Growing Problems of Climate Change and the Current Status of Green Finance in Asia

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Summary

1. "ESG investing" that takes into account non-financial criteria such as environmental, social, and governance (ESG) factors has been increasing worldwide. The potential impact of one of the ESG factors, climate change risk, is large and unpredictable. Declines in the value of real estate collateral and economic growth have a direct impact on the financial system. In addition, risks are greater in low- and middle-income countries due to geographic conditions, reliance on agriculture, and lack of funds to implement necessary measures.

2. The long-term risks posed by current global warming are greater than ever. An increase of 2°C or more above pre-industrial temperatures would lead to more frequent and even more severe coastal flooding, erosion, forest fires, heavy rain, and droughts in Asia. Moreover, the livelihoods of many people in Asia depend strongly on climate-sensitive factors such as agriculture and land use, and the economic and social impacts of climate change are believed to be large, particularly among the poor.

3. The Paris Agreement was adopted by consensus in 2015 to reduce greenhouse gas (GHG) emissions that contribute to climate change, and Asia accounts for more than 40% of global emissions. Challenges to reduce emissions include expanding the use of low-carbon energy, improving energy efficiency, and changing land use practices.

4. Green finance deals mainly with environmental problems caused by climate change. Reducing greenhouse gas emissions is a difficult task, and green finance plays an important role. Emerging economies, including those in Asia, tend to lag behind in their efforts due to the fact that economic growth tends to be prioritized, but they are also moving toward parity. The world as a whole needs to accelerate efforts in various fields, including the expansion of wind and solar power generation and the shift to electric vehicles.

5. As a precondition for expanding green finance, it is necessary for the government to strengthen environmental regulations and for the financial authorities to make efforts to reflect climate change risks in financial regulations. On that basis, the following issues need to be addressed: reducing risks through policies and increasing the number of bankable projects; enhancing the expertise of financial institutions supplying funds; explicitly considering environmental factors in corporate information disclosure and ratings; and promoting the establishment of international rules.

6. The issuance of green bonds whose use is limited to environmental improvement purposes is rapidly increasing. It is important to ensure that the proceeds are used for projects that are effective in improving the environment, and standards for this are set by various institutions. The challenges for expanding the issuance of green bonds have much in common with those for expanding green finance, but they are also premised on the development of bond markets and the expansion of infrastructure finance. In addition, identifying as clearly as possible the effects of investment in green bonds on greenhouse gas emissions would be a significant incentive to encourage investment.

Introduction

The problem of climate change is becoming increasingly serious, with various impacts occurring throughout the world. At the same time, in the financial sector, the issue has become a major driving force, and the phenomenon of seeking investment decisions based on various factors different from those used in the past, such as ESG investing, has become common.

This paper analyzes green finance initiatives in Asia based on these developments. The structure of this paper is as follows. Section 1 outlines ESG investing and the risks posed by climate change. In Section 2, after explaining the risks that climate change poses in Asia, I will point out that Asia has a significant role to play in reducing greenhouse gas emissions, and discuss measures to reduce emissions. In Section 3, we touch on the definition, necessity, required investment amount, and current status of green finance, which is becoming increasingly important for environmental improvement. I will then sort out the challenges for expanding green finance. Section 4 confirms the growth of the market for green bonds, which are part of green finance. Finally, the challenges of developing the green bond market are discussed in relation to the challenges of expanding green finance.

1. Rise of ESG Investing

While quantitative financial information, such as cash flow and profit margin, has been the main element used for measuring corporate value, "ESG investing" that takes account of ESG factors, which are non-financial information, is attracting attention as an additional criterion. ESG is an acronym for Environmental, Social, and Governance(1). Such investment has been increasing worldwide in recent years, and Japan is fast catching up (Table 1).

The inclusion of ESG factors in investment strategies is also referred to as sustainable finance(2). Sustainable finance entails external effects (Table 2). In other words, taking action to address the diverse issues encompassed within ESG factors can have a positive impact on society.

ESG factors have a critical impact on corporate performance and financial stability. Among them, climate change issues have two major risks. Firstly, there are physical risks of damage to property and infrastructure from natural disasters and climate change. Secondly, there is a transition risk, which means price changes of stranded assets and greater economic destruction caused by changes in climate policy, technology, and market sentiment during the transition to a low-carbon economy.

The potential impact of these risks is large and unpredictable. In addition, declines in the value of real estate collateral and economic growth will have a direct impact on the financial system. For

Table 1 Sustainable Investment Assets by Region

(Billion dollars, %)

	Investment amount in 2018	Composition ratio	Average annual growth rate between 2014-2018	Percentage of total assets under management in each region
Europe	14,075	46	6	48.8
United States	11,995	39	16	25.7
Japan	2,180	7	308	18.3
Canada	1,699	6	21	50.6
Oceania	734	2	50	63.2
Total	30,683	100	–	–

Source: Global Sustainable Investment Alliance [2018]

Table 2 Classification of Environmental, Social, and Governance Issues, Parties, and Initiatives

Environment	Climate change	CO_2 emissions and vulnerability to climate change
	Natural resources	Energy efficiency, water efficiency, material selection, and land use
	Pollution and waste	Toxic emissions, air quality, wastewater management, electronic waste, and hazardous substance management
	Opportunities and Policies	Renewable energy, green building, clean technology, environmental and biodiversity targets and investments
Social	Human resources	Work environment, worker participation, diversity and inclusion, development opportunities, and work practices (wages, working conditions, etc.)
	Product liability	Safety and quality, customer secrets and data safety, sales practices and product labeling, and access
	Relationships	Communities, civil society, and government
Governance	Corporate governance	Board structure and accountability, executive compensation and management effectiveness, accounting and disclosure practices, and ownership and shareholder rights
	Corporate behavior	Corruption management, competitive behavior, systemic risk management, business environment management (laws and regulations, etc.), quality of income, and transparency of tax and affiliate transactions

Source: IMF[2019], p.82.

example, insurance claims for natural disasters have quadrupled since the 1980s, leading to higher premiums. An increase in large-scale natural disasters will put pressure on the management of insurance companies.

In addition, the risks associated with climate change are greater in low- and middle-income countries due to geographic conditions, reliance on agriculture, and lack of funds to implement necessary measures.

Now, let's look at ESG investing. ESG investing originates from investing activities in the stock market, such as seeking out factors that create long-term corporate value and avoiding risks that could undermine the evaluation of investment managers (exclusion from the portfolio of stocks of companies involved in, for example, tobacco and weapons)[(3)]. In the bond market, the issuance of green bonds (bonds for which the use of the proceeds is limited to the purpose of contributing to the improvement of the natural environment; details will be discussed later) has increased, and ESG factors have been taken into account in the credit ratings assigned by credit rating agencies. Such ratings are not limited to green bond issuers, but are intended to cover a wider range of firms.

The rise of ESG investing seems to be due to a change in values that has led institutional investors to place greater emphasis on ESG factors from a longer-term perspective in making investment decisions. Initially, the focus was on negative screening, which excluded specific companies and industries, but the focus has gradually shifted to positive screening, which includes companies with excellent ESG performance, companies meeting specific minimum standards, and sectors deemed sustainable. Increasingly, ESG factors are explicitly and systematically integrated into all investment analysis and decisions (Table 3).

With regard to bonds, the recognition that ESG factors have a significant impact on credit risk has become increasingly common. Demand for green bonds is also growing rapidly, with many investment-grade issues being offered by European issuers and, more recently, by Chinese issuers. The outstanding amount of green bonds increased from 78.0 billion dollars at the end of 2015 to an estimated 590 billion dollars in August 2019[(4)].

However, the methodology for ESG investing is not well defined, and there is much discussion about the impact on investment performance. In the future, it is essential to enhance disclosure of information on ESG factors and to examine the effects of investments on ESG factors. Therefore, attention must be paid to the fact that it is a growing investment method.

Table 3 Sustainable Investment Strategies

Stocks	–	There are many strategies for ESG investing. Negative screening has long been popular but there is a shift to engagement and positive screening.
Bonds	Corporate bonds	Introduce key ESG criteria for corporate credit risk analysis.
	Government bonds	Integrate ESG factors into traditional debt credit risk analysis.
	ESG money market funds	Apply ESG factors to investments in short-term instruments.
	Green bonds	The proceeds from issuances will be used to finance new and existing projects that benefit the environment.
	Social bonds	Procure funds for new and existing projects with positive social impact.
	Sustainability bonds	The proceeds from issuances will be used to finance and refinance green and social projects.
	Green MBS	Securitize loans to finance green property.
Bank loans	Green loans	The proceeds from issuances will be used to finance and refinance green projects. The scale of procurement is 70 to 80% smaller than that of green bonds, but they have expanded rapidly since 2018.
	Sustainability loans	Loans that provide borrowers with incentives to achieve predetermined sustainability performance targets.

Notes: In addition to the above, there are also REITs, PE, and VC related to environmental objectives.
Source: IMF[2019],p.86.

