage an independent third party to analyze the compliance of each issued green bond and green sukuk with its respective framework and to provide assurance on its annual green bond and green sukuk report.

Figure 16: Issuance of Green Bonds listed on Indonesia Stock Exchange



Data source: Bloomberg terminal.

Table 3: Qualification Criteria of Indonesia’s Framework and Regulation of Green Bond Issuance

Qualification Criteria	GBGSF	PT SMI	PT SMI	PPSI-III	PPSI-III	PPSI-III	PPSI-III
Sector	Any	Government	Government	Government	Government	Government	Government
Issuing Place		Indonesia	Indonesia	Indonesia	Indonesia	Indonesia	Indonesia
Listing Place		IDX	IDX	IDX	IDX	IDX	IDX
Principal, USD mln	Any	17.33	9.17	750	1,250	750	1,250
Tenure, years	Any	5	3	5	5	5	5
Project location	Indonesia	Indonesia	Indonesia	Indonesia	Indonesia	Indonesia	Indonesia
Project	“Green eligible project” ^a	NA	NA	NA	NA	NA	NA
Re-finance	Allowed	NA	NA	NA	NA	NA	NA

GBGSF = Indonesia’s Green Bond and Green Sukuk Framework, PTI SMI = Sarana Multi Infrastuktur, PPSI-III = Perusahaan Penerbit SBSN Indonesia III, IDX = Indonesia Stock Exchange.

^a Eligible green projects must fall into at least one of the following sectors: renewable energy, energy efficiency, resilience to climate change or disaster risk reduction, sustainable transport, waste to energy and waste management, sustainable management of natural resources, green tourism, green buildings, and sustainable agriculture (The Republic of Indonesia 2017, p. 3–5).

Source: Authors’ own based on data from Bloomberg terminal.

5. DISCUSSION AND POLICY RECOMMENDATIONS

Using the data from Bloomberg terminal as of July 2019 and other sources, this paper reviews the issuance of green bonds and policies supporting green bond issuance in ASEAN countries. Green bond issuance in ASEAN countries started only few years ago in 2017, but is growing fast. The proceeds from green bonds issued in ASEAN countries are mostly used for green buildings and energy. This paper reviews in detail green bond issuance and policies supporting green bond issuance by the top three largest issuers in ASEAN countries, i.e. Indonesia, Singapore, and Malaysia. The issuance of green bonds in the Philippines and Thailand were not reviewed in detail, as green bonds were issued in these two countries only recently, in 2019.

The issuance in Indonesia, Singapore, and Malaysia is driven by the support from the government. However how governments support green bond issuance differs across countries. The issuance of green bonds in Indonesia is driven by the government issuance of green bonds. 99% of all green bonds in Indonesia are issued by the Indonesian government. The issuance of green bonds in Singapore and Malaysia is driven by the private sector, but incentivized by government policies supporting green bond issuance, such as green bond grant schemes and tax incentives. Several policies supporting green bond issuance are implemented in ASEAN countries: green bond grant schemes, tax incentives, green bond standards/frameworks, etc. (Table 4). Policies supporting green bonds in Singapore, Indonesia, and Malaysia are listed in Table 4. Table 5 summarizes the differences and similarities of requirements of green bond grants in Singapore; Malaysia; Hong Kong, China; and Japan.

Table 4: List of Green Bond Policies in ASEAN Countries

Country	Authority	Policy Title	Issue
Indonesia	Bank of Indonesia	Green Lending Model Guidelines for Mini Hydro Power Plant Projects	2012
	Bank of Indonesia	Government Regulation on Social and Environmental Responsibility of Limited Liability Companies	2012
	OJK (Financial Services Authority)	Roadmap for Sustainable Finance in Indonesia 2015-2019	2014
	OJK (Financial Services Authority)	Framework and Regulation for Green Bond Issuance	2017
	Directorate general of budget financing and risk management Ministry of Finance	Green Bond & Green Sukuk Framework	2017
Singapore	Singapore Stock Exchange	Guide to Sustainable Reporting for listed Companies	2010
	Monetary Authority of Singapore (Central Bank)	Green Bond Grant Scheme	June 2017
	Monetary Authority of Singapore (Central Bank)	Sustainable Bond Grant Scheme	June 2019
Malaysia	Securities Commission	SRI Sukuk Framework	August 2014
		Tax Deduction on the Issuance Costs of SRI Sukuk	2017–2020
		Tax Exemption for Recipients Under the Green SRI Sukuk Grant Scheme	2018–2020
	Capital Markets Malaysia	Green Bond Grant Scheme	July 2017
		Green SRI Sukuk Grant Scheme	January 2018

Source: Authors' own based on data from Volz (2018) and governments' official websites.

Green Bond Standards

The Indonesian government set its own national standards of green bonds, “Framework and regulation for green bond issuance,” in 2017. Soon after this, the Indonesian government started to issue green bonds following its own standards. The Malaysian government set the SRI Sukuk framework in 2014. The central bank of Singapore did not produce its own standards, but rather accepts any internationally recognized standards, including ASEAN green bond standards. This allows the Singapore Stock Exchange to attract international issuers of green bonds.

Public Issuance of Green Bonds

Growth of green bonds issuance in Indonesia is driven by public issuance of green bonds. 99% of green bonds listed on the Indonesian Stock Exchange are issued by the Indonesian government. Public issuance of green bonds could be by city municipalities, development banks, and governments with the objective to provide initial market product pipelines and liquidity, engage investors, and educating them about green bonds.

Green Bond Grant

Green bond grants reduce the cost of labeling bonds “green”. Green bond grants are provided in Malaysia and Singapore in order to promote listing of green bonds on the Malaysian and Singapore (respectively) stock exchange. Both green bond grant schemes are set for three years as a temporary measure to boost green bond issuance. Both schemes allow users to claim up to \$0.07 million to cover the cost of external review. However, there are some differences in these grant schemes.

Table 5: Comparison of Green Bond Grant Schemes and Their Eligibility Criteria

	Singapore	Singapore	Malaysia	Hong Kong, China	Japan
<i>Description</i>					
Grant title	Green Bond Grant Scheme	Sustainable Bond Grant Scheme	Green SRI Sukuk Grant		Financial Support Programmed for Green Bond Issuance (Subsidy Project)
Grant administrator	Monetary Authority of Singapore (central bank)	Monetary Authority of Singapore (central bank)	Capital Markets Malaysia	Hong Kong Financial Services and Treasury Bureau	Ministry of Environment
Grant budget	NA	NA	RM6M (US\$1.55M)	NA	NA
External reviewer cost covered by the grant	100% up to SGD 0.1M (USD0.07M)	100% up to SGD 0.1M (USD0.07M)	90% up to RM0.3M (USD0.07M)	100% up to HK\$0.8M (US\$0.1M)	90% up to JPY50M (US\$0.5M) in 2018, JPY40M in 2019 ⁵
<i>Eligibility criteria</i>					
Sector	Any	Any	Any	Any	Any
Issuance, place	Singapore	Singapore	Malaysia	Hong Kong, China	Japan
Listing, place	SGX	SGX	KLSE	HKSE	
Principal, min	S\$200M	S\$200M	NA	HK\$500M (US\$64M)	Any
Tenure, min years	3	1	NA	Any	Any
Green bond standards	Any internationally recognized	Any internationally recognized green/social/sustainability bond	Securities Commission Malaysia SRI Sukuk Framework	Hong Kong Quality Assurance Agency Green Finance Certification Scheme	Japan's Green Bond Guidelines (March 2017)
Company location	Any	Any	Any	Any	Japan
Coupon	Any	Any	Any	Any	
Currency	Any	Any	Any	Any	
Project	Green	Green/social/sustainability	SRI & Waqf ⁶	Green	Green
Project location	Any	Any	Any	Any	Domestic
Grant application period	1 June 2017 to 31 May 2020	February 2019–31 May 2023	from July 2017 until it has been fully utilized	15 June 2018–	

NA = not available, SRI = Sustainable and Responsible Investment, SGX = Singapore Stock Exchange, KLSE = Kuala Lumpur Stock Exchange, HKSE = Hong Kong Stock Exchange.