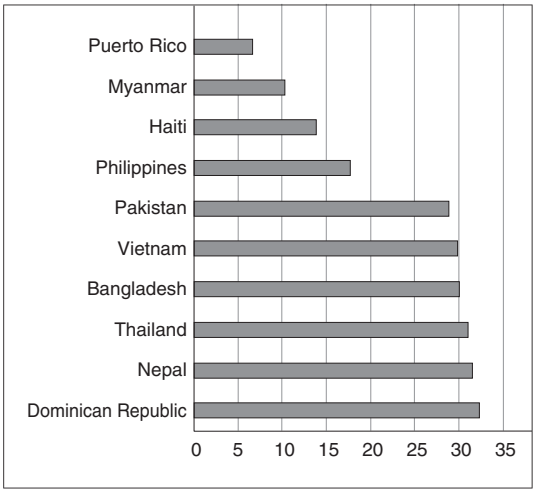
2. Climate Change Issues in Asia

(1) Impact of Climate Change

The long-term risks posed by rising temperatures are greater than ever[(5)]. In Asia, coastal flooding, erosion, forest fires, heavy rain events, and droughts are expected to occur more frequently and to a greater extent if temperatures rise by more than 2°C compared with pre-industrial times. Scientists are increasingly convinced that human-induced climate change has increased the risk of extreme weather events such as floods, storms, droughts, and wildfires.

Many Asian countries are geographically vulnerable to natural disasters. Floods and cyclones are increasingly threatening coastal countries such as Bangladesh, where sea levels are low. Island countries such as the Philippines and the Pacific nations are similarly vulnerable. Extreme climates can also threaten infrastructure and electricity and water supply. According to the Global Climate Risk Index 2020, the top 10 countries that have suffered damage from natural disasters during the 20 years from 1999 to 2018 were three countries in Central America, four in Southeast Asia, and three in South Asia (Fig. 1). Inadequate infrastructure and increasing coastal migration due to population growth have also contributed to increased damage from natural disasters in Asia.

Fig. 1 Long-Term Climate Risk Index: 10 Countries Most Affected Between 1999 and 2018



Notes: The smaller the value, the greater the effect.
Source: Global Climate Risk Index 2020, p.9.

Risks associated with rising temperatures range from biophysical risks to economic and social risks, which are briefly discussed below. With regard to biophysical risks, rising temperatures change the natural environment in a variety of

ways, threatening human life. First, evaporation and the melting of glaciers due to rising temperatures will reduce the supply of clean water, mainly in large river basins, threatening the supply of energy and food. Risks such as submergence, coastal flooding and erosion caused by rising sea levels also increase. Second, marine and forest environments change. Deforestation is expected to have a major impact on crop growth, securing water resources, and maintaining biodiversity. Third, health risks increase. As deaths from heatstroke increase, the incidence of diarrhea, dengue fever, and malaria increases due to changes in patterns of drinking water- and insect-borne diseases. Furthermore, if food production decreases, undernourishment will spread, especially in poor regions.

In terms of economic risks, the livelihoods of many people in Asia depend strongly on climate-sensitive factors such as agriculture and land use, and the impact of climate change is large, particularly among the poor. First, changes in the natural environment have a major impact on agriculture and fisheries. Tourism, an important industry in many Asian countries, is also vulnerable to climate change. For example, the Maldives relies on tourism for more than 30% of its GDP, and a one-meter rise in sea level is expected to flood almost the entire country by around 2085. Second, people's health risks and declines in productivity[(6)] due to rising temperatures reduce labor and production. The impact on agriculture will lead to higher food prices, directly affecting the poor.

With respect to social risks, increasing spending on climate change will make it difficult to maintain social security. It is also highly possible that the decline in economic growth will delay poverty reduction and widen disparities. In addition, climate change is projected to change the conditions of residential areas in various ways, making large-scale migration essential.

(2) Reducing Greenhouse Gas Emissions and the Role of Asian Countries

(i) Paris Agreement and the Role of Asian Countries

Countries around the world have sought a global agreement to curb greenhouse gas (hereinafter referred to as "GHG") emissions that contribute to climate change[(7)]. Such efforts started at the Rio Earth Summit (where the United Nations Framework Convention on Climate Change was signed) in 1992, and culminated in the Kyoto Protocol (in which the United States, the largest emitter of GHG, did not participate) in 1997 and the Paris Agreement in 2015. The Paris Agreement was the first global agreement to set emissions targets for almost all countries, with the United States becoming the exception with its subsequent departure. Asian countries, on the other hand, have signed the agreement without exception, bringing the total number of signatories to 187.

Countries have submitted pledges on emission reduction plans through 2030. These plans are called intended nationally determined contributions (INDCs). INDCs will become NDCs after ratification of the agreement. NDCs should be reviewed every five years and should always be more stringent after renewal. The content of INDCs in each country is diverse, with some emerging countries relying on financial, technical, and capacity-building support from developed countries in their plans[(8)].

The goal of the Paris Agreement is to limit the increase in mean temperature relative to pre-industrial levels to well below 2°C. In order to achieve this goal, global emissions will need to begin to decline by the early 2030s. This is not an easily achievable goal. There is an estimate that the average temperature will increase by 2.9°C by 2100 with the INDCs submitted by each country.

Under these circumstances, Asian countries have a significant role to play in reducing emissions. Global emissions increased about seven times from five billion tons in 1950 to 35 billion tons in 2017. Against this background, the global share of emissions from emerging Asia increased

from about 25% between 1990 and 1999 to about 40% in 2012. Between 2000 and 2012, the average annual growth rate of global emissions was 2%, compared with 8% in China and 5% in India, which achieved high economic growth.

As of 2012, the largest emitter was China, followed by the United States, India, Russia, and Indonesia, with three Asian countries included (Fig. 2). Per capita emissions in Indonesia and China are also above the global average, and those in India are rising rapidly albeit at a low level (Fig. 3). Without strong action, Asia will account for nearly 50% of global emissions by 2030. Reducing global emissions is an urgent task, and the active participation of Asia is essential to achieving it.

There is a positive correlation between GDP per capita and CO_2 emissions per capita, and an increase in GDP accelerates emissions[(9)]. Per capita emissions differ by more than 100 times between the United States and sub-Saharan countries. These points should also be taken into consideration.

(ii) Causes of GHG Emissions

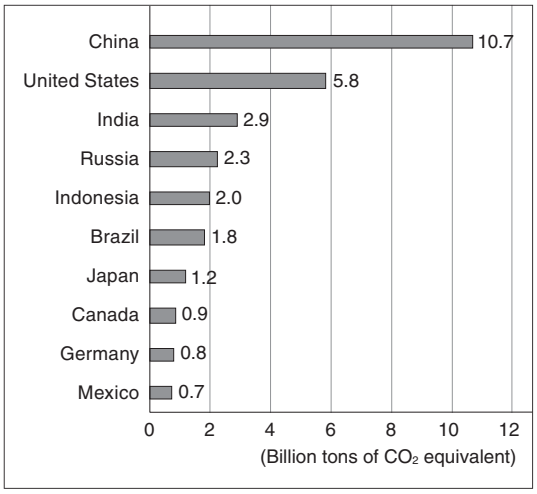
The three major sources of GHG emissions in Asia are electricity generation, manufacturing and construction, and land use such as agriculture. Transportation is also growing rapidly, but the absolute volume is small. The structure of the mix varies considerably from country to country.

Fossil fuels accounted for 85% of Asia's energy use in 2014, up from 70% in 1990. The main reason for this is an increase in the share of coal. Although the energy use ratio in production activities is declining due to changes in the economic structure and growing share of the service sector, the use of fossil fuels has a significant impact on emissions as energy consumption is increasing with economic growth.

(3) Means of Reducing Emissions

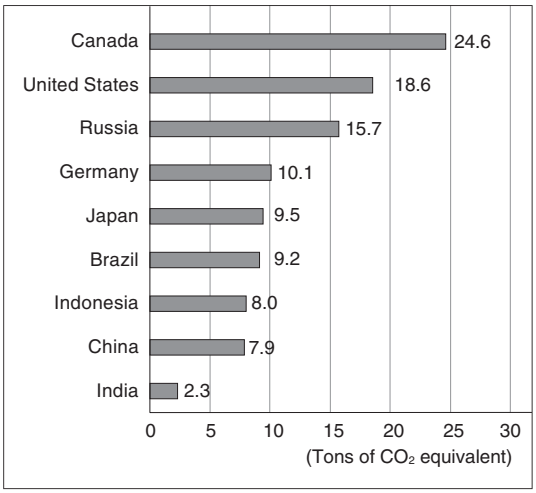
Measures to reduce emissions include, in descending order of importance, increasing use of low-carbon energy, improving energy efficiency, and changing land use practices. The diversity of INDCs in different countries means different measures are required, but if more stringent targets are to be achieved, switching energy sources will become more important. It is also essential to address Carbon Dioxide Capture and Stor-

Fig. 2 Top 10 Countries by Greenhouse Gas Emissions (2012)



Source: Asian Development Bank [2016],p.51.

Fig. 3 Top Countries by Greenhouse Gas Emissions Per Capita (2012)



Notes: The global average is 6.8.
Source: Asian Development Bank [2016],p.51.

age (CCS)[10].

The first point that we would like to discuss is the expansion of low-carbon energy use. In emerging Asia, energy from coal will more than double by 2050 under current conditions, but fossil fuels as a whole will have to decline by 2030 at the latest to meet the Paris Agreement emissions targets (Table 4). By contrast, renewables (wind power, solar photovoltaic, biomass[11], etc.) will have to account for nearly half of the energy supply by the 2050s. Traditional instruments such as coal and gas will have to be significantly reduced.