Source: Authors' own based on information from official websites of the Government of the Hong Kong, China Special Administrative Region, Monetary Authority of Singapore, and Green Bond Issuance Promotion Platform (Japan).

⁵ The upper limit of subsidies gradually decreases each fiscal year.

⁶ "Islamic endowment – a voluntary and irrevocable endowment of Shariah-compliant assets for Shariah-compliant purposes" (Securities Commission Malaysia 2019).

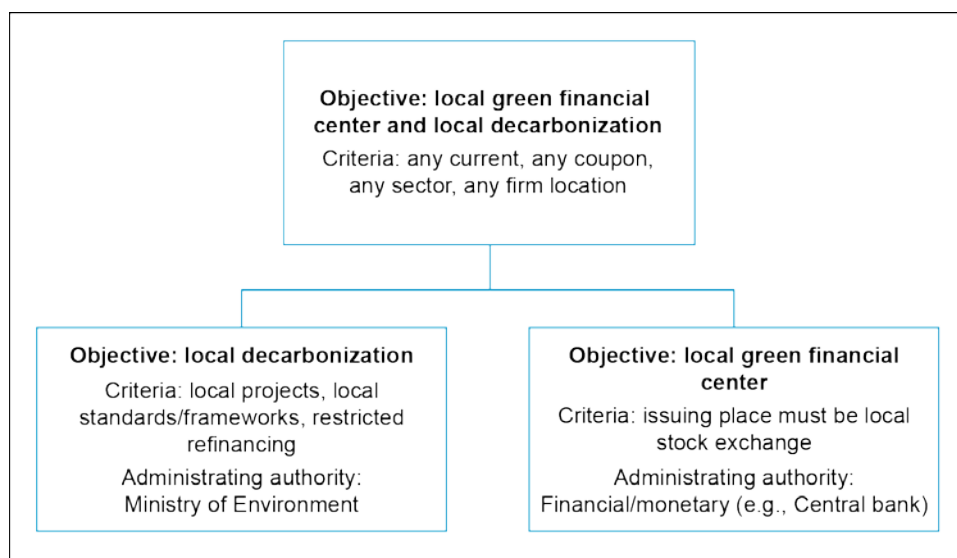
Policy makers should choose the design of green bond supporting policies based on the objective, such as to reduce local greenhouse gas emission or promote green finance. It is very hard to meet both objectives using the same policy. Some qualification criteria of policies supporting green bonds can conflict, such as project location and use of proceeds for refinancing (Table 6 and Figure 17). Policies promoting green bonds in order to reduce local greenhouse gas emissions need to restrict eligibility criteria of such policies to only domestic projects and/or limit use of green bond proceeds for refinancing.

Table 6: Green Bond Policy Qualification Criteria and Policy Objective

Policy Qualification Criteria	Objective: Reduce Local Greenhouse Gas Emission	Objective: Promote Local Green Financial Center
Project location	Domestic only	Anywhere
Use of proceeds for refinancing	Limited/restricted	Allowed
Listing place	Anywhere	Domestic (stock exchange) only
Currency	Any	Any
Issuer location	Anywhere	Anywhere
Coupon	Any	Any
Green bond standards/frameworks	Restricted	Any
Policy examples	Green Bond Subsidy Project in Japan	Green Bond Grant Scheme in Singapore
Grant administrator	Ministry of Environment	Central Bank or other financial/monetary authority

Source: Authors' own.

Figure 17: Design of the Green Bond Grant Scheme



Source: Authors' own.

6. CONCLUSION

Mobilizing finance for energy efficiency projects in ASEAN countries is important not only to combat climate change, but also to meet the rapidly increasing energy demand. While several barriers exist to soliciting energy efficiency and renewable energy investments, green bonds provide a unique opportunity to mobilize finance for energy efficiency and renewable energy projects.

ASEAN countries require \$40 billion of green investment annually until 2030 (DBS 2017a), and to reach this level green investment needs to increase by 400% (DBS 2017a). Green bonds have the potential to fill this investment gap.

Five out of ten ASEAN countries have already issued green bonds, i.e., Indonesia, Thailand, Malaysia, Singapore, and the Philippines (according to Bloomberg terminal as of June 2019). The issuance of green bonds in ASEAN countries is growing, as is the number of countries issuing green bonds. More than half of green bonds in ASEAN countries are issued by the Government of Indonesia. In ASEAN countries, most of green bond proceeds are used for green buildings, while most of green bond proceeds in the world are used for energy.

To make green bonds a more attractive financing option, Malaysia and Singapore disbursed grants to bond issuers to cover the costs of third-party reviews. Policies that subsidize the cost of green bond issuances are especially attractive for first-time issuers and Singapore's grant scheme did attract a number of first-time issuers. Policy instruments such as these were successful in promoting green bond issuances. A proof of that is that Singapore recently extended its 3-year grant scheme for a further three years and has relaxed some eligibility criteria.

Policies subsidizing the cost of green bond issuance are important for the first-time issuers. The main objective of green bond grants in ASEAN countries is to promote green bond issuance in the country. However, this does not mean that green bond grants have led to decarbonization in countries where these bonds were issued. Green bonds proceeds were also used for financing green projects abroad or for refinancing to pay back loans for past projects. In order to ensure that green bond grants support decarbonization in the country where they are issued, policy makers need to limit eligibility criteria only to local projects and/or specify refinancing, such as Japan's green bond grant.

REFERENCES

- ASEAN Capital Markets Forum (CMF). (2017). ASEAN Green Bond Standards, ASEAN CMF, <https://www.theacmf.org/images/downloads/pdf/AGBS2018.pdf>.
- Asian Development Bank. (2018). *Promoting Green Local Currency-Denominated Bonds for Infrastructure Development in ASEAN + 3*.
- Asia Pacific Economic Cooperation (APEC). (2017). Energy Efficiency Finance in Indonesia, Jakarta: APEC.
- Blumstein, C., B. Krieg, L. Schipper, and C. M. York. 1980. "Overcoming social and institutional barriers to energy conservation." *Energy* 5: 355–371.
- Chang, Y. (2019). Green Finance in Singapore: Barriers and Solutions. ADBI Working Paper Series, <https://www.adb.org/sites/default/files/publication/480756/adbi-wp915.pdf>.
- Climate Bonds Initiative (CBI). (2015). *The Paris Green Bonds Statement*, London: Climate Bonds Initiative, <https://www.climatebonds.net/resources/press-releases/paris-green-bonds-statement>.
- . (2017a). *Bonds and Climate Change: The State of the Market 2017*, London: Climate Bonds Initiative, <https://www.climatebonds.net/resources/reports/bonds-and-climate-change-state-market-2017>.
- . (2017b). *Sovereign Green Bonds Briefing*, London: Climate Bonds Initiative, <https://www.climatebonds.net/resources/reports/sovereign-green-bonds>.
- . (2018). *Green Securitisation: Unlocking Finance for Small-Scale Low Carbon Projects*, London: Climate Bonds Initiative, <https://www.climatebonds.net/resources/reports/green-securitisation-unlocking-finance-small-scale-low-carbon-projects>.
- Cochu, A., C. Glenting, D. Hogg, I. Georgiev, J. Skolina, F. Eisinger, and T. Chowdhury. (2016). *Study on the Potential of Green Bond Finance for Resource-Efficient Investments*, European Commission, <https://ec.europa.eu/environment/enveco/pdf/potential-green-bond.pdf>.
- Development Bank of Singapore (DBS). (2017a). *Green Finance Opportunities in ASEAN*, Singapore: DBS, https://www.dbs.com/iwov-resources/images/sustainability/img/Green_Finance_Opportunities_in_ASEAN.pdf.
- . (2017b). *Green Bond Framework*, Singapore: DBS, 1 July, <https://www.dbs.com/iwov-resources/images/sustainability/img/DBS-Green-Bond-Framework.pdf>.
- Frandon-Martinez, Camille and Monica Filkova. (2018). *ASEAN Green Finance: State of the Market 2018*, Climate Bonds Initiative 30 November, https://www.climatebonds.net/files/files/ASEAN_SotM_18_Final_03_web.pdf.
- Hyun, Son, Donghyun Park, and Tian Shu. (2018). *The Price of Greenness: Some Evidence from Green Bond Markets*, Presented at the 5th SEC-PSE Corporate Governance Forum, http://www.sec.gov.ph/wp-content/uploads/2018/11/2018_CGFD_5thSEC-PSECGForumPresentation-ByJosephErnestZveglich.pdf.
- Intergovernmental Panel on Climate Change (IPCC). (2018). *Global Warming of 1.5 °C*, IPCC, <https://www.ipcc.ch/sr15/>.