Increased use of renewable energy depends on lower costs from innovation. The costs of wind and solar power generation are rapidly declining, and there is no problem in assuming the above scenarios[12]. However, since wind and solar power generation is intermittent, energy storage technologies become more important. The destabilization of the power supply also creates a control problem.

The second point is improvements in energy efficiency. In the simple concept of climate change, CO_2 emissions are determined by multiplying population, GDP per capita, energy consumption per unit of GDP (= energy efficiency), and CO_2 emissions per unit of energy consumption[13]. Improving energy efficiency is therefore an important means of reducing CO_2 emissions. Improving energy efficiency generally refers to technological improvements in products and processes and structural and behavioral changes that reduce energy consumption.

Because some 700 million people in the Asia Pacific region have no access to electricity, solving this problem will entail significant increases in energy consumption, and it is estimated that energy demand in Asia will grow faster than the global average. It is also an opportunity in the sense that if it is delayed, it will lead to a reduction in emissions. Therefore, it is necessary to promote the improvement of electricity distribution efficiency, the improvement of energy efficiency of factories and transportation systems, the construction of buildings with excellent air-conditioning, and the promotion of energy saving. Improvements in energy efficiency are expected to boost productivity and promote economic growth and employment.

The third point is changes in land use. More than half of Asia's land is agricultural land, well above the world average of 37%. Southeast Asia is the most deforested of the major tropics. Many of these forests are located in peat swamps and their soil has a very high carbon content. This carbon is released when the surface water dries up due to fire following deforestation or other reasons. The World Bank estimates that deforestation and forest fires have caused economic losses of nearly 16 billion dollars in Indonesia.

The conversion of such land use to restore forests and prevent soil degradation, as well as the use of various agricultural technologies, can play a part in reducing emissions. These measures are expected to increase the area of forests and improve the productivity of rice production and livestock production, and are considered to be rela-

Table 4 Composition of Primary Energy in Emerging Asia under a Model Scenario

(Billion tons of oil equivalent)

	2005	2010	2015	2020	2025	2030	2035	2040	2045	2050
Biomass	0.51	0.56	0.59	0.59	0.57	0.52	0.61	0.96	1.09	1.22
Coal	1.44	1.71	1.96	2.22	2.29	2.38	0.92	0.60	0.59	0.59
Gas	0.24	0.38	0.50	0.68	0.81	0.92	0.87	0.62	0.65	0.65
Hydraulic power	0.06	0.06	0.07	0.08	0.09	0.10	0.11	0.12	0.12	0.13
Nuclear	0.01	0.01	0.02	0.04	0.06	0.09	0.11	0.12	0.13	0.13
Petroleum	0.69	1.11	1.45	1.88	2.17	2.43	2.38	2.09	2.09	2.07
Solar photovoltaic	0.00	0.00	0.00	0.01	0.01	0.03	0.09	0.14	0.20	0.26
Wind power	0.00	0.01	0.03	0.06	0.10	0.14	0.60	0.83	0.93	1.05

Notes: Assumption of 2°C increase in temperature over 2100 following the Intended Nationally Determined Contributions (INDCs) until 2030. (Asian Development Bank [2016], p.53.)
Source: Asian Development Bank[2016], p.64. (INDC to 2°C)

tively low-cost measures to reduce emissions.

In summary, achieving the Paris Agreement targets requires rapid reductions in GHG emissions, necessitating adjustments in economic activities and large-scale investments in low-carbon infrastructure. Emerging Asia will need to invest 10 trillion dollars in energy sector by 2050. To achieve these goals, a strong policy framework must be established.

By expanding the use of low-carbon energy, nearly half of the required emissions reductions can be achieved, but steady progress in technology, such as energy storage and smart grids, is a prerequisite[14]. Next, improving energy efficiency will account for about one-third of emissions reductions. Much of the rest must be achieved through changes in land use practices, which include reducing deforestation and reducing agricultural emissions.

3. Green Finance Considerations

(1) What is Green Finance?

Green finance addresses environmental and climate change issues. While there is this vague understanding, there is no established definition of green finance.

According to Sachs et al. [2019], "We need to expand financing for investments that benefit the environment. New financial instruments and policies are needed, including green bonds, green banks, carbon market instruments, fiscal policy, green central banking, fintech, and community-based green funds, collectively known as green finance." In other words, public financing instruments and policies are also considered to be included in green finance.

Sachs et al. [2019] also refer to an analysis by the Asian Development Bank [2017]. This report estimates the amount of infrastructure investment required by 45 Asian Development Bank (ADB) member countries between 2016 and 2030. After taking into account climate change factors, the required investment amount is approximately 26.2 trillion dollars (1.7 trillion dollars per year, 5.9% of GDP) as shown in Table 5. Much of the increase from climate change factor considerations is added to the electricity sector to mitigate climate change[15]. The breakdown of the amount of investment required after considering climate change factors is 56.3% for electricity and 31.9% for transportation, accounting for 88.2% of the total.

According to this analysis, the increase in investment due to climate change factors was approximately 3.6 trillion dollars over 15 years. However, green finance is not limited to infrastructure investment, and this analysis is only for reference.

Table 5 Required Investment for Infrastructure Development from 2016 to 2030 (2015 Prices by Sector)

(Billion dollars, %)

	Before consideration of climate change factors			After consideration of climate change factors			Climate change-related investments (annual average)	
	Required investment	Annual average of required investment	Share	Required investment	Annual average of required investment	Share	Adaptation	Mitigation
Electric power	11,689	779	51.8	14,731	982	56.3	3	200
Transportation	7,796	520	34.6	8,353	557	31.9	37	–
Communications	2,279	152	10.1	2,279	152	8.7	–	–
Water supply and sanitation	787	52	3.5	802	53	3.1	1	–
Total	22,551	1,503	100	26,166	1,744	100	41	200

Source: Asian Development Bank [2017] , P.45.

On the other hand, DBS [2017] estimates that investment of three trillion dollars will be necessary between 2016 and 2030 by limiting the scope to ASEAN countries[16]. Infrastructure accounts for 1.8 trillion dollars, and renewable energy, improving energy efficiency, food, agriculture, and land use for 400 billion dollars each. The bank says that about 200 billion dollars per year will be needed, but the actual investment is about 40 billion dollars, necessitating a fivefold expansion. It also argues that private investment must be increased more than 10-fold, assuming that public investment remains unchanged, in order to raise the ratio of private investment to total investment to 60% from the current ratio of public and private investment of 75% and 25%, respectively.

Next, Noh [2018] considers green growth as meaning the pursuit of both environmental improvement and economic growth at the same time, in view of the fact that an increase in emissions leads to a decline in economic growth. Noh [2018] also argues that green finance is future-oriented finance that simultaneously seeks to improve the environment, economic growth, and the financial system. Green finance should mobilize all new financial technologies, financial products, industries, and services to support low-carbon green growth, taking into account the environment, energy efficiency, and emission reductions.

Noh [2018] also explains the relationship between green finance and similar concepts (see Figure 2-2 on page 4 of the same paper), citing, in descending order of scope: (i) sustainable finance (including investment targets related to the environmental, social, and governance problems), (ii) environmental finance (investment target is environmental improvement in general, including without economic growth), (iii) green finance (excluding investment target that does not accompany economic growth from (ii)), and (iv) carbon finance (financing to reduce GHG emissions). Subsection (i) includes subsection (ii); subsection (ii) includes subsection (iii); and subsection (iii) includes subsection (iv). Furthermore, there is a concept known as "climate finance" included in "sustainable finance" in (i), which includes "carbon finance" in (iv) but partially overlaps with the other two subsections. This is finance for climate change mitigation and adaptation.

It should be noted that in Noh [2018]'s classification, green finance is not a concept that is limited to climate change.

(2) The Need for and Current Status of Green Finance

(i) Growing Climate Change and the Need for Green Finance

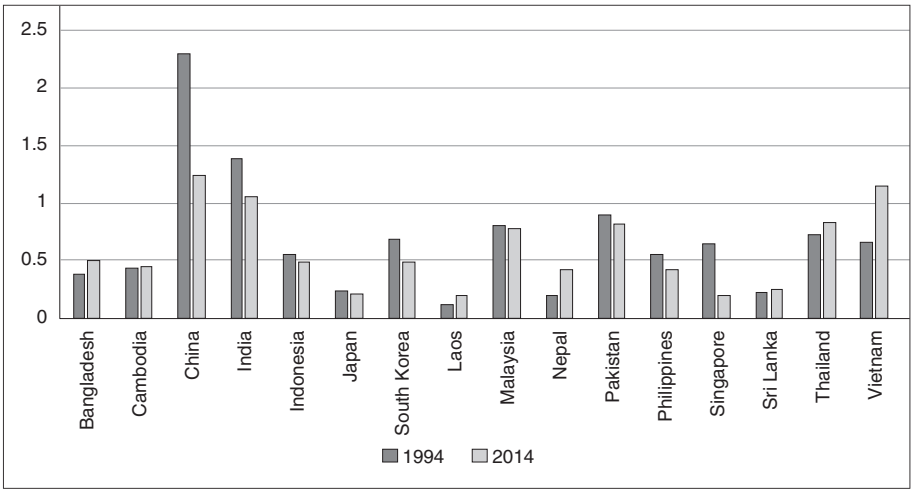
Achieving both economic growth and sustainable development is a global challenge. The growth model for emerging Asia is more resource intensive and thus the challenge is even greater[17]. Although CO_2 emissions relative to GDP have declined in many countries, those in emerging Asia remain high compared to developed countries in the region (Fig. 4). Looking at the degree of dependence on coal in Asia, as of 2013, 66% of electricity generation was coal-fired, which is remarkably high compared with 14% in emerging economies other than Asia and 32% in OECD countries[18]. This is attributable mainly to China (75%), India (73%), Indonesia (51%), South Korea (41%), and Malaysia (39%).

On the other hand, as shown in Fig. 1, many Asian countries are vulnerable to climate risks. Large investments are therefore required in infrastructure that is green and resilient to climate risks.

Integrating environmental and social considerations into finance is essential for building a financial system that supports the transition to a green economy. In addition, new concepts and financial instruments are needed, including green banking, green bonds, and insurance mechanisms for climate risks in agriculture, as well as appropriate regulatory frameworks for these.

Globally, clean energy investments totaled 3.7 trillion dollars between 2004 and 2018 due to the reduction of costs and technology risk[19]. However, while the use of renewable energy[20] avoided 214 megatons of CO_2 emissions in 2018, 1.25 gigatons of CO_2 were newly emitted in the energy sector as a result of economic growth. GHG emis-

Fig. 4 CO_2 Emissions from Asian Countries (kg/2010 Dollar-Denominated GDP)



Source: Volz[2018], p.2.

sions remain on a rising trend as coal-fired power generation and the use of oil in transport continue to increase.

In this general shortage of low-carbon investment, investment in emerging market countries, which are considered to involve relatively high risks for investment, is particularly scarce. For example, clean energy investment in the poorest countries from 2009 to 2018 accounted for only 0.1% of the total.

In addition to these new investments, it is also important to undertake the transition for industries with high emissions. Since developed countries and China together account for 70% of global emissions, these countries are particularly responsible. They should take measures such as the disposal and upgrading of high-carbon assets and the transition of the business models and restructuring of companies in these industries, where the role of green finance is also important.

(ii) Increasing Awareness of the Need for Green Finance

The importance of the financial system in addition to environmental, regulatory, and industrial policies for solving environmental problems, including climate change, has been increasingly recognized. There is an increasing need to take ESG risks into account, as companies and the economy will be damaged and financial institutions will be affected if they fail to respond appropriately to climate and environmental risks.

Green finance initiatives also have positive effects on financial institutions. They are expected to increase market share and profits, deepen transactions with customers, improve brand image, increase media interest, and strengthen relationships with external stakeholders who are highly interested in environmental issues.

Demand for green finance is growing as customers also increasingly recognize the environmental impact of their actions. This trend is expected to accelerate through increased awareness and knowledge of environmental issues, increased media coverage, expanded government support, and improved certainty in environment-related transactions and their prices through strengthened environmental regulations.

(iii) Current Status of Green Finance[21]

The Asian region is in the process of catching up with relatively advanced markets such as developed countries. As shown in Table 1, the trend of sustainable investment began in Europe and spread to the United States and Japan. In emerging economies, economic growth is a top priority,

which appears to be a major factor in slowing the rise in interest in sustainable investment. Although Table 1 does not include Asia outside Japan, the same survey in 2016 found that Asia outside Japan had sustainable investment assets of 52 billion dollars, or 0.2% of the global total (22.9 trillion dollars).

In addition, Volz [2018] (page 4) pointed out that the participation of Asian countries is lagging behind in many international initiatives. For example, of the 93 partner stock exchanges taking part in the Sustainable Stock Exchanges Initiative, which aims to improve the sustainability of capital markets, only 20 are in Asia[22].

Furthermore, it has been pointed out that ESG-related information was not disclosed sufficiently by palm oil companies and paper companies listed in Indonesia, Malaysia, and Singapore. In these cases, the growing importance of ESG investing appears to have been underappreciated by institutional investors and regulators.

On the other hand, however, there have been moves to catch up. For example, ESG investing-related stock indexes have been established on stock exchanges in Asian countries (Table 6). Issuance of green bonds in Asian countries, which started late, has also increased sharply in recent years. Asia's share of global outstanding balance rose from 4.1% in 2012 to 42.2% in September 2017. However, this is largely due to the rapid increase in the number of issues in China. In addition, international organizations are supporting Asian market expansion through the issuance of green bonds, and the Asian Development Bank has issued green bonds several times since March 2015. In Japan, the Development Bank of Japan issued the first 250 million euros of green bonds in Japan in October 2014.

There is no established definition of green banking for bank lending, and therefore there is little data. However, there are some countries that have been active early on[23]. In China, financial authorities have focused on green finance, with the balance of green bank loans increasing from 341 billion yuan (0.6% of GDP) at the end of 2007 to 7.5 trillion yuan (3.2% of GDP) at the end of 2016. In Bangladesh, green bank loans accounted for 7.5% of total credit in the fiscal year 2016 (July 2016 to June 2017). The expanding scope of green banking is shown in Table 7.

Table 6 Examples of Indices for ESG Investing

Exchange	Index name	Year of release
Shanghai Stock Exchange	Sustainable Development Index	2013
Bursa Malaysia Bhd	FTSE4Good Bursa Malaysia (F4GBM) Index	2014
Indonesian Stock Exchange (IDX)	Social and Responsible Investment (SRI) Index	2009
Singapore Exchange	iEdge SGX ESG Leaders Index iEdge SGX ESG Transparency Index	2016 2016

Source: Volz [2018], p. 6, various media coverage

Table 7 Examples of Green Finance by Banks

(Retail banking)	
Green mortgage	Low-interest rates are applied to new energy-efficient houses and to the conversion of electricity to green power.
Green car loans	Low interest rates are applied to the purchase of fuel-efficient vehicles (provided mainly by credit cooperatives).
Green cards	Credit card companies donate about 1% of credit card purchases to NGOs.
(Corporate banking)	
Green project finance	Banks respond to large-scale renewable energy projects by creating new specialized units and developing new financial instruments.
Green VC and PE	More emphasis is placed on environmental issues in corporate finance through capital markets.

Source: Noh [2018], p. 11.

In the insurance field, there is a need to develop and disseminate insurance against the risk of polluting the environment and products related to environmental risk management and emission reduction. A product called weather derivatives has the same effect[24]. For example, wind power derivatives, which are mainly provided by financial institutions in the United States and Europe, are designed to be paid to power producers when revenue from wind power falls below a predetermined level.

Green finance has only just begun and could expand significantly in the future. The strengthening of environmental regulations and laws will increase the certainty of environment-related transactions, and it is expected that demand for green finance will increase and the market will expand.

(iv) Status of Green Finance by Subject Area[25]

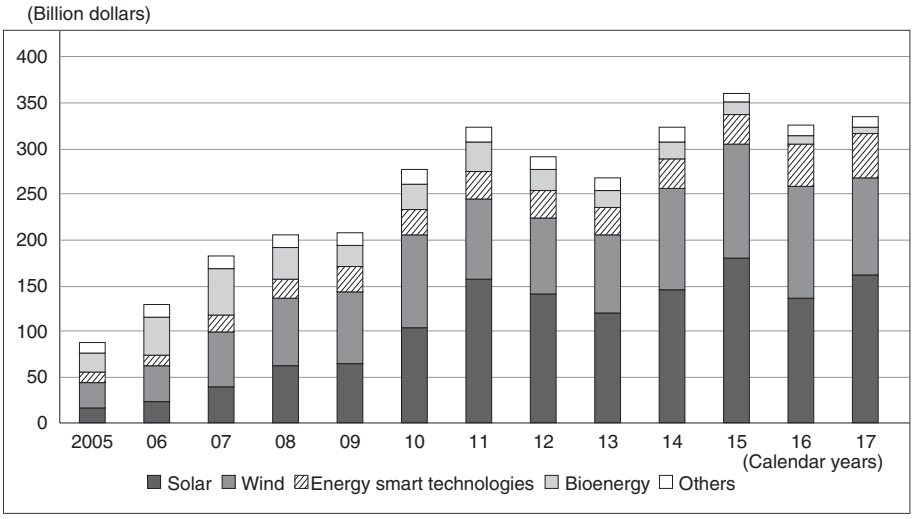
Investment in clean energy increased from about 60 billion dollars in 2004 to an annual average of 311 billion dollars in the 10 years through 2018. Wind and solar power-related investments hold a large share (Fig. 5). Technological progress and economies of scale have led to significant reductions in electricity costs, and in recent years, additional generation capacity has continued to increase, although investment has remained flat.

This has led to global emissions reductions driven by the expansion of renewable energy and improvement of energy efficiency. Increased investment in clean energy is driven by incentives provided by government policies. A variety of policies have worked, including government revenue guarantees for projects and environmental regulations to curb fossil fuel power generation.

In many parts of the world, the costs of wind and solar power generation are dropping rapidly and are becoming fairly competitive compared with coal[26]. As a result, private financial institutions have significantly increased their financing of wind and solar power projects. Nevertheless, wind and solar power accounted for only 7% of global power generation in 2018, compared with 37% for coal. The Intergovernmental Panel on Climate Change (IPCC) estimates that six times the 2015 investment in clean energy and improvement of energy efficiency by 2050 is required to keep the temperature rise at 1.5°C.