- International Capital Market Association (ICMA). (2018a). *Green Bond Principles Voluntary Process Guidelines for Issuing Green Bonds June 2018*, Paris: ICMA <https://www.icmagroup.org/assets/documents/Regulatory/Green-Bonds/June-2018/Green-Bond-Principles---June-2018-140618-WEB.pdf>.
- . (2018b). *The Green Bond Market in Asia-Pacific*. Paris: ICMA.
- International Energy Agency (IEA). (2018). *Energy Efficiency 2018: Analysis and outlooks to 2040*, Paris: IEA.
- International Renewable Energy Agency (IRENA). (2017). *Renewable Energy Prospects: Indonesia*, IRENA, March, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2017/Mar/IRENA_REmap_Indonesia_report_2017.pdf?la=en&hash=79237811C02D9722E35F5049ACBA278B126493BB.
- . (2018). *Renewable Energy Market Analysis Southeast Asia*, IRENA, https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2018/Jan/IRENA_Market_Southeast_Asia_2018.pdf.
- Kidney, Sean. (2017). *Hot Off the Press: Singapore's Central Bank Announces Green Bond Grant Scheme to Cover Any Additional Issuance Costs of Going Green – What a Way to Kick-Start the Market!*, Climate Bond Initiative 23 March, <https://www.climatebonds.net/2017/03/hot-press-singapore%E2%80%99s-central-bank-announces-green-bond-grant-scheme-cover-any-additional>.
- Koh, H. (2017). Half of Southeast Asia's Renewable Energy Projects are Unbankable. *Eco-Business*. <http://www.eco-business.com/news/half-of-southeast-asias-renewable-energy-projects-are-unbankable/>.
- Marsh & McLennan Companies. (2017). *Closing the Financing Gap – Infrastructure Project Bankability in Asia*. http://www.oliverwyman.com/content/dam/oliverwyman/v2/publications/2017/jun/Closing_The_Financing_Gap_Infrastructure_Project_Bankability_In_Asia.pdf.
- McCollum, David L., Wenji Zhou, Christoph Bertram, Harmen-Sytze de Boer, Valentina Bosetti, Sebastian Busch, Jacques Després, Laurent Drouet, Johannes Emmerling, Marianne Fay, Oliver Fricko, Shinichiro Fujimori, Matthew Gidden, Mathijs Harmsen, Daniel Huppmann, Gokul Iyer, Volker Krey, Elmar Kriegler, Claire Nicolas, Shonali Pachauri, Simon Parkinson, Miguel Poblete-Cazenave, Peter Rafaj, Narasimha Rao, Julie Rozenberg, Andreas Schmitz, Wolfgang Schoepp, Detlef van Vuuren, and Keywan Riahi. (2018). Energy Investment Needs for Fulfilling the Paris Agreement and Achieving the Sustainable Development Goals. *Nature Energy*, 3(7), 589–599, doi:10.1038/s41560-018-0179-z.
- Ng, Thiam Hee, and Jacqueline Yujia Tao. (2016). Bond Financing for Renewable Energy in Asia, *Energy Policy*, 95:509–517.
- Östlund, Emmi. (2015). *Are Investors Rational Profit Maximisers or Do They Exhibit a Green Preference? – Evidence from the Green Bond Market*. Stockholm School of Economics.
- Petrova, Antoniya. (2016). *Green Bonds: Lower Returns or Higher Responsibility?* Radboud University, Nijmegen School of Management, Master Thesis.
- Rating: Moody's Philippines Credit Rating 2018. (2018). Retrieved 22 November 2018, from <https://countryeconomy.com/ratings/philippines>.