Looking at clean energy investment by country from 2014 to 2018, the top 20 included China, India, Mexico, Chile, Brazil, Pakistan, Thailand, and Jordan, among emerging economies, while developed countries and China together account for an overwhelming share. However, it is not easy for emerging countries to attract private investment

Fig. 5 Global New Investment in Clean Energy



Source: Bloomberg New Energy Finance[2018], p.44.

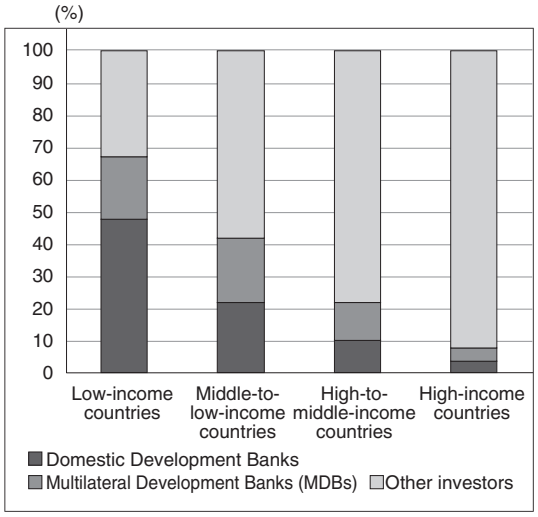
from advanced countries, and low-income countries rely heavily on public funds (Fig. 6).

The shift to electric vehicles is also accelerating. Sales of electric vehicles grew from 38,000 units in 2011 to 1.93 million units in 2018, with major automakers pledging from 2017 to 2018 to invest a total of 141 billion dollars over the next five years. On the other hand, production costs fell by 85% between 2010 and 2018. Nevertheless, the share of electric vehicles in the passenger vehicle category is projected to be 9% in 2030 and 30% in 2040, and the decline in GHG emissions in the transport sector will have to be gradual. Policies are needed to accelerate it.

There is also some investment in improving energy efficiency in commercial buildings and industrial sectors[27]. However, low-carbon investment in the industrial and land use sectors is still small, accounting for only 2% and 10%, respectively, of the use of green bond funds issued in 2018. Heavy industry, large transport, and land use account for more than 50% of emissions, and decarbonization in other sectors will increase this share even further.

Low-carbon production in energy-intensive sectors, such as steel, cement, and aluminum, has not progressed. Governments are urged to carry out reforms in these areas with a strong commitment to reducing emissions.

Fig. 6 Composition of Financing Providers for Clean Energy Investment



Source: Climate Finance Leadership Initiative[2019], p.29.

(3) Challenges for Expanding Green Finance

Next, the challenges of expanding green finance are described in terms of preconditions for promoting efforts to address climate change and specific measures for expanding green finance.

(i) Prerequisites for Promoting Efforts on Climate Change Problems

Naturally, the expansion of green finance is an interim goal and the ultimate goal is to reduce the risk of climate change. This is an extremely difficult task that must be tackled jointly by the public and private sectors. The reduction of emissions is a long-term issue, and it is a major premise that the people involved change their way of thinking and become motivated. In this regard, the role of the government, which can exercise coercive power and provide incentives, is significant. Specific issues are as follows.

The first is to strengthen environmental regulations set by the government. More concrete actions must be taken to achieve the reduction targets (NDCs) set out in the Paris Agreement. Regulatory measures include: (i) emission standards (for example, setting numerical targets for emission reductions for individual companies), (ii) input standards (requiring companies to use specific raw materials for production), and (iii) technical standards (requiring the use of specific technologies to reduce emissions)[28]. All of these methods have their advantages and disadvantages, and in practice they involve the simultaneous implementation of a variety of regulations.

The second is for the financial authorities to recognize the impact of climate change risks on financial stability and to reflect them in financial regulations[29]. For example, Bangladesh's central bank believes that green finance policies are essential for macroeconomic and financial stability. Indonesia's central bank is also considering the

inclusion of climate change risks in the macroprudential regulatory framework. Conversely, central bank policies could provide incentives to promote green finance. Dialogue between financial authorities and financial institutions is also essential. For example, the People's Bank of China established the Green Finance Committee in 2015.

The third issue is to increase awareness of climate change risks in various ways. Dissemination activities and media coverage on climate change may also help. In addition, as will be described later, the creation of a system to disclose information on companies' efforts to deal with climate change risks is being promoted, and this is thought to serve as a kind of pressure on companies to strengthen their efforts. However, this should only be an incentivizing, not coercive, force. Sufficient discussion is necessary to create such a system.

(ii) Specific Measures to Expand Green Finance

In ordinary financial transactions, the returns generated by transactions and the risks associated with transactions are judged economically. However, green finance must incorporate the element of emission reductions (and other elements related to environmental improvement). Expanding green finance requires transparency in returns and risks, and increased returns and reduced risks. Specific issues are as follows.

The first is to increase the number of bankable projects by reducing project risk and increasing returns through policies. When it comes to renewable energy, it is difficult for investors (financial institutions and banks) to understand the concept before it is in widespread use as it is a new technology, and the investment risk is high. In addition, the development and dissemination of new technologies are largely dependent on policies, and there is a risk of regulatory changes, such as changes in incentives to promote them. Therefore, governments need to enhance governance and implement consistent policies, as well as policies that will reduce risk and increase returns, such as guaranteed income from projects and tax incentives. As mentioned earlier, central banks may be able to provide green finance incentives. However, a general caveat is that preferential treatment does not lead to corruption.

Investment in emerging markets is low because investment risk is higher than in developed countries (Table 8)[30]. A number of factors have restrained investment, including a lack of policy framework leading to an enabling environment, high market risk, and other barriers to market entry. On the other hand, these countries are expected to see a rapid increase in emissions, so expanding investment in emerging markets, including Asia, is a particularly important issue, and it is essential to improve the environment for project implementation. For private sector investors, investing in new countries is very risky and costly. Therefore, it is effective to enter with the support of Multilateral

Table 8 Factors Affecting Climate Financing in Emerging Countries

Macroeconomic considerations	Market considerations
· Political and macroeconomic stability · Policy stability (no expropriation or breach of contract by the government) · Existence of financial market of a certain size · Currency stability and the availability of foreign exchange hedging instruments · Stable and predictable incentives for low-carbon investment · Government's ability to build relationships with investors	· Appropriate energy prices (lack of subsidies) · Have an established power purchase agreement · Existence of reliable offtakers · Appropriate ownership and local content requests · Establishment of licensing and approval procedures · Reliability of legal aspects such as the dispute resolution framework · Power grid capability · Understanding of projects in surrounding communities · Certain number of investment projects · Existence of experienced international contractors

Source: Climate Finance Leadership Initiative[2019], p.47.

Development Banks (MDBs). MDBs also provide technical assistance in target countries and can play a more central role in renewable energy investments.

The second is to secure personnel with specialized knowledge. In order to be in charge of investment in the renewable energy field, it is necessary to have expertise in the fields of finance, energy, and the environment, but it is not easy to secure such human resources. Therefore, Noh [2018] says it is necessary to establish a specialized financial institution called Green Investment Corporation[31].

It is also essential for private financial institutions and institutional investors to secure and train human resources. For example, in Indonesia and Vietnam, financial authorities place great importance on securing and training experts[32].

The third is the explicit treatment of climate change factors in financial transactions. Climate change factors must be reflected in laws and regulations on investment, financing, rating, and accounting[33]. As investors and lenders, financial institutions must always take environmental factors into account, and the same is required for rating and accounting processes.

Companies, including financial institutions, should be required to include environmental information in listing procedures and other information disclosure. Disclosure was considered by the Task Force on Climate-related Financial Disclosures (TCFD), which was established within the Financial Stability Board at the request of the Group of 20. The Task Force released its final report in June 2017. The report recommends that public companies and financial institutions should include in climate-related information disclosure four elements: governance, strategy, risk management, and metrics and targets (Table 9)[34]. To make more informed investment decisions, investors need to understand how climate-related risks and opportunities affect the future balance sheets, income statements, and cash flow reports of the companies in which they invest.

As of December 2019, more than 930 organizations (including financial institutions, corporations, stock exchanges, central banks, financial authorities, central governments, etc. with a total market capitalization exceeding 11 trillion dollars) have expressed their support for the TCFD[35].

Next, rating agencies are required to incorporate critical climate-related information into the rating process in a transparent manner. For example, Moody's has developed a methodology for assessing a company's climate-related risks in terms of current GHG emissions, exposure to technology-related risks, risk-mitigation strategies, and long-term exposure to scenarios of rapid low-carbon growth[36].

The fourth issue is the quantification of climate-related risks. The establishment of such a method is desirable for making investment decisions, but it is not easy. Of particular importance is the pricing of GHG emissions (carbon pricing). Methods that have been studied and implemented include carbon taxes and emissions trading systems.

A carbon tax seeks to tax CO_2 to raise the price of fossil fuels and reduce both their use and GHG emissions. On the other hand, in emissions trading, an emissions allowance (cap) is set for each company, and if the actual amount of emissions exceeds the allowance, the company is obliged to

Table 9 Outline of Recommendations Made by Task Force on Climate-related Financial Disclosures (TCFD)

Governance	Strategy	Risk management	Metrics and targets
Disclose organizational governance of climate-related risks and opportunities.	Disclose the actual or potential impact of climate-related risks and opportunities on an organization's business, strategy, and financial plans.	Disclose how the organization perceives, assesses, and manages climate-related risks.	Disclose metrics and targets used to assess and manage climate-related risks and opportunities.

Source: Task Force on Climate-related Financial Disclosures

procure an emissions allowance[37]. The methods for procurement include: (i) purchases from the government through bidding, (ii) free allocations from the government, and (iii) purchases from other companies. The trading of allowances between companies is possible, and supply and demand determines the price of GHGs.

This approach presents difficulties in establishing appropriate allowances. Also, without strict market monitoring and regulations, trading prices could become unstable or stagnant. It can be said that sufficient research and discussion on the framework of the system are required.

These measures are expected to expand green finance. It is essential to continue efforts to develop such a framework. On the other hand, some emerging countries still have fuel subsidy systems to promote the use of fossil fuels, and it will be important to abolish them.

The fifth issue is to establish rules on green finance and strengthen international cooperation. Financial authorities should provide financial institutions with incentives to expand green finance and strengthen rules and regulations[38]. In green finance, it is important to clarify the scope of the target project as much as possible, and to confirm that the procured funds are certainly used for their intended purpose and are effective in improving the environment.

Voluntary rules in the private sector are also necessary. The Association of Banks in Singapore (ABS) released the ABS Guidelines on Responsible Financing in October 2015. In the same year, the Indian Banking Association also introduced the National Voluntary Guidelines for Responsible Finance.

International rules have also been established. In January 2014, the International Capital Market Association (ICMA) published its Green Bond Principles. It has been continuously revised since then, and the latest edition was published in June 2018. In March 2018, the Loan Markets Association (LMA) of the United Kingdom and the Asia Pacific Loan Market Association (APLMA) jointly announced the Green Loan Principles.

As climate change is a global issue, international action is essential. This will benefit countries in sharing their experiences and knowledge and in providing technical assistance. It is often desirable for regulations and rules to be unified globally. Because efforts to reduce emissions are costly, strict regulations imposed only on companies in one country could undermine their international competitiveness. It has also been pointed out that production bases may move to countries with less strict regulations.

International efforts related to green finance include, in addition to the Paris Agreement, Principles for Responsible Investment (PRI, a principle proposed in 2006 that requires ESG factors to be considered and reflected in institutional investment decisions), and the Sustainable Development Goals (the SDGs, adopted at the United Nations Sustainable Development Summit 2015 in September 2015, set expectations to achieve 17 targets by 2030).

In addition, the Equator Principles have arisen from the private sector. This is a framework for recognizing, assessing, and managing the environmental and social risks of projects covered by the Principles (risks of negative environmental and social impacts of large projects). It was created in 2003 by private banks and the IFC. Targeted financial instruments include project finance, its advisory services, and corporate finance for projects. As of January 2020, 101 financial institutions from 38 countries are participating.

4. Green Bond Considerations

(1) Definition of Green Bonds and Voluntary Rules

Green bonds, one of the means of green finance, will now be discussed from several perspectives. A significant portion of green finance projects are investments in infrastructure, particularly in the renewable energy sector. Therefore, bond issuance, which is a long-term financing instrument, is considered appropriate as a means of financing.

A green bond is a bond that specifies that the proceeds will be used for an application related to environmental improvement (project implementation and asset acquisition)[39]. Except for its limited use, it is no different from a conventional bond.

Except in some countries, the definition of a green bond is not fixed by law[40]. In practice, the Green Bond Principles developed by the ICMA described above appear to be used as a universal standard. The Green Bond Principles specify: (i) the use of proceeds, (ii) evaluation and selection process for projects, (iii) management of proceeds, and (iv) reporting. First, regarding (i), the use of the proceeds from issuance is defined as the 10 items shown in Table 10. This table provides an assessment of the extent to which projects in each category can contribute to the five environmental objectives set out in the Green Bond Principles, broken down into three categories.

With regard to (ii), issuers are required to evaluate and select a project in order to certainly achieve their objectives, and complementary external reviews are recommended to ensure process transparency is maintained. An external review confirms that the issuance meets the four points of Green Bond Principles. External reviews should be as independent as possible, and the results should be disclosed in detail, including the credentials and expertise of external reviewers.

With respect to (iii), transparency is emphasized, and the proceeds from the issue must be managed separately and linked to green projects in a formal manner, and transparency must be enhanced by utilizing auditors and other third parties.

For (iv), reporting is required to be carried out periodically, including reporting on the use of proceeds from the issuance, the amount of proceeds used for each purpose, the explanation of the main points of the project, and the expected impact. Where possible, the expected impact should include a quantitative description and estimation methodology.

(2) Current Status of the Green Bond Market

(i) Whole World[41]

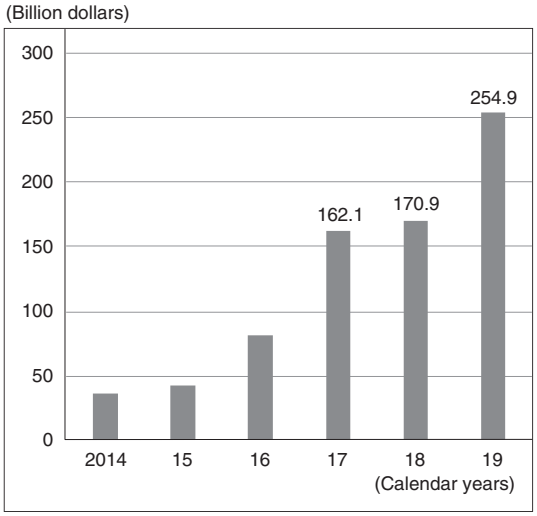
The value of green bonds issued from 2007 to 2019 totaled 775.9 billion dollars (Fig. 7). By country, the outstanding balance was 118.6 bil-

Table 10 Green Projects under ICMA Green Bond Principles

	Environmental objectives				
Green project categories	Mitigation of climate change	Adaptation to climate change	Biodiversity	Protection of natural resources	Prevention and control of pollution
1. Renewable energy	●●●			●	●
2. Energy efficiency	●●●				●
3. Pollution prevention and management				●	●●●
4. Environmentally sustainable management of organisms and land use	●	●●	●●●	●●●	
5. Protection of terrestrial and aquatic biodiversity		●	●●●	●●●	
6. Clean transportation	●●●			●	●●●
7. Sustainable water and wastewater management		●●	●●	●●	●●●
8. Adaptation to climate change		●●●			
9. Products, product technologies, and processes that are environmentally efficient and/or adaptable to a circular economy	●●		●	●●●	●
10. Green building	●●●	●		●●●	●

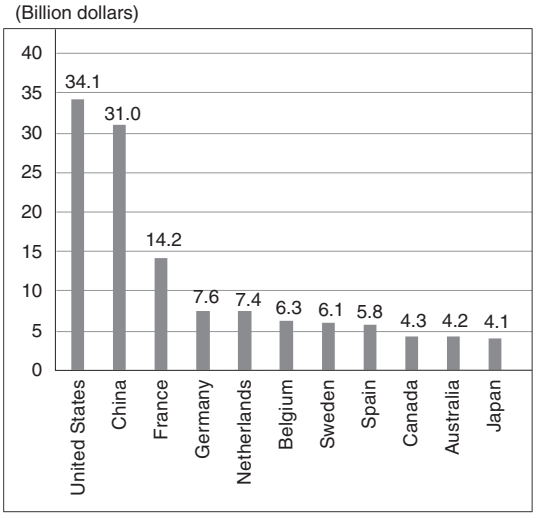
Notes: The larger the number of ●, the greater the contribution of projects in this category to environmental objectives.
Source: ICMA [2019], p.4.

Fig. 7 Global Issuance of Green Bonds



Source: Climate Bonds Initiative

Fig. 8 Amount of Green Bond Issuance by Country (2018)



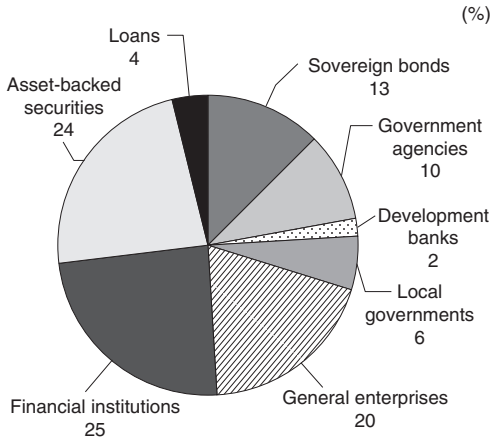
Source: Climate Bonds Initiative [2019], p.10.

lion dollars for the United States, 77.5 billion dollars for China, and 56.7 billion dollars for France. Fig. 8 shows the amount of green bonds issued by country in 2018[(42)].

Developed countries accounted for 67% (115 billion dollars) of 2018 issuances. In terms of the regional breakdown of the amount issued, including bonds issued by emerging economies, the United States' share declined significantly between 2017 and 2018, while that of the Asia Pacific region rose. In 2018, the breakdown was 40% in Europe, 29% in Asia Pacific, 22% in North America, 7% by international financial institutions (the European Investment Bank, the World Bank, the Asian Development Bank, the Inter-American Development Bank, etc.), and 2% in other countries (Africa and South America). Contributing to the substantial growth in Asia Pacific are China, Australia, Japan, and Singapore. International organizations (especially the International Finance Corporation, or IFC, the Asian Development Bank, etc.) also contribute to the support of issuers.