- . (2018). Retrieved 22 November 2018, from <https://countryeconomy.com/ratings/thailand>.
- The Republic of Indonesia. (2017). Green Bond and Green Sukuk Framework, <https://www.djppr.kemenkeu.go.id/uploads/files/dmodata/in/6Publikasi/Offering%20Circular/ROI%20Green%20Bond%20and%20Green%20Sukuk%20Framework.pdf>.
- Securities Commission Malaysia. (2014). *Guidelines on Sukuk*, Securities Commission Malaysia, 28 August 2014, <https://www.sc.com.my/regulation/guidelines/lodge-and-launch-framework>.
- . (2017). *Guidelines on Unlisted Capital Market Products under the Lodge and Launch Framework*, Securities Commission Malaysia, 9 March 2015, revised on 8 November 2017, <https://www.sc.com.my/regulation/guidelines/lodge-and-launch-framework>.
- Securities Commission Malaysia and World Bank Group. (2019). *Islamic Green Finance: Development, Ecosystem and Prospects*, Securities Commission Malaysia, March 2019, <https://www.sc.com.my/api/documentms/download.ashx?id=a86707ce-07e0-4c75-9e45-7ad7bca6f540>.
- Taylor, Robert P., Chandrasekar Govindarajalu, Jeremy Levin, Anke S. Meyer William A. Ward. (2008). *Financing Energy Efficiency*, The World Bank.
- United Nations Environment Program (UNEP). (2016). *Green Bonds: Country Experiences, Barriers and Options*, UNEP, http://unepinquiry.org/wp-content/uploads/2016/09/6_Green_Bonds_Country_Experiences_Barriers_and_Options.pdf.
- United Nations Environment Program (UNEP) DTU Partnership and Copenhagen Centre on Energy Efficiency. (2015). *Accelerating Energy Efficiency: Initiatives and Opportunities – Southeast Asia*, Denmark: Technical University of Denmark, <https://c2e2.unepdtu.org/wp-content/uploads/sites/3/2016/02/c2e2-report-asia.pdf>.
- United Nations Framework Convention on Climate Change (UNFCCC). (2015). *Singapore's Intended Nationally Determined Contribution (INDC) and Accompanying Information*, UNFCCC, <https://www4.unfccc.int/sites/ndcstaging/PublishedDocuments/Singapore%20First/Singapore%20INDC.pdf>.
- United Nations (UN). (2017). *Bridging Climate Ambition and Finance Gaps*, UN Climate Press Release, 13 November, <https://unfccc.int/news/bridging-climate-ambition-and-finance-gaps>.
- United States Agency for International Development (USAID). (2018). *Overcoming Barriers to Energy Efficiency Planning*. <https://www.usaid.gov/energy/efficiency/developing-programs/financing/barriers>.
- Volz, Ulrich (2018). *Fostering Green Finance for Sustainable Development in Asia, Asian Development Bank Institute Working Paper Series*, March N814, <https://www.adb.org/publications/fostering-green-finance-sustainable-development-asia>.
- World Bank. (2015). *What Are Green Bonds?* World Bank.
- . (2017). *The Green Bond Market: 10 years Later and Looking Ahead*, World Bank.

Yoshino, Naoyuki and Farhad Taghizadeh-Hesary. (2018). A Model for Utilizing Spillover Taxes and Community-Based Funds to Fill the Green Energy Financing Gap in Asia, *Asian Development Bank Institute Working Paper Series*, N899, <https://www.adb.org/sites/default/files/publication/469281/adb-wp899.pdf>.

Zerbib, Olivier David. (2019). The Effect of Pro-Environmental Preferences on Bond Prices: Evidence from Green Bonds. *Journal of Banking & Finance*, 98, 39–60.