The breakdown of issuers by type is shown in Fig. 9, although the scope is limited to developed countries. Global sovereign issuances of 17.5 billion dollars, or about 10% of global issuances, have the effect of making a country's emissions reduction plan recognizable. Issuance by global

Fig. 9 Breakdown of Green Bond Issuers in Developed Countries (2018)



Source: Climate Bonds Initiative [2019], p.10.

financial institutions more than doubled from the previous year. Most of the proceeds from their issuances are used to construct energy-efficient houses and commercial buildings. Looking at the amount of issuance by financial institutions by country in 2018, China was by far the largest, accounting for 41% of the total, but banks in a growing number of countries issued green bonds.

With regard to the outstanding balance of green bonds, China accounted for more than 70% of the outstanding amount issued by emerging econo-

mies, and the amount issued in 2018 exceeded 30 billion dollars. India, on the other hand, had a cumulative issuance of 7.2 billion dollars up to 2018, and in 2017 guidelines for the issuance of green bonds were developed.

Fig. 10 shows the use of proceeds from the issuance of green bonds in emerging countries excluding China. Looking at the composition of denominated currencies for the issuances by emerging countries excluding China in 2018, the U.S. dollar accounted for 60%, the euro for 13%, the Indian rupee for 6%, the South African rand for 5%, and other currencies for 16%. The ratio of the U.S. dollar was much higher than that of the rest of the world combined (U.S. dollar accounted for 31%, the euro for 40%, yuan for 13%, other currencies for 16%) in the same year. This is probably to attract cross-border investment.

(ii) ASEAN Countries

While green bonds issued between January 2007 and November 2018 totaled 497 billion dollars, the Asia Pacific region accounted for 22% of the total, or 108 billion dollars. The green bond issuance in ASEAN countries amounted to only five billion dollars. It also included 1.1 billion dollars in green loans to Singaporean real estate companies.

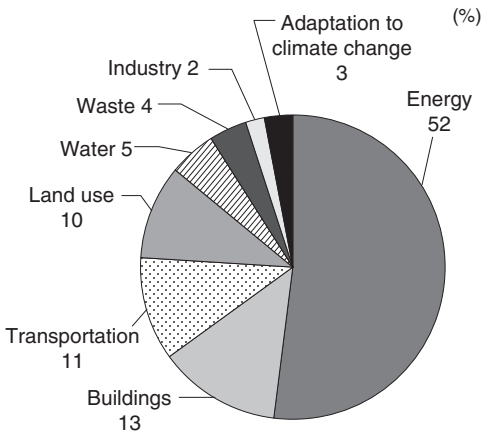
Although not included in the aforementioned five billion dollars, the IFC has issued green bonds denominated in the Philippine peso and Indonesian rupiah, and the European Bank for Reconstruction and Development (EBRD) in Indonesian rupiah. In addition, U.S. and European financial institutions, such as Credit Agricole and Manulife, have also issued green bonds in the currencies of ASEAN countries (Credit Agricole issued green bonds in Indonesian rupiah and Manulife in Singapore dollars). This indicates the issuers' interest in the ASEAN market.

On the other hand, 49% of green bonds issued by issuers in ASEAN countries are denominated in U.S. dollars (Fig. 11). This is probably to appeal to overseas investors. In addition, 42% of green bonds in the region are Islamic bonds. The 2014 revision of the Islamic Securities Guideline, which stipulated standards for socially responsible investment, promoted the issuance of green sukuks.

In ASEAN, the proceeds from green bond issuances are used mainly for low-carbon buildings and renewable energy (Fig. 12). The former is a green loan to a borrower in Singapore, and the latter is mainly for solar and geothermal power generation.

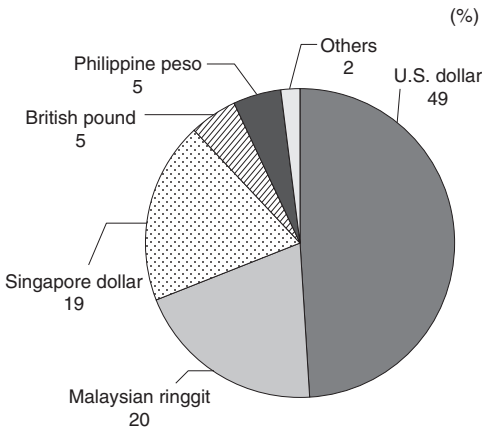
In addition to green bonds, bonds issued by

Fig. 10 Emerging Countries' Use of Green Bonds (2018)



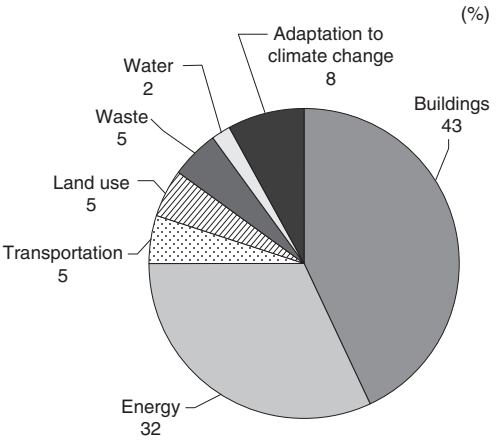
Source: Climate Bonds Initiative [2019], P.15.

Fig. 11 Currency of Issuance of ASEAN Green Bonds (2018)



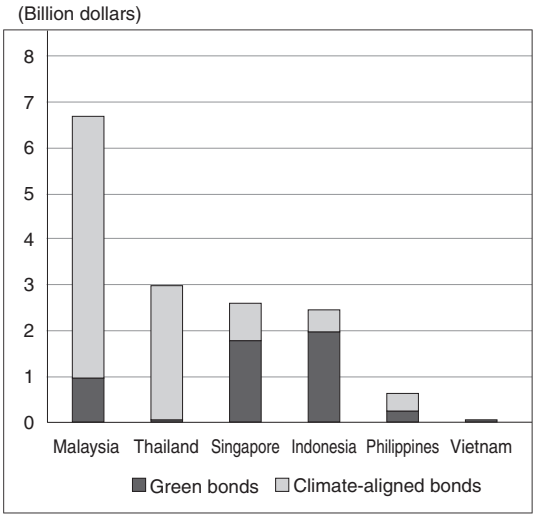
Notes: Others include Indonesian rupiah, Indian rupee, and Vietnamese dong.
Source: Climate Bonds Initiative [2018], p.3.

Fig. 12 Use of Green Bonds in ASEAN (Balance Basis)



Source: Climate Bonds Initiative [2018], p.5.

Fig. 13 Balance of ASEAN Green Bonds and Climate-Aligned Bonds by Country



Source: Climate Bonds Initiative [2018], p.7.

companies that derive at least 75% of their income from environment-related businesses are called climate-aligned bonds, and the outstanding amount of this type of bonds issued in ASEAN countries is 10.2 billion dollars. Combined with green bonds, the balance of environmental bonds stands at 15.2 billion dollars (Fig. 13).

Although the issuance of green bonds in the ASEAN region is currently small, it is expected that the issuance of green bonds by public and private issuers (environment-related companies and the public sector institutions with environment-related infrastructure and assets) will increase in the future. International institutions such as the IFC and the Asian Development Bank are playing the role of "anchor investors" that demonstrate to foreign investors the creditworthiness of issuers by investing in green bonds in the region. Moreover, the ASEAN Green Bond Standards were issued[(43)] and the issuance guidelines of each country are being prepared. All these movements are expected to encourage market expansion in each country.

(4) Challenges in Market Development

(i) Prerequisites for Expanding the Green Bond Market

Next, we consider issues related to the Asian green bond market. While the issues of green finance were discussed in Section 3(3), the basic concepts are the same.

The first is to establish and disseminate climate change countermeasures in each country (this corresponds to Section 3(3)(i)). The basic premise is that the reduction targets based on the Paris Agreement (NDCs) are at the core and that the government is taking the lead in putting them into practice. For green projects, the relationship with NDCs, which are national strategies, should be clarified. This point is closely related to increased motivation for green finance.

The second is the development of a bond market. The development status of Asian bond markets remains diverse, and many countries have low ratios of outstanding bonds to GDP[(44)]. In Cambodia, Laos, and Myanmar, there are few bond markets based on free interest rates. Institutional investors are also on the way of development in Asia. It is essential to improve institutional investors' ability to invest in bonds by developing relevant systems.

The third is the expansion of infrastructure finance in each country[(45)]. The number of project bonds issued in Asia is smaller than that in other emerging economies, and the development

of those markets is a major challenge. There is a need to increase the number of bankable projects, for example, by establishing the PPP system, and to improve the risk-taking capacity of institutional investors. The easier it is to issue a project bond, the easier it is to issue a green project bond. Because project bonds finance projects directly, rather than infrastructure-related companies, they increase investment risk, but they also facilitate easier green certification. Therefore, the development of the project bond market will contribute to the promotion of the issuance of green bonds.

Since there are still few institutional investors with high risk-taking capacity in Asia, it is essential to expand cross-border investment from within and outside the region.

(ii) Challenges in the Green Bond Market

The first challenge for the Asian green bond market is to increase the supply of green bonds (this corresponds to the first point of Section 3(3)(ii)). To this end, it is essential to improve the risk-return profile by the public sector, particularly the government.

Specifically, the following measures can be considered. (a) Government issuance of green bonds. This means that the government will raise funds, while at the same time supporting the expansion of the market and promoting it. (b) Technical assistance for the issuance of green bonds. The IFC, Asian Development Bank and others provide technical assistance and advice on what projects and assets are eligible for issuance and how to proceed with issuance. (c) Clarification of environmental regulations. Consistent implementation of environmental regulations and increased project transparency are necessary to reduce risk. (d) Provision of government guarantees (finance repayment guarantees, offtake agreements guaranteeing income from projects, etc.) and tax incentives for projects. Credit guarantees for projects are also provided by national export credit agencies, development banks, other government agencies, and MDBs. For example, when AP Renewables, a geothermal power company in the Philippines, issued the country's first green bond in 2016, the Asian Development Bank and the Credit Guarantee and Investment Facility (CGIF), a regional corporate bond guarantee agency, jointly guaranteed the bonds. (e) Reduction of issuance costs. Green bonds have additional costs compared to regular bonds, such as managing the use of funds, reporting after issuance, and conducting external reviews. In Singapore, for example, the Monetary Authority of Singapore has a mechanism to bear external review costs. Although the cost is not high, the scheme has the effect of encouraging issuance and raising awareness of green bonds.

The second challenge is to increase the demand for green bonds (this corresponds to the second point of Section 3(3)(ii)). Green bond investors should have a strong interest in environmental issues and a certain level of expertise. For the former, the main investors in green bonds are responsible investors, who always include non-financial information in their investment decisions. However, in emerging Asia, where ESG investing is not so common yet and the number of responsible investors is small, green bonds are often purchased by regular investors. However, with the growing seriousness of the climate change problem, the recognition that ESG factors are potential risks is rapidly gaining ground, and the importance of these factors will increase in Asia. Islamic finance, which has mainly taken root in Malaysia, emphasizes ethics and is a factor in promoting ESG investing.

Moreover, regarding the latter, namely a certain level of expertise, a number of ESG investing training courses for investment managers have already been conducted[46]. These are done by professional accreditation bodies and asset management industry associations in many countries, and sometimes are incorporated into the investment manager licensing process.

It is also possible to encourage public pension funds and sovereign wealth funds to invest in green bonds, or to set up a dedicated fund for green finance[47]. An example of the latter is the Clean Energy Finance Corporation, established in Australia in 2012. This is the government-owned green bank.

The third is to establish explicit rules for green bonds (this corresponds to the third to fifth points

of Section 3(3)(ii)). Green bond investors want to ensure that their investments will have a positive impact on climate change. Therefore, making this point transparent will encourage investment in green bonds. As required by the ICMA's Green Bond Principles, it is extremely important to clarify the scope of projects for which green bonds will be issued, how the proceeds will be used, and the impact of the investment. To this end, it would be effective to strengthen market infrastructure such as external review frameworks.

In the United States and Europe, there is no detailed policy framework for green bonds, and markets have expanded as market participants voluntarily responded to social demands for consideration of ESG factors[48]. The Green Bond Principles are an example. In emerging Asia, on the other hand, governments are required to formulate clear rules, such as laws and regulations, and take the lead in expanding the market. This is what many investors want.

As mentioned above, the primary objective of developing a green bond market is to reduce GHG emissions, so it is necessary to clarify the relationship with NDCs, which are national strategies, when developing laws and regulations. If it is not clear what the goal of a green bond investment is, it may not be accepted by investors and issuance may be constrained. On the other hand, if it is defined by law, investors need only follow it. It is also possible to avoid arbitrary definitions.

However, the definition should not be inflexible because the purpose of investment may change due to advances in environmental technologies and other reasons. In addition, because of the costs of reporting and disclosure associated with the issuance of green bonds, it may not be appropriate to impose stricter regulations on them than the Green Bond Principles in the early stages of market development.

Conclusion

As noted in this paper, the Asian region is highly vulnerable to climate change risks. In addition, many people in Asia depend heavily on climate-sensitive factors, such as agriculture and land use, for their livelihoods, and climate change has major economic and social impacts, particularly on the poor.

Asia, which accounts for more than 40% of global GHG emissions, has a major role to play as the world moves toward reducing GHG emissions. The increase in emissions is due to the economic growth and high dependence on coal-fired power generation. Asian countries are required to take serious measures to expand the use of low-carbon energy, improve energy efficiency, and change land use.

Nevertheless, for a variety of reasons, efforts to expand green finance tend to be delayed except in some countries. As a prerequisite for the expansion, governments must strengthen environmental regulations, and financial authorities should reflect climate change risks in financial regulations. Also, it is necessary to raise awareness of such risks. After these conditions are met, it is necessary to increase the number of bankable projects by reducing risks and improving returns through policymaking, to increase the expertise of financial institutions that provide funds, to explicitly consider environmental factors in corporate information disclosure and rating, to develop a carbon pricing framework, and to promote international rulemaking and cooperation.

In addition to the issues described above, it has been pointed out that there are many countries in Asia that do not have sufficiently developed bond markets. That is why there are still problems with infrastructure finance due to the limited issuance of project bonds. These improvements are prerequisites for promoting the issuance of green bonds.

In order to expand green finance in Asia, it is desirable for the government to take the initiative in promoting green finance under explicit rules. By establishing laws and regulations consistent with the NDCs and clarifying the definition of green projects, investors' costs will decrease. This will serve as an incentive for the expansion of green finance and will help to promote the importance of addressing climate change issues.

End Notes

1. The above explanation is from the Government Pension Investment Fund (GPIF) website.

2. IMF [2019] is referred to as for the explanations below.

3. This kind of investment behavior can be said to be common to Islamic finance, which requires investment targets to be consistent with Islamic law.

4. IMF [2019], p.85.

5. The following statements are based on Asian Development Bank [2016].

6. Asian Development Bank [2016], see Box on page 47. Rising temperatures also affect the construction and mining industries. The ideal annual average temperature is 14.2°C, above which economic productivity declines. Two-thirds of 31 emerging Asian countries are above this level, indicating high risk.

7. The following statements are based on Asian Development Bank [2016], Auffhammer [2019], and Mizuguchi [2019].

8. For example, the INDC for India has such conditions. See Asian Development Bank [2016], page 50 for details of each of the INDCs.

9. Auffhammer [2019], pp. 20-21.

10. Technology to separate and recover CO_2 and store it in the deep sea or underground. It is one of the technologies for controlling the increase of CO_2 concentration in the atmosphere, and research and development are being carried out as a part of global warming countermeasures. There are many issues to be considered, including costs, impacts on ecosystems, and leakage of stored CO_2.

11. Biomass means "reusable organic resources (excluding fossil fuels) derived from plants and animals." Such resources include wood, seaweed, food waste, paper, animal carcasses, manure, and plankton. Unlike fossil fuels, biomass is produced from water and CO_2 by living things, using solar energy, making it a continuously renewable resource.

12. Asian Development Bank [2016], pp. 65-66.

13. Auffhammer [2019], p. 20.

14. Asian Development Bank [2016], p. 72.

15. Mitigation means reducing climate change by reducing emissions, and adaptation means addressing the diverse impacts of climate change.

16. DBS [2017], p. 13.

17. Volz [2018], p. 1.

18. Sachs et al. [2019], p. 3.

19. The following descriptions are based on Climate Finance Leadership Initiative [2019], p. 19.

20. Clean energy is defined as energy with very low emissions of pollutants (nitrogen oxides [NOx], CO_2, etc.) into the environment, including renewable energy and natural gas with low levels of pollutants. Renewable energy is a non-fossil energy source that is recognized as a permanent source of energy.

21. Volz [2018], p. 4 and onward.

22. Japan Exchange Group (JPX) has participated in this initiative since December 2017.

23. Volz [2018], p. 9.

24. Noh [2018], p. 12.

25. Climate Finance Leadership Initiative [2019], p. 26 and onward.

26. The following statements are based on Climate Finance Leadership Initiative [2019], p. 27 and onward.

27. Climate Finance Leadership Initiative [2019], p. 31.

28. Auffhammer [2019], p. 23.

29. Volz [2018], p. 18.

30. Climate Finance Leadership Initiative [2019], p. 46.

31. Noh [2018], p. 16.

32. Volz [2018], p. 18.

33. Noh [2018], p. 20.

34. Climate Finance Leadership Initiative [2019], p. 80.

35. TCFD's website.

36. Climate Finance Leadership Initiative [2019], p. 86.

37. Matsumoto [2016].

38. Volz [2018], p. 21.

39. Asian Development Bank [2018], p. 2.

40. Asian Development Bank [2018], p. 15.

41. Climate Bonds Initiative [2019].

42. The issuance between January and September 2019 reached about 188 billion dollars.

43. Announced by the ASEAN Capital Markets Forum in November 2017. They were revised in October 2018 and the requirements were strengthened. The Standards aim to enhance the transparency, consistency, and uniformity of green bonds in the region. Unlike the ICMA's Green Bond Principles, which provide principles worldwide, the aim is to create a framework for what can be described as an "ASEAN Green Bond" by demonstrating compliance with the ASEAN standards.

44. Refer to Shimizu [2018] for the development status of Asian bond markets.

45. Asian Development Bank [2018], p. 60. Refer to Shimizu [2016] for the details of infrastructure finance in Asia.

46. Asian Development Bank [2018], p. 80.

47. Asian Development Bank [2018], p. 78.

48. Asian Development Bank [2018], p. 66.

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